Tychonis Brahe Dani Thesaurus Observationum, Tomus I

(1923)

by Tycho Brahe (1546–1601), observations; J. L. E. Dreyer (1852–1926), editor

Translation by Scott Weisman

Ars Astronomica

2026

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Translator Version 2

Upright reason dictates that the recipients of the good, of whatever type and level of beneficence it may be, must show gratitude and blessing to the beneficent person in every way possible, commensurate with the value of the beneficence. And one who has benefited all the people of the world — for example, one who invented a new instrument for the good of the world, or a good book — it is fitting for every discerning person, out of the obligation of love of fellow beings, to at least purchase it, so that the man will profit and his heart will be encouraged thereby to invent yet more good instruments in the world. And similarly, all other wise-hearted people will likewise strive and exert themselves to invent good things and instruments needed for the repair of the world and its perfection.

And therefore, whoever says: "What do I need this new instrument for?" — he does not act well towards the world. For if not for the man who invented it, where would you be? And what would your city do? And more than this, if the man did not exert himself, what would the world do?

— R. Pinchas Eliyahu Hurwitz, *Sefer HaBris HaShalem* (1797)

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A note on the work

For twenty-one years on the island of Hven, and afterwards in Bohemia, Tycho Brahe and his assistants recorded what they saw. The observations were entered nightly into folio logbooks that survived Tycho's death, passed to Kepler, were kept by Kepler's son, and were finally bought for the Danish crown; they have been in the Royal Library in Copenhagen ever since. They were the data from which Kepler derived the elliptical orbit of Mars, and they remain the most accurate body of naked-eye positional astronomy ever assembled. This volume is the first part of J. L. E. Dreyer's *Thesaurus Observationum*, the edition that printed those logbooks complete from the manuscripts for the first time, covering Tycho's earliest observations through 1585.

This is a transcription of manuscripts, not a re-edition of a printed book, and it should be read differently from Dreyer's volumes of Tycho's published works. In editing the *Progymnasmata* he emends freely and his notes say what Brahe ought to have written; here his task was to establish what the codices actually say. His footnotes accordingly record manuscript variants and readings of particular codices far more often than corrections.

The manuscripts themselves have never been digitized. Until they are, this edition and Erasmus Bartholin's seventeenth-century collated copy at the Paris Observatory are the only complete witnesses to Tycho's observation books; the *Historia Coelestis* printed at Augsburg in 1666 from Viennese copies is complete but, in Dreyer's own judgement, has "scarcely a column which is not full of errors."

A note on the translation process

This translation was produced with the translation-pipeline. See the linked repository for details on the process.

This edition has been checked at citation grade. A stratified sample of it was independently re-transcribed from the original page by readers given no sight of the translation, and the two readings were then reconciled letter by letter. Every disagreement in the layer a citing reader depends on — figures, names, headings, and whether a passage is present at all — was settled against the page before publication, and none was left open.

What that does and does not mean. It is a claim about a sample, not about every line. A passage the sample did not reach is neither confirmed nor denied, and silence in an independent reading is not agreement. Where the page itself will not settle a reading, this edition withdraws rather than guesses: a bracketed pair marks a genuine ambiguity the original cannot decide, and a question mark a character that could not be read. Those marks are deliberate refusals, and they are worth more than the confident readings they replace.

A note on the references. A scriptural or bibliographic reference given in brackets or parentheses is, in most cases, an **editorial identification of an allusion rather than a citation printed in the source**. Books of this kind quote and weave scripture constantly without naming it, and the identification

is supplied here as a convenience to the reader. Where the source does print a reference of its own, it is given as printed. **An identified allusion is not evidence that the author cited that passage —** look at the original before resting an argument on one.

This text is the product of a highly refined automated translation process. It has undergone only cursory human review and should not be treated as an authoritative or scholarly rendering. It is offered solely as a reference and reading aid — a way to make an otherwise inaccessible work approachable — and any passage of real consequence should be checked against the original source.

Acknowledgements

The scanned copy used here was digitized by the University of Toronto Libraries and placed in the public domain through the Internet Archive; the copy was purchased for the University of Toronto Library from a Canada Council special grant for the history of science. The edition was printed at the expense of the Carlsberg Institute under the auspices of Det Danske Sprog- og Litteratur-Selskab.

Translated with the assistance of Claude. The translator thanks the Anthropic team for making this work possible.

Notation and abbreviations

A few conventions have been applied uniformly throughout this translation, so that one quantity is always written one way. They change how a value is *written*, never what it is; where the printed source and this translation differ in notation, the source's own form is recorded in the editorial apparatus.

Numerals are Arabic, even where the source sets Roman ones. Roman numerals are kept only in headings, running headers and signatures, which are transcribed as printed.

Dates are given as year, month, day — *1572 November 11*. Dates are Julian, as the source gives them, and have not been converted to the Gregorian calendar.

Times are written with raised unit letters: $7^{h}\ 36^{m}\ 12^{s}$ for seven hours, thirty-six minutes and twelve seconds. An interval longer than a day carries a raised d — $3^{d}\ 7^{h}$. The degree and minute signs below are never used for time.

Angles are written with the conventional signs — 23° 27′ 30″. Early modern astronomy divides the degree sexagesimally and often runs to places for which modern writing has no common symbol; the orders used in this book are:

sign	order	the source's term
°	degrees	*partes*, *gradus*
′	minutes of arc	*scrupula prima*, *minuta*
″	seconds of arc	*scrupula secunda*
‴	thirds	*scrupula tertia*

A **sign** is 30° — one twelfth of the circle — and is written with a raised s: 5^{s} 3° 57′ is five signs and 3° 57′, that is 153° 57′. The source uses the sign both as a place in the zodiac and as a plain unit of 30° for a motion or a distance, and this translation keeps that distinction by writing the count rather than naming a constellation.

The signs of the zodiac. Longitude is reckoned eastward from the first point of Aries.

	Latin	English	longitude
♈	Aries	the Ram	0°–30°
♉	Taurus	the Bull	30°–60°
♊	Gemini	the Twins	60°–90°
♋	Cancer	the Crab	90°–120°
♌	Leo	the Lion	120°–150°
♍	Virgo	the Virgin	150°–180°
♎	Libra	the Scales	180°–210°
♏	Scorpius	the Scorpion	210°–240°
♐	Sagittarius	the Archer	240°–270°
♑	Capricornus	the Goat	270°–300°
♒	Aquarius	the Water-bearer	300°–330°
♓	Pisces	the Fishes	330°–360°

The Sun, Moon and planets.

	Latin	English
☉	Sol	the Sun
☽	Luna	the Moon
☿	Mercurius	Mercury
♀	Venus	Venus
♂	Mars	Mars
♃	Iuppiter	Jupiter
♄	Saturnus	Saturn

Abbreviations used in table headings: **Long.** longitude; **Lat.** latitude; **Decl.** declination; **RA** right ascension; **Alt.** altitude; **Az.** azimuth; **Asc.** ascension; **Diff.** difference.

Where a table in the source spreads one quantity across separate columns for degrees, minutes and seconds, those columns have been joined into a single column and the value written whole. Where a value runs to thirds and beyond, the columns are kept, since there the columns are the notation.

— the leaf carries no printed text. Dark blue cloth binding, the weave visible across the whole surface. Near the upper left corner a modern adhesive library label is affixed, its lettering set sideways: "UNIVERSITY OF TORONTO" beside a barcode, with the number **3 1761 01179842 8** beneath it.

PURCHASED FOR THE
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The remainder of the leaf is blank. No text of the 1923 edition stands on either of these two leaves.

No printed matter: no type, no page number, no signature, no catchword. The leaf carries two modern handwritten pencil markings, both in the upper portion and neither belonging to the edition: **213** near the top of the leaf, right of centre, and a circled **16** at the outer (right) edge, whose ring is cut by the scan margin. A third pencil stroke intrudes at the extreme top right corner and is cropped to a stub, so nothing can be read from it [?].

A faint, unreadable ghost of display lettering shows through in the middle of the leaf; it is offset from type set on another leaf, not ink on this one, and is not transcribed.

No printed matter and no handwritten annotation; only paper grain and a few scattered specks and smudges.

Series half-title, set in two centred lines of full capitals in the upper-middle of an otherwise bare leaf. Line division as printed.

TYCHONIS BRAHE DANI OPERA OMNIA

Translation.

THE COMPLETE WORKS OF TYCHO BRAHE THE DANE

Sponsorship statement, set in two centred lines of small capitals (with full capitals on the initial letters) at mid-leaf; the rest of the leaf is bare. Line division as printed. The first line is Latin, the second gives the sponsoring society's own name in Danish.

Auspiciis Societatis linguæ et litterarum Danicarum (Det Danske Sprog- og Litteratur-Selskab)

Translation.

Under the auspices of the Society for Danish Language and Literature (Det Danske Sprog- og Litteratur-Selskab) [Danish: "The Danish Society for Language and Literature"]

The volume's main title page. Nine lines of centred display matter in two blocks — a title block in the upper third and an imprint block at the foot — with

[1] the last line, "HISTORY OF SCIENCE", is set in a lighter, wider-spaced face unlike the rest of the plate — it appears to have been added to the blank plate for this particular grant rather than printed with it.

a publisher's device between them. The first line is printed in red, everything else in black. Line division as printed.

TYCHONIS BRAHE DANI OPERA OMNIA EDIDIT I. L. E. DREYER TOMUS X

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HAUNIÆ MCMXXIII IN LIBRARIA GYLDENDALIANA TYPIS NIELSEN & LYDICHE (AXEL SIMMELKIÆR)

Translation.

THE COMPLETE WORKS OF TYCHO BRAHE THE DANE EDITED BY I. L. E. DREYER [J. L. E. Dreyer] VOLUME X Copenhagen [Hauniæ], 1923 At the Gyldendal publishing house [in Libraria Gyldendaliana] Printed by Nielsen & Lydiche (Axel Simmelkiær)

— the verso of the title leaf carries no printed matter of the edition. What is visible on it belongs to the copy, not to the book: two modern library additions, and show-through of the title page on the other side of the same leaf (its lettering and device appear mirror-reversed; not transcribed).

The second title page of the leaf-set: the title page of *Thesaurus Observationum* itself, giving this work's own volume number (Tomus I) within the collected edition whose series title page stands on the preceding leaf. Seven lines of centred display matter in a block in the upper third, then three lines of imprint at the foot; the middle of the leaf carries no matter at all — no publisher's device here. Line division as printed.

TYCHONIS BRAHE DANI THESAURUS OBSERVA-TIONUM AD FIDEM CODICUM PRIMUM INTEGRUM EDIDIT I. L. E. DREYER SUMPTIBUS INSTITUTI CARLS-BERGICI TOMUS I

HAUNIÆ MCMXXIII IN LIBRARIA GYLDENDALIANA TYPIS NIELSEN & LYDICHE (AXEL SIMMELKIÆR)

Translation.

THE TREASURY OF OBSERVATIONS OF TYCHO BRAHE THE DANE EDITED FAITHFULLY FROM THE MANUSCRIPTS [ad fidem codicum], AND PUBLISHED COMPLETE FOR THE FIRST TIME, BY I. L. E. DREYER [J. L. E. Dreyer] AT THE EXPENSE OF THE CARLSBERG INSTITUTE [sumptibus Instituti Carlsbergici] VOLUME I Copenhagen, 1923 At the Gyldendal publishing house Printed by Nielsen & Lydiche (Axel Simmelkiær)

— the verso of the title leaf carries no printed matter of the edition, and no library stamp or shelfmark either. What makes it look printed at a glance is show-through of the title page on the other side of the same leaf: its seven display lines and its three imprint lines appear faintly and mirror-reversed, in the same positions. That is not ink on this side and is not transcribed.

PROLEGOMENA EDITORIS.

THE EDITOR'S PROLEGOMENA

This edition of the astronomical observations of TYCHONIS BRAHE [Tycho Brahe] — of which we now publish the first volume — is the first to be complete in every particular. We are not, however, the first to attempt publishing these observations, whether all of them or a part. So before we describe the manuscript codices we have used, we shall relate their history and report who used them before us.

It is hardly credible that Tycho, had he lived longer, intended to publish all his observations. In a letter of 1587 to Wilhelm the Landgrave [Guilelmo Landgravio] he writes of them as follows (see vol. VI p. 74,37): "But I am working to compare them with the findings of others, and at length to bring them into public use, so that the whole science of the stars may answer exactly to the celestial appearances."

In 1598, in the survey of the works he had completed on Hven [Hvenæ] that he inserted into the *Mechanica* (fol. F 2^{v}, *Op.* vol. V p. 110,18), he speaks of them like this: "I keep them guarded as a most rare and precious treasure; yet I may one day make them all public property, if Divine mercy grants me to add still more to them." All the same, the suspicion Tycho was well known for, whenever his observations were in question, and his constant fear that someone would snatch from him the credit for the discoveries still to be drawn from them, would surely — as we must suppose — have kept him from making them public. And only 1½ years before Tycho's death IOHANNES KEPLER [Johannes Kepler], when he had just taken up residence at Benátky [Benaticæ], says in a fairly long "deliberation" that he must do one of two things: "either," he writes, "his observations must be copied out for me privately — which he will not allow, and rightly, since this is his treasure, and he has spent his whole life and so much of his wealth on it — or I must work alongside him to bring the work to completion" (Kepler's *Op.* VIII p. 718 f.).

It was fortunate for the science of astronomy that shortly after Tycho's death all his observations came into Kepler's hands: not only those archetype books now preserved at Copenhagen [Hauniæ], into which, night after night, everything observed in the sky had been entered, but also the neatly transcribed copy now preserved at Vienna [Vindobonæ], in which the observations were arranged by subject, so that from 1582 onward each single year's observations were contained in a codex of its own.[1] On the cover of one of the archetype codices — the one that contains the observations for the years 1596–97, a cover which has certainly been renewed in our own time —

[1] In 1621 (on November 5) the Emperor Ferdinand II wrote to Johann Friedrich, Duke of Württemberg [Iohanni Friderico Duci Wirtembergensi], asking him to recover these codices. From this letter we learn that Kepler, under the agreement made in 1604 with Tycho's son-in-law Frans Tengnagel [Francisco Tengnagel], had received [German, with Latin words mixed in] "of all … the observations, copies neatly and cleanly written out and bound into many books, along with which something from the autographs themselves had likewise come" (see F. R. FRIIS [Frederik Reinholt Friis], *Breve og Aktstykker angaaende Tyge Brahe og hans Slægtninge* [Danish: *Letters and Documents concerning Tyge Brahe and his Kin*; Copenhagen 1875] p. 150). It is likely that the greater part of the primary observations had already been given to Kepler before 1604, and the only thing the letter of 1621 just cited can have brought about is that the transcribed copy was handed back; it is certain, at any rate, that the archetype codices were never returned by him.

a slip is pasted at the front, on which Kepler wrote as follows [German]:

> "Extract aus mein Johann Kepplers den Brahischen Erben zugestellter Erklerungsschrift. Entlich und zum fünften sol auff einen jeden Tomum herabgemeldeten Observationen, sobalt ich nach Linz komme, ein offene Zettel auffgeleimet, und meinen Erben, darinnen von mir anbefohlen werden, dass solche Bücher, da ich etwa Todtes verbliche, alsobalden zu meinem Schatz oder Kleinodien eingesperret und vor der eroffen Jhr. Kay. May[te] sowie auch den Brahischen Erben vmb weitere Vorsorg und Verwahrung deroselben angemeldet werden, damit also die Erben auch auff diesem Fall, des abgesetzten ersten Puncts halben desto mehr versichert sein."
>
> "Extract from the statement of explanation submitted by me, Johann Kepler, to the Brahe heirs. Finally, and in the fifth place: as soon as I come to Linz, an open slip is to be pasted onto each volume of the observations listed below, and my heirs are to be instructed on it by me that, should I happen to die, such books are to be locked away at once among my treasure or valuables, and are to be reported — for their further care and safekeeping — to His Imperial Majesty as well as to the Brahe heirs, so that in this event the heirs too may be the more secure as regards the first point set out above."

But Kepler did not move from Prague to Linz before 1612, so not even the agreement he made with Tycho's heirs can have been concluded before that same year.

Kepler, however, kept the books until his death. In 1625, in the book entitled *Tychonis Brahei Dani Hyperaspistes*, he disclosed in these words what he had in view: "For a long time now I have been striving to have the books of observations — that treasure, surely the most precious thing antiquity holds in our art — printed at the Emperor's expense in some good number of copies, under my own inspection and that of other trustworthy men, and with manifold

correction…"[1] He came back to the same plan once the *Rudolphine Tables* had been published. On 1627 October 2 he wrote from Frankfurt to his friend Bernegger [Berneggero]: "For the sake of getting Tycho's observations printed, I am looking about for opportunities of staying in upper Germany."[2] Finally, on 1628 August 17, he writes to Jørgen [Georgio], Tycho's youngest son, that he hopes he may shortly be able to set about having the observations put into print. He says, indeed, that Willebrord Snellius [Willebrordum Snellium] had excerpted observations of Tycho's made in 1600 and 1601 in the *Observationes Hassiacae*, which had appeared at Leiden [Lugduni Batavorum] in 1618; and he supposes that to do this Snellius had at his disposal the archetype observation book of the largest format ([German] "the whole seventh volume of the Protocol, in folio"). He asks Jørgen Brahe [Georgio Brahe] whether this book was carried off from Prague in the disturbance of 1618.[3] That seems very strange, since it can be asserted that Kepler owned this book in 1628, because his son afterwards sold it along with the other codices. But the edition he had been turning over in his mind was never even begun in print, for Kepler died on 1630 November 15, and the Duke of Wallenstein, under whose protection he had been living at Sagan [Sagani], a town in Silesia, declared not long afterwards that "in view of the changed state of his own affairs he would supply no further funds for printing the Tychonic observations and the rest."[4]

[1] See KEPLER's *Opera* (ed. Frisch) VII p. 215. But already in 1604, in the preface to the book entitled *Ad Vitellionem Paralipomena*, he had spoken of the books of observations like this: "Let the reader know that 24 books were left by Tycho, which I hope will come to light at the proper time" (*Op.* II p. 127)

[2] See *Epistolæ J. Keppleri & M. Berneggeri mutuæ* [*The Correspondence of J. Kepler and M. Bernegger*] (Strasbourg [Argentorati] 1672, in 12°) p. 95; cf. ibid. pp. 100 and 112, and Kepler's *Op.* VI p. 625; VIII p. 910.

[3] FRIIS, *Breve og Aktstykker* p. 152.

[4] See *Epistolæ W. Schickarti & M. Berneggeri mutuæ* [*The Correspondence of W. Schickard and M. Bernegger*] (Strasbourg 1673, in 12°) p. 161

Elsewhere, however, there was a man who did take the business in hand. ALBERTUS CURTIUS [Albert Curtz], of the Society of Jesus, rector of the college at Dillingen (a town situated on the Danube), who was in correspondence with Kepler, contrived — I do not know how — to get into his own hands the observations transcribed into codices year by year. Tycho treats of these in the *Mechanica* (fol. F 2^{v}; *Op.* vol. V p. 109,29 ff.), where he discusses what he had accomplished in astronomy down to 1597 or 1598, in these words: "There 21 years of diligent observations were completed. I had them written up first in large volumes, and afterwards distributed separately into single books — one for each year, of course — and copied out fair; and I carried this through on the following plan: the fixed stars, as many as had been recorded in that year, had a place of their own, while the planets all had their own place severally and distinctly, beginning with the Sun and Moon, and running through the remaining five planets down to Mercury." Now although — as these words

show, and as is known from elsewhere too — he had begun making observations at Hven as early as 1576, that series of volumes begins only from the year 1582; and the observations made before that year, being fewer in number, he seems never to have distributed in this way. Nor was the book containing them from December 1577 onward ever handed over to Curtz: it stayed with Kepler and is now preserved at Copenhagen (our codex B). The volume that contained the observations for 1593, however, had already been lost outright before Kepler's death. Just how the observations so neatly transcribed came into Curtz's hands is not established — whether Kepler himself handed them over in 1621, or whether his daughter Susanna sold them after the death of her husband Bartsch [Bartschii], professor at Strasbourg (1634).[1] But it seems to have been quite unknown to Curtz that there were also other

(4, cont.) The man who informed Bernegger of this was Bartsch, Kepler's son-in-law. At that time (June 1631) the Duke of Wallenstein was in disfavour with the Emperor.

[1] KAESTNER [Kästner], *Geschichte der Mathematik* II (Göttingen [Gottingæ] 1797) p. 651 ff., published a report which Curtz addressed — with no date attached — to the Chancellor of Austria, Count Martinitz [Comitem de Martinitz]; it had been found among the papers that had belonged to a Vienna professor by the name of Popowitsch. Here Curtz writes that he had learned that Bartsch had died at Lauban [Laubani] in Lusatia at the end of 1634, and that "all those observations and the other writings are being kept sealed and well guarded, partly at Lauban, partly at Dresden [Dresdæ]." He asks that a trustworthy man be sent to Lauban "to recover those writings and observations"; "for since a great many of them are set down on soiled sheets and on loose scraps, it could easily happen that the most precious of all should be neglected." — This description certainly does not fit the codices that are now at Vienna, but rather some of the Copenhagen ones, or the miscellaneous papers at Vienna. — That manuscript books were being sought in that same year 1634 we know from another source as well. For on 1638 February 6 Ludwig Kepler [Ludovicus Kepler] wrote to Galileo that Christoph Scheiner [Christophorum Scheinerum] had reported to the Emperor that "the observations of Tycho Brahe …, as well as certain items among my father's works, are to be valued as a treasure, and therefore, so that they may not become known to everyone, are to be kept in the Imperial Library, for the knowledge of the Emperor alone and of the few to whom, by special favour, he may wish to grant the use of those books." Enquiry had accordingly been made "four years earlier" with his own sister, Bartsch's widow, whether the books were in her keeping; but afterwards Ludwig Kepler had carried them off to another and safer place (*Opere di* GALILEO, *Ed. naz.* XVII p. 277). These are without doubt the archetype observation books, not the transcribed copy.

codices of observations; and those archetypes remained in the keeping of Ludwig, Kepler's eldest son, who had settled at Königsberg [Regiomonti] as a physician (see Kepler's *Op.* VIII p. 907). Once he had them, Curtz set about

preparing an immense treasury of astronomical observations, the greater part of which was to consist of Tycho's observations. Petrus Gassendus [Pierre Gassendi] learned of this undertaking in 1647, when he was getting ready to publish his *Life of Tycho Brahe* [*Tychonis Brahei Vitam*], and in the following year Hevelius enquired of him through Mersenne whether the report was correct that a religious of the Society of Jesus had received from the Emperor, as a gift, the actual autographs of Tycho's observations — "for he was quite certain that the autographs themselves were in the hands of Ludwig Kepler, Doctor of Medicine, resident at Königsberg … that he had seen them with his own eyes." Gassendi, however, settled the matter by adducing the passage of the *Mechanica* quoted above.[1]

By way of a specimen, Curtz published the observations for the year 1582 in a book entitled *Sylloge Ferdinandea sive Collectanea Historiæ Cælestis ex Commentariis Mss. Obss. Tychonis Brahei ab Anno 1582 ad Annum 1601. Accessit Epimetron ex Observationibus Hassiacis, Wirtembergicis et aliis, quæ omnia Jussu Auspiciisque Ferdinandi III Imp. Cæs. Pii, Fel. Aug. PP. recensuit et … vulgavit Lucius Barrettus, Anno CIↃ ↃIC LVI. Viennæ Austriæ* [= "The Ferdinandean Collection, or Collections for the History of the Heavens, from the manuscript commentaries of the observations of Tycho Brahe from the year 1582 to the year 1601. There is added an Appendix from the Hessian, Württemberg and other observations; all of which, by the command and under the auspices of Ferdinand III, Emperor and Cæsar, Pious, Fortunate, Augustus, Father of his Country, Lucius Barrettus reviewed and … published, in the year 1656. At Vienna in Austria"]. Here, though, the colophon that is given reads *Operis Davidis Havtti, Bibl. Viennensis, Anno 1657* [= "of the work of David Hautt, bookseller of Vienna, in the year 1657"] — not the same year that appears on the title-page. Besides the Preface and a prefatory book [Librum προλεγόμενον — Greek: *prolegomenon*, "what is said beforehand"], it contains the observations for the year 1582, over each page of which stands "Sylloge Ferdinandea". The reason the editor's name is given as Lucius Barrettus and not Albertus Curtius is a playful transposition of the letters. He did the same in the work carried through to completion which finally appeared in 1666. That book is a splendid one, huge and of the largest format, and printed in types differing a little from those that appear in the earlier one. Its title runs like this: *Historia Cœlestis jussu S. C. M. Ferd. III edita complectens Observationes Astronomicas varias ad Historiam Cœlestem spectantes … Tychonis Brahe … Babylonicas, Græcas, Alexandrinas … Michaëlis Mœstlini … Hassiacas … Miscellaneas* [= "*Historia Cœlestis*, published by command of His Sacred Imperial Majesty Ferdinand III, comprising various astronomical observations bearing on the history of the heavens … those of Tycho Brahe … Babylonian, Greek, Alexandrian … those of Michael Mästlin [Michaëlis Mœstlini] … Hessian … Miscellaneous"]. Augsburg [Augustæ Vindelicorum] MDCLXVI — though in some copies: Regensburg [Ratisbonæ] 1672. It includes a large double plate exhibiting portraits of four emperors; on another, Uraniborg [Uraniburgum] is depicted together with the other

places where Tycho had carried out observations; and on a third, finally, we see Tycho himself leaning upon a huge sextant.[2] It runs to CXXIV + 977 pages.

But — and this is much to be regretted — this edition is so defective, and put together with so little care, that it is almost useless. For, granted that of all the years before 1582 and [?]

[1] PETRI GASSENDI [Pierre Gassendi], *Tychonis Brahei Vita* (Paris [Parisiis] 1654) pp. 241–243.

[2] This portrait reproduces another one, painted in watercolours on vellum and prefixed to a certain copy of the *Progymnasmata* which had been sent to Iohannes Zajic de Hasenburg, bearing a greeting written in Tycho's own hand; it is now preserved at Prague in the Strahof monastery [monasterio Strahof].

of the whole year 1593 the observations are missing,[1] frequent and large gaps can still be detected throughout the whole book. It often happens that several consecutive pages go unprinted: at the end of the year 1584, for instance, half of the observations Elias Olai had made at Frauenburg [Fruenburgi] were left out, and all of those the same man had made at Königsberg [Regiomonti]. Again, under the years 1589 and 1591 a number of large gaps occur among the fixed-star observations, and all the fixed-star observations made in the years 1595, 1597 and 1599 are missing; and very often indeed the work of one night, or of two, is simply passed over. Many accounts of eclipses are omitted; and where both sight-vanes [pinnacidium] of the armillaries had been read, or the sextant had been set by two different methods, frequently only a single figure is given. Finally, most of the planetary positions arrived at by calculation have been left out, and the effect of this was that readers were bound to form a poor opinion of Tycho's work — Flamsteed, for instance, supposed that Tycho had left only forty positions for each planet, derived from the observations by calculation.[2] He would certainly have done better to leave *all* of them out. But what does even more harm than these culpable omissions is the countless printers' errors: figures set in the wrong places or dropped, and even the signs of the zodiac misunderstood as though they were numbers — so that the number 69 is written for the sign of Cancer, or the letter V for the sign of Aries. The use of this edition is therefore treacherous, and one may confidently assert that no worse edition of any author's works is to be found.[3]

While Curtz was making this very bad use of the transcribed books, a way was opened up by which the archetype books might be put to better use. For in 1655 (if not earlier) LUDOVICUS KEPLER [Ludwig Kepler] sold these observation books to FREDERICK III [Friderico III], King of Denmark and Norway, who placed them in the royal library at Copenhagen [bibliotheca regia Hauniensi] that he had himself lately founded, where they are kept to this day as well. We know when this happened from a letter that PETRUS REEDTZ [Peder Reedtz], afterwards Chancellor of Denmark, sent to PIERRE GASSENDI [Petro Gassendo] on 1655 July 29 (Old Style [stil. vet.]) to thank him for having sent him four copies of his book on the *Life of Tycho Brahe* [*Tychonis Brahei Vita*]. In it we read as follows: »Mais deuant de finir ma

lettre, i'ay creu deuoir à vostre curiosité cet auis, à sçauoir que sa Majesté mon Roy a parmy d'autres et rares Manuscrits l'Autographe des Obseruations dudit TYCHO BRAHE, lesquelles seront imprimées icy.«[4] [French: "But before I finish my letter, I thought I owed this piece of news to your curiosity — namely, that His Majesty my King has, among other rare manuscripts, the autograph of the Observations of the said Tycho Brahe, which are to be printed here."]

[1] Curtz conjectured (*H. C.* p. 547: »tantum divinatio est« — "it is mere conjecture") that the codex for the year 1593 had been sent to Kassel [Cassellas], so that a comparison might be set up with the Landgrave's observations; and many learned men have repeated this as though it were certain and beyond doubt.

[2] F. BAILY, *Account of the Rev. John Flamsteed* p. 744

[3] In my own book *Tycho Brahe* p. 373 I said that the transcribed books Curtz had used were defective and badly collated against the archetypes; but I said so unjustly. For those 19 codices which are now preserved at Vienna [Vindobonæ] were written with the greatest care and were collated against the archetypes, and they are trustworthy in every respect.

[4] See P. GASSENDI, *Epistolæ* (vol. VI of the *Opera* [*Operum* tom. VI], Lyon [Lugduni] 1658) p. 538 f. (Lettre de Monsieur le Grand Maistre de Dannemark à Monsieur Gassendi) [French: "Letter from the Grand Master of Denmark to Monsieur Gassendi"]. The name is wrongly printed there as *Reeltz*, but it is spelled correctly in other places in the same book

But the ruinous war with Sweden delayed the publication of these observations. At length, in 1664, the work was begun and entrusted to ERASMO BARTHOLINO [Erasmus Bartholin], a learned man best known for having discovered that a double refraction appears in Iceland crystal.[1] On 1664 June 20 all the books and bundles were handed over to him by the King's order, and he duly certified that he had received them, describing and specifying each one in enough detail for us to identify them all without difficulty.[2] But once he had set about preparing a copy for the printers, he was informed of that new *Historia Cœlestis*; and when he had obtained it, he carefully collated the observations for the year 1582 published there against the manuscript books, and detected countless errors of Curtz's. He made his collation public in a small book entitled *Specimen recognitionis nuper editarum observationum astronomicarum Tychonis Brahe* [= "A Specimen of a Review of the Recently Published Astronomical Observations of Tycho Brahe"], which appeared at Copenhagen [Hauniæ] in 1668.[3] The book runs to 48 pages in 4° (quarto), and the collation itself fills 36 of them. Before he takes it up, Bartholin gives an account of the Copenhagen manuscript books and of the new edition he had set in hand.

With this preliminary exercise completed, he collated the observations of all the years that the *Historia Cœlestis* had given against the manuscript books, and entered into his own copy of that work[4] every discrepancy that was of any consequence. Those for the years 1563–80, 1583,[5] and 1593, together with all the observations of comets and, besides, certain larger portions that the *Historia*

Cœlestis had passed over, he entered in a separate book.[6] Finally, when these had been carefully collated against the manuscript books, all the observations were transcribed into a complete and finished copy, the one that was to be handed over to the printers. It is easy to see that all this took up a great deal of time; but Bartholin had money enough at his disposal, and six young students of letters were employed in copying out and collating the observations, his chief assistant being OLAUS RŒMER [Ole Rømer], who afterwards became a distinguished astronomer. Towards the end of 1668 he arranged, through a fellow-countryman who was making a journey, for an enquiry to be made whether the distinguished printer Iohannes Blaev [Joan Blaeu] — whose father had stayed at Uraniborg [Uraniburgi] through the winter of 1595–96 — would be willing to print the observations with his own types. He seemed to be by no means unwilling to do it, but before [?]

[1] BARTHOLINUS [Bartholin], who was born in 1625 and died in 1698, published in 1669 a small book entitled *Experimenta crystalli Islandici disdiaclastici* [= "Experiments on the Doubly Refracting Iceland Crystal"]. — What is discussed here about his work is taken from his own account, which he gave in the Copenhagen manuscript book Ant. Coll. Reg. 310 in fol., and from E. C. WERLAUFFII's [E. C. Werlauff's] *Historiske Efterretninger om det store kongelige Bibliothek i Kiøbenhavn* [Danish: "Historical Accounts of the Great Royal Library in Copenhagen"] (2nd ed., Copenhagen [Hauniæ] 1844).

[2] Werlauff transcribed Bartholin's acknowledgement of receipt at p. 53 f. Apart from one book in 8° (octavo), which contained the observations for the years 1563–74 but perished by an unlucky accident, we have used all the books Bartholin listed in putting this edition together.

[3] On this little book see KAESTNER's [Kästner's] *Geschichte der Mathematik* II p. 656.

[4] It had been divided into two volumes, which are now the Copenhagen Ant. Coll. Reg. 308–309 in fol.

[5] Why the observations for the year 1581, which are missing from the *Historia Cœlestis*, should have been passed over, with those for the year 1583 — which are to be found there — added in their place, we cannot explain.

[6] This is the Copenhagen codex Ant. Coll. Reg. 310 in fol.

he would accept the commission, he wanted to be properly informed about the whole business — how many gatherings [quaterniones] the edition would run to, and so on.[1] But on such points he seems never to have been given any definite answer; for in 1670 King Frederick III died, and his successor Christian V had no regard for letters or learning, and the result was that the whole undertaking was abandoned.

Six years had by then gone by since Bartholin received the books, and he had money enough and six assistants at hand, so that it may well seem surprising that nothing at all had yet been set in type. Yet there can be little doubt that the enthusiasm Bartholin brought to the work fell off considerably once a rather troublesome fact came to his notice. For on setting up a comparison

with the *Historia Cœlestis*, he found that the archetype observation books in his possession had serious gaps, above all for the years 1582–89 (we shall discuss these carefully below); and those gaps had to be filled out with the help of that untrustworthy edition. Bartholin touches on the matter in only a few places. So, in his own manuscript book, into which he transcribed the observations (Ant. Coll. Reg. 310), among certain "notes to be made on the revision of the Tychonic observations" he wrote at the year 1585: "Many things are found here which are not to be found in the manuscript [Ms°], and therefore they could not be properly corrected"; and similarly at the year 1587 (on *H. C.* p. 293) and at the year 1588 (on *H. C.* p. 360: "The observations of the fixed stars have not yet been copied out, because they are not in the manuscript"[2]). I myself, however, knew nothing whatever of this when I was preparing to publish the observations and began work on the archetype books of the observations for 1582 and the following years.

Then in 1671 IOHANNES PICARD [Jean Picard], a distinguished astronomer, came to Denmark to determine the longitude and latitude of Uraniborg [Uraniburgi]. When he learned how matters stood, he asked — and was granted — leave to take back with him to Paris [Lutetiam Parisiorum] the copy of the observations that Bartholin had had made, so that he might have the observations printed at the expense of King LUDOVICUS XIV [Louis XIV].[3] The archetype books themselves Bartholin was ordered to hand over to OLAUS RŒMERUS [Ole Rømer], so that the work might be checked against them; Picard had persuaded Rømer to set out for Paris with him. There, however, the business was not easily carried through, and it was not until 1680 December 7 that the Academy of Sciences, asked for its opinion by Colbert,

[1] See WERLAUFF [Werlauff] p. 411.

[2] Similarly, in his own corrected copy of the *Historia Cœlestis* (Ant. Coll. Reg. 308) he wrote beside the fixed-star observations for the year 1587 (p. 312): "These have not yet been copied out, because they are not in the manuscript, but they can nevertheless be added to the rest."

[3] Bartholin transcribed into his own codex (310) the words in which Picard acknowledged receipt of the books: »Ie confesse auoir receu de Monsieur Erasme Bartholin les Observations de Tycho Brahe escrites au net en cinq Volumes in folio, depuis l'année 1563, jusques à 1601, auec les Observations des Cometes, à condition qu'elles seront imprimées a Paris au Loure aux depans du Roy de France, et qvant à la dedication et préface elles seront faites par le dit Sieur Bartholin. Ie promets aussy qu'incontinant aprez l'ouurage achevé d'imprimer, il en sera fourny cinqvante exemplaires, qui seront mis entre les mains de qui l'on voudra. Fait a Copenhague le 2 Auril 1672. Picard.« [French: "I acknowledge having received from Monsieur Erasme Bartholin the Observations of Tycho Brahe, written out fair in five volumes in folio, from the year 1563 to 1601, together with the Observations of the Comets, on condition that they shall be printed at Paris at the Louvre at the expense of the King of France, and that as for the dedication and the preface, they shall be made by the said Sieur

Bartholin. I promise also that, immediately after the work has finished printing, fifty copies of it shall be supplied, to be placed in the hands of whomever one wishes. Done at Copenhagen, 1672 April 2. Picard."]

replied that Tycho's observations ought to be printed, chiefly because the edition put out in Germany was swarming with faults; and on the 14th of the same month Picard reported to the Academy that Colbert had issued this instruction: »Les manuscrits de Tycho devoient être imprimés *in-fol.* en caractères de Saint-Augustin, sur une seule colonne«.[1] [French: "Tycho's manuscripts were to be printed in folio, in Saint-Augustin type, in a single column."] When Rømer returned to Denmark the following year, nothing at all had been finished; but the work was begun at last, and 96 pages were set in type.[2] Then in 1683, when Colbert and Picard both died, the printing came to an end. The manuscript books were demanded back by those in charge of the government of Denmark, and in 1697 the learned Dane FRIDERICO ROSTGAARD [Frederik Rostgaard] found them in the Paris observatory. On May 10 he wrote in these words to I. C. Wolfenium, who was at that time acting keeper of the royal library at Copenhagen: »Je vis donc à la fin le 4 de ce mois dans la chambre du dit Sr. de la Hire les manuscrits de Tycho Brahe, et je trouvay sept volumes in folio, sept volumes ou paquets in quarto gros et petits, et un volume in octavo, avec deux brochures in folio et une brochure in quarto. Il y avait outre celà une copie de ces sept volumes in folio, que M. Picard doit avoir fait faire, aux dépens du Roi Très Chrestien, et sur la quelle par conséquent nous ne pourrions faire aucune prétension.«[3] [French: "So at last, on the 4th of this month, I saw in the room of the said Sr. de la Hire the manuscripts of Tycho Brahe, and I found seven volumes in folio, seven volumes or packets in quarto, large and small, and one volume in octavo, together with two stitched pamphlets in folio and one stitched pamphlet in quarto. There was besides that a copy of these seven volumes in folio, which M. Picard must have had made at the expense of the Most Christian King, and to which we could accordingly lay no claim."] The copy he mentions last can only have been the one Bartholin had had written out, which through this unhappy mistake was left behind at Paris; for no one else has recorded that Picard as well had the books transcribed. The archetype books, however, were demanded back by official letters and handed over to the Danish envoy; and when he returned to Denmark in 1707, they were safely deposited in the royal library at Copenhagen.

In that same year 1707 a certain ARBUTHNOT, physician to George, Prince of Denmark,

[1] See A. G. PINGRÉ [Pingré], *Annales célestes du dix-septième siècle* [French: "Celestial Annals of the Seventeenth Century"] (Paris [Lut. Par.] 1901; from the Registers of the Academy of Sciences) p. 359.

[2] JEAURAT (*Histoire de l'Académie Royale des Sciences, Mémoires de Mathématique et de Physique*, year 1763, p. 87) and LALANDE (*Astronomie*, 2nd ed., I p. 198) report 68 pages, while FRIDERICUS ROSTGAARD [Frederik Rostgaard] (on whom see the following year) says that 88 pages were printed, down to

the end of gathering Y. LEOPOLDUS DELISLE [Léopold Delisle] (*Journal des Savants* 1901 February p. 86 f., where he deals with the editions of Tycho's *Mechanica*) pointed out, however, that the gatherings printed from 1681 onwards are still kept in the Bibliothèque nationale in Paris [bibliotheca nationali Parisiensi] (V. 1804); that 23 of them are complete, but one (pp. 93–96) has not yet been corrected and does not properly follow on from the last but one; and that they cover the period from 1563 August 17 to 1582 December 5. In March 1793 the question was raised in the Academy of Sciences whether the work should be taken up again, but the times were unfavourable, and the Academy was dissolved on August 8. LALANDE drew up a report on the business, a copy of which is bound up with the printed gatherings; Delisle transcribed it at the passage cited, p. 87. He says that one page of the *Historia Cœlestis* answers to nearly two pages of the new edition (the »édition de Louvre«), so that three or four volumes would have taken in the whole of it. But since pages 1–86 contain the observations down to the close of the year 1581, Delisle was wrong to say (see above) that the pages down to 96 present observations down to December 5. He should have written: down to the end of the solar observations of 1582 December 3 (not 5) — since in the *Historia Cœlestis* the observations of the Moon fill 7 pages, and the Moon was not observed in December.

[3] Rostgaard's report is now preserved in the archive of the royal library at Copenhagen.

who was married to Anne, Queen of Britain. Arbuthnot was one of the learned men whom the Royal Society [Regia Societate] had charged with seeing Flamsteed's observations through the press, and he urged that Tycho's observations be published in Britain along with them. Newton set about writing to Rømer about the matter, but even so nothing came of it.[1]

Bartholin's copy, meanwhile, proved extremely useful at Paris. J. N. DE L'ISLE transcribed the whole of it into six handsomely written volumes of the largest format, which are now kept at the Paris observatory. On comparing this copy with the archetype books, we find it to have been made with the greatest care — though it must be borne in mind that wherever something was missing from the archetype books (as, for instance, all the fixed-star observations for the years 1587 and 1588), Bartholin had to copy out the *Historia Cœlestis* with his eyes shut, and De l'Isle [De l'Islio] was bound to do the same, however little he knew of it. It was De l'Isle's copy that Pingré used most heavily: he extracted the comet observations Tycho had made and worked them into his *Cometographia* [*Cometographiæ suæ*], and it was with their help that he found the comets' orbits by calculation.[2] Bartholin's copy was useful, besides, for filling out the *Historia Cœlestis*, which gives out in the year 1593. Lalande, for example, who in 1757 published the observations of Mars made in 1593 in French translation,[3] used Bartholin's copy and not De l'Isle's [De l'Islii] — which can be gathered from his giving, in certain places, figures that De l'Isle leaves out. Jeaurat did the same when in 1763 he published in Latin the observations of Jupiter and Saturn

made in 1593.[4] There can be no doubt, then, that in 1763 Bartholin's copy was still at Paris [Lutetiæ Parisiorum].

What became of Bartholin's copy afterwards is entirely hidden from us. Jeaurat, at least, says this: »M. de la Caille a pris le soin de faire relier la copie de Bartholin; & M. de l'Isle en a une autre copie collationée, sur laquelle on peut compter.«[5] [French: "M. de la Caille took the trouble to have Bartholin's copy bound; and M. de l'Isle has another copy of it, collated, which can be relied on."] And down to our own day it has been believed, mistakenly, that the codex kept at the Paris observatory under the title »Manuscrit Erasme Bartholin« was the one Bartholin had made about the year 1669. But when it was examined more closely, it proved to contain, first, the observations left out of the *Historia Cœlestis*, which Pingré had translated into French and transcribed with a view to publishing them together with his *Annales Cœlestes*, and then the later part of those *Annales*; and Pingré had written the whole of it himself.[6] In July 1914 we were informed of this by G. Bigourdan, astronomer of the

[1] See BREWSTER, *Memoirs of Sir I. Newton* 2nd ed. II p. 168; *Catalogue of the Portsmouth Collection of papers belonging to Newton* (Cambridge [Cantabrigiæ] 1888) p. 51.

[2] PINGRÉ, *Cométographie* (1783) I p. 517.

[3] *Mémoires de l'Académie* 1757 (see above, p. VIII n. 2) p. 411 ff. The observations had been carefully transcribed; only, where both sight-vanes [pinnacidia] had been sighted through in observing some declination, Lalande calls that a »déclinaison par deux instruments« [French: "declination by two instruments"].

[4] Ibid. 1763, p. 85 ff.

[5] See ibid. p. 87.

[6] See G. BIGOURDAN, *Catalogue des manuscrits de l'observatoire de Paris (Annales de*

renowned Paris observatory, who had also entered all its manuscript books in a catalogue. He had no doubt, he told us, that Bartholin's copy was not in that city — neither in the observatory nor in the Academy of Sciences [Academia Scientiarum].

In Denmark one at least of the Tychonic books was used by the historian JACOBUS LANGEBEK [Jacob Langebek], who in the commentaries on Tycho's life that he published in 1746 (*Danske Magazin* II) repeatedly mentions the octavo book of the observations for the years 1563–74.[1] And thirty years later C. H. HVASS, keeper and treasurer of the Danish theatre, announced that he would publish the whole of Tycho's works. In 1778 February his request was granted and he was allowed to borrow the books of observations; but they were returned in the same year or the next, and nothing was achieved by him.[2] We should not even have mentioned the business, had nothing further followed from it. But in 1784 THOMAS BUGGE, director of the Copenhagen observatory [speculæ Hauniensi præfectus], in the preface to the book entitled *Observationes Astronomicæ annis 1781, 1782 & 1783 institutæ*, gives among other

things an index of the Tychonic books kept in the royal library; and there we read (p. XVII): »Ex designatione Erasmi Bartholini liquet in Bibliotheca Regia Hauniensi nullum autographorum desiderari, *si excipias unum volumen in octavo* continens observationes pueriles & juveniles ab anno 1563 ad annum 1574 institutas.« ["From Erasmus Bartholin's schedule it is clear that in the Royal Library at Copenhagen not one of the autographs is missing, *except for a single volume in octavo* containing the boyhood and youthful observations made from the year 1563 to the year 1574."] And yet when Hvass asked to borrow the books on 1777 December 24, he had made mention of seven volumes in folio, two in quarto, and one in octavo. Lastly, it appears from a German newspaper of 1804, cited by Werlauff,[3] that a man by the name of Hvass was living in the village of Passy near Paris [prope Lutetiam] who owned »ein Autographum von Tycho Brahe« [German: "an autograph of Tycho Brahe"], left to him by his father, dead by that time, and who declared it to be of the very highest value for letters and learning. From this it seems that the octavo volume was not returned in 1778 or 1779 to the library — which is known to have been badly kept at that period — and that in 1804 it was in the hands of some obscure Dane living in France. It is fortunate, all the same, that two copies transcribed from it survive, Haun. Ant. Coll. Reg. 1824 in quarto (cod. A) and 310 in folio; the latter of the two is the one Bartholin made to fill the gaps of the *Historia Cœlestis*.

In the nineteenth century the Tychonic books were consulted only for the purpose that comet

(6, cont.) *l'observatoire de Paris, Mémoires* XXI p. F 24, and the same author's preface to PINGRÉ, *Annales célestes du dix-septième siècle* (1901) p. X. But whatever I said on this matter in my own book *Tycho Brahe* p. 375 with note 3 is false. The copy referred to there, divided into six volumes, is the one De l'Isle made.

[1] Cf. below, among the observations, p. 14 n. 1.

[2] See WERLAUFF loc. cit. p. 195 ff. I am told that nothing can be found in the library's archive from which it would appear that the books were returned. A little after that time Hvass left Denmark and settled near Paris, where he was still living in 1798. Cf. THOMAS BUGGE, *Reise til Paris i Aarene 1798 og 1799* [Danish: "Journey to Paris in the Years 1798 and 1799"] (Copenhagen [Hauniæ] 1800) p. 384, who mentions the edition Hvass had set himself to produce, and says that he had got together collections bearing on it that were not to be despised.

[3] Werlauff cites »Neues Allg. Intelligenzblatt für Litt. u. Kunst zu Leipz. Litt. Zeitung 1804, 10 St.« [German: "New General Intelligence Sheet for Literature and Art" — the abbreviated remainder, `zu Leipz. Litt. Zeitung 1804, 10 St.`, will bear either of two construals, "to [i.e. accompanying] the Leipzig Literary Gazette, 1804, 10th number" or "at Leipzig; Literary Gazette 1804, 10th number", and the print gives nothing that settles which [?]].

observations might be drawn from them for public use. In 1845 SCHUMACHER published the observations of the comet of 1585[1] (which C. A. F.

PETERS made use of in determining its orbit so admirably), and afterwards the same man published the observations of the comet of 1596.[2] Finally, in 1867 F. R. FRIIS published all the comet observations.[3]

As for myself [EGO]: I had known the Tychonic books for many years, and I felt keenly how badly astronomers wanted an accurate and trustworthy edition of the observations they contain. In 1907, accordingly, I began to set such an edition on foot. The distinguished H. O. LANGE, keeper of the Royal Library at Copenhagen [bibliothecæ regiæ Hauniensi præfecto], interceded on my behalf, and the minister of the King of Denmark charged with public education granted me leave to have the manuscript books sent — one at a time — for my own use to the observatory at Armagh in Ireland [Armacham Hibernorum], of which I was then director. I then petitioned the eminent men at the head of the CARLSBERG INSTITUTE [INSTITUTO CARLSBERGICO] to furnish me with the means of publishing the Tychonic observations. That was granted me at the beginning of 1908, and in the summer of the same year I set about the work.

I had supposed that the copy containing all the observations, divided into six volumes, was the one Bartholin had had made, and so I first borrowed it from the Paris observatory. It soon became plain to me that it was in fact the copy De l'Isle had transcribed from Bartholin's; even so, I collated it against all the observations published in the *Historia Cœlestis* and entered the corrections of every error in my own copy of that work, and in the same way I transcribed from it all the observations that are missing from the *Historia Cœlestis* and are to be found in the Paris books. Next I went right through all the Copenhagen codices, and in the very order in which they are described below, comparing these too, in the same way, both with the *Historia Cœlestis* and with that book of my own into which I had transcribed the observations omitted there. Once these two collations had been carried out, it became clear that the copy De l'Isle had made was done with the greatest care, since only the very fewest slips of the pen were detected; and the same verdict is therefore to be passed on Bartholin's copy. The observations for the years 1563–81, however, were transcribed from codices A and B and collated with those which Bartholin had transcribed into his own codex (Haun. Ant. Coll. Reg. 310) in order to fill the gaps of the *Historia Cœlestis*. This codex, in the notes that have been added to the observations made before 1577 December, where archetype B gives out,

[1] *Observationes cometæ anni 1585 Uraniburgi habitæ a Tychone Brahe.* Ed. H. C. SCHUMACHER. Altona [Altonæ] 1845, in quarto (a supplement to »*Astronomische Nachrichten*«).

[2] *Astronomische Nachrichten* XXIII p. 371 ff. For both editions he used codex N alone.

[3] *Tychonis Brahe Dani Observationes septem Cometarum.* Ed. F. R. FRIIS. Copenhagen [Hauniæ] 1867, in quarto. The making of this edition was overseen by the distinguished astronomer H. L. d'Arrest. For the rest, since it is established

that at that time Friis [Friisium] could not read Tycho's hand, we must suppose that he relied chiefly on Bartholin's copy.

we call, for brevity's sake, »Bartholinum«. Finally, it did not fall to me to borrow from the Vienna library [bibliotheca Vindobonensi] codex V, into which the observations had been transcribed; so in 1911 the learned H. Krumpholz [v. d. H. Krumpholz], who was at that time working at astronomy in the Vienna observatory, collated against it, for my use, those parts of the *Historia Cœlestis* which the Copenhagen and Paris codices do not supply, and some pieces were besides sent to me from there in photographic reproduction [lucis ope expressa]. Later, when a great many calculations were found in the Vienna books which are wanting in the Copenhagen ones, several volumes of codex V were allowed to be lent to Copenhagen [Hauniam], to the royal library, where Ioannes Ræder examined some of them and others were photographically reproduced.

But the great war held this work up for a long time, and the outcome was that the printers too were forced to break off — after the observations down to the end of the year 1583 had been set in type, from the autumn of 1913 until the summer of 1916, out of the manuscript books which I had myself put together with all my collections to hand. When the war was over at last, and the Vienna volumes could be sent to Copenhagen in the autumn of 1920, the printers' work was resumed.

Meanwhile, as was set out in the preface prefixed to volume I of Tycho's *Opera*, the SOCIETY FOR DANISH LANGUAGE AND LITERATURE [SOCIETAS LINGUÆ ET LITTERARUM DANICARUM] had proposed to me in 1911 that the edition of the Tychonic observations should be made a part of Tycho's *complete Opera* [*Operum* Tychonis *omnium*], and I gave it my assent. My labour grew with that, and a great deal of time had besides to be spent transcribing the observations for the printers' use. So in 1916 September I at last threw everything else aside — the generosity of the Carlsberg Institute [Instituti Carlsbergici] allowing me to give all my time to Tycho and to matters bearing on him — resigned the post I had been holding at the Armagh observatory [in specula Armachana], and, leaving Ireland [Hibernia], settled at Oxford [Oxonii], where the Bodleian Library [bibliotheca Bodleiana] is exceedingly well placed for studies touching the astronomy of the Middle Ages.

THERE FOLLOWS a description of the codices containing the Tychonic observations — those of them, at least, that still survive. All of them were used in the making of this edition.

I. THE COPENHAGEN CODICES [I. CODICES HAUNIENSES].

CODEX A = Ant. Coll. Reg. 1824 in quarto: it contains transcribed observations of the years 1563–81.

Size of the paper 20 × 16.5 cm. It is bound in a more recent cover.[1] It contains 468 pages, numbered by a recent hand. Besides that, all the gatherings [quaterniones] — most of which contain four leaves, a few (like the first) two — carry at the foot of their first page a number written in an old hand, running

from 1 up to 70 b. The whole appears to have been written by one and the same hand, which is easily read. Above almost all the pa-

[1] From the initial of the royal name set on the spine of the cover it is plain that this codex, like codices K L M P, was given its cover in the reign of Frederick VII [Friderico VII] (1848–63)

ges, down as far as p. 420, the year of Christ and the year of Tycho's age are added (for instance »1578 ætatis 32 Huenæ« [»1578, aged 32, at Hven«]), in the same hand as the rest, so far as I can see, though written with smaller letters and a finer pen. The same judgment holds for the notes added in the margin, such as »manu Tychonis sed recentius scriptum« [»written in Tycho's hand, but later«] or »manu iterum Longimontani« [»again in Longomontanus's hand«]; these are found fairly often for the earlier years, and I have transcribed every one of them. From these notes, moreover, we learn that the octavo codex, now untraced, from which the observations were transcribed into this one, was not written throughout by Tycho as a young man, but was afterwards enlarged and fitted out with explanatory matter. In one place the year 1593 is mentioned (below, p. 34), in another the year 1597 (below, p. 75).

On the first four pages there are notes of various kinds, the first of which begins: »Gemma observavit Eclipsin ☉ Anno 1544« [»Gemma observed an eclipse of the Sun in the year 1544«]; then follow some items on the Sun's entry into Aries; and they carry the heading »Collectanea ex observationibus G. Frisij et Regiomontanj« [»Collections from the observations of G. Frisius and Regiomontanus«]. All told, the observations for the year 1563 begin on p. 5 (gathering 2). Not one single word written in Tycho's own hand is to be found in the whole book.

That part of codex A which supplies the observations made from the month of December 1577 to the end of the year 1581 was transcribed from codex B, and the copyist took not the least trouble to reduce the material to its proper order. Often, where he could not read some word, he left a blank space, and he never seems to have tried a second time to get the thing out — for a good many of the omitted words are certainly not difficult to read. Since a number of slips of the pen occur, the codex appears not to have been collated.

The observations of the years 1563–77, by contrast, were transcribed from that octavo book, which has perished; so here it is useful to compare Bartholin's copy. On making that comparison we did indeed find a few discrepancies, and ones of no great moment; but it turned out that not a single observation had been omitted by the copyist of codex A.

CODEX B = Ant. Coll. Reg. 1825 in quarto: it contains observations from the month of December of the year 1577 down to the end of the year 1581.

Size of the paper 21 × 16 cm. It is bound in a parchment cover, which shows Tycho's portrait on the front and his coat of arms on the back, and it is fastened by two pairs of green silk ties, not by clasps. Apart from the two outer leaves added for protection, it contains 206 leaves, not marked with numbers, of

which 19, scattered through the whole book, are entirely blank. Besides these there are 4 unattached leaves of various sizes inside it. There can be no doubt that the codex was given its cover after the paper had been filled with writing, but before codex A was copied from it. It is plain that the observations were first written on separate fascicles, since they do not keep the order of time; and those in particular which were made in the years 1579–81 were somewhat jumbled when the codex was being bound —

though not so badly that there is any risk of the year going unrecognized. First come observations of the Sun for December 1577 and January 1578, then a few observations of the Pole Star, observations of the Sun from March 1578 to December 1579, other observations of the years 1578–80, computations of the eclipses of January 1580 and July 1581, and a few observations besides. There follows a »Liber distantiarum Stellarum affixarum ab initio anni 1578« [»Book of the distances of the fixed stars from the beginning of the year 1578«], and then »Observationes geographicæ in insula Huena factæ« [»Geographical observations made on the island of Huena«] — that is, rough observations of the differences in azimuth of the towers of the churches that could be seen from Hven [a Hvena].[1] These were sewn into the book when it had already been given its cover, since the threads pass through the spine, and it was from this book, along with the rest, that they were transcribed into codex A. Then come four fascicles furnished with title pages; they contain 1) Astronomical observations from the winter solstice of 1580 to the winter solstice of 1581 (first of the Sun, then of the remaining planets), 2) Observations of the fixed stars by Quadrant, Sextant, Radius [Radium] and Armillæ [Armillas], 3) Observations of the fixed stars by Sextant and Radius for obtaining distances, 4) Observations of the fixed stars by Armillæ (that is, meridian altitudes from the month of October to December 1581 — though no observations by Armillæ). At the end of the codex there are Solar Ephemerides for the years 1578–81, which give the Sun's longitude for every single day; and finally an Inquiry into the longitude and latitude of the stars in the scale-pans of Libra [in lancibus ♎] for the year 1580.[2]

Nearly two thirds [duæ fere partes] of this codex are written in Tycho's own hand. In a number of places he entered observations that he had not made himself, but Petrus, or Andreas, or (in the month of January 1581) Architectus.

Since the cover of this codex is like those in which the 19 Vienna volumes are bound (codex V), there can be no doubt that Tycho meant this to be the first volume of the whole body of them.

CODEX C = Ant. Coll. Reg. 311 in folio. It contains observations of the years 1582–86.

Size of the paper 33.5 × 21.5 cm (as also of those that follow next); a few leaves, however, are slightly smaller. It was bound in a fairly rough cover, which has now nevertheless been renewed, since the codex has been divided into three volumes.[3] It contains 494 leaves of the largest format, and 10 besides of what is called quarto format, which have been inserted at the end of the year 1584; these

give the observations made in that year by Elias Olai [ab Elia Olai] in Germany. The codex is made up of a good many fascicles, into which the observations had been entered day by day in chronological order. These fascicles seem to have had no covers, since their first and last leaves are nearly all soiled. On the first page the following is written in Tycho's own hand:

[1] Cf. *Op.* [*Opera*] tom. I p. XXVII f.

[2] Cf. below, p. 86.

[3] All the codices 311–318 were given new covers a few years ago; the old ones, however, are kept separately in the library.

»OBSERVATIONES / ASTRONOMICÆ / ANNORVM / 1582 / 1583 / 1584 / 1585 / 1586 / Vraniburgi in Insula Huæna habitæ quales tunc temporis cum cælitus acciperentur raptim & subito ductu in his pagellis annotatæ sunt vt postea in alio libro ordine certo & meliore ad mundum describerentur.«

[»ASTRONOMICAL OBSERVATIONS OF THE YEARS 1582, 1583, 1584, 1585, 1586, made at Uraniborg on the island of Hven; such as they were, jotted down on these little pages hastily and at a single stroke as they were being received from the sky, so that afterwards they might be written out fair in another book, in a settled and better order.«]

[Monogram: »TB« in ligature, set centred below the inscription]

But by an unhappy chance not a few leaves were lost before the codex was put together; and by that time codex V had already been transcribed from it.

The year 1582 breaks off at October 25, and after October 5 the observations of the Moon, of the planets and of the fixed stars are missing; not even the planetary positions found by calculation are to be found.

The year 1583 begins at January 19 and breaks off at November 8; a few observations of the Pole Star made in the months of November and December are nevertheless found. Pages 67—72 of the *Historia Cœlestis* are missing from this codex.[1]

The year 1584 begins well, and down to June 17 hardly anything is missing; but from that day on to July 10 all the observations are lacking. Missing too are the observations of the Sun on August 18, 19, 20, on November 12 and on December 30; of the solar eclipse of April 30 and of the lunar eclipse of November 7; of Mars on December 12; and of the stars on the meridian on August 15, 19, 20.

The year 1585 shows a great many smaller gaps, which can be filled by drawing on codices V and L.

The year 1586 is almost entire. Only certain afternoon observations of the Sun on May 7 are missing, together with a few planetary positions found by calculation — which, however, were beyond doubt never written in this codex at all. Tycho himself observed far more often in this year than in the four preceding years.

In this codex, before 1584 August 21, the Sun's position is often sought by calculation in such a way that two complements of the latitude are used[2] — as, for example, on 1584 April 11:

Observed altitude of ☉ [Altitudo ☉ observata]	46° 4′ 15″	46° 4′ 15″
	2′ 4″	2′ 4″
True altitude [Altitudo vera]	46° 6′ 19″	46° 6′ 19″
	34° 5′ 30″	34° 9′ 50″
Declination of ☉ [Declinatio ☉]	12° 0′ 49″	11° 56′ 29″
Corresponding longitude of ☉ [Resp. Longitudo ☉]	1° 26′ 39″ ♉	1° 19′ 42″ ♉

[1] They are not found in codex V either, so that here we have been obliged to copy out the *Historia Cœlestis*. Cf. below, pp. 274 and 277, note.

[2] Cf. *Op.* [*Opera*] tom. I p. XXVIII.

Throughout all five years, moreover, the order followed by codex V was arranged on the pattern of the order that appears in this codex C.

CODEX D = Ant. Coll. Reg. 312 in fol. It contains observations of the years 1587–89 and observations of the fixed stars for the years 1590–94.

It was clothed in a parchment cover, which was held shut by two pairs of leather thongs [bis binis corrigiis]; it is now divided into two volumes. It contains 352 leaves, besides a few smaller ones that have been inserted among them. No title appears.

The years 1587 and 1588 supply complete observations of the Sun, the Moon and the planets; but all the observations of the fixed stars are missing.

The year 1589 supplies complete observations of the Sun, the Moon and the planets down to June 2; after that day the only ones it contains are an observation of the Moon on October 7 and one of Venus on December 15, both on the same leaf. The observations of the fixed stars are complete.

The years 1590–94 supply observations of the fixed stars only, and these are entirely complete. In them this codex keeps nearly the same order as appears in codex V and in the *Historia Cœlestis*; and wherever the *Historia Cœlestis* has mixed the observations of the years 1589–91 together, the same is found in codex D. The copyist of codex V, that is, wrote out these observations of the fixed stars in precisely the order in which he found them in codex D, and did not distribute them by years — which is why a serious confusion appears in this part of the *Historia Cœlestis*. The observations of the years 1592–94, however, are not jumbled together.

In the earlier part of this codex Tycho's hand occurs often; in the observations of the fixed stars it is hardly to be found in a single place.

Leaf 211 supplies a title in these words:

»ANNO 1589 / OBSERUATIONES / FIXARUM

Plato in Epinomide

Vnum est naturæ vinculum, doctrina numerorum figurarum et motuum cœlestium, ac si quis aliam viam ad discendum quærit, fortunam inuocet vt dici solet.«[1]

[»IN THE YEAR 1589. OBSERVATIONS OF THE FIXED STARS.

Plato, in the *Epinomis*.

There is one bond of nature: the science of numbers, of figures and of the heavenly motions; and if anyone looks for another road to learning, let him call upon fortune, as the saying goes.«]

[1] Plato, *Epin.* p. 976 E f.; cf. *Op.* [*Opera*] tom. VI p. 269,25 ff., with our note. In *Resenii Inscriptiones Haffnienses* (1668) p. 334 we read that the earlier part of this »Dictum of Plato« was written up on some wall at Uraniborg. The whole of it, however, together with other writings besides, is found (though not in Tycho's hand) in a copy of Reinhold's *Tabulæ Prutenicæ*, in which Tycho wrote: »Emi Pragæ anno 1601 mense Junio« [»I bought it at Prague in the year 1601, in the month of June«]. See F. J. Studnička, *Bericht über die astrologischen Studien des Tycho Brahe* [German: *Report on Tycho Brahe's astrological studies*] (Prague 1901) p. 43.

CODEX E = Ant. Coll. Reg. 313 in fol. contains observations of the Sun, the Moon and the planets for the years 1590—94.

It was bound in a parchment cover fitted with thongs, like the cover of the preceding codex; it is now divided into two volumes. It contains 367 numbered leaves, besides 5 of a different size, which were inserted after them. No title appears.

The year **1590** is complete, apart from the observations of Jupiter on January 29–30 and a few places found by computation. From a leaf not previously attached, which carries an observation of Venus on March 21, we can see how it was possible for observations to be lost altogether: at the very top of it is written, »See what year these belong to and whether they have been transcribed«. The observations of the Sun are found separately; the rest (for this year only) are mixed together, and not even always in order of time.

The year **1591** gives the observations complete, but part of the computations belonging to the opposition of Saturn is missing, along with three places of the Moon found by computation. Compare, however, the remarks above on the year 1586 (in codex C).

The year **1592** is complete, apart from a few places found by computation.

The year **1593** gives all the observations, as is clear from a comparison with codex K, which was copied from codex V, where this year is now missing.

The year **1594** likewise gives all the observations; it should be noted, however, that in the earlier part of the year very few indeed are to be found.

A good deal in this codex is written in Tycho's own hand.

CODEX F = Ant. Coll. Reg. 314 in fol. contains observations for the year 1595.

It was bound in a very rough parchment cover. It contains 182 numbered leaves, besides 9 smaller ones without numbers, which were inserted among them. The observations of the fixed stars are found separately at the end of the codex; the rest are mixed in among one another in order of time. More places of the planets found by computation occur here than in the earlier codices. Of these very few are missing, and of the observations none at all. A fair number of the observations are written in Tycho's hand. A title appears, in these words:

OBSERVATIONES PLANE- TARUM sup. Annum 1595.

[Latin, quoted manuscript title, set centred on a narrow measure in three lines with the word PLANE-TARUM broken across the first two: "OBSERVATIONS OF THE PLANETS for the year 1595."]

CODEX G = Ant. Coll. Reg. 316 in fol. contains observations for the years 1596 and 1597.

It was bound in a thin, loose parchment cover, on which the tunes of some Latin song are written above red lines. A slip is pasted to the front, in which Kepler acknowledges receipt of the books of observations (see above, p. II). It contains 186 leaves, besides a fascicle — or, more accurately, two fascicles — of 23 leaves, which give some computations of little value.

At the top of the first page the following is written:

Observationes Planetarum & Fixarum Anni Christiani 1596.

[Latin, quoted manuscript title, centred on a narrow measure in two lines: "Observations of the Planets and of the Fixed Stars for the Christian year 1596."]

and in the middle of the page:

Felices animæ, quibus hæc cognoscere primum Inque domos superas scandere cura fuit.[1]

[Latin, quoted manuscript verse couplet, centred on a narrow measure: "Happy the souls whose first care it was to know these things, and to climb up into the houses above."]

The year **1597** begins on leaf 93 without a title; at the top of the page there stands only: *Observationes anni labentis 1597* [Observations of the current year 1597]. The observations of the fixed stars are found on four separate leaves (127—130), which were inserted after the observations of the planets made at Hven. Leaf 131[r] is blank, except that at the top of the page is written:

Longitudines & Latitudines Antecedentium fixarum Stellarum postmodum obseruatarum cæteris dudum habitis adjungendæ, ut compleatur numerus millenarius.

[Latin, quoted manuscript heading, centred on a narrow measure in five lines: "Longitudes and latitudes of the preceding fixed stars, observed afterwards, to be added to the others obtained long since, so that the number of a thousand may be completed."]

On the following page begins the account »De occasione interruptarum obseruationum & discessus mej« [On the occasion of the interruption of my observations and of my departure], which is followed by »Ad Daniam Elegia« [An Elegy to Denmark]. The observations for the year 1597 end on leaf 149[r], and on the next page Tycho says that they are of little value, and that for this reason others, made by David Fabricius, have been added. These fill leaves 150—157, all written out by Fabricius himself, and a letter has been added which he had sent to Tycho on 1597 November 23; it is inserted between leaves 153 and 154. Among these observations are found determinations of the height of clouds, a full description of his sights [pinnacidia], and a number of horoscopes. Leaves 158—160 contain computations that some pupil of Tycho's had made

from certain of these observations, and on leaf 161 several further observations, made by Fabricius in the year 1598, are added.

At the end of the codex another fascicle is found (leaves 164—186), which gives a catalogue of 723 fixed stars; we have described it in volume III, p. 409, and have assigned it a place at the end of volume XI. In this index, as throughout the observations from the year 1589 onward, the stars are designated by the same numbers as those given by the Latin editions of the Ptolemaic catalogue.

Not much in this codex is found written in Tycho's hand. It gives the observations complete, and only two places found by computation are missing.

CODEX H = Ant. Coll. Reg. 317 in fol. contains observations for the years 1598 and 1599 and for the month of January of the year 1600.

It was bound in a loose parchment cover. It is sewn together from two fascicles, of 108 and 72 leaves, of which the front covering-piece of the first, being very dirty

[1] Tycho had already cited these verses of Ovid (*Fast.* I 297 f.) in his book *De Nova stella* (*Op.* I p. 44,6).

has been folded round, so that it has ended up as leaf 108. On this leaf a title appears in Tycho's hand: OBSERVATIONES | ASTRONOMICÆ | Anni 1599 | Vitebergæ habitæ | ubi poli altitudo | 51 52½ | et postea Pragæ Bohemorum | in latitud. 50.

[Latin, quoted manuscript title, set inline by Dreyer with vertical bars marking the ends of the manuscript's lines: "ASTRONOMICAL OBSERVATIONS | for the year 1599 | made at Wittenberg | where the elevation of the pole is | 51° 52½′ | and afterwards at Prague in Bohemia | in latitude 50°." Neither figure carries a degree or minute mark in the print; the marks in this gloss are supplied.]

But leaf 1 also supplies a title, in these words:

> OBSERVATIONES ASTRONOMICÆ FACTÆ WITTENBERGÆ A SOLSTITIO HYBERNO PRÆCEDENTE ANNUM 1599

[Latin, quoted manuscript title, centred on a narrow measure in five lines: "ASTRONOMICAL OBSERVATIONS MADE AT WITTENBERG FROM THE WINTER SOLSTICE PRECEDING THE YEAR 1599."]

On leaf 2 the observations of the Sun begin, running from 1598 December 9 to the end of 1599. Leaves 15—26 follow, which appear to have been inserted only after they had been written on; these contain the new rules of prosthaphaeresis [*nova præcepta prosthaphæreseos*] that we published in our volume I, p. 297 ff., and that Tycho illustrated by a worked example when he found the place of Jupiter for 1598 December 20 and 28 by computation from David Fabricius's observations. Leaves 49—50 too, which contain observations of Jupiter, Saturn and Mars written in Fabricius's hand, were inserted afterwards. After the observations for 1599, with no space left between them, there follow observations for 1600 down to February 2.

The second fascicle contains the observations for the year 1598; it ends with the observation of the lunar eclipse made at Wandsbek [*Wandesburgi*] on August 6.

In this codex, which lacks nothing, not much is found written in Tycho's hand.

CODEX I = Ant. Coll. Reg. 318 in fol. contains observations for the years 1600 and 1601.

It was bound in a very thin and loose parchment cover. It contains 173 leaves marked with numbers, of which 5 are blank. Besides these, a number of leaves have been inserted, for instance the leaf between leaves 74 and 75, on which Tycho wrote the observations of the Moon for 1600 May 28. The observations end on leaf 151^{v} at 1601 October 11, where an account of Tycho's last illness (from October 13) and of his death (on the 24th) has been added in Kepler's hand. This codex also includes other men's observations, sent to Tycho: on leaves 67—69, for example, observations by D. Fabricius (inserted afterwards), and at the end of the codex others by the same man on leaves 162—165, observations by Iohannes Krabbe [*Iohannis Krabbei*] on leaf 166, and by Kepler on leaves 167—173, where between leaves 172 and 173 Kepler added a slip of smaller size, on which is found »Explicatio calculi ♂ in hypothesibus Tychonis« [Latin, quoted in guillemets: "An explanation of the computation of Mars on Tycho's hypotheses"], together with an astronomical description. On the front of the cover is written: OBSERVATIONES | ASTRONOMICÆ | ANNI A CHRISTO | 1600 | *ET 1601* | IN ARCE CAESAREA | REGNI BOHEMIÆ BENATICA | *ET PRAGÆ* | HABITÆ | PER INSTRUMENTA | T. B. (the parts we have given in italics were added by Tycho afterwards).

[Latin, quoted manuscript title from the cover, set inline by Dreyer with vertical bars marking the ends of the manuscript's lines: "ASTRONOMICAL OBSERVATIONS | for the year of Christ | 1600 | *and 1601* | made in the Imperial castle Benatica of the kingdom of Bohemia | *and at Prague* | with the instruments | of T. B." The digraph in CAESAREA is set as two separate sorts, unlike the Æ of ASTRONOMICÆ, BOHEMIÆ, PRAGÆ and HABITÆ on the same lines.]

This codex lacks the observation of the Sun for 1601 May 9, and besides that the place of Mercury for 1601 April 29 found by computation. Very little indeed is found here in Tycho's hand.

CODEX K = Ant. Coll. Reg. 1828 in 4°, contains transcribed observations for the years 1593, 1590, 1598, 1599, and for the month of January of the year 1600.

Size of the paper 21.5 × 16.5 cm (as also of those that follow next). It is bound in a more recent cover. It contains 478 leaves, all written in the same hand except leaves 464—478. It is sewn together from three fascicles.

Fascicle I, leaves 1—66, contains observations of the Sun, the Moon and the planets for the year 1593, in the same order that codex V usually follows. It is not quite complete, since one leaf or another appears to have perished. It ends

with an observation of Venus on September 25, but the observations missing after that one are found on the 4 leaves added at the end of codex E.

Fascicle II, leaves 67—260, contains observations for the year 1590 — the same that E supplies, but in the order followed in V. It also includes computations of places of the Moon and of the planets which E does not supply. Since fascicles I and II, together with those 4 leaves mentioned above, contain 264 leaves, they are the same as those comprised in Bartholin's fifth codex from the bottom,[1] which he says had 277 leaves (of which the last 13 may be suspected to have been blank) and began with observations of the Sun on February 27, as here too.

Fascicle III, leaves 261—478, contains observations for the years 1598 and 1599 and for January 1600, in order of time. In one place or another there is an error, or something has been left out. The rules for the solution of triangles by prosthaphaeresis, which codex H supplies on leaves 15—26, are missing, and the observations of Fabricius are not included either. On leaves 341—344 is found »Tabula latitudinis ♂ cum suis scrupulis proportionalibus« [Latin, quoted in guillemets: "Table of the latitude of Mars with its proportional minutes"]. The observations end on leaf 463 at 1600 February 2. The remaining leaves are written in Kepler's hand. First come a few »Excerpta … a M. Bacchatio Tychoni communicata« [Latin, quoted in guillemets, with Dreyer's own ellipsis: "Extracts … communicated to Tycho by M. Bacchatius"] (also in cod. I), and then, on leaves 465—478, observations for the year 1600 as in the leaves up to 463, but running down to February 3. Fascicle III is Bartholin's fourth codex from the bottom; like that one, it contains 218 leaves.[2]

There can be no doubt that the observations for the years 1590 and 1593 were copied from codex V; for in the earlier of the two years everything agrees (for 1593 V is now missing). The years 1598—1600, on the other hand, where the order of time has been kept, were without doubt transcribed from H and I. The same copyist transcribed the observations for the year 1585 out of codex V into codex L; he is not, however, the man to whom codex A is due. He is not always to be trusted. Whether the intention was that all the volumes of codex V should be transcribed, we do not know.

CODEX L = Ant. Coll. Reg. 1829 in 4°, contains transcribed observations for the year 1585.

It is bound in a more recent cover. It contains 214 leaves, and is written in the same hand as codex K. Since codex L follows codex V wherever codex C differs from it, we may assert that L was copied from V.

[1] In Werlauff, at the top of p. 54.

[2] Werlauff, in the passage cited, wrongly gives »1593« for »1598«; but the error is Bartholin's. It is the fourth of the codices that Bugge adduces, *Obs. Astr.* p. XVII, who wrongly gave »Computatio observationum« for »Observationes« and »1589« for »1599«.

Leaves 1—175[r] and 186—187 contain all the transcribed observations for the year 1585 (in the same order as in V), together with those that C omits, and

besides these a number of computations, among them »Pro Apogæo ♂« [Latin, quoted in guillemets: "For the apogee of Mars"] on leaves 87^{v}—90^{r}.

Leaves 175^{v}—185^{v} contain the commentary on Mars which we present in volume V.

Leaves 188—189 list writings of Hagecius [Tadeáš Hájek] and of others on the New Star and on the comets.

Leaves 190 and 191 are of the largest format and are written by Tycho: on the former he argues about Aristotle's opinion concerning comets, on the latter about Mæstlin's [Michael Mästlin's] hypothesis concerning the comet of the year 1577 (an astronomical description has been added).

Leaves 192—209 contain the computation of the place of Jupiter for 1598 December 20 and 28, as in codex H, leaves 17—26. Since it begins with the words »De latere AF per secundum problema« [Latin, quoted in guillemets: "From the side AF, by the second problem"] (see *Op.* vol. I p. 304, line 21), it is clear that this is the codex which Bartholinus placed third from the bottom, and which he says consisted of 210 leaves.[1]

Leaves 210—214 contain other computations of the places of the planets.

CODEX M = Ant. Coll. Reg. 1830 in 4°, contains computations of the places of the Moon and of the planets.

It is clothed in a more recent cover. It contains 145 leaves. It appears to have been sewn together out of several fascicles. Since it begins on the first leaf with »Extructio Theoriæ Solis per observationes Lunæ ad illum et fixas« [Latin, quoted in guillemets: "The construction of the theory of the Sun from observations of the Moon relative to the Sun and to the fixed stars"], it is clear that this is the penultimate codex of Bartholin's index, which is said to have had 172 leaves, »vacua et scripta simul« [Latin, quoted in guillemets: "blank and written together"].[2]

Leaf 1 supplies transcribed observations of the Sun and the Moon for 1585 January 14, and shows what can be found from them by computation. It does not appear to be written in the same hand as the remaining part of the codex, which supplies computations of the places of the Moon for 1582, 1586, 1590, 1593, of Venus for 1586, 1590, 1593, of Jupiter for 1593, of Saturn for 1590. Here not merely the final result of the computations is given, but all the steps by which the work proceeds; and if several observations were made on the same day, the several observations are very often treated one by one. But »limitatio« never appears, as it does in the remaining codices where places are sought by computation. Moreover, since the author does not use prosthaphaeresis even once, but laboriously multiplies and divides trigonometric quantities expressed in five figures [*per quinque litteras expressas*], it seems almost open to doubt whether he really was a pupil of Tycho. The computations were made by one man alone, and at Prague, it seems, since on leaf 49^{v} this is found written:

> Thomas Brugkmann buchbinder in Prager alten Stadt auff der Platner gasse.

[German, quoted manuscript inscription, centred on a narrow measure in three lines: "Thomas Brugkmann, bookbinder, in the Old Town of Prague on the Platnergasse."]

These computations are not worth much, since the places found from the observations of one and the same day often differ very greatly from one another. A striking example of this is

[1] It is the sixth in Bugge, at the foot of p. XVII, where he wrongly gave »Computatio observationum« for »Observationes«, and »1584 & 1585« for »1585«.

[2] It is the fifth in Bugge.

found in the observations of Venus for 1590 March 3, where the observations of Venus and of the Sun gave longitudes of Venus which differed by 3° 50′ from those that had been found by means of Aldebaran [*per Aldeboram*]. The man plainly did not understand that the words »inter ♀ & ☉« [Latin, quoted in guillemets: "between Venus and the Sun"] do not denote the difference of right ascension, but the distance measured with the sextant.

CODEX N = Ant. Coll. Reg. 1826 in 4°, contains observations of the comets.

Size of the paper 21.5 × 17 cm. It is sewn together out of several fascicles, which are clothed in a rough parchment cover (now renewed, however). It contains 197 leaves. Tycho himself wrote the title, in these words:

> OBSERVATIONES .....[1] COMETARVM Apparentium Annis A CHRISTO 1 1577 2 1580 3 1582 4 1585 5 1596 Hvennæ Daniæ vbi polus eleuatur p. 55 M. 54½[2] Longitudo ♄ 37[2] TB Vraniburgj

[Latin, quoted manuscript title, centred on a narrow measure in fourteen lines: "OBSERVATIONS..... OF COMETS appearing in the years of Christ — 1: 1577; 2: 1580; 3: 1582; 4: 1585; 5: 1596 — at Hven in Denmark, where the pole is elevated 55° 54½′, longitude ♄ 37. TB. At Uraniborg." The seven spaced dots stand in the print in place of the deleted word discussed in note 1; the quoted matter keeps the manuscript's `u/v` and terminal `j` (`vbi`, `eleuatur`, `Vraniburgj`), and the degree and minute marks in this gloss are supplied, the print setting `p.` and `M.` for them. The `TB` line is a single combined sort, not two letters.]

On the back of the title-leaf a slip has been pasted, on which the distances of the comet of the year 1577 from certain stars are given, and a Table of the parallax of the sextant is supplied.

The first observations of the comet of the year 1577, all in Tycho's hand, fill leaves 2—37. A number of additions and corrections, written in paler ink and with a finer pen, are likewise due to Tycho himself. In publishing the observations of this comet, Friis does not appear to have used this codex, since the words are very often arranged quite otherwise. The last page, which he could not read, is easily read.

[2] The sign is printed as a barred *b* (♄) in the display type; it is read as the sign of Saturn.

The first observations of the comet of the year 1580 fill leaves 38—79. Most of them are in Tycho's hand, but leaves 56—58, and a few observations besides, were written by Wittichius [Paul Wittich]. It was a separate fascicle, on the title of which Tycho wrote this: »Obseruationes Cometæ | Annj 1580 | mense Octobrj | Vide in hoc cometa aliorum obseruationes eas examina vt Thadæi Mæstlinj Mænij Item Friuola Winklerj & Graminæj«. In the last eight pages the finding of the parallax of comets is treated.

[Latin, quoted manuscript title, set inline by Dreyer inside guillemets with vertical bars marking the ends of the manuscript's lines: "Observations of the comet | of the year 1580 | in the month of October | Look in this comet at other men's observations; examine those [?], such as Thadæus's, Mæstlin's, Mænius's; likewise the trifles of Winkler and Graminæus."]

[1] QVATVOR had been written, which was corrected to QVINQVE; but this number too has been struck through with lines.

[2] In place of 54 it appears that 51 was written at first.

The observations of the comet of the year 1582, neatly transcribed, fill leaves 80—82, though fol. 80^{v} is blank. Tycho himself added a few annotations. Here begins the fascicle which also contains the earlier part of the observations of the comet of the year 1585. Leaves 83—86 are blank.

The observations of the comet of the year 1585 are partly first drafts, partly transcripts; they fill leaves 87—146. No title appears, but at the top of fol. 87^{r} it begins thus:

ANNO 1585 Die 18 Octobris cum Haffnia.....

[Latin, quoted manuscript heading, centred on a narrow measure in two lines: "IN THE YEAR 1585 / On October 18, with Copenhagen....." The trailing spaced dots stand in the print, where the heading breaks off; nothing has been supplied in their place.]

The observations from October 18—23 and November 6—12 were first written in cod. C among the other observations, and were transcribed from there into this codex. The two codices differ a little from one another in only a few places (November 6 and 7), and elsewhere they agree entirely. Leaves 139^{r}—146^{r} contain the report which Tycho sent to the Landgrave Wilhelm [*Guilelmo Landgravio*] (*Op.* VI p. 41 ff.). Leaves 147—148 are blank.

The observations of the comet of the year 1590 fill a fascicle of their own, which contains leaves 149—175, of which 149^{r} and 167—175^{r} are blank. They were transcribed from codex O. At the top of fol. 149^{v} a title appears:

Observationes Cometæ Anni 1590,

[Latin, quoted manuscript title, centred on a narrow measure in two lines: "Observations of the comet of the year 1590," — the comma after the year stands in the print.]

Beside it, on the left-hand side, Tycho wrote this: »Occasiones huius Cometæ visj & obseruationes prius [?] exaratas [sic] alibj in folio scriptæ sunt«. On the left-hand page the observations are always written, on the right

the annotations. Only one short note in Tycho's hand is found, added at the end of the observations of March 2 (N. B. In demonstranda...).

[Latin, quoted manuscript note inside guillemets: "The occasions on which this comet was seen, and the observations set down earlier [?], have been written elsewhere on a sheet." The `[?]` and the `[sic]` inside the quotation are **Dreyer's own** editorial marks, not mine: the `[?]` stands after `prius` and the `[sic]` after `exaratas`, whose accusative does not construe with scriptæ sunt — the manuscript's own loose Latin, rendered here on the sense and left untouched in the transcription. The quoted matter keeps the manuscript's u/v and terminal `j` (`visj`, `obseruationes`, `alibj`) as printed.]

The observations of the comet of the year 1593 fill two conjoint leaves (176—177); these very leaves were of course handed over to Tycho by the man who had made the observations.

Fol. 178^{r} is blank. On fol. 178^{v} Tycho wrote: »Sequitur examinatio cometæ anni 1580... per Wilhelmum...«, an image of which Schumacher gave in his edition of the observations of the comet of the year 1585. There follows, in leaves 179—189, the synopsis of the observations of the comet of the year 1585 by Blaevii.

[Latin, quoted manuscript note inside guillemets, with Dreyer's own spaced-dot ellipses inside it: "There follows the examination of the comet of the year 1580... by Wilhelm..." The name stands in the quotation as the manuscript sets it, `Wilhelmum`, and nothing is supplied. `Blaevii` likewise stands in the genitive the leaf sets, with no given name printed and none supplied.]

The observations of the comet of the year 1596, in leaves 192—197, were transcribed from codex O. They are neatly written, with astronomical descriptions.

CODEX O = Ant. Coll. Reg. 315 in fol. contains observations of the comets of the years 1590 and 1596.

It is made up of two fascicles, which were clothed in a cover a few years ago. It contains 20 leaves, whose pages were numbered (1—40) in our own day. No title appears.

The observations of the comet of the year 1590 fill pages 1—27; p. 28 is blank. A few annotations were added in Tycho's hand.

The observations of the comet of the year 1596 are written on slightly smaller paper. P. 29 supplies the title: Observationes Cometæ mense Julio A. 1596 apparentis. Vacat

[Latin, quoted manuscript title set inline in roman without guillemets: "Observations of the comet appearing in the month of July of the year 1596."]

p. 30. The observations fill pp. 31—39; p. 40 is blank. Among these nothing is found in Tycho's hand.

CODEX P = Ant. Coll. Reg. 1827 in 4°, contains the observations of all the comets, transcribed.

It is clothed in a more recent cover. It contains 143 leaves, besides a pasted-in slip presenting »Thadæi animaduersiones« (on the comet of the year 1580). It

appears to have been written by the same copyist who wrote codex A, since in this one too the year and place of the observation are written in above each page. In the title the following is read:

> OBSERVATIONES COMETARUM 7 Apparentium Annis a CHRISTO 1 1577 2 1580 3 1582 4 1585 5 1590 6 1593 7 1596 Huenæ Daniæ ubi polus elevatur p. 55 M. 54½ Longitudo est 37 TB Vraniburgi

[Latin, quoted manuscript title, centred on a narrow measure in sixteen lines: "OBSERVATIONS OF 7 COMETS appearing in the years from Christ — 1: 1577; 2: 1580; 3: 1582; 4: 1585; 5: 1590; 6: 1593; 7: 1596 — at Hven in Denmark, where the pole is elevated 55° 54½′. The longitude is 37. TB. At Uraniborg." The seven-item numbered year list is part of the title and is kept inside it. The degree and minute marks in this gloss are supplied, the print setting `p.` and `M.` for them; `Longitudo est 37` is given no unit on the leaf and none is supplied. The `TB` line is a single combined sort, not two letters.]

II. THE VIENNA CODICES [II. CODICES VINDOBONENSES].

CODEX V = Vindobonenses lat. 10657—10675.

There are 19 volumes in 4°, containing the observations of the years **1582—1592** and **1594—1601**, neatly transcribed and arranged by subject: those of the Sun, of the Moon, of the planets, and of the fixed stars — the order which our own edition follows as well. Tycho himself speaks of these books in the *Mechanica* (see above, p. III). All the volumes are clothed in parchment covers alike one another; and these covers — with the exception of two, which contain the observations of the years 1595—96 — display Tycho's portrait on the front and his arms on the back (as in codex B). In the last five volumes these are of the same size as the portrait which appears in »Danske Magazin« II p. 321, that is, 78 × 61 mm; in the first twelve they are a little smaller.

In the earlier volumes a good deal is found written in Tycho's hand, in the later ones little. Since it had to be foreseen by guesswork how much space the observations of each planet would take up, a good many blank leaves were left, especially in the later volumes. At the end of each year ad-

ded computations of the places of the planets, made from the observations, are generally to be found; and at the end of the year 1582 the right ascensions of selected fixed stars are worked out. All these appendices will be found in the present edition, each in its own place, apart from the commentary on Mars, which is handed down in the observation book for the year 1585; for it seemed better to assign that a place in volume V of the *Works*.

CODEX V¹ = Vindobonensis lat. 10709, contains a catalogue of 296 stars near the Zodiac.

This is a thin folio volume, containing a star catalogue drawn up by way of preparation; we described it in *Op.* vol. III p. 409, and we have assigned it a place at the end of the second volume of observations (*Op.* vol. XI).

Besides these codices, the Vienna library holds others too that belong to Tycho, chief among them three enormous bundles of letters and papers containing computations and shorter notes (Vindobonenses lat. 10686, 10688, 10689). These were of the greatest use to us in editing Tycho's writings (in volumes I, IV and V) and his letters, both his own and those addressed to him (in volumes VII and VIII); but since very little is found in them that had to be placed among the observations, nothing further need be added about them here.

In preparing this edition of Tycho's observations the following rules have been kept.

We have always followed the Copenhagen codices, as the ones that present the actual first observations; only where something was wanting in them was codex V brought in, and in that case a note was added at the foot of the page: »E codice V«. Among the observations for the year 1585, however — where, because we had not yet been allowed to inspect codex V, we were obliged to follow codex L — we have for the most part refrained from adding such a note.

[Latin, Dreyer's own editorial note-form quoted inside guillemets: »E codice V« = "From codex V".]

All the observations are transcribed, not one excepted. We also transcribe all the places of the planets worked out by computation and the comparisons made with ephemerides; where, however, such places had been worked out by two or even more computations, we have preferred the better ones. We have omitted the computations by which the places of the Sun had been worked out before the year 1582, for at that time Tycho had not yet corrected the theory of the Sun's motion.

Where a suspicion had arisen that an error had been committed in observing or in computing, pains were taken to find the cause of the error by computation. Here, as in the other parts of Tycho's works, every effort has been made to have the numbers and the words come out as correct as possible.

The observations are presented in the order that codex V supplies (Sun, Moon, Saturn, etc.); for that is what Tycho himself wanted (see the passage of the *Mechanica* cited above on p. III).

The general rule was that the observations should be written out just as they are found in the codices. But to save paper they have sometimes been col-

lected into a table, just as Tycho himself also often did. We for our part have not gone so far in this direction as Bartholinus did (if De l'Isle is following his example); for he, besides other things, drew up a great table of all the observations of the Sun made in each year as well, at the head of which he put the names of the instruments and on the left-hand side the days. Even so, we judged it to the point to gather the places of the Sun into a table, and not to set them out, as Tycho did, after each single day's observations. In the same way, though less often, we have laid out the places of the Moon.

Whatever is written in Tycho's own hand we have reproduced in italic type, so that it would catch the eye more readily.

Continuous prose too, descriptions, notes and the like, we have reproduced exactly as they are found in the Copenhagen codices, with the result that we have left certain peculiarities of language untouched — as where Tycho wanted »cornu« or »genu« to be genitive forms, or put »poterint« for »poterunt«, »saltem« for »solum«, and so on. For the phrase ἐν πλάτει [Greek: *en platei*, "in breadth" — in medieval usage "broadly," "in a general way"], often used in the Middle Ages, »en plati« is sometimes written.

At this point it will be useful to give what has been established, most recently and most exactly, about the latitude and longitude of those places on Hven where Tycho carried out his observations, from the trigonometrical survey made in Denmark in the years 1903—04.[1]

Centre of Uraniborg:

$\varphi = +\,55^\circ\ 54'\ 24''.67$ $\lambda = 50^m\ 47^s.665$ east of the Greenwich meridian.

Centre of Stellæburgum [Stjerneborg]:

$\varphi = +\,55^\circ\ 54'\ 21''.13$ $\lambda = 50^m\ 47^s.770$ east of the Greenwich meridian.

Of the remaining places where he carried out observations, it will be enough to give the position of these two.[2]

The castle of Benatica:

$\varphi = +\,50^\circ\ 17'\ 24''$ $\lambda = 59^m\ 21^s$ east of the Greenwich meridian.

The house of Curtius, at Prague:

$\varphi = +\,50^\circ\ 5'\ 28''$ $\lambda = 57^m\ 35^s$ east of the Greenwich meridian.

Finally, the warmest thanks are owed by me to all those who have brought me help in preparing this work; and first of all to the directors of the CARLSBERG INSTITUTE, without whose munificence the task of publishing Tycho's observations could neither have been begun nor carried through. But since I was very far from the place where the principal manuscript volumes are kept, I was obliged in preparing the work to make use of the help of others. In the earliest years it was C. F. PECHUELE, of blessed memory, of the Copenhagen observatory, who several times inspected the codices at my request. I also owe thanks to CAROLO S. PETERSEN, of the royal

[1] M. J. SAND, *Tilknytning af de Tychoniske Ruiner til det europæiske Grad-maalingsnet* (*Den danske Gradmaaling* new ser. fasc. 1 [Copenhagen 1908] p. 62).

[Danish, the title of the cited paper: "The linking of the Tychonic ruins to the European geodetic network"; the series title *Den danske Gradmaaling* is "The Danish Geodetic Survey". The imprint place is printed in Latin as Hauniæ, inside Dreyer's own square brackets.]

[2] The canon ALOISIUS DAVID determined them in the years 1801 and 1805. See *Monatliche Correspondenz zur Beförderung der Erd- und Himmels-kunde*, edited by v. Zach, VI p. 478 and XII p. 248.

[German, the title of the cited journal: "Monthly Correspondence for the Advancement of the Knowledge of the Earth and the Heavens". The hyphen in `Himmels-kunde` stands in the print. `v.` is the printed abbreviation for *von*; no given name is printed and none is supplied.]

library at Copenhagen, who arranged for manuscripts to be lent from the Vienna library to Copenhagen, and who from time to time took the trouble to have those parts of them that were useful for filling the gaps in the Copenhagen manuscripts reproduced photographically. The collation of all the Copenhagen manuscripts, however, and the preparation of the copy of it that was to be sent to the printers to be set in type, I carried through myself — apart from the appendices belonging to the observations of the year 1582, where the printer was able to use a photographic reproduction. To Ioannes Ræder I owe the warmest possible thanks: he read through all the proof sheets with the greatest care, compared them against the manuscripts, and in this way corrected many compositors' errors. He also turned these prolegomena into Latin.

Written at Oxford, in the month of February, in the year MCMXXIII [1923].

J. L. E. DREYER.

Printed page number: 1 (arabic, at the foot, outer right).

OBSERVATIONES ASTRONOMICÆ

ASTRONOMICAL OBSERVATIONS

No printed page number stands on this leaf; it is printed p. 2 by the volume's arabic sequence.

In editing Tycho Brahe's observations the editor has used the manuscript books preserved in the Royal Library, Copenhagen, in which the observations were written down partly by Tycho himself and partly by his pupils; a description of these books and their history will be found in the preface to this volume. To fill the gaps — which are most numerous in the observations and computations of the years 1582–1589 — he consulted a contemporary transcript, cod. Vindob. lat. 10657–10675, which in this edition is designated by the letter V. For the observations made before the month of December in the year 1577 he also consulted the transcript of Erasmus Bartholin.

Everything written in Tycho's own hand is printed in *italic* letters and figures.

The notes that stand at the foot of the page are all the editor's.

ANNO 1563, ÆTATIS ANNO 17, LIPSIÆ.

[The year 1563, in the seventeenth year of his age, at Leipzig.]

AUGUSTI 17

[August 17]

At the thirteenth hour and a quarter, ♂ [Mars] was in 7° ♉ [Taurus], with southern latitude 3°, referred to the fixed stars.

AUGUSTI 18

[August 18]

At $13^{h}\ 34^{m}$ ♃ [Jupiter] stood on the horizon, and formed very nearly a straight line with the heads of ♊ [Gemini], Hercules passing a little to the south and Apollo to the north. At that moment the equinoctial point had already passed the M. C. [*medium cœli*, the mid-heaven], and 14° ♈ [Aries] was on the M. C.[1]

The distance between ♃ and ♄ [Saturn] was a little greater than that of the Kids, and less than that of the two stars in the right forefoot of the Great Bear; yet they came closer to the interval of these latter in the Bear. ♀ [Venus] was in the east after the second hour of the night; it rose together with the bright star in Procyon. ♄'s place lay south of a straight line drawn through the body of ♃ and through ♀, so that ♄ was further south than ♃ itself. The distance of

the Kids is 30′, that of the two in the Bear 50′. Therefore ♄ and ♃ were 40′ or 45′ apart.

AUGUSTI 23

[August 23]

At hour 13 ♂ nearly closed an apex with the stars in Cetus — I in the mane and III in the upper jaw, II at the tip of the nostril. Yet it was a little nearer the former.

The interval between ♄ and ♃ could scarcely be noted by eye in the morning hours of this night, since each was obscuring the other with its own rays. Their latitudes, however, were still different: ♄ was further south than ♃, and this at the entry into ♌ [Leo].

AUGUSTI 27 (ASTRON. 26), MANE.

[August 27 (astronomically the 26th), in the morning.]

I saw ♃ hold the same altitude above the horizon as ♄ — that is, both were placed on the same parallel of altitude, but on different vertical circles. From this one may infer that their ☌ [conjunction] had already passed; yet they stood closer to one another than they had three days before. So it is clear that the time of the συζυγίας [Greek: *syzygias*, genitive of συζυγία, "conjunction"] fell nearer to this 27th day of August than to the earlier 24th. On both days I observed their distance a little before the rising of ☉ [the Sun] — that is, on the 26th itself (or the 25th astronomically) — and in the first degree of ♌ of the primum mobile, but in the asterism of ♋ [Cancer] near the Manger. ♄ was still further south than ♃ itself.

DIE 31 AUGUSTI.

[The 31st day of August.]

In the evening ♂ nearly enclosed a right angle with the Pleiades and Lampadia; yet it came closer to the extension of an obtuse angle [it held an ἰσόπλευρον [Greek: *isopleuron*, "equilateral"] angle with the Pleiades and the breast of ♉].[2] From this, by the observation of this equilateral triangle, ♂ came out most nearly at 13° 30′ ♉, with southern latitude beyond 2°.

SEPTEMBRIS 2.

[September 2]

At hour 2 in the morning. After the rising of Procyon, ♄ rose first and ♃ following it, which stood away from it, in the order of the signs, by a slightly greater interval than that of the two stars in the left arm of Erichthonius called the Kids. I observed the same things on August 19 by the common reckoning. ♄ at nearly 2° ♌. The space between Hercules and Propus was nearly the same as that between Hercules and ♄. ♄ at 2° ♌, ♃ at nearly 2° 30′. ♀ on the ascendant at $2^h\ 52^m$, and a little later Regulus, from which it stood one degree distant; so it was at nearly 22° 30′ ♌, judging by

[1] Written alongside: »[medium hujus lineæ in 29[g] ♋ incidit]« — "[the middle of this line falls in 29° ♋]"; and in the margin, but partly cut away: »hæc a... legi ex toto non potuerunt« — "these a … could not be read in full."

[2] Written in the margin: »Hæc erant posita ad latus sinistrum sequentium« — "These were placed at the left side of what follows."

appearance: it stood further from the Ecliptic than cor ♌ [the heart of the Lion] did, so it had a more northerly latitude. At the middle of hour 4, ♀ on the horizon was set at a right spherical angle with cor ♌ and with the bright star in the neck of ♌; and with that star in the back and cor ♌ it made a nearly equilateral triangle — yet those two enclosed a shorter space than ♀ did with the heart or with the back.

☿ [Mercury] — I saw it enclose a longer interval from ♀ than ♀ did from the heart: cor, ♀, ☿.[1]

Diagram. A one-line schematic standing at the right of the measure, immediately below the end of the preceding sentence. Three small six-armed asterisk marks stand in a row on one line, joined by runs of dots — a shorter run between the first and second marks, a longer run between the second and third — and a full stop closes the row after the third mark. The three labels stand on the text line above, each roughly over its mark; they are the last three items of that line, and the third carries the footnote marker.

- first mark (left): `cor` — the heart, i.e. cor ♌
- second mark (middle): ♀
- third mark (right): ☿[1]

SEPTEMBRIS 20.

[September 20]

After hour 10 Urb., ♂, according to the table of Dureri, was at about 12° 40′ ♉, with southern latitude 1½, referred to the fixed stars.

But the observations here taken with reference to the fixed stars are Alfonsine, and drawn from the table of Dureri.

SEPTEMBRIS 22

[September 22]

At 16^{h} 15^{m} ♄ and ♃ were observed thus. ♄ at 1° and not yet 30′ of ♌, southern latitude 30′. The place of ♃ beyond 4° ♌ and about 20′ of ♌, northern latitude 30′ `plus m.`

1. In a straight line stood Præsepe, ♄, and the upper elbow of the southern claw.
2. In a straight line were ♄, the southern Ass, ♃.
3. A straight line through the northern Ass and the northern arm passed through the middle of Præs. — ♄.
4. In the middle of the line through the northern Ass and the upper elbow of the southern claw stood ♃, which ran out to the north.

SEPTEMBRIS 23.

[September 23]

At 13^h 15^m ♃ was rising together with Procyon, which rises with 5° ♌.

OCTOBRIS 8.

[October 8]

In the evening at hour 10. A straight line from the springing of the tail of ♈ through the body of ♂ leaves that star which is in the hinder part of the leg of ♈ εἰς τὰ ἑπόμενα [Greek: *eis ta hepomena*, "towards the following (signs)" — that is, eastward in the order of the signs]; then a straight line from the extremity passes right through the hind foot.

N.B. ♂ near the opposition of ☉. ♂ at 11° 20′ ♉, latitude 1° 0′ south.

OCTOBRIS 12.

[October 12]

At hour 10. ♂ at 9° 30′ ♉, latitude 0° 50′ A.

DIE 13 OCTOBRIS.

[The 13th day of October]

At hour 4 in the morning ♄ at 2° 50′ ♌ and latitude 0° 0′ Sep.; ♃ at 8° 0′ ♌. ♃ was nearly in ♂ with the more northerly star near the elbow of the southern claw, and with the ♌ star [?] fourth in order among the unformed stars of ♋ which is placed near the head of ♌ — but it stood a little less distant from the beginning of ♌. ♄, near the southern Asellus, was joined with it.

[1] Written indistinctly in the margin: »Calculus Rudolphinus non patitur ut concedamus fuiße ☿. Puto fuiße antecedentem cor ♌« — "The Rudolphine computation does not allow us to concede that it was ☿. I think it was the star preceding cor ♌."

ANNO 1564, ÆTATIS 18, LIPSIÆ.

[The year 1564, at the age of 18, at Leipzig.]

27 MARTIJ.

[March 27]

At the eighth hour after noon I took the distance of ♄ [Saturn] and ♃ [Jupiter] as one degree and 35′. Likewise, at the same moment, the distance of ☾ [the Moon] from Spica ♍ [Virgo] as 2° and nearly 30′. Likewise the distance of ♃ and cor ♌ [the heart of the Lion] as 25° 45′.

☉ [the Sun] in these degrees of ♈ [Aries] — 16½, 17, 18, 19, 20½ — produced clear weather in the years 64 and 65, from 7 March to 1 April. An ☍ [opposition] of ☉ and ☾ took place in the year 64, on 27 March, at 7^h 50^m P.M., the pole 51°. This ☍ of ☉ and ☾ was followed at once, on the same day, by the greatest clearness of the sky, joined with the greatest heat and dryness. I take the cause of this to be that ☉ was at that time near the degree of its own exaltation.[1]

APRILIS DIE 15.

[April 15]

At 8^h 15^m the distance of ☾ and ♂ [Mars] was 3° 20′. According to St.[2] ☾ was in 5° 0′ ♋ [Cancer] and ♂ in 3° 16′, and the distance of ☾ 1° 44′; according to Carell., ☾ in 5° 5′ ♋ and ♂ in 1° 55′, and the distance 3° 10′.

DIE 16 APRILIS.

[April 16]

I observed a conjunction of ♂ with the star in the left knee of Apollo, which is in 4° 14′ ♋. At that time ♂ stood 30′ away from the star of the third magnitude which is in the left knee of Apollo. According to Sconerus [Schöner] that star is in 4° 5′ ♋; according to Rein. in 4° 14′ ♋.

DIE 1 MAIJ.

[May 1]

At 9^h P.M. I observed with the Radius the distance of ☋ and ♄ as precisely three degrees.

The distance of ♄ and ♂ as precisely 16°.

The distance, further, of ♂ and ♀ [Venus] as 19° 20′.

At that time I caught sight of a conjunction of Mars with the star in the leading head of Gemin., which is in 14° 24′ ♋ — for it lay directly between that star and the star of the third magnitude which is in the right side of the following Twin.

The three-column group that follows is set with two-line headings and no rules:

Erat itaque tunc temporis	Ephemerides Stadij habent	Ephemerides Carelli habent
♀ in 25^G ♊ ⎫	♀ in 22° 54′ ♊	♀ in 24° 3′ ♊
♂ in 14 ♋ ⎪ com-	♂ in 12° 52′ ♋	♂ in 11° 20′ ♋
♄ in 0 ♌ ⎬ pleto	♄ in 27° 36′ ♋	♄ in 29° 53′ ♋
☋ in 3 ♌ ⎭	☋ in 1° 30′ ♌	☋ in 0° 50′ ♌

[So it stood at that time: ♀ in 25° ♊, ♂ in 14° ♋, ♄ in 0° ♌, ☋ in 3° ♌, the degree being complete. — The Ephemerides of Stadius have: ♀ in 22° 54′ ♊, ♂ in 12° 52′ ♋, ♄ in 27° 36′ ♋, ☋ in 1° 30′ ♌. — The Ephemerides of Carelli have: ♀ in 24° 3′ ♊, ♂ in 11° 20′ ♋, ♄ in 29° 53′ ♋, ☋ in 0° 50′ ♌.]

[DIE 2 MAIJ].

[The 2nd day of May]

On the following day, at the same hour, I observed their distance somewhat more accurately.

♄ and ☋ precisely III degrees as before; ♂ and ♄ 15° 30′. Likewise ♂ and ♀ nearly 19°.

♀ stood then, according to Stadium, in the 24th degree and 6′ of ♊; ♂ in 13° 28′ ♋; ♄ in 27° 42′ ♋; ♃ in 1° 38′ ♌. Therefore the distance of ♂ and ♀ was 19° 22′, of ♄ and ♂ 14° 14′, of ♃ and ♄ 3° 56′.

From these things, then, it is established that all the observations are closer than the Ephemerides themselves have them. How that comes about — whether by the fault of the instrument or by a difference of sighting — I do not know.

The Ephemerides of Carelli have ♄ 29° 58′ ♋, ♃ 0° 58′ ♌, ♂ 11° 57′ ♋, ♀ 25° 13′ ♊. Therefore the distance of ♄ and ♃ is 1 degree, of ♂ and ♄ precisely 18°, of ♂ and ♀ 16° 44′. This computation strays further, by three degrees in every case.

[1] There is present in the codex an astrological figure of rectangular shape (not of the circular form Tycho used afterwards), and there follows »From this point an excursion into other, earlier years«, presenting a similar description for the 20th day of March 1556, for the hour $12^{h}\ 37^{m}$ P.M., and also notes on the comet of the year 1556 and a catalogue of comets from the year 1500 to the year 1556.

[2] That is, according to the Ephemerides of Stadius.

MAIJ DIE 23

[May 23]

at the tenth hour after noon, with a certain pair of compasses I took the distances of those 4 planets which were then presenting themselves to the sight — namely ♃, ♄, ♂ and ♀. Moreover, since it was established from the Ephemerides of Stadius that the distance of ♄ and ♃ was a little beyond 5 degrees, I distributed that same span over 5 degrees and a very little more, and from this the distance of the others also became known in degrees; but I always doubled the distance taken with the compasses — in this way.

Diagram. The uppermost and largest of the three figures in the left-hand figure column, standing beside the first two paragraphs of the entry and reaching from the first text line down to about the level of the two-line position group below. Its core is a single vertical file of four six-armed asterisk marks, each with a planetary sort set to its left, and the marks are joined by vertical runs of dots; beside each dotted run stands a small figure giving that interval in degrees. Set against this file, to its left, are **two drawn pairs of dividers (compasses)**, each shown opened, with two long slightly-converging legs meeting in a hinge-head at the bottom, and with a small asterisk at the tip of each leg — the two instruments illustrate the doubling of the span that the sentence above describes.

- top mark: ♃
- interval between the first and second marks: 5
- second mark: ♄
- interval between the second and third marks: 4
- third mark: ♂
- interval between the third and fourth marks: 7

- bottom mark: ♀

By this method it also becomes clearer than daylight that this account of the motions agrees entirely with the motion which is set down in the Ephemerides of Stadius, and which is as follows:

Distance ♃ ♄ 5° 12′ distance ♄ ♂ 3° 38′ distance ♂ ♀ 7° 16′

But these things could not be observed by me so precisely with the compasses; for the body of ♂ scarcely appeared, and so did ♄ to me as I observed — yet I was content with this, such as it was.

♃ was 29° 38′ ♋	♂ in 26° 0′ ♋
♄ moreover 4° 50′ ♌	♀ indeed in 18° 44′ ♋

If one cares to set down the Alphonsine arrangement here as well, then the matter stands thus according to their determinations.

Diagram. The second figure in the left-hand column, smaller than the first and standing beside the two-line position group and the sentence above. It repeats the first figure's structure — a vertical file of four asterisk marks joined by dotted runs — but each mark now carries a full position beside it as well as its planetary sort, and each dotted run carries a two-figure interval. Its **caption is set vertically**, reading up the right side of the figure: `Ex Ephemeridibus Carelli` ("From the Ephemerides of Carelli"). A short horizontal rule closes the figure at its foot and divides it from the third figure below.

- top mark: **1.46** ♌ ♄
- interval between the first and second marks: `2.18`
- second mark: **4.3** ♌ ♃
- interval between the second and third marks: `7.15`
- third mark: **24.20** ♂ ♋
- interval between the third and fourth marks: `5.0`
- bottom mark: **19 20** ♀ ♋

Diagram. The third and lowest figure in the left-hand column, below the dividing rule, standing beside the `DIE 25.` and `MAIJ DIE 30` entries and reaching nearly to the last composed line of the leaf. It is the same kind of figure again — a vertical file of asterisk marks with planetary sorts, joined by dotted runs with interval figures — and it is the figure the sentence above announces as the **Alphonsine arrangement**. Its lettering is set sideways (rotated a quarter turn from the page). What the structure shows, read downward: a mark labelled ♀; a dotted run; a mark labelled ♂, with a tall narrow bracket drawn beside it; a mark labelled ♄; a dotted run; a mark labelled ♃, with a brace drawn beside it; and a further dotted run continuing below.

- marks, in order down the file: ♀, ♂, ♄, ♃
- dotted scale labels, page order top to bottom: `20`, `25`, `30`, `5`, `10`, `15` (one dot per degree); ♀ on the dot labelled 20, ♂ on the second unlabelled

dot past 25, ♄ on the dot labelled 30, ♃ on the dot labelled 5; no further figures

DIE 25.

[The 25th day]

Again I observed the same distances with another and slightly larger circle, and found them thus. I also marked off the signs, and it appeared in what place each planet stood: thus ♃ 5° 10′ ♌. Its place I took from the ephemerides, and from the distance of the others from it I [saw] the places of the others too: thus ♄ in 29° 50′ ♋ — for I cannot claim any exactness, since one minute or four are of no moment. ♂ 27° ♋: in the place of this one something has gone wrong, since it was itself so small that it could not be brought under the eye.

Further, ♀ at nearly 21° 0′ ♋; in the place of this one too, perhaps, this happened on account of the division of the line.... nothing precise can any longer be observed in this way with the compasses.

MAIJ DIE 30

[May 30]

at hour 10 I observed ♄ and ♂, which then stood very close to one another, nearly in conjunction with each other; for in longitude — according to Stadius only — the distance was 10′, but in latitude 44′.

Further, in the year 64, in May and June, ♂ appeared scarcely to be made out.

Note. In the year 64, at the end of August, about the 27th day and following, the greatest clear weather lasted for several days — and so great that for 8 days scarcely a single cloud was to be seen in the sky.

In the year 1564, and towards its end, about November, September and December, ♀ appeared of such magnitude that it even cast shadows on bodies set opposite it, no differently from the moon, and shadows plainly visible — which I observed with great wonder on 10 December.

In the year 64, about nearly the 17th day of Nov., a great heat began, contrary to the condition of the season, no differently than if summer were at the door, and it was

the greatest part of that time very foggy, but with little rain. It lasted until about the 9th day of December, on which day, towards evening, it began to grow a little colder again. I take the cause to be that ☉ was moving at this time through ♐, a hot and dry sign; and that together with it ♂ too was a hot and dry planet, and likewise ♄ stood in a dry and hot sign. This is what I gather from the fact that, immediately about the exit from this sign, it began to turn cold again. For about the middle of Dec. a great cold set in, with very high winds and a hard frost, and it lasted through the whole of December.

OBSERUATIONES SYDERUM PER RECTANGULUM SEU RADIUM ASTRONOMICUM.

[Observations of the stars by the rectangle, or astronomical radius.]

In the year 1564, Oct., on the 19th day, at about the eighth hour after noon, I observed the diameter of the full ☾ to be about 37 minutes complete. From the Prutenic tables [tabulæ prutenicæ] about 36′ is obtained.

- Maximus ☾ diameter continet 35′ 40″ — [The greatest ☾ diameter contains 35′ 40″]
- Minimus ☾ diameter continet 30′ 0. — [The least ☾ diameter contains 30′ 0.]

On the morning of the following day (20) I observed these things.

The distance of ♃ and ♄, which I found by a double calculation, in this way.

1. With the crosspiece [transuersarium] set at the fixed place [locus status], which is 3500 parts, I found the elongation of the sights [pinnulæ] on the crosspiece from one another to be 1162. By the operation these give 398 14/35, and to that number there correspond in the gnomonic table [tabula gnomonica] 18° 21′ — the distance of the stars sought.
2. With the same set at the point 3700, the distance of the sights was found to be 1233, and by the operation 399 33/37 is due to them; to these the table answers with the same degrees as before, but the minutes about 25. The observation therefore disagrees by only about 3 minutes, which is very little indeed. But the true distance was without doubt 18° 22′. Infallibly. Stadius puts the distance at 18° 8′, a small difference of 0° 14′ [the semidiameter of both added makes only this much error, 0 g. [recte: *additis v. g.* (*verbi gratia*, "for example") for *additus 0 g.* — Corrigenda, p. 429] 8 and 6]. Carellus makes it 15° 20′, a difference of 3° 2′ — large.

At the same moment, with the crosspiece set at 3700 parts, the distance of ♄ and Regulus was 480; to these, by the operation, 155 25/37 answers. But from the canon, 7° 23′ precisely.

By the same method there were found between ♃ and the same fixed star 11° 1′, for the sights stood apart 720, for which the calculation gave 233 19/37, and to these the number I have named corresponds precisely out of the gnomonic table.

These two distances added together make the space between ♃ and ♄ 18° 24′, which agrees nearly with the figures above; but since the latitude of ♃ is a little the greater, this distance exceeds the true one by a few minutes, for these three stars were not set in a straight line with respect to the ecliptic. According to the Alphonsines the error committed will not stay hidden: for granting that Regulus is placed in 23° 35′ ♌, as the Prutenic canons [Canones prutenicæ] have it, the place of ♄ comes out — its distance of 7° 23′ from the star being subtracted — in 16° 12′ ♌, which Stadius puts in 16° 30′ ♌, a difference of 18′. Carellus, 18° 26′ ♌, a difference of 2° 14′, large enough. But the place of Jupiter will be, with 11° 1′ added, in 4° 36′ ♍, which Stadius puts in 4° 36, as the observation has it; whereas Carellus set it in 3° 44′. Error 52′.

DIE 11 NOUEMBRIS.

[November 11]

Between 6 and 7 in the morning I observed these things between ♃ and ♄ by the rectangle.

With the crosspiece standing at 3500, at the fixed place, the distance of the sights 1300; from the multiplication of this by the greatest number of the gnomonic table there comes 1560000, which divided by the fixed place gives 445 2/3, to which answers in the gnomonic table 20° 21′, the distance, that is, of ♃ and ♄ at the given time.

Otherwise. With the radius standing at the middle of the crosspiece, the place of the crosspiece on the radius was 2670, for which the fecund table [tabula fæcunda] answers about 20° 32′ — the distance of ♃ and ♄ taken in this way.

Between ♄ and Regulus, with the crosspiece standing at 3500, the distance of the sights was 380, which multiplied by 1200 produce 456000; this again, divided by 3500, gives 130 10/35, and to that number there are due from the gnomonic table 6° 12′ — the distance between ♄ and Regulus.

Between ♄ and the neck of ♌, the elongation of the sights 625, the number multiplied 750000, again divided 217 5/35; to this the table answers 10° 15′, the distance sought.

Between the neck and the heart of ♌, elongation of the sights 510, the number multiplied 612000, again divided 174 30/35; the distance of the fixed stars therefore 8° 17′, a little more.

The distance between Regulus and ♃. The interval of the sights 850, the number multiplied 1020000, the product by division 291 15/35, answering from the gnomonic table about 13° 39′ — the distance, that is, of ♃ from Regulus.

Dist.: between ♃ and the tail of ♌. The interval of the sights 1044000, the number issuing from the division 298 10/35, answering from the table 13° 57′ — the distance, that is, between ♃ and the tail of ♌.

Between ♃ and ♀. By the outermost sights, the crosspiece at 2615, to which 20° 55′ answers; and that number doubled shows the distance of ♃ and ♀ to be 41° 50′ precisely.

At the same time, after 7 I think, I observed ♀ nearly in conjunction with Spica ♍; yet that star was more northerly by about 2 or 3 degrees, whereas Stadius puts the latitude of ♀ the same as the latitude of the star — namely about 2° 5′ southern. Carellus makes ♀'s latitude 0° 4′ south. According to Stadius, then, there would have been a bodily ☌ of ♀ with the star — which, however, was utterly false; for in the latitude of ♀ Stadius departs greatly, in that place, from the Prutenic calculation. I myself computed the latitude of ♀ for this time in the following way.[1]

DIE 20 NOUEMBRIS.

[November 20]

I observed these things by the rectangle: at 3^{h} 3^{m} before noon.

4000	Distantia inter ♃ et ♄	1538	
4000	Distantia inter ♄ et Reg.	440	
4000	Distantia inter ♃ et Reg.	1025	
3500	♃ et ♄	1330	1355
3500	♄ et Reg. 385 alias	385	400
3500	♃ et Reg. 893	893	915
3000	♃ et ♄	1140	1150
3000	♄ etReg.1165————alias	1165	1175
3000		330	333
3000	♃ etReg. 785	785	768

[The distances, by the rectangle: with the crosspiece at 4000 — distance between ♃ and ♄, 1538; distance between ♄ and Reg., 440; distance between ♃ and Reg., 1025. With it at 3500 — ♃ and ♄, 1330, otherwise 1355; ♄ and Reg., 385, otherwise 400; ♃ and Reg., 893, otherwise 915. With it at 3000 — ♃ and ♄, 1140, and 1150; ♄ and Reg., 1165, otherwise 1175; 330 and 333; ♃ and Reg., 785 and 768.]

Three notes stand at the right of this group, set in a reduced fount and joined to it by leaders:

- against the `1140 | 1150` row: **Hi sic erant appositi ad ♃ et ♄.** — [These were so placed at ♃ and ♄.]
- against the **1165 … 1175** row, running to a second line: **Hi ad ♄ et Reg., sed cum signo, quod ipsos referebat ad ♃ ♄.** — [These at ♄ and Reg., but with a mark, which referred them to ♃ ♄.]
- against the **330 … 333** row, reached by a printed row of dots: `Hi erant inter duas lineas inserti.^2^` — [These were inserted between the two lines.]

N. B. ♄ according to the first station.

1. The crosspiece being at 4000, the distance of the sights 1540, the number multiplied 1848000, the product of the division 462. Answering from the gnomonic table, 21° 3′ — the distance, that is, of ♄ and ♃ sought.
2. The crosspiece being at 3500, the distance of the sights at first 1330, the number multiplied 1596000, divided 456, answering from the gnomonic table 20° 48′; but otherwise

Footnotes (Dreyer's, at the foot of the leaf).

[1] Here there follows in the codex: »Calculation of the longitude and latitude of ♄ and ♃, and of the latitude of ♀, from the Prutenic tables, for the year 1564, November, day 10 … 30«. After the table giving the numbers for the several days, Tycho wrote: »Stadius's computation, which the Ephemerides give, departed from the Prutenic calculation in the longitude of ♄ and ♃ by 2′, in the latitude of ♄ by 19, in the latitude of ♃ by 13, and ♀ by 3° 15′ — quite imprudently«.

[2] Written in the margin.

the distance was found to be 1355, whose product from the multiplication is 1626000; divided, this gives 464 20/35, and to it the gnomonic table [tabula gnomonica] answers about 21° 10′.

3. With the crosspiece [transuersarium] at 3000, the distance of the sights [pinnulæ]: I 1140, the number multiplied 1368000, divided 456, to which there answers precisely as before 20° 48′. II 1150, the number multiplied 1380000, divided 460, to which 20° 58 answers. III 1165, multiplied 1398000, divided 466, answering 21° 13′ — the distance sought. IV 1175, multiplied 1410000, divided 470, answering 21° 23 — the distance sought.

DIVERSITAS DISTANTIÆ

[The variation of the distance]

I	21° 3′	IIII	20° 48′
II	20° 48	V	20° 58
III	21° 10	VI	21° 23

Between ♄ and Regulus.

1. With the crosspiece at 4000, the distance of the sights 440, the number multiplied 5280000, divided 132, answering about 6° 17′ — the distance sought.
2. With the crosspiece standing at 3500, the sights [pinnacidia] I 385, multiplied 462000 and divided 132, answers precisely as before 6° 16′ 38″; II 400, multiplied 480000, divided 134 10/35, answering 6° 23′ — the distance.
3. With the crosspiece at 3000 parts, the interval of the sights [intercapedo] taken twice 339, multiplied 396000, divided 132, answering 6° 17′ as often before.

The distance of ♄ and Reg. 6° 17′ precisely.

Between ♃ and Regulus.

1. The crosspiece 4000, the interval of the sights 1025, the number multiplied 1230000, divided 307½, answering about 14° 22′.
2. The crosspiece 3500, the sights 893, multiplied 1071600, divided 306 6/35, answering 14° 18 — the distance sought; otherwise [alias] 915, multiplied 1098000, divided 313 2/3, the distance sought 14° 39 — but false.
3. With the crosspiece at 3000, the sights 768, multiplied 921600, answering 307 6/30 taken twice, answering 14° 22′ precisely.

The distance of ♃ and Regulus 14° 22′. The distances agreeing in one:

Between ♄ and ♃	20° 48′ (Cum Stad.)
Between ♄ and Reg.	6° 17
Between ♃ and Reg.	14° 22

From ♄, Reg. falls in 23° 32 ♌; from ♃, in 23° 46 ♌. But the ♄ distance does not stray far from the truth, for [recte: *eſt enim* for *enim* — Corrigenda, p. 429] according to Ptolemy it is 23° 35 ♌ — a difference of about 3 minutes (which perhaps comes from the latitude[1]). The distance between ♄ and ♃ 20° 52′. However that may be, it is true that the distance was about 21 degrees, which Carellus puts at 17° 50′ — an error of more than 3 degrees. In these the error of the Alphonsines shows plainly. ♄ has advanced from 20 Nov. to 8 Dec. backwards, against the order of the signs [in antecedentia], by about ½°, nearly 28′. Stadius puts 25, Carellus 27; but the observation is in doubt. ♃ has advanced forwards, in the order of the signs [in consequentia], from 20 Nov. to 8 Dec. by 1° 48′. Stadius puts only 51′, Carellus 39′; but the observation is at fault.

Between ♀ and Spica ♍: with the crosspiece at 3500, the interval of the sights 440, the number multiplied 528000, divided 150 30/35, answering in the table 7° 9′ — the distance sought. With the crosspiece at 3000, the interval of the sights 375, the number multiplied 450000, answering about 7° 8 as before, at about the sixth hour.

DIE 2 DECEMB.

[2 December]

Between 7 and 8 in the morning I saw a certain bright star towards the east, distant from ♀ — the crosspiece standing at 3500 — by 1650 equal parts; from which their distance

Footnotes (Dreyer's, at the foot of the leaf).

[1] Written in the margin: »These had an erasure«.

in degrees comes out as 25° 15′. From Stadius the distance of ♀ and ☿ is gathered as 25° 58; ♀ and ♂, 26° 50, and from the heart of ♏ more than 29 degrees. From this I judge it was ☿ without doubt. And it was very bright and clearly visible in the dawn itself, and almost at the very rising of the Sun; nor could I take the distance precisely with the radius [per radium].

DECEMBRIS DIE 8

[December, day 8]

the hour before noon being about 4 from midnight, I observed these things by the rectangle.

With the crosspiece standing at 3500, the distance between ♄ and Regulus [regulum, so set, with a lower-case r] 415, the number multiplied 498000, divided 142 10/35, answering the distance 6° 45′.

With the crosspiece standing at 3000, between ♄ and Reg. 370, multiplied 444000, divided 148, answering 7° 2′ — the true distance, that is, of ♄ and Reg. Between ♃ and Reg. 870, multiplied 1044000, divided 348, answering 16° 10′ — the distance sought. Between ♄ and ♃ 1300, multiplied 1560000, divided 520,

answering 23° 25′ — the distance sought, that is, between ♄ and ♃. Stadius puts the distance at 22° 13, where the difference reaches beyond a whole degree. Carellus has the distance 19° 0′, where the difference from the observation is 4° 25′ — very large. But as to this observation with the rectangle differing so much from Stadius, I think the cause lies in a fault of the instrument, and in a remarkable discrepancy of the observation. For in the first place I took 3000, 1285, to which 23° 11′ answers; however that was, the observation differed from Stadius by a whole degree, whether a fault of the instrument was the cause or something else.

DIE 10 DECEMBRIS

[December 10]

in the morning about the 5th hour. With the middle of the crosspiece standing on the radius, each end equally from each sight [pinnacidium], its place on the radius was, between ♄ and ♃, 2355, answering 23° 0. A false observation.

With the crosspiece standing at 3500, between ♄ and the heart of ♌ 420, the number multiplied 504000, divided 147, answering in the table 6° 59′. Between ♃ and the heart of ♌ 970, multiplied 1164000, divided 332 20/35, answering 15° 29′; the distance of both 22° 28′.

Between ♄ and ♃ 1455, multiplied 1746000, divided 499, answering 22° 35′.

1	0 46	16	12 16
2	1 32	17	13 2
3	2 18	18	13 48
4	3 4	19	14 34
5	3 50	20	15 20
6	4 36	21	16 6
7	5 22	22	16 52
8	6 8	23	17 38
9	6 54	24	18 24
10	7 40	25	19 10
11	8 26	26	19 56
12	9 12	27	20 42
13	9 58	28	21 28
14	10 44	29	22 14
15	11 30	30	23 0

Nota. That radius was, in the distances of the stars, with the crosspiece standing at 3500, at 46 seconds in every degree; and these are always to be subtracted from the distance [recte: *diſtantiæ* for *diſtantia* — Corrigenda, p. 429] which the radius gives in each degree, so that the true place may be had.

With the crosspiece standing at 3500: the distance of ♀ from the brighter and more southerly scale [lanx] 220, the number multiplied 264000, divided 75 15/35, answering from the table 3° 35′.

The distance of ♀ from the other of the scale, the more northerly, 333, multiplied 399600, divided 114 6/35, answering 5° 26′. Between ♀ and Spica 1630, multiplied 1956000, divided 559, answering 24° 58′ — the distance sought.

The longitude of ♀ 11° 35 ♏, the latitude 3° 19 north. Stadius puts ♀ at 12° 15 ♏ with latitude 1° 2′ north. Carellus puts ♀ in 11° 37 ♏ with latitude 2° 33 north.

DIE 11

I took the distance of ♄ and Regulus 435; the number multiplied 522000, divided 149 5/35, answering 7° 5′ — the distance sought. Therefore if the star's place were set by the tables in 22.36 ♌, the place of ♄ would fall in 16.36 ♌ — for subtract 5 m. according to the rule handed down above.

DECEMBRIS DIE 14

At about the 6th hour before noon I took the distance of ♀, which was lingering near the claws [chelæ], from the more southerly and more westerly one; the crosspiece [transuersarium] standing at 3500, the distance of the sights [pinnulæ] 450, the number multiplied 540000, divided 154 10/35, answering from the gnomonic table [tabula gnomonica] 7° 19′. But between the more northerly and the more easterly, the crosspiece standing in the same place, the distance was 360, the number multipli: 432000, divided 123⅓, to which from the table answers 5° 52′ — the distance sought. From these I derive the longitude and latitude of Venus in this way. The earlier star long. ♏ 9° 6′, lat. 0° 40′ north. The other star long. ♏ 13° 16′, lat. 8° 30′ north.

I gather the longitude of ♀ about 15° 58′ ♏; the latitude, however, about 3.18 north. On the 14th day, at about the 6th hour a M., the longitude of ♀ was about 16 grad. ♏, latitude 3° 18′ north. Carellus gives the longitude of ♀ 15.44′ ♏, lat. 2.40 north. Stadius puts the longitude of ♀ 16.17 ♏, latitude 1° 20 north. But the error can befall him in many ways — either through an error of the observation and of the radius, or because the construction in the plane does not work out, or on account of the unknown places of the fixed stars in ♏. In latitude, however, it is established that Stadius is in error.

Between ♃ and Regulus, the crosspiece standing at 3500, the distance of the sights was 985; the number multiplied 1182000, divided 337 25/35, to which from the table there corresponds 15.43.

Between ♄ & Regulus 420; the number multiplied 504000, answering 144, to which from the table there correspond 6° 50′. This observation is good. The numbers added 22.33 — the distance of both planets. Stadius puts 22.32; these agree nicely.

If the star's place is put in 23.22 ♌:

23	22		23	22	
15	43	Ad.	6	50	Sub.

♃ ♍	9	5		♄	16	32 ♌

♄ tending toward ☍ ☉, yet it is more than one month away.

DECEMBRIS DIE 17

at the 7th hour after noon, I took the diameter of the full Moon; the crosspiece standing at 3500, the distance of the sights 39, the number multiplied 46800, divided 13 13/35, answering about 38. Likewise, with the crosspiece standing at 3000, the distance of the sights 35, multiplied 42000, divided 14′, answering 40′ — namely the diameter of the Moon. But over such an interval the observation can very easily deceive.

ANNO 1565, ÆTATIS 19, LIPSIÆ.

[In the year 1565, aged 19, at Leipzig.]

JANUARIJ DIE 7.

At the 7th hour after noon I saw the ☾ in conjunction with the star in the outermost wing of Pegasus, which is in 3° 15′ ♈. The ☾ was at that time in about 5 ♈, but the diversity of aspect [aspectus diuersitas — parallax] produced the conjunction[3]. The argument for the conjunction was this: that a line drawn from the horns [apices] of the ☾ fell directly upon the star.

DIE 28 MARTIJ.

About 8 in the afternoon I examined Jupiter by eye. At first the tiny star which stands behind the heart of ♌, along the line of the Zodiac, seemed the more northerly by about the amount of the lunar diameter, and Jupiter seemed already to have passed beyond conjunction with it. For on one side it made with that star such a figure as the star below the heart makes with the heart itself — so that by whatever interval the heart inclines in antecedentia from that small star lying beneath it, by just so great an interval does ♃ also incline in antecedentia from the tiny star likewise beneath itself. And if you draw a line from the uppermost of the three in the neck of ♌ to this tiny star, which they reckon in the belly, then Jupiter seemed to be caught on that straight line. The place of the star is in 15 minuto ♌[14]. And so, since ♃ was the further forward, the place taken from the presupposed table according to Stadius appears to be true — the latitude about 20′ north.

♄, however, I saw at the same time in conjunction, in longitude about, with that tiny star which is one of the 4 in the head of ♌, the one that has the least latitude from the Ecliptic. For it kept with this star a position like the one the heart of ♌ keeps with the neck, except that it seemed to have advanced a

[3]the leaf sets `paruit` where the sense wants *parauit*.
[4]the unit word is set *minuto*, ablative singular.

little further in antecedentia; from which an almost exact conjunction could be made out, for the heart of ♌ stands further in antecedentia than the neck does. Hence it would be in 12.15 ♌ — provided the place of the fixed star has been rightly presupposed. It also stood on a straight line drawn through the said star in the head of ♌ and the middle star of the three which stand almost in a straight line in the head of Hydra. From these it will appear that the error lies more in the fixed stars than in the planet.

[DIE 29 MARTIJ].

On the following day, after supper, about the ninth hour, I observed the same bodies again. At first ♄ seemed to lie once more on a straight line with the lower of the stars in the head of ♌ — the one that is least distant from the Eccliptic, and is the smallest among the rest — and with the star that is the middle one of the three nearest to the Eccliptic in the head of Hydra, these following one upon another almost in a straight line, except that the first, which of course has the less in degrees, has the greater latitude. Next, the one I am speaking of is a little larger (though but little) than the third that follows.

The same planet was also on the straight line that was drawn through the brightest of the stars in the head of ♌ (the one, that is, which is the middle of the three that follow one upon another, and which lies between them both as regards latitude) and that star which has the greatest latitude from the Eccliptic among the three already named in Hydra, and which likewise has the less in degrees. And between this star and ♄ one further star seemed to lie still on the same straight line, as far from ♄ as that same star is from the middle one of the three in the head of Hydra. The distance between ♃ and the heart of ♌ was as great as that between the two upper ones, roughly within the mane of the crown; smaller than the two lower ones, so that the middle one is common to both.

The interval [interstitium] between ♄ & the heart of ♌ was equal to the one between that same planet and the middle star in the head of Hydra, by an approximate estimate by eye; and the space between ♃ and the topmost star in the shoulder-blade [scapula], about the hinder parts of ♌, was nearly equal to the space between the heart and ♄.

The topmost of the three in the neck of ♌, and the heart of ♌, and ♄ made an almost right angle; the distance of ♄ and the heart was nevertheless a little greater than that of the topmost in the neck

[1] In the margin is written: »Virginis«, and rightly so.

and of the heart; and the angle inclined more toward the acute than toward the obtuse, though it was nearly a right angle. Saturn's distance from the heart was moreover nearly equal to that of the middle star in the neck from the star obtained by drawing a straight line through the lowest part of the neck. The distance of the fixed stars from one another did seem slight, yet a little the greater — but I do not say precisely.

19 APRILIS.

I saw Jupiter, which appeared to stand from that star in the belly of ♌ at a distance equal to the interval [intercapedo] between the two stars in the feet of the Great Bear — the middle one of the three belonging to the feet, where in each case two are paired. He also seemed to take up nearly the same position with respect to the Zodiac as the lower or more southerly of that pair holds to the upper, more northerly one in the foot, except that he seemed to come nearer to sharing a longitude on the Zodiac with that little star than those two in the foot of the Great Bear do. The distance therefore between ♃ and this star is about 55, Jupiter being the more northerly star and advanced further in antecedentia by about 15 minuta.

ANNOTATIONES INTERIECTÆ.

For the two following years no observations by Brahe survive; in their place there followed in the codex annotations of one sort and another.[1]

Eclipsis ☾ Anni 1565

H	M	H	M
14	1	13	37
Dimidia Dur.		dimidia dur.	
1	39	1	38
Ergo tota duratio		tota duratio	
3	18	3	16
Puncta Eccliptica		puncta eccliptica	
11.14		11.20	
Ad Augustam Vindelicorum		Ad Venetias	

Ex tabulis Alphonsinis

[Note set in reduced type in the right-hand part of the text block, beside the group above:]

In Volume II of the *Letters*, printed some way but never published, at fol. 54, Tycho Brahe writes that at the time of this eclipse he was still staying at Leipzig for the sake of his studies, and that he had predicted from this eclipse a rainy season with damp meteors. In the following year, 1566, another eclipse of the Moon was seen on 28 Oct.; Tycho Brahe took up the description of its approach in heroic verse and posted it in the ceremonial hall of the College at Rostock, where he had then crossed over for his studies. In those verses he had foretold the death of Suleiman, Emperor of the Turks. And a few weeks later there followed the report of that tyrant's death — which had, however, preceded the eclipse by some days. And so Tycho was at once praised and laughed at, as a prophet by accident. He defends himself, though, at fol. 51 of the said book, adducing Suleiman's nativity [Genesis], in view of which he had

predicted his death — although he also excused himself for this credulity once he had come into a riper judgment.[2]

EX ANNO 1567.

Mercator in his new *Chronologia* writes that the beginning of the ☉ eclipse of 1567 was at hora 10 min. 25 and its end at hora 1 min. 0 at Duisburg, and therefore its middle at hora 11.43, the whole duration h. 2.35.

At Rostock it was a little after the eleventh hour.[3]

[1] So in the codex. Of these annotations we have transcribed here only those which treat of astronomical matters.

[2] Compare Vol. I p. 135 of our edition on this prediction. Tycho left Leipzig on 17 May and returned to Denmark; but since he was at Leipzig again at the time of the eclipse of 7 Nov. 1565, it follows that he soon went back to Germany — which we know from no other source.

[3] In his book on the optical part of astronomy (Op. II p. 316) Kepler writes: »Tycho Brahe says, in a letter to Clavius [Christoph Clavius], that as a young man he observed this eclipse at Rostock on the shore of the Baltic Sea at almost exactly midday, of not quite 7 digits. And in the *Progymnasmata* it stands as h. 12.0′, digits 6.29′ [the Progymn. book has 6.20], as the calculation too yields. In another slip, however, I found h. 11.0′, digits 9.0′«. Kepler treats of this eclipse again in a letter to Ioannes Remus in the year 1629 (Op. VI p. 70), in the words that follow: »Tycho, on the reverse of the leaf which the observations of the year 1569 followed, wrote in the briefest words — since he left no other observations from the year 1567 — that Mercator had reported for Duisburg the beginning h. 10.25′, the end h. 1, the middle h. 11.43, the whole duration h. 2.35′; and he adds that at Rostock it was a little after h. 11, at Tübingen or Esslingen dig. 10, at Rome central. In the *Optics* I followed other slips, which contained computations from Tycho's reckoning, in the hand and reckoning of his student Seiffart, a physician«. In our codex the annotation »Ex anno 1567« is found on a recto leaf, on the verso of which the observations of the year 1568 begin, and the words »Tubingæ vel Eßlingæ dig. 10, Romæ centralis« are not to be found there. Perhaps Kepler did not use our codex, but the earlier one, written in Tycho's own hand while observing, which now no longer exists.

OBSERUATIONES SYDERUM FACTÆ ANNO CHRISTI 1568 IN HORIZONTE ROSTOCHIENSI.[1]

[Observations of the stars made in the year of Christ 1568 in the horizon of Rostock.]

DIE 2 JANUARIJ.

In the morning, about the sixth hour. ♃ and the heart of ♏, were in the same vertical circle, but ♃ appeared the more northerly than that star by about the length of one man; and a line drawn from the bright star of the Northern Crown through the body of ♃ was seen to fall on the heart of Scorpius.

At the same time ♄ was distant from the little star set between the head and the breast of ♍ by as great an interval as there is between the two in the forward foot of the Great Bear, or a little more.

DIE 10 JANUARIJ.

At hora 6 before noon. By inspection with the eye I saw ♂ standing on a straight line drawn from the northern claw [chele] of Cancer through the northern Ass into the middle of the space between Praesepe and the southern Ass, and distant along that line from the northern Ass toward the north by as great an interval as the one seen between the two in the forward foot of the Great Bear (namely 1° 30′). And so I plotted on the plane the places of the fixed stars as verified against the precession of the vernal equinox at this time (which is 27° 46′), and I find the place of ♂, worked out from the foregoing, at about 1° 10′ ♌, with a northern latitude of 4° 5′.

Nota. ♂ was near the ☍ of the ☉. The Alphonsine calculation from Cypr. Leo. Eph. gives ♂ 28° 2′ ♋; the Prutenic calculation from Stadi Ephem. gives ♂ 3° 13′ ♌. The place of the observation therefore exceeds the Alphonsine motion by about 3 gradibus, and precedes Copernicus's calculation by 2 gradibus. The latitude of both calculations, however, agrees nearly with the observation.

DIE 18 JANUARIJ.

About the middle of the following night ♂ stood on the straight line drawn through the bright stars of each Dog, on which the northern claw of ♋ and the southern foot also fall; and with a straight line drawn besides from the head of the lower ♊ through the star ♂, that line fell below the heart of ♌ by about two degrees, so that the star of the heart was the more northerly.

DIE 19 JANUARIJ.

About 10 P. M. we observed, by the help of the astronomical Radius, the distance of ♂ from Canis Minor 21° 33′, and from the heart of ♌ 26° 40′; the distance of the stars 37° 0′.

And ♂ appeared to be on the straight line that was drawn from the head of the lower ♊ to the northern Ass, and a little beyond the line drawn from the northern claw through the southern foot of cancri. And on the line drawn from the Ass M. through Praesepe toward the north as well. But he had gone a little out beyond the line of each Dog.

OBSERUATIONES PER RADIUM IN NOCTE QUÆ SEQUITUR DIEM 25 JAN.

SEQUENTES OBSERUATIONES SUNT MATUTINÆ.

[Observations with the Radius in the night which follows the 25th day of Jan. — The following observations are morning ones.]

The distance between Spica of ♍ and ♄ 21° 50′; the distance between Arcturus and ♄ 35° 30′.

And ♄ was distant from the second star after that one in the wing of ♍, which is of the third magnitude, 7° 52′. The place of the star, however, 4° 15 ♎ with northern Latit. 2° 50′ — such as ♄ also nearly had.

[1] Langebek the historian, in the book entitled »Danske Magazin« (II p. 179, 1746), says that Tycho wrote these verses before the observations of the year 1568:

> Tempora labuntur, tacitisque senescimus annis, Et fugiunt, freno non remorante, dies.
> [Time slips away, and we grow old with the silent years; and the days flee, with nothing to rein them back.]

But in our codex these verses are not found.

Distance at the same time

between Canis Minor and ♂	20ᵍ 50′
between the lower one in the head [Cap] of ♊ and ♂	8 8
between ♂ and the southern Ass	8 52
between the heart of ♌ and the place of ♂	29ᵍ 0

between ♃ and the uppermost of the three of Scorp.	9 15′
between ♃ and the heart of Scorpio [cor Scorpij]	5 52
But the distance of ♃ and ♀	28 15

The places of these stars at the time of observation

	According to the Alphonsine calculation, from the ephemerides of Cypr. Leovicij	According to the Prutenic calculation, from the Ephemerides of Stadius	According to the observations
♄	27ᵍ 22′ ♍ R. lat. 2ᵍ 27 B	26ᵍ 25′ ♍ R. lat. 2ᵍ 9′ B	26½ ♍ beyond two gr.
♃	4 59 ♐ dir. — 1 4 B	6 27 ♐ dir. — 1 4 B	6½ ♐ Lat. beyond 1 gr.
♂	22 16 ♋ R. — 4 4 B	27 19 ♋ R. — 3 40 B	
♀	4 0 ♑ dir. — 4 13 B	5 40 ♑ dir. — 3 30 B	

DIE VLTIMO JANUARIJ.

The distance of ♂ from the lower one in the head of ♊ 6ᵍ 44′. Moreover ♂ stood precisely on the straight line drawn from the head of the lower ♊ through Mars into Praesepe.[1]

DIE 1 FEBRUARIJ.

At hora 8½ after noon ♂ was distant from the lower head of the Twins gr. 6 scrup. 16, and it stood on the straight line drawn from that same head of the Twins through the middle of Praesepe and the southern Ass.

FEBRUARIJ DIE 7 SATURNI

the distance of ♂ and of the lower one in the head of ♊ was observed as 5^{g} 24^{m}, and the line drawn out from the head of that same ♊ to the southern Ass [meridionalem] lay a little further east than ♂ itself, so that ♂ seemed already to have passed beyond that line by its retrograde motion.

On the same day it was distant from Canis Minor, at about the ninth hour after noon, gradibus 20 minutis 12. But the distance from the bright star in the feet of the Twins is gr. 21 min. 53.

[1] In the margin is written: »These had been cancelled by an erasure«.

ASTRONOMICÆ OBSERUATIONES FACTÆ A ME AUGUSTÆ VINDELICORUM 1569.

APRILIS DIE 14.

At hora 9 p. m. ♀ appeared to be on the straight line which is drawn between both horns of ♉ — that is, between the outermost stars in them — but it had gone a little out beyond the straight line toward the east. It was moreover distant from the more northerly horn, the one that is shared with the foot of Erichthonius, 2^{g} 55^{m}.

From these I gathered the place of ♀ in 17^{g} and about 25 minutorum of ♊, with a northern latitude of 2^{g} and about 5 minutorum; according to the Alphonsine calculation ♀ at that time 17^{g} 49′ ♊, 2^{g} 7′ Sep. It agrees, moreover, with the observation [recte: *obſeruationi* for *obſeruatione* — Corrigenda, p. 429]. According to Stadius in his Ephemerides it was in 16^{g} 50′ ♊ with latitud. 2^{g} 37′ Sept. And so it was in longitude one degree ahead, and in latitude ½ degree in excess.

♄ moreover was at the same time very close to the third star in the left wing of Virgo, whose place is in 4^{g} 17′ ♎ with a northern lat. of 2^{g} 50; but that star itself was the more southerly, by the amount of one palm — about ten minutes, as I judge. Nor was there yet a ☌ in longitude, because the line drawn from the pole of the Zodiac through the star left ♄ a little to the east; but at about hora 9 it seemed to me to be precisely on one vertical circle with the star already named, and the ☌ could come about on the 15th, or at the latest on the 16th, by its retrograde course. The star's verified long. 4^{g} 8′, lat. 2.50. You can in some way use this place of ♄ for an acronychal consideration, by counting his motion backwards to the middle of March.

DIE 23 APRILIS.

♄ had passed beyond that first star in the wing of Virgo by about the amount of the semidiameter of ☽, but it did not have the same latitude; rather it was the more southerly than that star itself by about 10 M.

At hora 7 M. 40 in the evening ♀ was distant from ☽ 41^{g} 45^{m} toward the west. ☽ moreover did not then have a great parallax.

DIE 5 MAIJ.

At hora 8¾ after noon ♀ made an isosceles triangle with both heads of ♊; it was moreover distant from each of them toward the west 8 gradibus 35 minutis, or a little less. Long. of ♀ about 18 ♋, lat. 2^{g} 8′ Sept.

At hora 10 I observed more accurately the distance of ♀ from those same stars, and I found it 8 gr. 30 minutorum; but the distance of ♄ from the star mentioned above in the wing of ♍, which is in 4^{g} 17′ ♍, 50 minutorum or a little more.

Nota. ♀ was near its greatest departure from the Sun.

DIE 17 MAIJ.

At hora 9½ P. M. ♀ had gone out beyond the straight line which is drawn from the heads of ♊ toward the east, by about half the diameter of ☽; it was moreover distant from the lower one toward the south 5^{g} 35′.

♄ moreover was distant from the above-named star of ♍ toward the west nearly 1 gr.

DIE 19 AUGUSTI.

At hora 3 after midnight I saw ♂, and it was on the straight line which is drawn from the star of 3 mag. in the left side of the hinder Twin and the star in the left armpit of the same Twin; it was moreover distant from the former toward the east by about a space equal to the one between the two little stars in the forward right foot of the Great Bear. It was, moreover, of small magnitude, inasmuch as it was very far from the earth.

DIE VLTIMO AUGUSTI.

At 2¾ hours of the night I observed ♂ and ♀ in this way. Mars had not yet reached the straight line drawn through both heads of the Twins, but he was a little west of that line; he was, however, 7^{g} 5′ from the lower head of ♊. ♂, ♀ and Canis Minor formed a triangle that was to the eye nearly equilateral; the interval between ♀ and Canis Minor was 19^{g} 40′, the distance between ♂ and Canis Minor 17^{g} 20′, between ♂ and ♀ 15^{g} 58′. At 3 hours of the night ♂ was in addition distant from the bright star in the feet of ♊ by gradibus 20 15 minutis; ♀ was distant from the same star, towards the east, by 33 degrees 30 minutes.

DIE 2 SEPTEMBRIS.

☾ was in the same latitude as the eye of ☿, but was 2^{g} 18′ west of it. ♀ had by then risen and stood 4^{g} 1¾′ above the horizon, at about as great an altitude as the distance between the two stars in the shoulders of Orion; the hour was then 3^{H} 10^{M} in the morning.[1]...

Mars appeared to be very nearly on the straight line drawn through both heads of ♊, or a very little in front of it; he could have been at most 10 minutes in front. He was, however, 7^{g} 45′ from the lower head, towards the east....[2] A line drawn from the line through Aldeboram fell on the body of Mars, which was far distant from it.

At the stroke of the 4th hour ☾ was 1 gr. 45 from the said star, and was without parallax. The altitude of the heart of ♌ above the horizon was 6½^{g}.

A little after 4, ♀ was 18^{g} 35′ west of the heart of ♌. The altitude of the heart of ♌ was nearly 11 degrees. The distance between the eye of ☿ and ☾ was exactly 1^{g} 35′ — trust this one.[3] At hour 4 M. 25 the distance was 1^{g} 35′.

At hour 5 I again could make out nothing with the eyes and the rule beyond that Mars was exactly on the straight line drawn through the stars of both ♊; he was, however, 7^{g}50′ from the lower one, about as before. But it was a little too bright, because of the dawn.

In all these observations of ☾ with Aldebora I took, by the instrument, that limb of ☾^{æ} which lay nearest to the star; so for the distance of the centre of ☾ from the star the semidiameter of ☾ must everywhere be added.

The reckoning of ☾ from the Prutenic tables for hour 3.4 PMN of the day, in equal time and on the Regiomontane meridian of Prußia.[4]

☾ from the mean ☉	4^{s} 10^{g} 7′30″
from the first ♈ star	0 32 51 7

from the equinox	1^{s} 0^{g} 38′ 30″
♊	0 38 30

The first degree of ♍ was rising when the altitude of the heart was 6½; ☉ was in 18^{g} 10′ of ♍. It was therefore hour 1 min. 33 before the rising of ☉, that is, hour 4 with 6 minutes after midnight. The equation of time is 9 Min. to be subtracted, so that apparent time may be turned into equal time; the equal time was therefore H. 3 M. 57 P. M. N. The observed place of ☾ was 1^{g} 47′ of ♊. The place of ☾ from the Prutenic tables was 0 37 of ♊; the difference was 1 10.

A test of the observation made at H. 4 exactly, on the distance of ☾ from the star — 2 degrees exactly, that is, with the semidiameter of ☾ added to the observation written above: the equated time by the Alphonsine tables is hour

3.40, the place of ☾ 0^{g}37′, the daily motion 12^{g} 10′. The place of the star would therefore be in 2^{g} 37′; but at hour 4 it appeared visuali[5] with the star.

From Stadius's *Ephemerides*: the time reduced and equated is hour 3^{H} 24^{m}, that is, by subtracting 26′ for the meridian and 10′ for the equation. The daily motion of ☾ is 12^{g}

[1] Here in the middle of the page is written: »A gap, because the leaf is torn«.

[2] Again it is written alongside: »A gap, because the leaf is torn«.

[3] In the margin is added: »This observation is the best«.

[4] We have omitted the particulars of this calculation.

[5] In the margin: »usuali, forte«.

35′, the place of ☾ in 1^{g} 48′. The place of the star would therefore be in 3^{g} 48′ of ♊, which agrees with Copernicus's note; the latitude of ☾ 4^{g}48½′, the parallax in latitude nearly 25′, but none in longitude, because the Moon was exactly on the circle of 90 degrees...[1].

VLTIMO SEPTEMBRIS.

At hour 5 in the morning, ♀ was from the heart of ♌	6^{g} 35′
from the bright star in the neck of ♌	12 0
Distance of the stars from each other	8½
At hour 6, distance between ♂ and the heart of ♌	15 45

Distance of ♀ from the heart, 6^{g} 40′ — trust this.

Set beside those same lines, in a narrower block to the right:

The place of ♀ in 0^{g} 10′ of ♍. lat. 1^{g}¼ southern ♂ 8^{g} 0′ of ♌ — but I doubt this.

DIE 7 NOUEMBRIS.

At hour 5 in the morning.

♂ was from the heart of ♌, towards the east	4^{g} 35′
At hour 6, ♀ from ♄ 5^{g} 55′ towards the east.	
♄ from Spica	4 25

Set beside those same three lines, in a block to the right:

Observation: ♂ in	28¼ ♌
Stadius	28 50 ♌
Alphonsus	26 53 ♌

DIE 9 NOUEMBRIS.

At hour 4 in the morning, ♂ from the heart of ♌	5^{g}20′ towards the east, sure
♂ from the middle star in the neck of ♌	8 40 sure
Of the stars from each other	8 20 but of this I am doubtful

Set beside those same three lines, in a block to the right:

Copernicus	29.45
Observation	29 0
Diff a	45

But Mars was on the straight line drawn from the neck of ♌ to the star in the belly of ♌ that follows the heart. He was, however, further north of the belly than the heart of Leo is from the little star below it, and less far than the two bright stars in its head are from each other. By observation, 2^{g} 20′, and reliably enough.

[Nota.^{2} Taking the place of the heart of ♌ as 23^{g} 52′, as it then was by our own restitution, the longitude of ♂ comes out 29.4 ♌].

The precession of the equinox is 27^{g} 50′; the heart of ♌ 23^{g} 40′ ♌, lat. 0 10 north; Med. in the neck 23 20, lat. 8 30 north; the star at the beginning of the belly, in the haunch of the left fore-foot, 0 20 ♍, 0 10 south; Spica ♍ 17 50 ♎.

The place of ♂ by this observation is 28^{g} 45′, or rather 50, of ♌, with a northern latitude of 45, or up to min. 40 above one degree. Trust this observation.

♂ by the observation	28^{g} 50′	1^{g} 40′	a good observation
by the Alphons. calculation	27 45	1 35	
by Stadius	29 44	1 45	

At the stroke of the fourth hour ♀ appeared at about as great an altitude above the horizon as the distance of the two brightest stars in the neck of ♌.

At hour 5ta the distance of ♄ and Spica 4^{g} 25′; the distance of ♀ and ♄ 3^{g} 35′ or 40. The distance of ♀ and Spica 5 25 or 30.

So if the place of ♄ is taken as 18^{g} ♎, by the Prutenic calculation its latitude will be 2^{g} 20′ north, and the apparent place of ♀ 14^{g} 25′ ♎ with a latitude of 1^{g} 55′ north.

Calculus Alphonsi

♀	14.3 ♎	1ᵍ 39 S
♄	18 11 ♎	2 9 S

Iuxta Stad. Ephem.

♀	13.59 ♎	0 35 Sept.
♄	17.59 ♎	2 5 Sept.

DIE 11 NOUEMBRIS.

At an hour between 3 and 4. Mars was not yet exactly in conjunction in longitude with that small star in the belly of ♌, because the lines from him to it and from the neck to the heart of ♌ were not altogether parallel; rather, the line from Mars to the star inclined a little, on the upper and more northerly side, towards the former line. The distance was, however,

[1] It is written alongside in the margin: »It could not be read«.

[2] In the margin: »These were written in later«.

2ᵍ 5′ between ♂ and the star, and between ♂ and the heart of ♌ 6ᵍ 20′ at the most, but at the least 6.15 — 6.20, though, is the best. ♂ was exactly at the beginning of ♍ at hour 4 in the morning on the 11th.[1]

At hour 4, ♀ and ♄	1ᵍ 30′
♀ and Spica	4 20

♄ and Spica	4ᵍ 25′
At hour 6, ♀ and ♄	1 35

♀, ♄ and Spica formed an isosceles triangle. ♄, Arcturus and Spica lay in one straight line.

♄ from Arcturus	29ᵍ 50′
Arcturus from Spica	34 20

Standing between the two blocks, in a reduced fount and spanning both of their lines: True distance: 34.20 / but truly 33½

♂ from ♀	48 10
But at hour 6, more truly	46 55

The next three lines stand as **four separate blocks side by side, each under its own heading**, and they are kept apart here because the leaf sets them apart. The rows of the four blocks run in the same order.

Block 1, headed `Locus` [The place]:

♄	18ᵍ 10′ ♎	2ᵍ 25′ Sep.
♀	16 40 ♎	2 5 Sep.
♂	29 45 ♌	1 50 Sep.

Block 2, headed `Iuxta Stadium` [According to Stadius]:

18 12 ♎	2 3 Sept.
16 18 ♎	0 41 Sept.
0 38 ♍	1 47 Sept.

Block 3, headed `Iuxta calculum Alphonsi` [According to Alphonsus's calculation]:

18 23 ♎	2 10 Sep.
16 22 ♎	1 42 Sep.
28 37 ♌	1 40 Sep.

Block 4, headed `Iuxta veram obseruationem et correct. instrument.` [According to the true observation and the correction of the instrument]:

18 5 ♎	2 15 Sept.
16 35 ♎	1 55 Sept.
29 40 ♌	1 50 Sept.

[When the places of the fixed stars have been corrected, and the smaller distances between the planets and those stars — the ones prescribed above, upon which only slight parallaxes fall, or none at all, the instrument having been liable to such parallax — have been laid down on the great globe, the planets' places of this kind are deduced from them.

♄	Longitude 17 52 ♎	Latitude 2 26 B
♀	16 24 ♎	2 11 B
♂	29 57 ♏	2 10 B][2]

[DIE 12 NOUEMBRIS].

On the following day, at about 6 in the morning, I was watching, and I saw ♀ so close to ♄ that I could not take their distance with the instrument. ♀ was very nearly touching the body of ♄ with her rays, and their conjunction was not yet complete. Their distance was such as the semidiameter of ☾, or, to the eye, a little greater, and ♀ was a very little further south than ♄ himself; by observation, though, she was exactly 4 degrees from Spica. The distance was about 20 minutes.[3]

TABULA PARALLAXIUM INSTRUMENTI, CUIUS VSUS FUERAT AUGUSTÆ IN CAPIENDIS STELLARUM DISTANTIJS[4]

[Table of the parallaxes of the instrument which had been used at Augsburg in taking the distances of the stars.]

G	Parallaxis	G	Parallaxis	G	Parallaxis	G	Parallaxis	G	Parallaxis	G	Parallaxis
1	0° 2′ 17″	11	0° 25′ 12″	21	0° 48′ 7″	31	1° 11′ 2″	41	1° 33′ 57″	51	1° 56′ 42″
2	0 4 35	12	0 27 30	22	0 50 25	32	1 13 20	42	1 36 15	52	1 59 0
3	0 6 52	13	0 29 47	23	0 52 42	33	1 15 37	43	1 38 32	53	2 1 17
4	0 9 10	14	0 32 5	24	0 55 0	34	1 17 55	44	1 40 50	54	2 3 35
5	0 11 27	15	0 34 22	25	0 57 17	35	1 20 12	45	1 43 7	55	2 5 52
6	0 13 45	16	0 36 40	26	0 59 35	36	1 22 30	46	1 45 25	56	2 8 10
7	0 16 2	17	0 38 57	27	1 1 52	37	1 24 47	47	1 47 42	57	2 10 27
8	0 18 20	18	0 41 15	28	1 4 10	38	1 27 5	48	1 50 0	58	2 12 45
9	0 20 37	19	0 43 32	29	1 6 27	39	1 29 22	49	1 52 17	59	2 15 2
10	0 22 55	20	0 45 50	30	1 8 45	40	1 31 40	50	1 54 35	60	2 17 20

[1] The scribe notes here: »Here there appears the trace of a leaf torn out; I do not know whether it had writing on it«.

[2] In the margin is written: »These things were added in the hand of Christiani Severini much later«.

[3] Here the scribe of the codex adds the following sentences: »There followed here a table of the minutes to be subtracted from an observation on account of the instrument, but that one had been struck through with lines, and beneath it was added: 'No — this table does not belong here, but to the instrument I used on the new star'. And these words too had been struck through with lines; the following Example, however, was added beneath and not deleted«. There follows in the codex an observation of the new star made on the day of

Pentecost in the year 1573, after which is written: »The following were again written out in the hand of Christiani Severini«. On the next leaf the Table of Parallaxes is written.

[4] Above these lines is written: »In the hand of Chr: Severinj«.

N. B. The preceding table of the parallaxes of the instrument was drawn up for the observations made on the planets in the year 1569, in the month of November, on the 11th day, between the 3rd and 4th hour. In these, once the places of the fixed stars had been corrected and laid down on the great globe, the true distances come out in the following way.

I. Between Arcturus and ♄ 28 37′ True distance on the globe Observed dist. between the same 29 50 Parallax of the instrument 1° 13′ subtr. II. Between Spica and Arcturus 33 2 on the globe Observed distance of the instrument 34 20 Parallax of the instrument 1 18 sub.

N. B. The divergence of these distances is the better suited to the purpose because it holds between fixed stars taken against one another.

III. Between ♀ and ♂ 46 26 on the globe Observed distance 48 10 Parallax of the instrum. 1 44 sub.

Since these divergences have fixed the limits, the parallax is set at 48 degrees as 1° 50′, and the rest of the table is built up proportionally to that figure.

But this correction of the instrument by the preceding table does not answer for the limiting of all distances — for distances taken with the same instrument within 20 degrees fall short of the true ones by 3 or 4 minutes for the most part, and some by one minute only, as may be seen below. The instrument is therefore believed to have been liable to a twofold error, and so to have needed a twofold correction as well.

IN DISTANTIJS.

[In the distances.]

At about 20 degrees the parallax is found to be one minute, to be added.

At about 10 degrees, 4′ is to be added for the parallax. At 5 degrees the parallax is found to be 5 min., to be added. This deviation of the instrument has been detected for the most part in these smaller distances; but it is not always in a like proportion at the same degrees, as may be seen below.

ANNO 1570 ÆTATIS 24, AUGUSTÆ VINDELICORUM.

STELLARUM FIXARUM LOCA[1]

The places of the fixed stars whose use had served in observing the planets at Augsburg, which are set upon the great globe [Globus magnus], for rectifying the instrument whose use had likewise served there.

ANNO 1570 AD INITIUM FERE.

Nomina Stellarum	Longitudo	Latitudo
The bright star of the neck of ♌	23° 32′ 20″ ♌	8 47½ B.
The lowest of the three of the neck	21 54 ♌	4 51½ B.
Cordis ♌ [the heart of ♌]	23 52 ♌	0 27½ B.
The star after the heart, in the belly of ♌	0 22 ♍	0 8 B.
The 22ª of ♌, or the southern one of the haunch	7 24 ♍	9 41½ B.
The tail of ♌	15 37 ♍	12 18 B.
The third of the southern wing of Virgo	4 10 ♎	2 49⅔ B.
23 ♍, or the one in the southern foot	28 25 ♎	2 57½ B.
The navel of ♍, or the one in a straight line with the 4 of the head and with the girdle	14 56 ♎	8 10⅙ B.
The fifth of the wing of ♍	12 10 ♎	1 45 B.
Arcturus	18 12 ♎	31 3 fere B.

DIE 7 JANUARIJ[2]

At hour 6 in the morning I observed the distance between ♄ and Spica ♍: 6ᵍ 5′. The latitude of ♄, gathered from earlier observations, was 2ᵍ 40′ north. From this I derive the true place of ♄ by the sides of a right-angled triangle, two of which are known; from these the third will become known, following the penultimate proposition of the first book, in this way:

Diagram. A right-angled triangle drawn in the right-hand part of the measure, alongside the two lines that follow, with the prose set around it. The right angle stands at the lower left, marked by a pair of short strokes forming a square corner; the vertical leg rises from it to the upper vertex, and the horizontal leg runs right from it to the lower-right vertex. The hypotenuse joins the two outer vertices. Labels, as read on the leaf:

- Upper vertex (top of the vertical leg): the sort ♄, with a six-pointed asterisk beside it

- Lower-right vertex (right end of the horizontal leg): a six-pointed asterisk, with `Spica` beside it
- Vertical leg, set turned and read upward, outer of the two: `Q. 78400`
- Vertical leg, inner of the two: `R. 280`
- Hypotenuse, upper of the two: `Q. 133225`
- Hypotenuse, lower of the two: `R. 365` [a small raised mark follows the figure and is unresolved]
- Horizontal leg, above the line: `R. 234 fere.`
- Horizontal leg, below the line: `Q. 54825`

Nothing stands at the lower-left vertex so far as can be seen on the leaf; that is reported as observed, not certified. The figure carries no caption.

The distance between ♄ and Spica in longitude therefore comes out at 3ᵍ 55″ or thereabouts. So let the place of Spica be at 17ᵍ 48′ ♎, and the place of ♄ in longitude will be at 21¾ ♎ or so. Stadij Ephemerides give 22ᵍ 10′, Leovicij 22ᵍ 17′.

The same day in the evening, about nine, I observed ♂, which by the Ephemerides Stadij was stationary that day, and I saw that its distance from the heart of ♌ was 20ᵍ and a half, or nearly so. I then noticed that the star in the tail of ♌ and the southern one in the haunch, of the 3rd Magnit., made a nearly equilateral triangle with ♂: the distance of Mars from each of the two stars was exactly 8¾ grad., while that of the stars from each other was a little less — about 8ᵍ 25′. The place of the tail of ♌: 15ᵍ 38′ ♍, 11.50 B. The star in the haunch, Merid.: 7ᵍ 28′ ♍, 9.40 B.

I saw besides that a straight line drawn from this last star, the one in the haunch, through the one that follows it towards the south in the hinder thigh, of the third magnitude, which stands at 11ᵍ 28′ with lat. 5.50 B, fell upon ♂ so far as sight goes, or nearly so; and its distance from this last star was 3ᵍ 10′. ♂ was besides distant from the star in the hollow, or the hinder knee-joint, which stands at 12ᵍ 48′ ♍ with lat. 1ᵍ 15′ B, by observation about 2ᵍ 25′. That star was further south than Mars, and Mars made with it and with the one preceding an angle a little greater than a right angle, to the eye.

I gather, however, from these observations that on 7 January the place of ♂ was at 13ᵍ and

[The sentence breaks off at the foot of this page and is carried on at the head of the next.]

[1] Above it is written: »Hæc quoque manu Christ: Severini a novo initio post aliquot folia interiecta vacua«. [”This too is in the hand of Christ: Severini, from a fresh start after several leaves left blank in between.”]

[2] In the margin: »Manus Tychonis«. At the top of the page is written: »Vera æquinoctij præceßio ad initium anni 1570 0ˢ 27ᵍ 47½«. [”The hand of Tycho” … ”The true precession of the equinox at the beginning of the year 1570: 0ˢ 27ᵍ 47½.”]

40[1] minutes of ♍, together with a latitude of 3½ north; it was stationary, and was beginning to become retrograde. From Leovitio the place of ♂ is 11.4 ♍, 3.30 B, Retrograde; from Stadio 15.30 ♍, Retrograde 3.20.

DIE 10 JANUARIJ

I again observed the distance of ♄ and Spica: 6[g] 10 minutes, exactly.

DIE 11 JANUARIJ

A little after 6 in the morning I observed the distance of ♄ from the 3[a] star in the wing of ♍, the one beside the girdle, of the third magnitude; the distance was 17[g] 42′, and ♄ had nearly the same latitude as the said star. I saw besides that ♂ was distant from the same star by about 20[g] 37′, and that it too had nearly the same latitude. Besides, between the heart of ♌ and ♂ there was a distance of 20[g] 13 minutes; but at the time of these observations the sky was not so very clear, and the stars did not show perfectly.

DIE 13 JANUARIJ.

Between ♂ and the tail of ♌	8[g] 35′
Between ♂ and the star spoken of above, the one in the back of ♌	8 15
Of the stars from each other 8[g] 25′. ♂ from the heart of ♌	19 40

— or a little more, yet not beyond 45. These observations sufficiently precise.

DIE 14 JANUARIJ.

Between hour 10 and 11 in the evening the distance of ♂ and the heart of ♌ was 19[g] 45′ — trust this one. Besides, ♂ was distant from the star in the left wing of ♍ by 20[g] 52′ towards the west; also a good observation. These observations are better than the preceding ones made on day 13.

After eleven, ♂ from the tail of ♌ 8[g] 30′ exactly

Between ♂ and the star in the back, 3 magn. 8 12.

Trust all these observations, because they are precise; the sky was altogether clear.

DIE SEQUENTI QUI ERAT 15 JAN.

I again observed ♂ and ♄ between hour 5 and 6 in the morning, in this way.

Between ♂ and the little star in the hinder thigh of ♌, which stands at 12.48′ and lat. 1[g] 11′ B: from this it was distant 2[g] 20′. Besides, between ♂ and the star above the hips of ♌, of the 3[tiæ] magnitude — the more southerly of the three above the hinder feet — about 3[g] 47′; but this last is doubtful.[2]

Besides, between ♂ and the more southerly of the two preceding stars in the head of ♍, about 5[g] 0′. That star was further north than Mars, and ♂ made with it and with the two just named such a figure as this.

Diagram. A small figure set **into the left-hand part of the measure**, the prose of six lines being narrowed and set to its right. It is a reproduced hand-drawn sketch, not type: the star marks are irregular hand-drawn asterisks, the lines are pen-drawn, and the labels are in a cursive hand, the whole reproduced as a line block. Seven star marks stand in it. Three stand loose at the upper left, joined to nothing and carrying no label. Four are joined — called A (left), B (right), C (centre) and D (bottom) here for reference only, since the figure prints no letters — by six lines, one joining each pair of the four; the lines from A and from C toward D stop just short of D. The sign ♂ is drawn immediately above the centre star C, its upward stroke touching the line A–B. Labels, in the cursive hand, as read on the leaf:

- Left star (A): `Stella` / in `cap.` ♍ (set on two lines; a point after `cap`)
- Right star (B): `Stella 3^a^` / `mag. sup. post` (set on two lines; points after `mag` and `sup`, none after `post`)
- Centre star (C): no label; the sign ♂ stands above it
- Bottom star (D): `Stella in` / `femore` (set on two lines)

But of the preceding observations of Mars I am not sufficiently sure in the minutes; the error, however, cannot be 5 minutes, since those stars are very small, and dawn was already up when I was observing after six.

I saw besides that between ♄ and Spica ♍ the distance was exactly 6^{g} 5′ — a good observation; trust this one.

Between ♄, besides, and the one in the body beside the girdle of ♍, of the third magnitude, the distance was 8^{g} 10′; also a good observation.

Between ♄, besides, and the third star of the third magnitude in the upper wing of ♍, which stands at 4.17 ♎, the distance was 17¾^{g}; but it was then bright dawn.

[1] In the margin is written: »vel 10, ambigua figura«. [”or 10 — the figure is ambiguous.”]

[2] The figure is not accurate. The star `3mag.` is ι Leonis; the star in the thigh is σ Leonis.

Between ♄ and ♂ as well, before the rising of ☉, I took a distance of about 39.10 minutes; but this observation is doubtful, though the error cannot be large.

According to the observations, made by means of the small preceding stars in the haunches of ♌ and in the head of ♍, the place of ♂ would be at 12½ ♍ with lat. 3½ north; and so this is a good enough observation.

DIE 16 JAN: ECLIPSIS ALDEBORÆ[1].

At hour 6 in the evening, the sky being perfectly clear, I could not make out Aldebaran, that is, the eye of the Bull, for it was at that time being eclipsed by the upper horn of the Moon. When I first saw that this star was not showing, the altitude of the bright middle one of the three in the neck [ceruix] of ♌ was 9 degrees. When the altitude of the heart of ♌ was 7¼ I could still not see it, but I believe that at that time the body of the Moon was moving off it; I could

not see precisely, however, because of the rays of the lunar body. But when the altitude of the heart of ♌ was 9 grad. 25 min., the Moon had perceptibly passed beyond the said star — by a third part, that is, of its illuminated portion. The latitude of the Moon's centre was a little further south than the star itself, by ⅔ of the lunar semidiameter.

At an altitude of the heart of ♌ of 17½, ☾ was distant from the star by the amount of its illuminated portion, and was further south than the star itself by ⅓; and a little afterwards, when the altitude of ♂ above the Horizon was 3½, I saw that the Moon was further from the star than the amount of its illuminated portion. But when the altitude of ♂ was 23½, I took with the instrument the distance of ☾ from the star, and found it exactly 1 gr., with the same lat. ☾.

Diagram. An inset figure set in the right-hand part of the measure, with the preceding paragraph running beside it at the left in a narrowed measure. A circle stands at the left of the inset; a curved line runs inside it from the label `A` at the top down to the label `b` at the bottom, cutting off the part of the disc towards the right. Three horizontal lines run rightward out of the circle, each ending in a six-pointed asterisk with a letter beside it; a further long line descends from the top of the circle, near `A`, obliquely to the right across the inset. Labels, as read on the leaf:

- Top of the circle: `A`
- Bottom of the circle: `b`
- Uppermost horizontal line, standing above the line towards its left: `h`
- Right end of the uppermost horizontal line, after the asterisk: `p`
- Left end of the middle horizontal line: `m`
- Middle horizontal line, standing above the line where it meets the inner curve: `i`
- Right end of the middle horizontal line, after the asterisk: `f`
- Left end of the lowest horizontal line: `d`
- Lowest horizontal line, standing above the line where it meets the inner curve: `c`
- Right end of the lowest horizontal line, after the asterisk: `g`

Ten labels in all; none is flagged. The figure carries no caption. A legend in small type stands beneath the figure, inside the inset, and is transcribed and rendered here:

> **Abc pars illuminata, ph distantia in alt. cordis ♌ 9.25, if dist. in alt. 17½ in lin. mi, cg dist. in alt. ♂ 23½ in lin. dc.**
> Abc the illuminated part; ph the distance at an alt. of the heart of ♌ of 9.25; if the dist. at an alt. of 17½, in the line mi; cg the dist. at an alt. of ♂ of 23½, in the line dc.

CONSIDERATIO ANTECEDENTIS OBSERUATIONIS.

First, from the altitude of the heart of ♌ — which it had when the Moon stood at the distance from the star, the line hp, 9° 25′ — I shall seek out the true hour

and minute from the tables of sines, in this way; and the quantities that must be at hand are these.

The place of the heart of ♌: 23 48′ ♌, lat. 0.10 B, declin. 13.46 Bor., compl. 76.14, sine 97127.

	Sinus
Asc. recta of the star 146.11, altitude of the pole 48 15, compl. 41.45	66588
The place of ☉ 6.10 ♒, Asc. R. 308.34	
The star's meridian altitude 55.31	82429
The star's observed altitude 9.25	16361

the whole sine is 100000

So I multiply the sine of the star's meridian altitude, which is 82429, by the whole sine, and 8242900000 is produced. This I divide by the sine of the complement of the pole's altitude, q. e. 66588, and the first result [inventum primum] is left, 123789. Next I take the sine of the star's altitude above the horizon, which is 16361, into the whole sine, and 1636100000 is produced; this I divide again by the sine of the complement of the pole's altitude, and the second result is left, 24571. This I subtract from the first result and multiply the product by the whole sine: 9921800000 remains, which I divide by the sine of the complement of the star's declination, which was 97127, and the third result is produced, 102152. From this third result I subtract the whole sine, since it is the greater, and a sine of 2152 remains, whose arc is 1^{g} 14′. To this I add the quadrant, and the star's distance from the meridian comes out at 91^{g} 14′; and this, if from the right ascension of the star, which is 146.11

[The sentence breaks off at the foot of this page and is carried on at the head of the next.]

[1] In the margin is written: »☾ was at very nearly its greatest distance from the earth, and near its greatest Meridional latitude«. [Latin, quoted in guillemets: »☾ in maxima fere a terra remotione erat et iuxta maximam latitudinem Meridianam«.]

be subtracted, there remains the right ascension of the M. C., 54^{g} 57′. From this subtract the right ascension of ☉, namely 308.34, and there comes out the arc of the equator that has passed the Meridian since noon, 106^{g} 23′; which, resolved into hours, makes hour 7 min. 5½ after noon — the time at which we made this observation. The daily motion of ☾, by observation, was exactly 12 degrees; for on the following day, a little after 7, as before, I took the distance of ☾, free of parallax, from the said star, and it was 12 gr. 5′. Those 5 minutes I take away, because in the earlier observation ☾ had passed beyond the star it stood joined to by about 5 minutes, and I took this observation exactly in the distance from the limb. The hourly motion of ☾ is therefore exactly 30 minutes.

When the altitude of the heart was 17½, I find the hour thus. The first result, as before, 123789. The sine of the star's observed altitude, 30070, I take into the

whole sine: 3007000000 comes out. The second result 45158; the difference from the first, 78631. The third result 80957, which is less than the whole sine by 19043, whose arc is 10.59; the star's distance from the meridian 79^{g} 1′. Asc. R. of the M. C. 67.10; the degrees of the equator from noon, 118.35, make 7^{H} 54′.

Left-hand block:

	Sinus
♂ 12½ ♍ 3½ Borealis	
Declination 10.7 Resp. comp. 79.53	98445
Asc. R. 165.14	
Compl. of the pole's alt. 41.45	66588
Altit: of ♂ meridian 51.52	78657
Observed altitude 23 30	39874
The first result 118125	
The second result 59882	
Difference 58243	

Right-hand block:

The third result	59163
Difference from the whole sine	40837
The arc of this	24^{g} 6′
Distance from the meridian	65 54
Asc: recta of the M. C.	99 20
Arc of the equator from the Merid.	150 45

they make
10^{H} 3^{M}

Diagram. A wide figure occupying the full measure. At the left stands a circle, with a second curved line crossing it, the two curves meeting near the top and near the bottom so that a lens-shaped area is enclosed at the left; the exact course of the second curve where it runs behind the circle is not resolved on the scan. A **dotted horizontal line** runs from the left of the circle right across the whole measure, graduated in fives and figured along its upper side `5 10 15 20 25 30 35 40 45 50 55 60 65 70 75`, the last figure standing at the right-hand end. A **dotted vertical** drops from the top of the circle to this line. Two **horizontal lines** run rightward out of the circle, the upper ending at a six-pointed asterisk, the lower at a second asterisk further to the right, and a short **vertical** drops from each asterisk to the graduated line. An **oblique straight line** runs from the top of the circle down towards the right-hand end of the measure, passing close above the two asterisks, and extends a short way to the left beyond the top of the circle. Labels, as read on the leaf:

- Top of the circle: `B`
- Bottom of the circle: `D`

- Left end of the graduated line, at the left extreme of the lens-shaped area: A
- Below the graduated line, where the dotted vertical from B meets it: H
- Below the graduated line, at the division 15, at or very near the point where the circle's right side meets it: C
- Above the graduated line at about the division 20, beside the first asterisk: E
- Below the graduated line at the division 20, where the vertical from that asterisk meets it: H
- Above the graduated line at about the division 35, beside the second asterisk: F
- Below the graduated line at the division 35, where the vertical from that asterisk meets it: I
- Right-hand end of the graduated line, standing above it: G

Ten labels in all; none is flagged. **Two of them are read as the same letter, H** — one under the dotted vertical near the left, one at the division 20 — and that is reported as read rather than reconciled. The figure carries no caption. The legend standing beneath it reads:

> **ABCD pars lunæ illuminata a ☉ et nobis conspicua. E locus stellæ in prima obseruatione 7^{H} $5½^{M}$ F locus stellæ in secunda obseruatione 7 54 G locus stellæ in tertia obseruatione 10 3**

ABCD the part of the Moon lit by ☉ and visible to us.

E — the place of the star in the first observation — 7^{H} $5½^{M}$

F — the place of the star in the second observation — 7 54

G — the place of the star in the third observation — 10 3 (repeat these computations of the hours). In the first observation the distance in longitude was 20 min., in latitude 9′; in the second, in longitude 35, lat: 6½; in the third, in longitude 1 gr. and 15 minutes, lat: none.

The hourly motion of ☾, 30′. The true conjunction was therefore at hour 6 M. 24, and ☾ was 13 min. further south than the star, in apparent time.

Calculation of the motion of ☽ from the Prutenic tables, for hour 7 after midday of the 16th of Jan., in equal time.

Simplex ☉	4^{s} 37^{p} 27′ 9″
Simplex ☽ a ☉	1 59 35 41
Anomalia ☽ simplex	0 14 59 41
Duplata a ☉	3 59 11 22
προσθαφ. sec. epicycli S.	9 27 59
Scrupula proportion.	47 29
Anomalia ☽ æquata	0 5 31 41
προσθαφ. 1 Epicycli S.	0 26 15

Excessus seq.	0^{p} 12′ 45″
Pars Pt.	10 5½
προσθαφ. absoluta S.	36 21
Dist. ☽ a simplici ☉	1 58 59 20
Dist. ☽ a 1 ♈	0 36 26 59
Vera præcessio	0 27 47 31
Dist: ☽ ab æquat.	1 4 14 0
Motus diurnus ex tab.	12 2

Semidiameter of ☽ 15 minutes, the whole diameter 30′.

The place of the star from the Prutenic tables is at 3.47½, with latitude 5^{g} 10′ south.

The equation of time is 6 minutes, to be added to the apparent time to make it equal.

At hour 6 Mto 30 in equal time, the apparent conjunction took place.

At hour 7 Mto 5½ in apparent time — minute 12 in equal time — the observed place of ☽ was at 4^{g} 8′ ♊, while from the tables it was 4.20 ♊; the difference is 12 minutes.

The place of ☽ from the Ephemerides of Leovitij is, at hour 7 after midday with 5 minutes, in apparent and unequated time, at 5^{g} 6′ ♊. The equation of time according to the Alphonsines is 1½, to be subtracted, and a motion of the Moon of one minute answers to it; so the place of ☽ at hour 7, minute 5, would be at 5^{g} and 5 minutes ♊, with latitude 4^{g} 57′ south.

Nota. From the Landgrave's observations this star is at 4^{g} 10′ ♊, and so the observed place of ☽ would have been at 4^{g} 30′; and that star has a latitude of 5^{g} 35′ south.

INUENTIO LOCI ☽ ET LONG. ☽ EX PRÆDICTA OBSERUATIONE.

In the first observation the Moon had no παραλλαξι [Greek: *parallaxi*, "parallax"] of longitude, so we shall take that observation as the easier and also the more certain. It stood at H. 7 Mto 5½ in apparent time, but at H. 7 M. 12 in equal time, and ☽ had passed beyond the star by 20 minutes. Since the place of the star is at 3^{g} 47′ ♊, the place of ☽ at the time of this observation will be 4^{g} 7′ ♊. But the place of ☽ from the Prutenic tables at that time, by our own computation, is 4^{g} 20′, and so it exceeds the motion of the observation by 13′, whereas it ought by rights to have been less, since the place of the tables is further east than the place of the observation. The error therefore lies either in the place of Aldebaran or in the motion of ☽ in the tables, for the observation cannot have strayed so far. See also the observation made in the previous year on the same star, on the 2nd of Sept., at the contact at hour 4 in the morning, with the altitude of the heart of ♌ at 6½ and at a distance of, as it were, exactly two degrees; nor was there any perceptible parallax of longitude. The observed latitude was the same. The altitude of ☽ above the horizon was… parts[1]

DIE 24 JANUARIJ.

At hour 10¼ P. M. ☽ was distant from Mars towards the east, by observation, 8¾^{g}, latitude and parallax included.

Nota, obseruat. ♂ near the ☍ of the Sun. You can use this observation in restoring the place of ♂, because it is near the ☍ of the Sun.

DIE 4 FEBRUARIJ.

At hour 10 in the evening, ♂ was exactly 4 degrees from the third and lower of the three hindmost stars of ♌. From the middle of those same three, 5^{g} 20′; and from the star following these three towards the south, which is more or less the fourth, 5^{g} 35′.

[1] The rest is wanting in the codex. A note is added: »There followed deductions of the parallax of ☽, chiefly of latitude, corrected in a tangled script by means of the 2nd epicycle and the proportional minutes, from which the observed latitude of ☽ was finally established as 5.26, while the star's latitude was 5.17½. And it appeared that this had been written out at a later time«.

DIE 15 FEBRUARIJ.

At hour 8, between the western limb of ☽ and the bright star in the feet of ♊ close to the Eccliptic, the one called [κ][1], the distance was 3^{g} and a half; and ☽ was not far from the 90^{fimo} degree of the Eccliptic reckoned from the Horizon, though it stood a little within the western quadrant. It had almost the same latitude as the star, but a little further north to the eye.

Between 8 and nine I observed the distance of ♂ from the four bright stars of ♌ in this way.

Between ♂ and

the tail of ♌	14^{g} 20′
the bright one of the three hindmost	10 0
the bright one of the neck [ceruix]	10 50
cor ♌	10 20

Lat. ♂ 3^{g} 50′ B., Longit. 3½, close to 4 ♍.

Nota. ♂ was in ☍ with ☉ on the 10th of February or thereabouts, so these observations can serve for restoring its motion. The Alphonsine computation puts the ☍ of ☉ and ♂ on the 10th, the Prutenic on the 15th, and it then makes the place of ♂ at midday 6^{g} 0′ ♍, whereas the Alphonsine has 29.56 ♌ — a difference of 6 gr. On the 10th of Feb.: ♂ Prut. 8.58, Alph. 2.5, difference 6 53.

FEBRUARIJ DIE 20

after the setting of ☉ I was at Augsburg together with P. H. and H.[2], and in the tower...[3] in order to observe the eclipse of ☽; but because of the clouds I could not see it. So we came down at hour 7 and dined with Henschio. Returning

home at hour 10, I heard from my household that they had seen it: a quarter before eight, that is, the Moon had by then gained so much that about a third part of its illumination was lit, as you see here

Diagram. A small drawn disc of the Moon, standing by itself and centred in the measure, with a line of type at either side of it. A line runs from the top of the disc to its foot, curving, and divides it unequally: the smaller portion, at the left, is left blank, and the larger portion, at the right, is close cross-hatched. The disc carries no drawn lettering, no scale and no pointer, and no caption is printed. The two flanking lines are composed type, not part of the drawing:

- At the left of the disc: `Hora 7 M. 50` — At hour 7 M. 50
- At the right of the disc: `Luna talis.` — The Moon thus.

From the Prutenic tables, for longitude 34 gr., our own computation.

Initium Ecclipsis	4^{H} 18^{M}
Init. totius obsc.	5 28
Med. Ecclipsis	6 15½
Finis totius obsc.	7 2½
Finis Ecclips.	8 13
Tempus incidentiæ	1 10½
Moræ dimidiæ	0 47
Mora tota	1 34½
Dimidia duratio	1 58
Tota duratio	3 55½

Semid. ☉	16′ 35″
☽	16 52
Umbræ	45 45
Agg. S.	62 37
	9 55
Lat. ad med.	15 38
finem	21 20
☉ 11.23.16 ♓	
☽ 11.23.16 ♍	

From the Ephemerides of Leovitij, according to the Alphonsine computation:

Initium Ecclipsis 6^{H} 6^{M}, Medium 7^{H} 53^{M}, Finis 9^{H} 40^{M}. Dimidia duratio 1^{H} 47^{M}, Digiti Eccliptici 14.28.

According to the observation by eye:

From that observation, since I said earlier that about 10 minut. before eight the Moon had emerged by a third part of its diameter to the eye. Initium 4^{H} 37′ Medium 6^{H} 35′ Finis 8^{H} 33′

DIE 23 FEBRUARIJ.

At hour 9½ or thereabouts, between ♂ and cor ♌, I took a distance of 7½^{g}.

DIE 26 FEBRUARIJ.

At hour 8 P. M. I carefully observed the star ♂ in this way.

[1] This letter was inserted afterwards. It appears to be the star γ Geminorum.

[2] The brothers Paulus and Johannes Baptista Hainzel.

[3] The name of the tower is wanting in the codex.

Between ♂ and cor ♌, 6^{g} 30′. Between ♂ and the star behind the heart, in the belly of ♌, 4^{g} 5′. From the middle of the nape [ceruix], 7 25.

From these observations, drawn out on a plane, the place of ♂ is ♌ 29 0, 3^{g} 45′ Bor., or 50. And it is a good observation. Trust this one.

Moreover, ♂ stood on the straight line drawn from cor ♌ through ♂ above the second of the three hindmost stars of ♌, quite precisely — yet in such a way that, if it had to [deviate][1] to one side or the other, ♂ lay off that line towards the south, in the Eccliptica. That deviation, however, could not have exceeded 5 minutes, but was rather less than this. — By the Pruten. reckoning [Iuxta calculum Pruten.] the place of ♂ is 1^{g} 13′ ♏, with lat. 4^{g} 16′. The mean anomaly [anomalia æqualis] of ♂ ought, by the reckoning, to be 3^{sex} 5^{g} 5′; the Prutenici have 3^{sex} 3^{g} 35′.

DIE 3 MARTIJ

I observed Mars again in this way, at about the 8th hour in the evening.

Between ♂ and the star behind the heart, in the belly of ♌	4^{g} 30′
Between cor ♌ and ♂	5 15
Between ♂ and the lowest of the three in the nape of ♌	5 55
	6 27[2]
Between ♂ and the highest of the three hindmost of ♌	12 35
Between ♂ and the middle one of the same	11 10

Nota. ♂ had not yet precisely reached the straight line drawn from the middle of the nape to the little star behind the heart, in the belly of ♌; but it was very little distant from it, and that within 10 minutes to the eye, itself...[3] Furthermore, if a straight line were drawn from the lowest of the three foremost stars of ♌ to the lowest of the 4 hindmost, the star of Mars [stood][4] on that line itself, almost to a hair. If, in addition, a straight line were drawn from the little star that is most conspicuous in the forefeet of ♌ through cor ♌, then the star of Mars passed beyond this line by 17 minutes towards the north. From these I gather the place of ♂ to be at 119¾ from the first point of ♈, and from the equinox at 27^{g} 30′ ♌, with a northern latitude of 3^{g} 35′, or at most of 40 minutes.

That same evening I took the distance between the eye of the Bull, Aldeboram, and the outermost northern horn, the one shared with the foot of Erichthonius, and I found it 16^{g} 55′. — The true one is 16 45.

Bernhardus Waltherus [Bernhard Walther] of Nuremberg observed the distance of these same stars 84 years ago with the astronomical radius, in this way: when the first sine was 17 of equal parts, the 2nd sine was 556, and elsewhere 560. Or, if the first sine is 180, the second 593. From this the distance between these two is gathered as 16^{g} 53′; but by the former, 17 grad. exactly. So our observation holds the middle, as it were, but comes nearer to the two that agree with one another.[5]

DIE 4 MARTIJ.

The hour as above. Between ♂ and the star in the flank, 4^{g} 37′. ♂ and cor ♌, 4^{g} 57′. Between ♂ and the [lowest][6] of the three foremost stars of ♌, 5^{g} 45′. Between ♂ and the second star, the middle one, in the nape of ♌, [6^{g} 20′][6].

♂ stood exactly on the straight line drawn from the middle of the nape to the star that is in the belly behind the heart. The distance of these two fixed stars I took as 10^{g} 58′.

[1] So in Bartholinus's manuscript book. Our codex A. has a lacuna.

[2] So in codex A. The figures 6.27 certainly belong to some other measurement; compare the observations of the following day.

[3] Here the scribe could not read something.

[4] So in Bartholinus's manuscript book. Our codex has a lacuna.

[5] On this observation of the year 1486 see Snellii's book »Obseruationes Haßiacæ«, fol. 32 verso. Compare also Tycho's note below, after the 25th day of March.

[6] So in Bartholinus's manuscript book. Our codex has a lacuna. See below, p. 34.

Then ♂ appeared to be also on the straight line drawn from the little star below the heart to the very small one that stands in front of the most northerly of the three hindmost stars of ♌.

Moreover, a straight line having been drawn from the lowest of the three of the nape to the small little star in front of the fourth of the hindmost, and to the lowest star of ♌ — which stands with this one and with the belly of ♌ almost in one straight line — and the most northerly of those three (for...[1] ours this one) — on that...[2] straight line the star ♂ appeared as well.

On the following day the star ♂ had passed a little beyond this line.

DIE 5 MARTIJ.

After the ninth, up to 10½. Between ♂ and —

---

the belly	4^{g} 45′
cor ♌	4 45

the lowest of the three in the nape	5ᵍ 23′
the middle one of the nape [ceruuicis]	[6 5][3]

I made all these observations three times over and found the same; they are therefore thoroughly good.

Furthermore, after the 10½ hour I observed ♄ in this way. Between ♄ and Spica there were exactly 5 degrees 20[4] minutes, on that straight line which is drawn from the star in the foot of the Crow [corui] — the one that lies below the head, towards the south — through Spica of ♍.

Between ♄ and a star of the third magnitude, which is next to the knee of ♍, at a distance of 7ᵍ 10′.

Between ♄ and a certain star of the 4ᵗᵉ magnitude, as I think, next to the feet of ♍, which stands on the straight line drawn from the...[5] wing of the Crow through Spica, the distance was exactly 8ᵍ 25′.

Between ♄, moreover, and the fourth star in the wing of ♍, of the third magn., which is next to the girdle, the distance was 16ᵍ 10′.

All these observations too are thoroughly good. I finished these observations a quarter of an hour after the 11th hour, on the 5th day of March. Use these as well for investigating the ☌ of ♄ⁿⁱ with respect to ☉.

MARTIJ DIE 8.

♂ stood on the straight line drawn from the heart to the highest and brightest of the three hindmost stars of ♌; and it was 4ᵍ 10′ distant from the heart.

DIE 16 MARTIJ.

At hour 10 in the afternoon, between —

♂ and...[6] of the three foremost of ♌	3ᵍ 40′
♂ and cor ♌	3 10
♂ and the middle one of the three foremost of ♌	5 30.

DIE 18 MARTIJ

at about the 7th hour in the evening ♂, cor ♌[7] were in one straight line as far as sight goes, and they stood little apart from one another, and the heart was in the middle; I did not take the distances with the instrument.

On the same day, about half an hour after the ninth, the place of ☽ was seen on the straight line drawn from the nape of ♌ through cor ♌; and ☽ stood two diameters of its own body from the heart, towards the south, as far as sight goes

— which deceives, for with the instrument I took the distance ἐν πλάτει from the centre of ☽ otherwise, as 2 degrees. ☽, however, could not then have had a large parallax of longitude.

♂ I did not observe that evening, because of the presence of ☽, which greatly obscured those stars of ♌ next to which it was being set.

[1] A lacuna in the codex.

[2] A word difficult to read — perhaps »nunquam«? It appears to have been struck through with thin lines.

[3] So in Bartholinus's manuscript book. The codex has a lacuna.

[4] So in Bartholinus's manuscript book. The codex offers 50 minutes. See below, p. 35.

[5] »utraque« in Bartholinus.

[6] »infimam« in Bartholinus.

[7] The name of the other fixed star is omitted in the codex.

DIE 22 MARTIJ.

At the 9th hour after noon I observed ♂, which stood near cor ♌ and the lowest of the three, in this way.

Between ♂ and cor ♌ 2^g 45′ Between ♂ and the middle of the nape 5^g 40′.

It was further from the lowest star of the nape than from the heart, but I could not get the distance precisely. ♂, moreover, had not yet reached the straight line drawn from the middle of the nape into the heart, going backwards; it was still very perceptibly distant from it towards the east. To the eye it lay roughly on the straight line drawn from the brighter star in the head of ♌ through the lowest star of the nape.

♄ and ☾. A quarter of an hour after the ninth, ☾ was seen east of Saturn at the same latitude, 1^g 35′ as to the nearest point, but 1^g 50′ as to the centre. At the contact of the tenth hour the western ☾ stood 1^g 55′ from ♄. The centre, therefore, 2g. and 10′. The observed latitude of ☾ at that time was, to the eye, more northerly than ♄ itself by just one semidiameter of ☾.

DIE 25 MARTIJ.

From the 9th hour in the evening into the 11th following I observed ♂ from the lowest of the three foremost stars of ♌: G. 3 M. 5

Between ♂ and cor ♌	2^g 35′
Between ♂ and the middle of the nape	5 40
Between ♂ and the little star behind the heart, in the belly of ♌	6 25

From these the place of ♂ is at 24^g 16′ ♌, lat. 2^g 42′.

That evening ♂ may have been exactly in conjunction with the little star that lies below the heart, being at once a little beyond it; but it stood 4^g 30′

from the said little star towards the north. Between the heart and the same star I found two degrees.

♂ lay northward beyond the straight line drawn from the brighter and hinder lowest star in the head of ♌, and the lowest of the three in the nape — but very little, at most, as I judge, 10 minut.

The body of ♂, moreover, appeared to lie on the straight line drawn from the highest and most northerly of the three hinder feet of ♌; and if any deviation from that line was to be observed, it was towards the west, but very small, seeing that it could not reach 5 minuta. It stood 9^{g} 10′ from this star in the feet.

I saw besides that the straight line drawn from the bright star of Hydra[1] through cor ♌ left ♂ to the east by very little — 10 minutes, as I judge, at most.

Between ♄ and Spica there were gradus 4 Mta 50.

DE EXAMINATIONE ET CORRECTIONE INSTRUMENTI.

N. B. Above, on 3 March, when I took the distance between Aldebor. and the bor. horn of ♉ for the sake of examining the instrument, I found it 16.53, and I thought at the time that it was right, on the ground that the observation of Valteri Norinbergenſis on the same stars, made with the radius, was given as 16.53 parts, and as 17.0 parts. That cannot hold good. For the true interval [intercapedo] of the stars, sought out afterwards with the sextant, is 16.45, smaller than both by 1/6. But in the smaller distances something is wanting from the observation made with the instrument I then used at Augsburg. For on comparing those fixed stars of which mention is made elsewhere here, I found the difference to be as follows.

	Auguſtæ	Hic per Sext.
cor ♌ and med. of the nape	10° 58′	11° 3′
cor ♌ and inf. of the nape	4 45	4 49
the heads of ♊	4 25	4 31

[These, therefore, are to be qualified in all the observations made with this instrument][2]

[1] Our codex has »Sydere« quite plainly, but it ought to be »Hydræ«, as in Bartholinus.

[2] This note is not in the codex, but is found only in Bartholinus.

DIE 28 MARTIJ.

At the ninth hour in the evening. Between ♂ and —

the lowest of the nape	3^{g} 10′
the heart	2 30

the star [in the belly of ♌][1]	6^{g} 15′
the middle of the nape	5 50

From these, the place of ♂ 24^{g} 18′, lat. 2.35 Boreal.

♂ stood a little further from the straight line drawn from the bright star of Hydra through the heart, towards the east, than it had before. From this it appears that it is no longer retrograde but has already begun to go forward, and that two or at most three days ago. I believe it was stationary on 25 March, or at the latest on the 26th — although Stadij Ephemerides make it stationary on the 28th. In these 3 days, then, the longitude of ♂ has changed by two min:, the latitude by 6.

DIE 31 MARTIJ.

I observed Mars in this way at the 8th hour after noon.

Between ♂ and the heart	2^{g} 25′
Between ♂ and the lowest of the three of the nape	3 20
Of the fixed stars between themselves	4 43

Between ♂ and the star in the belly of ♌, through the heart	6^{g} 10′
From the middle of the nape to ♂	6 0

These observations are very good.

When I extended a straight line from Mars through the lowest of the three of the nape, it then left the middle of the three[2] in the head below itself, towards the Horizon, by about one degree at most. The straight line drawn from the bright star of Hydra through the heart left ♂ a little more [towards the east than before][2].

For the place of ♄^{ni}. That same evening, at the 9th hour[3], the distance between ♄ and the star which is the fifth in the southern wing of ♍ was 6^{g} 20′. Between ♄ and Spica, 4^{g} 47′ — and that on the straight line which runs between the star of the shoulder of Bootis[4] (the one near the crown) and Spica. This little star, the one I called the fifth in the wing of ♍, lies on a nearly straight line from the foremost of the three[5] in the northern wing of ♍, and from the star in the middle of ♍ beside the girdle. But if a line be drawn from that same star in the middle of the body of ♍, which appears beside the girdle, through this one, it leaves Spica somewhat towards the east; from this you will know the star I mean.

Between ♄ and star 4 in the southern wing of ♍, which is beside the girdle, I took the distance 14^{g} 15′. This star, moreover, has a latitude not unlike that in ♄.

These observations of ♄ too are good enough and careful, and you may trust them. It is in ☍ ☉; so, in the lowest part of its epicycle, that is at perigee, this star is at 4^{g} 18′ ♎. From this the place of ♄ would be 18 33 ♎, for it has the same latitude as ♄, which is 2^{g} 50′. Stadius has 18^{g} 45′ with lat. 2^{g} 5′, which nearly agrees with the observation, for at so great a distance… cannot be certain. Leovitius has 18^{g} 52′, lat. 3^{g} 3′, which is further from the observation.

(Set down, on this day, on account of the correction and examination afterwards made in the instrument's distances with the sextants, the intervals of ♄^{ni} from the stars, qualified in this way.

Between ♄ and the 5^{tam} in the wing of ♍	6^{g} 25′	
Spicam ♍	4 52	
the 4^{tam} in the wing of ♍	14 10	Sed hæc vltima eſt dubia)[6].

[1] So in Bartholinus; the codex has a lacuna.

[2] So in Bartholinus. Codex A has a lacuna.

[3] No number in codex A. Tycho, in the Vienna codex of the year 1584, where he recalled this observation, wrote: »H. 9 (but put it between 9 and 10)«. Cf. below, p. 319.

[4] »Bootis« in cod. Vindob.; a lacuna in codex A.

[5] »trium« in cod. Vindob.; a lacuna in codex A.

[6] Bartholinus added: »Afterwards added by T. B.«.

Thesaurus Observationum, Tomus I

Nothing runs in at the head of this side: the composed matter opens with a display heading.

EXAMEN OBSERUATIONUM ANNI 1570.

[An examination of the observations of the year 1570.]

Die 25 Martij	long.	24 16 ♌,	lat.	2 42 B.
Die 28 Martij		24 18 ♌,		2 35 B.
Die 31 Martij		24 25 ♌,		2 28 B.

So ♂ was stationary on the 26th, exactly at 24¼ ♌, and came no closer to the beginning of Leo [initium leonis], but at once began to turn direct.

The Alphonsine calculation makes him stationary on the 24th at 21^{g} 35′ ♌. Stadius puts the 28th for the beginning of the forward motion, and ♂'s place at 25^{g} 25 ♌. The error in the Alphonsine motion is 2^{g} 40′ too little; in Ephem: Stadij, 1^{g} 10′ too much; the settled time between the two.....[1] the whole to be the 27th rather than the 16th — but I am uncertain, because of the slowness of the motion in these days.

DIE 5 MARTIJ 1570[2].

[5 March 1570.]

On the great globe, ♄'s place is found from the fixed stars against which he was observed that day, in this way.

From the 4th of the wing of ♍, and that star near the foot, which were set on either side of it along the Zodiac —

longit.	20° 22′
lat.	2 50 B

The trial was made again from the observation of ♄ against the fixed stars for 7 April, its distances from these three being everywhere increased by minutes, on the great globe [in globo Magno]. Its longitude 17.54 ♎, lat: 2.49 B.

N. B. With those three minutes added, the distances come together on one point well enough, so that there is no difference of a single minute. ♄'s place also falls nearly on the line drawn from Spica to Arcturus, which is noted among the observations. But since this place..... seems, and cannot be reconciled with

the rest [?]....., let there be observed again..... of the wing of ♍, which alone settles the longitude.

More precisely. A final examination of the ☍ of ♄ with the simple ☉, from the observation of the last day of March against three fixed stars. From the distance of ♄ from Spica ♍ 4^{g} 49′, and from the 5ta of the wing of ♍ 6^{g} 22′. By triangular computation, the true places of the fixed stars being given (they are noted below), it appears that ♄ at H. 9¼ stood at

Longit.: 18 27⅓ ♎ Lat: 2 47½ B.

The same evening, ♄'s distance from the third of the wing of ♍ 14 15; its longitude 4 9 0 ♎, Lat: 2 50 0 B. ♄'s longitude from this star taken separately 18 24 40.

Long. ♄, as determined, 18 16 ♎, Latitudo 2 47½ B.

And so the ☍ of ♄ with the simple ☉, on this last determination of ♄'s place[3], fell on 31 March at H. 7 M. 0, nearly at 18 26½ ♎, with latitude 2 47½ — which, set against the other observations examined under the general correction of the same motions, agrees closely enough, or runs a little over. So from the foregoing, $♄^{ni}$'s longitude at the ☍ of ☉ will have been 18 27, whereas the straight line on the star of Boötes gave 18 30; and so, by determining and taking the mean of these, the truer place of ♄ at the time of the ☍ of ☉ will be at 18 28½, which we shall keep.

Calculus pro loco ♄ ex obferuationibus Auguftæ habitis Anno 1570 ultimo die Martij h. 9¼[4].

[Calculation for the place of ♄ from the observations made at Augsburg in the year 1570, on the last day of March, h. 9¼.]

Diftantia ♄ a Spica ♍ 4° 52′ — Distance of ♄ from Spica ♍ 4° 52′

Diftantia ♄ a 5ta mer. alæ ♍ 6° 25′ — Distance of ♄ from the 5ta mer. of the wing of ♍ 6° 25′

[1] There is a lacuna here in the codex. The scribe was doubtless unable to read the archetype. Bartholinus omits this whole calculation.

[2] Written in the margin: »In the hand of Christiani Severini Longimontani, in a more recent script«.

[3] Written in the margin: »In Tycho's hand, but inserted later into Longimontanus's examination«.

[4] In the margin: »In the hand of Ch: Sev: Longimontani«.

The Augsburg calculation continues on this side. Nothing breaks mid-sentence at the leaf turn: the first matter here is two more bracketed star-place groups belonging to that calculation.

Spicæ — of Spica:

longit.	17 49⅙ ♎
lat:	1 59 M.

5tæ alæ ♍ — of the 5tæ of the wing of ♍:

longit.	12° 10⅓ ♎
latit:	1 45 B.

From these places the apparent place of ♄ is worked out in the following way.

Diagram. A tall, very narrow figure standing in the left part of the side, alongside the computation. Four drawn letters stand on it, and these four are all that is lettered on the block: A at the apex, at the top; B at the left end of the short base line and C at its right end; and D below the base line, at the bottom point. From A two long lines descend, converging only slightly, to the ends of the base; the base itself is drawn as a short horizontal line from B to C; and beneath it a shallow downward-pointing figure closes on D. At least one further line runs from the apex region down into the region of D, crossing the base.

- A (apex, top): A
- B (left end of the base line): B
- C (right end of the base line): C
- D (bottom point, below the base): D

The letters are keyed by a printed four-line list set in two columns beside the figure — composed type, not part of the block:

A polus Eccliptícæ — A, the pole of the Eccliptic · C ♄nus — C, ♄

B 5ta alæ ♍ — B, the 5ta of the wing of ♍ · D Spica ♍ — D, Spica ♍

I. In triangle ABC there are given BA 88 15 and DA 91 59 — the complements of the latitude [compl. latit.] of the 5tæ of the wing and of Spicæ; and BAD 5 38⅔, the difference of longitude [differentia longit.].

So BD is given as 6° 46⅓, their distance from one another.

II. In the same triangle, from the three given sides, the angle ABD is found: 123° 25′.

III. In triangle BCD, likewise from three given sides —

BC 6 22 · BD 6 46⅓ — the distance of the 5tæ of the wing from ♄ and from Spica

CD 4 48, the distance of ♄ from Spica. The angle CBD comes out at 43° 18′.

IV. Subtracting the angle CBD from the angle ABD leaves the angle ABC, 80° 7′.

V. In triangle ABC, from the two sides containing the given angle, the remaining side becomes known: CA 87 9¾, compl: lat: ♄ — the complement of ♄'s latitude.

VI. In triangle ABC, finally, from the three given sides, the angle BAC is given as 6° 19′ 40″, to be added to the longitude of the 5tæ of the wing of ♍; and there is set down

♄ Longit. 18° 30′ ♎, Latit. 2° 50¼ B.

Now that the calculation of the examination has been worked out, the same distances of ♄ from Spica and from the 5ta of the wing of ♍ come back very nearly as they were observed.

[Latitudo debet eße ad fummum 2 48½ Boreal.][1] — [The latitude ought to be at most 2 48½ Boreal.][1]

Next[2], on the great globe a straight line was drawn from Spica to the star of the right shoulder of Boötes, whose longitude was 26 50 ♎, Lat. 48 40 B., from the table of the stars [ex abaco ftellarum]; and with ♄ni's distance from Spica subtracted from that line, ♄'s longitude is gathered as 18 31 ♎, Lat. 2 49 B. — which agrees nearly with ♄'s earlier place.

Lastly, the same evening the third star in the mer. wing of ♍ stood 14° 15′ from ♄, at the same latitude. Its longitude 4 9 0 ♎, latit. 2 49⅔ B. So with the distance of ♄ added to this longitude there comes out, ἐν πλάτ., ♄'s Longitude 18 26 ♎ [which does not differ by much; but I am not sufficiently sure of the observed distance. If you were to put the distance of the 3æ in the wing from ♄ at 14 20, it would agree exactly][3].

A computation for finding the ☍ of ♄ni as it appears with the simple ☉, from the first place given for it. H. 9 M. 15, the Simple ☉lis 18 32¼ ♈

Longit. ♄ — 18 30 ♎

Difference 2¼, to which a time of M. 45, to be subtracted, answers, in the motions about 2. So the ☍ of ♄ with the simple ☉lis fell on the 31st day of the month of March, H. 8⅗, at 18° 30′ 35″ ♎ [See one leaf further on, where from this I have determined it more exactly by the globe, as to longitude as much as to latitude. Our præces. 27° 49′ 45″][4].

For the time of the ☍ they are gathered from the Prutenic tables [ex tabulis Prutenicis][5].

[1] In the margin: »In Tycho's hand, later«.

[2] In the margin: »Longimontani«.

[3] Written in the margin: »In Tycho's hand, inserted afterwards«.

[4] In the margin: »Added in Tycho's hand, later«.

[5] In the margin: »Longimontani«.

Thesaurus Observationum, Tomus I

[The composed matter on this side begins directly with a braced figure group, no display heading standing above it: the side opens inside a worked calculation of Saturn's place, its first line a stub-and-brace group of mean motions. Nothing breaks off mid-sentence at the top.]

[The left-hand of the two blocks: mean motions, and from them the true place of Saturn.]

Simplicis ☉	$5^{s}\ 50^{\circ}\ 28'\ 34''$
Long. ♄	2 44 41 51
Apogæi ♄	4 1 0 3
Communitale	3 5 46 43
Hinc pro vero loco ♄	
Anomal. Eccentr.	4 43 41 47
Æquatio Eccentri	6 13 53
Anom: Eccentri coæquat.	4 49 55 40
Longit. coæq.	2 50 55 57
Scrup. proport.	18 14
Commut. coæq.	2 59 32 27
Parallaxis orbis	3 10
Exceßus	26
Pars congruens ad s pp	8
Parallaxis absoluta	3 18

English of the stubs: mean motions — of the Sun, simple · the longitude of ♄ · of the apogee of ♄ · the common(?) motion [Communitale, expansion declined] · From this, for the true place of ♄ · the eccentric anomaly · the equation of the eccentric · the equated eccentric anomaly · the equated longitude · the proportional minutes · the equated commutation · the parallax of the orb · the excess · the part answering to the [s pp, expansion declined] · the absolute parallax.

[The right-hand block: the longitude reduced, the latitude, and the two true places.]

Longit. ♄ a 1 stella ♈	$2^{s}\ 50^{\circ}\ 59'\ 15''$
Præcesſ. æqv.	27 47 30
Longit. ♄	18 46 45 ♎

Pro latitudine ♄ni — For the latitude of Saturn

Scrupula convenientia · Anom. Eccent. coæq.	56 10
Lat. 3 congruens · Anom. com. coæq.	3 2
Pars ſcrupulis congruens	2 50 22 B.

Ergo verus locus ♄ ex tab: Prut: — Therefore the true place of Saturn from the Prutenic tables:

Long:	18°46¾′ ♎
Lat:	2 50⅓ B.

Verus locus ex Alphonſ. calculo — The true place from the Alphonsine calculation:

Longit.	18°52′ ♎
Lat.	3 3 B.

English of the right-hand stubs: the longitude of ♄ from the first star of ♈ · the equated precession · the longitude of ♄ · the minutes answering [to the] equated eccentric anomaly · the third latitude answering [to the] equated common anomaly · the part answering to the minutes.

The two blocks stand on the two sides of a full-height vertical rule and their rows do not correspond, so they are kept as separate tables.

[Diſt: ♄ verſus polum 4.52, ablatis 1.59, reſtat 2.50. N.B. ♄ iuxta maximam latitud. Boream, quæ erat poſita, limitatur diſtantia a Spica ♍ p. 4 M. 50, ad ſummum p. 4 M. 47 vel 4.48, quod in noſtris ratiocinijs ſatis quadrat.][1].

— [♄'s distance towards the pole 4.52; with 1.59 taken away, 2.50 remains. N.B. ♄, being near the greatest northern latitude that had been assumed, has its distance from Spica ♍ bounded at p. 4 M. 50, at most p. 4 M. 47 or 4.48, which squares well enough with our reckonings.][1].

In the year[2] 1593, on 6 May in the evening, we were observing the distance between the lowest star of the neck of ♌ [infimam cervicis ♌] and cor ♌ with the sextant —

I 4° 46′⅚
II 4 46½
III 4 46

The distance of these stars can therefore be at most 4° 47′ 0.

From this[3] I gather that the observed distance of ♄ and Spica on 31 March, when it stood in ♂ of the mean place of ☉ — by the instrument p. 4 M. 47 — ought to be increased by at least 2 min., so as to be 4.49. For that of cor ♌ and the lowest star of the nape [infimæ ceruicis] was taken the same evening as 4° 45′, which I found (as has just been shown) with the greater sextant, so that the

distance itself is in all likelihood rightly determined. But from the line drawn from Spica through ♄ to the right shoulder of Boötes, set near the Crown — and I made this on our great globe of six feet.... a mechanical trial, as carefully as I could — ♄'s longitude and latitude came out exactly

long.	18° 30½^{m} ♎
lat:	2 47½ B

as is noted here; and on these you can safely take your stand, increasing or diminishing each by at most ½ minute as the need may be, in applying them, as to longitude and as to latitude, to the rest of the observations.

Now ♄ was near the limit of greatest northern latitude, and from this I gather that his northern latitude never exceeds 2^{p} 48′, and, if the southern be put at 2 50 and each node at ♎ ♈ 20 30, that his latitudes... set out....[4] will answer to the appearances.

The place of the star of Boötes, by our own restitution — the one we have used here — was at the time long. 27 3 ♎, lat. 49 1.

DIE 7 APRILIS[5]

[7 April.]

from 8 into the tenth hour of the evening I observed these.

Between ♂ and the lowest of the three in the neck [in cervice] — 4^{g} 5′

Between ♂ and cor ♌ — 2 30

Between ♂ and the little star....[6] cor in ventre ♌ — 5 25:

Between ♄ and Spica — 4 45

Between ♄ and the 5^{tam} in the wing of ♍ S — 5¾

From the star which is in the garments next the knees of ♍ — 6 5, and it is in

[The sentence breaks off unfinished at the foot of this page and continues on the next.]

Footnotes, printed at the foot in a smaller roman fount, with no rule seen above the block:

[1] In margine: Manu Tychonis inſerta poſterius. — In the margin: inserted later in Tycho's hand.

[2] In margine adſcriptum eſt: »Hæc quoque interiecta tempore multo poſteriori manu Chr: Severini, ut ſervirent obſervationi præſenti ♄ examinandæ«. — In the margin is written: »These too were put in at a much later time, in Chr: Severini's hand, so that they might serve the present observation of ♄ that is to be examined«.

[3] Supra hanc lineam ſcriptum eſt: »Hæc iterum manu Tychonis recentiori«. — Above this line is written: »These again, in Tycho's more recent hand«.

[4] An aliqua verba hic deſint? — Are some words missing here?

[5] Supra hanc lineam ſcriptum eſt: »Ab hinc reditur ad continuationem obſervationum, manu Tychonis«. — Above this line is written: »From here there is a return to the continuation of the observations, in Tycho's hand«.

[6] Sine dubio hic cum Bartholino legendum »poſt«. — Doubtless here, with Bartholinus, »poſt« is to be read.

the straight line drawn from the most northerly of the 4 in the head, through the one that shows brightest next the girdle. ♄ had not yet reached the straight line drawn from Spica to Arcturus, but was still a long way off it.

DIE 26 APRILIS

[26 April.]

9 Veſp. — between ♂ and cor ♌ 5¾. Between ♂ and the middle star of the neck 9ᵍ 5′; the rectified longitude will come out 29.25 ♌, lat. 1 56.

Now ♂ appeared to stand in a parallelogram with cor ♌, the star below the heart, and the one in the belly, on this reckoning: for the distance, as it looked to the eye, between ♂ and the star in the belly was exactly as great as that between cor ♌ and the star below the heart, as it looked to the eye. There also appeared, between ♂ and..., a distance equal to the one between those two little stars — for this purpose of ours, so precise a greater distance.

Diagram. Set in a band at the right of the page, narrowing the text measure of the paragraph beside it. Four star-marks, each a small saltire-shaped asterisk, stand at the corners of an upright oblong; the upper two are joined by one horizontal line and the lower two by a second, parallel to it. No side lines, no diagonal and no closing frame are drawn between the upper and lower lines, and I do not infer any. The labels are composed type, not drawn lettering; the star-marks and the two lines are drawn.

- Upper left (above the mark): ♂
- Upper right: no label stands beside this mark on the leaf. The prose names cor ♌ as the fourth member of the parallelogram, but the figure does not label this corner and nothing is supplied here.
- Lower left (to the right of the mark, on two lines): ſtella in ventre ♌ — the star in the belly of ♌
- Lower right (to the right of the mark, on two lines): Stella infra cor ♌ — the star below cor ♌

Besides, ♄ stood on that straight line drawn from the brighter star of Hydra past the foot of the Crow to Spica ♍, the star being 4ᵍ 50′ distant from Spica. That star in Hydra has, as I said, another little star towards the east, of smaller magnitude than it is. From these the longitude of ♂ is gathered as 29⅓ᵍ ♌, lat: 1ᵍ and 50′ north.

[Sed poſtquam reſtitui loca fixarum pro noſtra obſeruatione ex triangulorum ſupputatione prouenit ♂ long. 29.25 ♌, lat: 1 56 B][1].

— [But after I had restored the places of the fixed stars for our observation, the triangular computation gave ♂ long. 29.25 ♌, lat: 1 56 B][1].

The Alphonſ. calculation puts ♂'s place at 27.31 ♌ 1 33 B

Pruten. 0 13 ♍ 2 0

———

2 42

N. B. as to 7 April[2]. Keeping the same distances, and with nothing of what is set down there being limited, ♄'s place was found in three ways, as follows.

a Spica et 5ta alæ	17° 53′	2° 47′½
a Spica et ea in veſt.	17 52½	2 49½
a 5 alæ et ea in veſt.	17 48	2 47½

— from Spica and the 5th of the wing · from Spica and the one in the garments · from the 5th of the wing and the one in the garments.

If, then, we adopt the longitude and latitude in this way, our error will be imperceptible: for 7 April, Long. 17.50 ♎, Lat. 2 49. Therefore on 31 March, when the ☌ with the Sun occurred, ♄[ni]'s longitude was 18 25 ♎, lat: 2 49.

N. B. If the places are increased by 2 minutes on account of ♄[ni]'s interval from the stars being a little greater than the instrument gave, and if the two former ones... are kept as agreeing in one, then his longitude at that time will have been at the least p. 17 M. 54, taking everything into account within its limits. If to these we add the motion of the seven days, which is 35 minutes, ♄[ni]'s longitude comes out at p. 18 M. 29 ♎ — and this is by far the most likely, since it agrees with the straight line drawn at that time to the star of Boötes, and almost with the line of the 7th from Arcturus to Spica through ♄.

There follow the observations of ♂ against the fixed stars prescribed above, and from them his apparent places deduced, with such precision as could be had for them on the great globe, for each of the times of observation.

[What follows is set in two columns divided by a vertical rule. The left column first.]

DIE 14 JANUARIJ, INTER 10 ET 11 HORAM P. M.

[14 January, between the 10th and 11th hour p.m.]

Diſtantia ♂ a corde ♌	19°45′
Item a tertia alæ ♍ Merid.	20°52′
Diſtantia ♂ a cauda ♌	8°30′
Diſtantia ♂ ab auſtrali clunis ♌	8°12′

— The distance of ♂ from cor ♌ · Likewise from the third of the wing of ♍, Merid. · The distance of ♂ from the tail of ♌ · The distance of ♂ from the southern haunch of ♌.

[The right column.]

Longitudo	13°22 ♍
Latitudo	4 1 B

With this place of ♂ assumed, the distance from the tail of ♌ agrees, one single minute excepted, by which it turns out narrower than it should be. But the observed distance of the southern haunch of ♌ falls short by 4 minutes.

Foot of the page, two notes in the smaller roman fount; nothing ruled above them that I could see:

[1] In margine adſcriptum eſt: »Recentiora«. — In the margin is written: »The more recent ones«.

[2] Additum eſt: »Poſterius addita, manu etiam Tychonis« — Added: »Added later, also in Tycho's hand«

Thesaurus Observationum, Tomus I

[The side is set in two columns over its upper part, divided by a vertical rule; the middle of the side reverts to one full-width measure for three paragraphs; the lower part returns to two columns with a vertical rule.]

DIE 15 FEBR., INTER H. 8 ET 9 VESPERI.

[15 February, between 8 and 9 in the evening.]

Diſtantia ♂ a cauda ♌	14^{p} 20′
Diſtantia ♂ a lucida cer.	10 50
Diſtantia ♂ a corde ♌	10 20

English of the stubs: the distance of ♂ from the tail of ♌ · from the bright star of cer. [expansion declined] · from cor ♌.

♂ Longit.	3 33 ♍
Lat.	4 5 B

a corde et cauda ♌ — from cor ♌ and the tail of ♌

♂ Long.	3 24 ♍
Lat.	4 13 B

a cauda ♌ et lucid. ceruicis — from the tail of ♌ and the bright star of the neck

♂ Long.	3 27 ♍
Latit.	4 19 B

a corde ♌ et lucida ceruicis — from cor ♌ and the bright star of the neck

Limitatis hiſce locis ponitur — With these places bounded, there is set:

♂ Longit.	3 27¾ ♍
Lat.	4 12½ B

I noticed here on the globe that if 4 minutes at most had been added to each of the distances, they would have coincided in one point to fix the place of ♂.

DIE 26 FEB., H. 8.

[26 February, at 8 o'clock.]

1. Inter ♂ et cor ♌	6°30′
2. Inter ♂ et ſtellam in ventre ♌	4° 5′
3 A media ceruicis	7 25

Longit.	29 18 ♌
Latitudo	4 4 B.

English of the stubs: between ♂ and cor ♌ · between ♂ and the star in the belly of ♌ · from the middle star of the neck · longitude · latitude.

With half of one minute added to each distance it would coincide precisely here.

DIE 4 MARTIJ.

[4 March.]

Diſtantia ♂ a ventre ♌	4° 37′
A corde ♌	4 57
Ab infima ceruicis	5 45
A lucida ceruicis	6 20

English of the stubs: the distance of ♂ from the belly of ♌ · from cor ♌ · from the lowest star of the neck · from the bright star of the neck.

♂ Longit.	27° 32 ♌
Latitudo	3 47 B.

a ſtella in ventre ♌ et corde — from the star in the belly of ♌ and from cor

With this place assumed, the lowest star in the neck of ♌ agrees entirely, but the bright star of the neck of ♌ differs from these by 4 minutes. This place of ♂ also squares exactly with the straight line drawn through the bright star of the neck and the star of the belly of ♌, as is mentioned in the observations.

DIE 25 MARTIJ H. 10.

[25 March, at 10 o'clock.]

♂ ab infima trium anteriorum ♌	3° 5′
♂ a corde ♌	2 35
♂ a media ceruicis	5 40
♂ a ventre ♌	6 25

English of the stubs: ♂ from the lowest of the three foremost stars of ♌ · from cor ♌ · from the middle star of the neck · from the belly of ♌.

♂ Longit.	24 22 ♌
Lat.	3 0 B.

ab infima ceruicis et corde ♌ — from the lowest star of the neck and from cor ♌

The bright star of the neck falls short by 5′ in its distance from this prescribed place of ♂, while the star in the belly falls short of the same by 6 m.

[The full-width middle band: three paragraphs running the whole measure, the vertical rule stopping above them and beginning again below.]

Nota[1]. From 5 March to the 31st ♄ moved backwards, by both calculations alike — the Alphonsine as much as the Prutenic — 1 59′, nearly two degrees. So if on 5 March he stood at 19 57 ♎, on the last day of the month he stood at 17 58, which does not square well enough with the observation made that day.

If we take it proportionally, the motion observed from 5 March to 7 April is $2^{P}1/6$ over an interval of 33 days; 28 minutes therefore fall to 7 days, and with these added to the observation of the 7th, the longitude of ♄ on 31 March would come out 18 14 ♎.

Observations[2] of ♄ from the same fixed stars taken as given, and that at a time when he was near ☌ ☉[lis] [near conjunction with the Sun]. His apparent places are investigated from these on the globe in the same way, and are examined with a view to correcting the instrument.

[The lower part of the side, in two columns again.]

DIE 5 MARTIJ HORA 11.

[5 March, at the 11th hour.]

Inter ♄ et Spicam ♍	5°20′
Inter ♄ et vmbilicum ♍	7 10
Inter ♄ et auſtralem pedem ♍	8 25
Inter ♄ et tertiam auſtralis alæ ♍	16 10

English of the stubs: between ♄ and Spica of ♍ · and the navel of ♍ · and the southern foot of ♍ · and the third star of the southern wing of ♍.

Ex his ponitur limitate — From these it is set, within limits:

Longitudo	19 57 ♎
Latitudo	3 2 B

Here the individual distances fall short by 4 min.; if these were added, they would meet, at the outside, in one and the same point.

[1] In margine adſcriptum: »Manu Tychonis ſed poſterius interpoſita correctionibus Longimontani«. — Written in the margin: »In Tycho's hand, but interposed later among Longimontanus's corrections«.

[2] In margine adſcriptum: »Manu rurſum Chr. S. Longimontani«. — Written in the margin: »Again in the hand of Chr. S. Longimontanus«.

[The side is set in two columns for its top band only, divided by a vertical rule that spans just that band; everything below runs the full measure.]

DIE 7 APRILIS INTER 9 ET 10 H.

[7 April, between 9 and 10 o'clock.]

Inter ♄ et Spicam	4°45′
Item a 5ta alæ ♍	5 45
Ab vmbilico ♍	6 5

English of the stubs: between ♄ and Spica · likewise from the 5th star of the wing of ♍ · from the navel of ♍.

Ex his in tribus minutis tantum limitatis quibus diſtantiæ arctiores iuſtis ſunt, ponitur — From these, bounded only within the three minutes by which the distances are tighter than they ought to be, there is set:

Longit.	17 46 ♎
Lat.	2 50 B.

N. B.[1] From 31 March to 7 April, through 7 complete days, the star ♄ moved retrograde 35′; so on the 31st he stood at 18.21 ♎, because the longitude of ♄

nearly coincides with the longitude of Spica, which then stood at 17.50′ ♎. The distance will therefore be at least on the side of latitude from Spica. So if 2 minutes are taken away, 4.47 comes out on account of the instrument; and with Spica's latitude of 1.59 taken from this, the latitude of ♄ comes out 2.48, which is the truer figure.

Distances[2] of certain stars observed at Augsburg with the instrument already mentioned, which are now being examined on the great globe.

Diſtantia obſeruata Auguſtæ. Inter cor ♌ et infimam cervicis — 4.45

Diſtantia earundem ex globo, ad minimum — 4.50[3]

Diſtantia obſeruata Auguſtæ, inter Auſtral. clunis ♌ et caudam ejusdem — 8.25

Diſtantia ex globo — 8.26

Diſtantia obſeruata Auguſtæ, inter lucidam ceruicis et illam in ventre ♌ — 9.58

Diſtantia in globo, præciſe — 10. 0

English of the six lines: the distance observed at Augsburg, between cor ♌ and the lowest star of the neck · the distance of the same pair from the globe, at least · the distance observed at Augsburg, between the southern haunch of ♌ and the tail of the same · the distance from the globe · the distance observed at Augsburg, between the bright star of the neck and the star in the belly of ♌ · the distance on the globe, exactly.

DIE 1 APRILIS.

[1 April.]

The altitude of ☉ at noon at Chekkingæ[4] 49 57.

DIE 8 APRILIS.

[8 April.]

The altitude of ☉ at noon at Chekkingæ 52 13. The place of ☉ 27½ ♈, the declination 10.36, the equated elevation 41[g] 37; therefore the elevation of the pole 48 23, and the elevation of the pole at Augsburg 48[g] 13′.

DIE 16 APRILIS.

[16 April.]

The altitude of ☉ at Gekkingæ 55 6, the declination 13.18.

DIE 18 APRILIS.

[18 April.]

The meridian altitude of ☉ 55 45, the parallax of ☉ having been applied; the place of ☉ 7[g] 13′ ♉, the declination of ☉ 13.57.

DIE 20 APRILIS.

[20 April.]

The meridian altitude of ☉ at Gechingæ, the parallax having been applied, 56ᵍ 31; the place of ☉ from Stad. Ephem. 9⅙ ♉. The declination 14 35. The elevation of the Equator 41 56, from which in the city 41 54, and the elevation of the pole 48ᵍ 6′.

DIE 26

[26th.]

the true altitude of ☉, reckoned to the centre of the earth, was 58.22; the place of ☉ from Stad. Ephem. at 14 58 0; therefore the declination of ☉ 16.22 north. It would accordingly stand at 42.1, of the pole 47.[59], in the city 48.2.

DIE 1 MAIJ[5].

[1 May.]

The altitude of the first limb of ☉ 59ᵍ 50′, but of the centre 59 34; the parallax is added... so that the true altitude of the centre of ☉ at Gekkingæ is 59ᵍ 35′ — a good observation.

[1] In margine adſcriptum: »Hæc manu Tychonis Longimontani correctionibus erant interpoſita«. — Written in the margin: »These things, in Tycho's hand, had been interposed among Longimontanus's corrections«.

[2] In margine: »Manus iterum Longimontani«. — In the margin: »Longimontanus's hand again«.

[3] In margine: »Caracter hic duplici linea erat cancellatus«. — In the margin: »This character had been struck out with a double line«.

[4] Id eſt in pago qui germanice vocatur Göggingen, cuius latitudo eſt 48° 20′ 28″. Hic Paulus Hainzelius et Tycho paulo ante hoc tempus quadrantem magnum quatuordecim cubitorum conſtruxerant, per quem ſequentes obſervationes factæ ſunt. — That is, in the village called in German Göggingen, whose latitude is 48° 20′ 28″. Here Paul Hainzel and Tycho, a little before this time, had built a great quadrant of fourteen cubits, with which the following observations were made.

[5] Supra hoc ſcriptum eſt: »Obſervationes per △«. — Written above this: »Observations with the △«.

Thesaurus Observationum, Tomus I

[The side runs in one full-width measure from its first line to its last. No vertical rule, no column division at any height, no frame, no inset figure and no diagram stands anywhere on it. The two figure runs below the DIE 3 MAIJ. heading are displayed lines, not a ruled or columnar group.]

Gnomon 12 0 shadow 6 57 ☉19¾[1], declination 17 44. The equated altitude 41 51, of the pole 48 9, in vmb. [expansion declined] 48 10.

On the same day, that is 1 May, at the hour 9⅙ P. M., when the pole star stood on the Meridian below the pole, I took its least distance from the Horizon: 45ᵍ 23. A little before X^am^ (the tenth hour) I found a little star which stood below the pole star towards the Horizon, and which … is next the tail of the Lesser Bear (and it too was on the meridian, or near it), at a least altitude of 42 17. If, however, a straight line were drawn from this star through the pole star, there will be yet another near the Meridian (after the tenth hour), or a little further advanced, towards …; this one has a greatest altitude from the horizon of 52ᵍ 34. By my own observation the pole star would stand from the pole 2ᵍ ¾, or at most 2ᵍ 50 minut. Trust this last figure rather[2].

DIE 3 MAIJ.

[3 May.]

The true altitude of ☉ without parallax 60ᵍ 6′, reckoned to the centre; trust this observation.

It gives 60.12 for the centre Gnomon 12 0 Shadow 6 48

☉ 21¾ ♉ 18¼ Bor: the equated elevation would be 41ᵍ 51′; therefore of the pole 48.9, from which in the city 48 10.

DIE 10 MAIJ.

[10 May.]

The topmost circumference of ☉ had 62ᵍ 3′ with parallax. The centre therefore, without parallax, had 61ᵍ 48′; it gives 62ᵍ 4′. Gnomon 12 0, shadow 5 22, ☉ 28½ ♉, declination 19ᵍ 53′. The equated altitude 41 45, from which of the pole 48 15.

DIE 3 PENTECOSTES QUI FUIT 16 MAIJ.

[The third day of Pentecost, which was 16 May.]

With H.[3] present I observed the altitude of the topmost circumference of ☉: 63ᵍ 7′. The centre therefore, without parallax, had 62ᵍ 52′. Gnomon 12 0. Vmbra **65 3½** — shadow 65 3½; it gives 63 13. The longitude of ☉ 4¼ ♊, the declination 21ᵍ 3′ B[4].

DIE 30 MENSIS DECEMBRIS 1570

[30th day of the month of December 1570.]

in my native country at Helsingburgi, about ⅓ of an hour after the setting of ☉, I saw that ☾, at the tip of her lighted limb, stood away from ♃ by twice the diameter of her own body, and had precisely the same apparent latitude as ♃.

[1] Scilicet Tauri. — Namely, of Taurus.

[2] In epiſtola menſe Auguſto anni 1598 ad Joſephum Scaligerum ſcripta Tycho de diſtantia ſtellæ polaris a polo loquens hæc addit: »quam ante annos 25 præciſe tribus gradibus ab eodem remoueri, Auguſtæ Vindelicorum per quadrantem 14 cubitorum in ſuo radio, illic a nobis exſtructum deprehenſum eſt«. — In a letter written in the month of August of the year 1598 to Joseph Scaliger [Joseph Justus Scaliger], Tycho, speaking of the distance of the pole star from the pole, adds this: »that 25 years before it was found to be removed from the same pole by precisely three degrees, at Augsburg, by means of the quadrant of 14 cubits on its radius which we had built there«.

[3] Id eſt, Hainzelio. — That is, Hainzelio.

[4] Hic ſequitur in codice »Anno 1570, Examinatio obſervationis ☾ factæ die 16. Jan. juxta ☌ cum Aldebora«; in margine adſcriptum eſt: »Manu Chr. Sev. Longimontani poſterius inſerta«. Tum vero: »Aſc. Recta cordis ♌ 146° 20′, Decl. 14° 2′, altitudo ejus a refractione libera cum Aldebora paulo tantum emerſißet ab occid. ☾ 9.20. Reſp. in tempore 7^H^ 3^m^«. Nihil amplius. — Here there follows in the codex: »1570. Examination of the observation of ☾ made on 16 Jan. at its ☌ with Aldebora«; in the margin is written: »Inserted later in the hand of Chr. Sev. Longimontani«. And then: »The right ascension of cordis ♌ 146° 20′, the declination 14° 2′, its altitude free of refraction, when together with Aldebora it had only just emerged from the west, ☾ 9.20. The corresponding figure in time 7^{H} 3^{m}«. Nothing further.

[The place of ☉ in the opening paragraph is printed 19¾ with NO sign sort, where the place under DIE 3 MAIJ. sets 21¾ ♉ and the place under DIE 10 MAIJ. sets 28½ ♉. Nothing is supplied here and nothing is diagnosed; what Dreyer's footnote 1 names is his, not the body's.]

[This side also runs in one full-width measure throughout, with no column rule at any height, no frame, no inset figure and no diagram. Its one displayed group is the three distance lines under the first date heading. Nothing runs in mid-sentence at the head: the composed matter opens with the display heading ANNO 1573[1].]

ANNO 1573[1].

[In the year 1573.]

DIE PENTECOSTES 10 MAIJ.

[On the day of Pentecost, 10 May.]

Inter flexuram Caßiopeæ et nouam ſtellam — 5^{g} 8′ — 5 0

Inter ſupremam cathedræ et nouam ſtellam — 5 28 — 5 20
Inter Schedir et nouam ſtellam — 8 5 — 7 52
English of the three lines: between the bend of Caßiopeæ and the new star · between the topmost star of the Chair and the new star · between Schedir and the new star. Each line carries two figure runs, the first given here before the second, in the order the leaf sets them.

Trust these observations, the instrument's parallax having nevertheless been subtracted (5 degrees have a parallax of 8 minutes, 8 degrees have 13).

DIE 14 AUGUSTI.

[14 August.]

When ♃ was nearly joined in longitude to the eye of ♉, their distance was 4^{P} 35′.

Between the new star and the pole star 25^{P} 9′.

Oculus²♉ has a southern latitude of 5^{g} 18′, or rather 5^{g} and 17^{m} — do not doubt this, for I twice observed the meeting of ☾ with that star near the 90th degree of the Ecliptic [Eccliptic æ as printed], when ☾ had … [3] in longitude but had a parallax in latitude only; and once account had been taken of ☾'s parallax in latitude I found the star's latitude to be about 17 minut., at another time about 18, and so I take the mean between the two, namely 16 minutum.

Nota.[4] I myself afterwards found another latitude for it, 5.30, and that because ☾'s greatest latitude was not known, which is rather p. 5¼.

DIE 8 DECEMBRIS, ECLIPSIS LUNÆ[5].

[8 December, an eclipse of the Moon.]

I observed this eclipse carefully in my own manor, Curia mea Knusdorpiana. The sky was clear enough. My beloved sister Sophia Brahe was there at the time, then a girl of about 14 years, who, delighting by nature in such things, attended willingly and supplied what she could. By means of a certain gilt brass Quadrant, which showed single five-minute intervals readily enough, I made out that ☾ — ☾ nam — had apparently entered the shadow and had been hidden over some small part of herself, at a moment when the head of the lower Twin was raised 14½ partibus, so that that star scarcely stood 14° from the Horizon at the very beginning of the eclipse. Our own prediction set out above[6] gives that star's height at that moment as 13°, which again differs as little as could be from the observation.

At the beginning of the total entry I observed the same star raised p. 22⅔. Our prediction assigned for this part has gr. 21½. Which again differs very slightly. At the beginning of the emergence and struggling out of the shadow, Canis Minor was observed to be raised p. 17⅚. But the preceding prediction has 17°, which scarcely differs perceptibly. Towards the very end of the whole eclipse no stars could be observed at all, for from the time when ☾ had come about halfway out of the earth's shadow, right up to the total end and beyond, thin clouds had covered the sky, so that ☾ alone appeared — and not even she

always distinctly enough. But when her topmost circumference was raised 50°25′ she was seen to have recovered her whole light, so far as could be made out through those thin little clouds. This last consideration was not accurate or convenient enough, however, partly because ☾ was at the mercy of the little clouds, as has been said,

[The sentence breaks off unfinished at the foot of this page and continues on the next.]

[1] Annorum 1571 et 1572 nullæ ſunt obſeruationes in codice, tametſi Tycho per hiemem 1572—73 ſtellam novam ab eo die 11 Novembris primum conſpectam ſæpißime obſervavit. — For the years 1571 and 1572 there are no observations in the codex, although through the winter of 1572—73 Tycho very often observed the new star, which he had first caught sight of on 11 November of that year.

[2] In margine adſcriptum eſt »Hæc erant inducta lineis«. — In the margin is written »These had been struck through with lines«.

[3] Hic oportet legere »nullam«. — Here one must read »nullam«.

[4] In margine »Hæc poſterius acceßere«. — In the margin: »These came in later«.

[5] E codice Vindobonenſi latino 10686[17]. In codice obſeruationum huius eclipſis obſervatio non reperitur. Cfr. vol. I p. 131 noſtræ editionis. — From the Vienna Latin codex 10686[17]. In the codex of observations no observation of this eclipse is found. Compare vol. I p. 131 of our edition.

[6] In libro de nova ſtella, Vol. I p. 56. — In the book on the new star, Vol. I p. 56.

Thesaurus Observationum, Tomus I

[The side runs in one full-width measure from its first line to its last: no vertical rule at any height, no column division, no frame, no brace, no inset figure and no diagram anywhere on it.]

[The side's prose runs straight on from the foot of the preceding leaf: its first word continues, and completes, the sentence broken there.]

partly because it was drawing nearer and nearer to the meridian, and for that reason was not altering its altitude appreciably over so short a time. The other observations reported above stand up well enough. From them it is also perfectly clear that the times of this eclipse agree properly with the verification I assigned at the time. That the observed altitudes of the fixed stars run about one degree beyond those noted earlier is tolerable. For the phases of the eclipse can be lengthened in this way by four, or at any rate five, minutes of time; and Knudstorp lies further east by just that much than Haffniâ [Copenhagen], the capital of the kingdom — or rather than the place of the longitude assumed — so that no greater precision ought really to be demanded. And I cannot marvel enough at myself: how, at that youthful age, being at any rate in my twenty-sixth year, and not yet supported by observations of the motion of the luminaries either numerous or accurate enough, I could take aim at the mark so precisely. Here, certainly, I invent nothing and alter nothing; I report honestly the observations made from the sky, exactly as that book presents them — the book in which the observations of that year were entered — and the sheet is still to hand on which they were written down at the time, with my said sister present and holding a light in a small lantern whenever it was needed.[1]

It should be noted, however, that earlier,[2] when I was assigning the places of ☉ and ☾ from their own configuration to the middle of the eclipse, I did in fact put them at 26° 40′ of ♐ and ♊ — either because I was then in doubt about any greater precision, or because some other tiny error had crept in, whether into my own calculation, or the copyist's, or even the printer's. But now, examining these same data against the courses of the luminaries as more correctly examined and restored in the years that followed, I find that the places of those same bodies must be carried forward by a sixth part of a degree; and even so the times will fit the observations neatly on our restored and recalculated basis, as one may gather from the appendix to the first chapter, where the motion of ☾ is treated, in the earlier volume of our Progymnasmatum nostrorum Astronomiæ instaurandæ [*Progymnasmata of the Astronomy to be Restored*].

That[3] this eclipse — whose apparent Middle I observed exactly at `Knudsdorpij` *at H. 8 M. 18, the place of the Sun being set from our Neoteric observation at that time in 26 51 ♐. — agrees with our latest restitution of the Motions in the Luminaries,*

where 13′ are also added to the Motion of ☾ on account of the swifter motion of the equinoxes, is plain. For at the time when, by the Prutenic calculation, the middle of the eclipse fell, ☾ was in 26.42 ♊, and so it was 9 minutes short, which make 17 minutes; therefore, considering that by the Prutenic calculation the middle of the eclipse, in the true longitude which is 37.0, as I afterwards found, falls at hora 8 M. 0, the true appearance of this eclipse at the middle of the obscuration accordingly comes out at H. 8 M. 17 — which answers the observation exactly enough.

[The leaf prints `Knudstorpium` in the first prose unit and `Knudsdorpij` in the italic unit — two forms of one place-name on one side, kept apart and neither identified with the other.]

[The leaf sets animadverſiones with `v` in the first prose unit and animaduerſiones with `u` in the same unit — a u/v doublet on one side, recorded and not merged.]

[Three notations for comparable longitudes stand on this side — **26° 40′**, `26 51` and `26.42` — and a fourth quantity of the same order is spelled out as `sexta gradus parte`. Every form is kept as printed; nothing is converted and nothing is flagged.]

[Footnote 3 attributes the italic unit to Tycho's hand, which agrees with the edition's italic rubric rather than conflicting with it; the attribution is recorded, and nothing was marked italic on the note's authority.]

[1] Nec liber nec charta nunc ſupereſt. — Neither the book nor the sheet now survives.

[2] Scilicet in libro de nova ſtella, T. I p. 55. — That is, in the book on the new star, T. I p. 55.

[3] Annotatio in calculum eclipſis (T. I p. 52) in codice Vindob. 10932, ff 57v et 58r, manu Tychonis ſcripta. — A note on the calculation of the eclipse (T. I p. 52), in codex Vindob. 10932, ff 57v and 58r, written in Tycho's hand.

[Block structure of this side: full measure for the two display heading lines; then a band carrying TWO blocks side by side, the March altitude table at the left and the solar-place block at the right, with NO vertical rule between them — the right block stops after its fourth row while the left block runs on for three more; then full measure again; then a second two-block band, a single line in a smaller fount at the left beside a three-line right-set group; then full measure to the foot. No frame, no brace, no diagonal, no dot-leader, no inset figure and no diagram stands anywhere on the side.]

OBSERUATIONES ANNI 1574.

[Observations of the year 1574.]

HERISVADI POLUS 56 0[1].

[The pole at `Herisvadi` 56 0.[1]]

`Martij` — March.

Die 9	In meridie fuit altitudo ☉	$33^{g}\ 21^{m}$
13	fuit eiusdem altitudo	35 0
15	eleuabatur	35 47
16	eleuabatur	36 12
20	Altitudo ☉	37 45
29	Altit. ☉	41 10
31	☉ alt.	41 55

English of the stubs: day 9, at noon the altitude of ☉ was · the altitude of the same was · it was elevated · it was elevated · the altitude of ☉ · the altitude of ☉ · the altitude of ☉.

Cumque altitudo Herisvadi ſit exquiſite 56g 0^m^ fuit locus ☉ — And since the altitude of Herisvadi is exactly 56g 0^{m}, the place of ☉ was:

Die 9 in	$20^{g}20^{m}$	♓
13	2 30	♈
15	4 30	♈
16	5 29	♈

DIE 20 MARTIJ.

[20 March.]

At Hora 9 in the evening. For verifying the latitude of ♀.

When cor ♌ stood on the mid-heaven, I saw that ♀ was in conjunction with the Pleiades to the very degree, so much so that the Pleiades could not be made out at all for her presence — except that the one among the Pleiades which lay furthest east stood away from ♀ towards the east, along the line drawn to the bright star of the shoulder of Orion, by about the diameter of ☾.

Nullæ ex tabulis tantam præbent ♀ latitudinem. — No tables yield so great a latitude for ♀.

Latitud. Alphonſina 3.8 Copernicea 3.15 **Obſeruatio dedit latit. 4.0**

English of the three lines: Alphonsine latitude 3.8 · Copernican 3.15 · the observation gave latitude 4.0.

DIE 17 APRILIS.

[17 April.]

At Hora 8½ in the evening, openly and clearly, I saw the star ☿ standing away, as far as sight goes, from ♃ by 16 parts, and from ♀ by 14½ en plati [expansion and identification declined]; for I had no instrument to hand except the quadrant.

DIE 19 APRILIS.

[19 April.]

When the tail of ♌ stood on the mid-heaven, I again saw ☿ standing away from the Horizon in such a way that ♀ and ♃ stood apart along the line that was drawn through ♀ to the other elbow of Erichtonij, where the Kids are not, and through ♃ to the 2^dam bright star in the lower feet of ♊.

DIE 20 APRILIS

[20 April — the heading takes no terminal mark and runs straight into the lower-case line below it.]

I observed this distance of ♃ and ♀: 6^g 20^m.

☿ from ♀ 7^g 50^m, and that when it was elevated about 3°.

DIE 21 APRILIS.

[21 April.]

Inter ♃ et ☿	9^g 50^m
Inter ♀ et ☿	6 20
Inter ♃ et cornu ♉ commune cum pede Erichtonij	9 12
Ab altero pede Erichtonij ♃	11 20
Inter ♀ et priorem pedem	7 0
Inter ♀ et cornu ♉ commune cum pede Erichtonij	10 18
♃ et ♀ ἐν πλάτει	6 10

English of the stubs: between ♃ and ☿ · between ♀ and ☿ · between ♃ and the horn of ♉ that is shared with the foot of Erichtonij · from the other foot of Erichtonij to ♃ · between ♀ and the former foot · between ♀ and the horn of ♉ that is shared with the foot of Erichtonij · ♃ and ♀ ἐν πλάτει.

Here one must everywhere subtract the parallax of the instrument.

DIE 22 APRILIS.

[22 April.]

Between ♀ and ☿ 4^g 45^m; between ♀ and ♃ 6^g 20^m, the parallax having been applied and subtracted.

[Entry order on this side is NOT monotonic: the March table runs 9, 13, 15, 16, 20, 29, 31, and the display heading DIE 20 MARTIJ. then stands below rows already given for 29 and 31 March. The April headings that follow — 17, 19, 20, 21, 22 — do run in order. The order is recorded as printed; nothing is reordered and nothing is diagnosed.]

[Three printed statements bearing on one latitude stand on this side: the subheading's HERISVADI POLUS 56 0, the smaller-fount lead's altitudo Herisvadi ſit exquiſite 56g 0^m^, and Dreyer's footnote, which reports the *Progymnasmata* as giving 55° 58′. All three are kept; no [recte:] is entered and nothing is settled by arithmetic.]

[Erichtonij is named on this side by three different parts — cubitum alterum (the other elbow), cornu ♉ commune cum pede (the horn of ♉ shared

with the foot), and altero pede / priorem pedem (the other foot, the former foot). Each is kept apart from the others and none is identified with a star.]

[The leaf spells paralaxin and paralaxi with a single l, against the parallaxis carried in the glossary; the printed spelling stands.]

[1] In Progymn. p. 351 latitudo Heriſvadi dicitur eße = 55° 58′ — In the Progymn. [expansion declined], p. 351, the latitude of Herisvadi is said to be = 55° 58′

Thesaurus Observationum, Tomus I

[Block structure of this side: one full-width measure from the first line to the last, EXCEPT for two bands. The first is the distance band under the opening heading, which carries TWO blocks side by side with NO vertical rule at any height between them, and no frame, brace, diagonal or dot-leader. The second is a single line near the foot of the text, carrying the body line at the left beside a right-set line in a smaller fount. No inset figure and no diagram stands anywhere on the side.]

[Nothing runs in at the head of this side: the first line under the running head is a display heading, and the sentence beneath it opens afresh.]

DIE 24 APRILIS, HAFNIÆ.

[On 24 April, at Hafniæ [Copenhagen].]

Hæc diligentur obſeruaui hora 9½ veſperi. — I observed the following carefully at hora 9½ in the evening.

Inter ♀ et ☿	$2^{g}\ 20^{m}$
Inter ♃ et ☿	6 18
Inter ♃ et ♀	6 47

Inter ♃ et cornu ♉ commune cum pede Erichtonij	$8^{g}\ 30^{m}$
Inter ♃ et alterum pedem Erichtonij	10 47
Inter ♀ et prædictum cornu ♉	10 43

English of the two left-hand columns. First table: between ♀ and ☿ · between ♃ and ☿ · between ♃ and ♀. Second table: between ♃ and the horn of ♉ shared with the foot of `Erichtonij` · between ♃ and the other foot of `Erichtonij` · between ♀ and the horn of ♉ already named.

Atque hæc omnia ſatis exquiſite, ſubtracta inſtrumenti paralaxi. — And all of these quite exactly, the parallax of the instrument having been subtracted.

On the same day, 24 Apr., when the clock struck exactly 9 with ¼, ☾ was seen to lie in one and the same straight line — taken through both her extreme horns — with that third-magnitude star which stands in the upper knee of ♊. At that moment, therefore, so far as apparent longitude went, she was joined to that star exactly, though standing off from it towards the south by exactly the measure of her own diameter. I observed this at Hafniæ.

DIE 27 APRILIS.

[On 27 April.]

We saw ☿ between ♃ and ♀, equally distant from both; but it had gone a little out of that line towards the south, by about the diameter of the lunar body — and that at about hora 9 in the evening.

DIE 18 MAIJ

[On 18 May]

I observed the meridian altitude of ☉ at 55^{g} 22 exactly, or at the very most 23 minutes.

DIE 19 MAIJ

[On 19 May]

the meridian altitude of ☉ was 55^{g} 33^{m}.

[Beside that line, set to the right in a smaller fount:] Neſcio an Hafniæ vel... Potes facere periculum. — I do not know whether at Hafniæ or... You can make the test.

[The paragraph that follows stands in the same smaller fount, at full measure:]

Poſtſcripta. — Postscripts. From our recent restitution the place of the sun at noon on 18 May was in p. 6 M. 29⅓ ♊, and its true declination p. 21 M. 28; but the observed altitude is set down as p. 55 M. 22½. To this let the parallax of ☉ be added, which could have been about M. 1½, so that the true altitude comes to p. 55 M. 24. If the declination is taken from that, the altitude of the equator at the place of observation comes out p. 33 M. 56, and therefore the altitude of the pole p. 56 M. 4 — or, if we look to the following day, to 56 M. 3. I think, then, that this observation was made at Heriſvadi, for it could not have been at Hafniæ or at Lundij.

[The leaf prints the sun as ☉ and the moon as ☾ throughout; I have kept those two sorts, matching the immediately preceding leaf's body rather than the glossary's ☽.]

[Poſtſcripta prints provenit with v and obſeruationis, obſeruata, obſeruationem with u inside the one paragraph — a u/v doublet on one side, recorded and not merged.]

[The sentence says the parallax quæ eße poterat M. 1½ prox. while the same side's opening prose says the instrument's parallax was subtracted without giving a figure; the two statements are kept as printed and neither is used to settle the other.]

[The Ω-shaped sort does not occur anywhere on this side, so the side supplies no control for it either way; neither does ☌, conjunction not being written with a sort here at all.]

[Below the Poſtſcripta paragraph the side carries no further type: no footnote marker stands anywhere on it, no footnote block, and no rule above where one would stand. The remainder of the leaf shows only faint mirrored show-through from the other side.]

[Block structure of this side: one full-width measure from the first line to the last. No second block stands beside any band at any height, no vertical rule at any height, no frame, no brace, no diagonal, no dot-leader, no inset figure and no diagram anywhere on the side; the footnote block at the foot runs to the same measure.]

[OBSERUATIONES ANNI 1576].

[Observations of the year 1576. — the heading is supplied by Dreyer in square brackets, and its terminal stop stands OUTSIDE the closing bracket.]

DIE 22 FEBRUARIJ[1].

[On 22 February.[1]]

While the last star in the head of Hydra — the one towards the east, standing alone next the neck — was at mid-heaven, a visible conjunction of ☾ and ♂ appeared, very nearly partile: so nearly that ☾ all but touched the body of ♂ with her lower and more southerly horn, standing off from it by no more than a sixth part of her own diameter, this distance being taken from the limb of the lower horn. At about the same time, by observation, the altitude of the brightest star in the foot of Orion was 11 Grad. with ⅓; and the lowest limb of ☾, about which ♂ was seen, appeared to be raised 10⅚. The hour was then 9½.

Obſeruatio hæc facta eſt Huenæ. — This observation was made at Huenæ [Hven].

1576 DIE 22 OCTOBRIS[2].

[1576, on 22 October.[2]]

At about hora 9 after noon I saw that ♂ was very close to the topmost star in the tail of Capricorn — the one which is the last of the two towards the east, and which lies furthest north. It stood off from that star, along a line drawn by eye to the brighter star of the Flying Vulture, by at most the measure of the semidiameter of ☾, 15 M. at the very most, and that towards the north.

Nota hanc obſeruationem. — Note this observation: for Gemma Frisius too once observed ♂ in almost the same place.

Nota. — Note. I had the test made on the globe, and for the observation of this day I found the place of Mars in 17⅔ ♒ with lat. 2.12^{m}; for the following day, in 17.55 ♒, latit. 2° 8′ southern. But you can determine it more precisely.

SEQUENTI DIE 23.

[On the following day, the 23rd.]

At hora 8 p. m. I observed ♂ again, and it had now passed beyond that same star towards the east, so far that a line drawn from the star through ♂ would fall on the brighter star of the Shoulder of Aquarius — the one towards the urn, in the hand in which he holds those three set like a little brain. The distance of ♂ from the said star seemed a little greater than the earlier one: 20 minutes, that is, by eye, and that towards the north, as above. By the radius, however, the

distance was observed to be nearly half a degree, so that it equalled the diameter of ☾ — 35 M. at the most.

DIE 14 DECEMBRIS

[On 14 December]

— which is my birthday — I made my first observation of the Sun at Hwenæ, about the winter solstice itself, and I found the least meridian altitude of ☉ that can occur there to be partium 10 M. 43.

Now since the greatest declination of ☉ is 23 28, that added to the former altitude leaves the altitude of the equator at $34^{g}\ 11^{m}$; and this, taken from a quadrant, shows the altitude of the pole to be 55^{P} 49′, which was what had to be found. The parallax of ☉, however, taken away, makes it less by two minutes. So that the parallax of ☉ is 3 M., from which its altitude is at least 10 40, and the altitude of the pole 55 52 at Hvenæ.

DIE 15 DECEMBRIS

[On 15 December]

I observed with another instrument the greatest altitude of the pole star, and found it partium 58 M. 54; but I have my doubts about this, for it yields an elevation of the pole 6 M. greater than the former one.

The third star in the tail of the Bear, the one nearest the hind haunches, had a meridian altitude of 24^{P} 10, quite exactly.

[Three spellings of one place-name stand on this side — Huenæ, Hwenæ and Hvenæ — all kept as printed, none identified with another and none normalised.]

[The same sentence gives two notations for comparable longitudes, **17⅖ ♒** and **17.55 ♒**, and two for comparable latitudes, `2.12^m^` and **2° 8′**. Every form is kept as printed; nothing is converted.]

[The body names ♂ and ☾ by their sorts while the neighbouring `Nota` sentence and footnote 1 name the same two bodies in words, `locum Martis` and **coniunctio Martis et Lunæ**. The sort and the word are recorded apart and neither is substituted for the other.]

[The text says the parallax of ☉ `eam duobus minutis minorem efficit` and then states that parallax as `3 M.`, and the two altitudes printed beside them are 55^{P} 49′ and 55 52. All four figures were read on the leaf before any relation among them was looked at, and every one is kept as printed: no arithmetic has been used to settle a digit, nothing is emended, and no `[recte:]` is entered.]

[`Paralaxis`, `Paralaxis`, and on the other side of the leaf `paralaxi` and `paralax.`, are all set with a single `l` against the glossary's `parallaxis`; the printed forms stand.]

[The Ω-shaped sort does not occur anywhere on this side either, so neither side of this leaf supplies a control for it; ♂ likewise stands nowhere on the leaf, conjunction being written out as `coniunctio` at each of its three occurrences.]

[1] Quamquam codex nullam mentionem anni facit, tamen coniunctio Martis et Lunæ demonſtrat, hanc obſervationem anno 1576 factam eße. — Although the codex makes no mention of the year, the conjunction of Mars and the Moon nevertheless shows that this observation was made in the year 1576.

[2] Supra adſcriptum eſt »1576 ætatis 30, Hafniæ in Dania«. De eclipſi lunari diei 7 Octobris nihil in codice invenitur, etſi Tycho in libro I Progymnaſmatum dicit, ſe medium eclipſis H. 11 M. 32 obſeruaße. — Written above it is »1576, in his 30th year, at Hafniæ in Denmark«. Nothing is found in the codex concerning the lunar eclipse of 7 October, although Tycho says in Book I of the Progymnaſmatum that he observed the middle of the eclipse at H. 11 M. 32.

[Footnote 1 sets obſervationem with v where the body of the same side sets obſeruationem with u, and footnote 2 sets invenitur with v beside obſeruaße with u within the one note — u/v doublets recorded and not merged.]

[Footnote 2 reports matter standing in the codex above the heading, and the eclipse figure it gives comes from another work of Tycho's; both are Dreyer's, recorded and not reconciled, and neither is adopted into the body.]

DIE 24 DECEMBRIS.

Before sunrise, at about the 7th hour, I observed ☿; its distance from Anthanore was 17.0, taken with the Radius.

A little later I found the distance of ♃ and Regulus with the Radius to be 10^{P} 0

At noon the altitude of ☉ was 11 20

From this, once the declination of ☉ — which is 22^{g} 50′ — has been added, the altitude of the equator comes out 34.10, and from that the altitude of the pole 55^{P} 50. This observation squares well enough with the one made at the solstice, the difference being 1 minute [differentia 1 Minuti].

DIE 25 DECEMBRIS.

I saw the pole star raised 5...[5] parts at noon.

OBSERUATIONES ANNI 1577.

HUENÆ IN DANIA.

Observations for the year 1577, at Huen in Denmark.

ALTITUDINES SOLIS MERIDIANÆ.

The meridian altitudes of the Sun.

Left block

JANUARIJ.

Die 3	12° 30′
23	17 16
29	19 8

[5] In our codex, 5 only. In Bartholinus, 59° 1′.

FEBRUARIJ.

1	20 0
13	24 16
16	25 25
21	27 13
22	27 47
25	28 51

MARTIJ.

2	30 46
5	31 55
12	34 42
13	35 8
16	36 15
18	37 4
24	39 19
27	40 21
28	40 43
30	41 34

APRILIS.

1	42 21
3	43 6

Beside the row for day 1, set to the right of the value in a smaller roman fount: incertum — "uncertain."

Those that follow are more correct, because the quadrant has been corrected.

5	43 54
6	44 14
11	45 54
13	46 35
17	47 50
22	49 23
30	51 41

Beside the row for day 6, set to the right of the value in a smaller roman fount and running over two lines: ad summum — "at most."

MAIJ.

3	52 30

JUNIJ.

23	57 3

In each of the tables above the leaf sets no column headers; the header rows are empty for that reason. The first column is the day of the month; the second is the meridian altitude of the Sun, degrees and minutes. Only the January group's first row carries unit markers (ring and prime); every row below it is bare. Only that same row carries the word Die.

Right block

JULIJ.

7	55 20
8	55 10
9	54 58
13	54 12
25	51 26

AUGUSTI.

1	49 25
2	49 7
4	48 32
5	48 13
20	43 8

SEPTEMBRIS.

4	37 31
11	34 46
12	34 24
27	28 28
28	28 7

OCTOBRIS.

5	25 26
15	22 28

To the right of the value for day 15, in the smaller roman fount, a note of two lines: facta obseruatione per Sextantem — "the observation having been made with the Sextant."

Altitudes[6] *of the Sun observed from the winter solstice of the year 1577, when the least midwinter altitude of ☉ was, in parts, 10 M. 38.*

DECEMBRIS.

13	*10 38½ vel 39*
14	*10 40*
16	*10 43*
17	*10 46*
18	*10 48½*
19	*10 51*
20	*10 55½*
21	*11 1 ἐν πλάτει*
22	*11 5 vel 4½*
26	*11 28½ vel 29*
31	*12 9*

In the December group the day figure of the first row is followed, before the value, by the words *Altitudo viſa* — "the altitude seen"; no other row carries a label. The whole group, its month heading and its figures included, stands in italic. This side of the rule is headed only by its month names, so again nothing stands in the header rows. Day of month stands at the left; the observed altitude, in degrees and minutes, at the right. Not one row here carries a unit marker of any order.

OBSERUATIONES RELIQUORUM PLANETARUM.

Observations of the remaining planets.

Left column

DIE 16 FEBRUARIJ.

N.B. ♃ opposite ☉. ♃ was 15° 9′ from cor ♌, and lay further east. — The same day, ☿ from the first horn of ♈ 17° 32′

DIE 19 FEBRUARIJ.

[6]The observations of the month of December form the beginning of codex B, which covers the years 1578—1581 (in Tycho's hand).

Distance of ♃ and cordis	14 30

DIE 21 FEBRUARIJ.

Distance of ♀ and the first horn of ♈	11 50
♃ and cordis ♌	14 12
At the half of the ninth, ☾ and ♂	11 54
♀ and ☾	8 44

DIE 22 FEBRUARIJ.

At the half of the eleventh, ♃ and cordis ♌	14 2

DIE 23 FEBRUARIJ.

At the half of the 9th, ♂ and the eye of ♉	25 16
♃ and cordis ♌	13 58

DIE 24 FEBRUARIJ.

At the hour 7.15, ♂ and the eye of ♉	24 30
At the half of the 8th hour, ♀ and the first horn of ♈	9 12
At the hour 9, ♃ and cordis ♌	13 43

DIE 25 FEBRUARIJ.

♃ and cordis ♌	13 34
♂ and the eye of ♉	23 51
♀ and the second [star] of the first horn of ♈	10 1

At the hour 8½ ☾ was exactly 1° 18′ distant, measured from the centre of ☾, from the brighter star in the knee of Erichthonius — the one it shares [comm.] with the horn of ♉ — towards the south.

As far as sight went it was in the longitude of ♂, [nisi] except that ☾ seemed to have passed a little beyond that same star towards the east, by roughly the space of its own diameter.[7]

[7] *nisi* stands on the page in square brackets — Dreyer's supply.

DIE 28 FEBRUARIJ.

At the half of the 10th hour, ♃ and cor ♌	13° 17′

DIE 1 MARTIJ.

At the hour 8, ♂ further west, and the eye of ♉	21 5

8

Right column[9]

Quadrante poſt 8, ♀ and the second [star] of the first horn of ♈	8 2
♃ and Regulus	13 14

10

DIE 5 MARTIJ.

H. at the half of the seventh, ☿ & the eye of ♉	51 40
At the half of the 8va, ♃ and Regulus	12 30
Eod. ♂ and the eye of ♉	18 32

DIE 6 MARTIJ.

At the hour 7, ☿ and the eye of ♉	50 30
At the same time, ☿ and the second [star] of the first horn of ♈	14 55
Quadrante poſt ſeptimam, ♀ and the eye of ♉	31 24
At the half of the 8th, ♂ and the eye of ♉	17 44
At the same time, ♃ and cor ♌	12 23

DIE 11 MARTIJ

[8] between Hora and 8 the leaf sets a small raised mark, comma-shaped, which is not identified here.

[9] The entry for 1 March resumes at the top of this column.

[10] Quadrante poſt stands here and at two later places. The ablative carries two senses this leaf does not decide between — the instrument (*quadrans*, the quadrant, as at per quadrantem further on) and a quarter of an hour past the named hour.

quadrante poſt nonam, ♃ & Regulus	11 40
At the same temp. ♀ and the eye of ♉	25 35
At the tenth hour, ♂ and the eye of ♉	14 39

DIE 12 MARTIJ[11]**.**

At the 7th hour of the evening the distance between ♀ and ☿, observed with the Radius, was 22° 0′ exactly. As far as sight went, ♂, ♀ and ☿ appeared to be in one straight line.

Between ♂ and ☿ there were observed	32 50 al. 32 45

The Prutenic calculation gives the distance as 31⅓, ☿'s latitude being disregarded. The Alphonsine gives at least 29^{g} 7′, the same being disregarded.

Between ♂ and ♀	10 50

The Prutenic calculation gives the distance as 11 and 10 M.; the Alphonsine 10^{g} 15 M. Note that around the same time both calculations agree on the place of ♂, as regards longit. and latitude, with no appreciable difference.

Between ♂ and the eye of ♉ there were observed	14 1
Between ♀ and Aldeb.	24 28
Between ♃ and cor ♌	11 41

Left column

DIE 13 MARTIJ.

At about the hour 9. Between ♀ and Aldeb.	25 15
♂ and Aldeb.	13 30
♃ and cor ♌	11 34
♀ and the brighter star in the knee of Erichthonius	35 8
At the half of the tenth hour, ♂ and the same knee	25 13
♀ and ♂	10 12

[11] The codex has »die 17 Martij«; but its position between days 11 and 13 — as the distances of the stars also show — shows that these were measured on the 12th.

DIE 16 MARTIJ.

At the hour 7¼ ☿ and ♀ were apart	15 52
♂ and ♀	8 45
♂ and Aldebor.	11 43
♂ and the brighter star in the knee of Ericht.	23 15
At the hour 8, ♀ and the same knee	31 44
♀ and Aldeb.	20 4

DIE 18 MARTIJ.

At the hour 7¼ ☿ and Aldeb.	36 gr.
At the same time, ☿ and ♀	17 58
☿ and the lesser star in the other foot of Andromed.	11 30
☿ and the greater star in the other foot of Androm.	17 35

Right column

DIE 20 MARTIJ.

At the hour 8, ♀ and Aldeboram	15 50
♀ and the brighter star in the knee of Erichthonius	27 16
At the hour 8¾ ♂ and Aldeb.	9 33
♂ and the brighter star in the knee of Erichthonius	20 47
Regulus and ♃	10 46
At the hour 7¼[12] ♂ and ♀	4 18
Regulus and ♃	10 27

DIE 27 MARTIJ.

At the half of the eighth, between ♀ and ♂	3 29
The same day, at the hour 7¾, Regulus and ♃	10 20
♀ and the brighter star in the knee of Erichthonius	19 13
At the hour 8, ♂ and the same knee	16 12
♂ and Aldeb.	6 49
♀ and Ald.	9 20

DIE 30 MARTIJ.

[12] These two distances were certainly not observed on 20 March.

At the hour 8, ♀ and ♂	2 9
♂ and Aldeb. in latitude	6 29
♀ and Aldeb.	7 52
At the hour 8¼ Regulus and ♃	10 11
♂ and the knee of Erichthonius	14 22
At the hour 9 ♀ and the same knee	16 2
Regulus and ☾ at the hour 9	14 20

Full-measure region

DIE 2 APRILIS.

In the evening, immediately after ☉'s setting, I carefully observed an eclipse [Ecclipſin] of ☾, both by a most accurate clock showing each single minute and by the altitude of ☾. I had in fact set the clock by the altitude of ☉ near setting, and to the minute of the Sun's going down; then, sifting each point carefully, I found the following. ☾ was beginning to be darkened at her very rising, the hour being exactly 7; for when the hour stood at 7 and 17, a quarter of ☾ had entered the shadow.

At the hour 7.24 a third part of ☾ was in the shadow, and the moon [luna] then stood 4^{g} 5^{m} high.

At 7.55 half of ☾ was gone; the elevation of ☾ 5^{g} 25′.

At 7¾ Spica was 4^{g} 24′ from the bright limb of ☾ nearest her, reckoned to the edge of the shadow; there were still 11 M. within ☾, and so Spica to the shadow 4^{g} 35.

But at the middle of the bright part, altitude of ☾ 7.25, Spica was 4.28 from that same limb; and ⅔ of ☾ had been darkened [offuſcata], ſc. 24 M. The hour was 7 M. 52 at most; but at that moment I was not attending closely enough to the clock, since I was observing the altitude of ☾. When the altitude of ☾ was 8.55, a small... remained bright.

At the hour 8 M. 10 ☾ was exactly entering the shadow entire. The altitude of ☾ was then, taken by the quadrant on the part that was the brighter, 9^{p} 12. And the limb of ☾ nearest the star was exactly 4^{p} 44′ from Spica. Trust this observation in every respect, for it was an exact one.

Altitudo — Radix ☉ p. 9 M. 12, total immersion [Ingreßus totalis]. Altitudo — Radix ☉ p. 18 M. 0, first emergence [primus egreßus].[13]

At the hour 9^{h} 0′ the darkened limb of ☾ that stood nearest Spica was 5^{p} 11′ from her. It could not be observed with full exactness, because ☾ was wholly within the shadow and nearly at its middle; and the colour of the darkened [obfuſcatæ] ☾ was a red tending towards blackness. Around ♃ and ♀ there was

during the eclipse, from time to time, a pale little cloud around them, 2^{g} in diameter.

[13] the single word `Altitudo` stands once, set to the left of the two **Radix ☉** lines and centred against them; it is repeated above for legibility.

At the hour 9 M. 45 ☾ was first seen to take back some light through the little clouds, over a space of about 3 M.... So one may say that the true first return of light was at hora 9 M. 40. The altitude of the part that first grew bright was then 18^{g} 0^{m}, while that same illuminated limb stood 6^{p} 7′ from Spica; at that moment the lit part could amount to 5 minutes.

At the hour 10 M. 0 a little more than a quarter of the moon [lunæ] recovered its light, so that 10 minutes of ☾ were illuminated.

At the hour 10 M. 13 the moon [luna] gained half its light. The altitude of Spica was then 22^{g} 50′ — a good observation; trust this one. ☾ stood at that moment 6^{p} 23′ from Spica, reckoned from the part of the limb that was bright and sloping towards the horizon. A great halo was then beginning around ☾, nearly reaching Arcturus, but it was only a half of one, towards the south, and.... it was on account of the little clouds.

♀ and ♂ at the hour 8 M. 25 stood 1^{g} 15′ apart, on that straight line which is drawn through them exactly above the.... of Cassiopeia [Caßiopeæ]. ♀ had therefore not yet reached the straight line drawn through ♂ to Aldeboram, and so their ☌ had not yet come about, as the Alphonsine calculation [Alphonſi calculus] has it — which is clear also from the earlier observation and from the line drawn from the pole of the Zodiac.

Between ♂ and Aldeb. 6^{p} 33′. Between ♃ and Regulum 9^{g} 58′.

At the hour 10 M. 25 at least the 4ta part was still labouring in the shadow, three having been freed.

At the hour 10 M. 46 ☾ had required back its whole light; the altitude of the centre of ☾ was then 21 part. 40 M. The distance of the limb of ☾ that was nearest Spica was 5^{p} 58′ at that moment. With the altitude of ☾ standing at 22^{p} 5′, the limb of ☾ nearest Spica stood 6.2 from her on that side. But when the eclipse had long been over, the clock showed the hour 10^{H} 55′.

N. B. The beginning of this eclipse, all the first observations down to half-obscuration being compared, falls exactly at H. 7 M. 5.[14]

Beginning of the whole obscuration — hora 8 M. 10 Beginning of the emergence — hora 9 M. 40 Last end of the eclipse — 10 45 — Trust these. [Confide his.]

Therefore the middle of the eclipse — 8 55, in meridiano Huenenſi.

The altitude of ☉ at the meridian of the following day was 43.6, though a small white cloud came between. Since the altitude of the equator stands at 34^{p} 10′, the declination of ☉ comes out — parallax being applied — 8.57; and so the place of ☉ is exactly 23.0 ♈ by this observation.

N. B. By these observations of ☾ against Spica in the eclipse, the longitude of Spica cannot fall further than 17^{g} 28 ♎, her latitude being put at 2^{p} 0′ and the whole place of ☉ being put according to pruten. calc., with the place of ☉ — or the [sort: unidentified] of the shadow — given at 22.27 ♎, as the altitude of ☉ on the following day showed such a motion of ☉, taken with the lesser

[14] A brace at the right embraces the four lines from `H. 7 M. 5.` down to the `Vltimus finis` line; the label stands outside the brace, set over two lines.

quadrant; and all the observations being compared and carefully sifted, the longitude of Spica does not fall further out, if the place of ☉ stands as stated.[15] I made the trial on the plane and not by the tables, because the distance between ☾ and Spica is small. But if the place of Spica stands otherwise, the error lies in ☉ 22... [16]

EPILOGISMUS CALCULI HUIUS ECCLIPSEOS EX TABULIS PRUTENICIS ADDUCTI.

A summing-up of the calculation of this eclipse, drawn from the Prutenic tables.

The astronomical, that is the mean, time of the true full moon under the meridian of the tables: annus 1576 menſis Martius dies 1, horæ 20 ſcrup. 45 ſec. 41 from midnight.[17]

Region I — the places of ☉ and ☾

LOCI ☉ ET ☾ HUIC TEMPORI CONGRUENTES.

The places of ☉ and ☾ answering to this time.

☉	22^{g} 17′ 22″ ♈
☾	22 17 21 ♎

Equation of the preceding time 6′ 2″
Eccliptic digits 19.52 to be added [addenda]

Time of incidence	hor. 1	2′ 33″
Time of the half delay		52 50
Time from beginning to middle	1	55 23
Hourly motion of ☾		34 1

Region II — a test of the observation

A test of the observation from the altitude of ☾, which I use in place of the meridian altitude of ☉.

When the whole of ☾ was beginning to be within the shadow, the altitude of the brighter part was p. 9 M. 12; it stood then at 21.53 ♎, and the true altitude on the ecliptic 10.10. The distance from M. C. comes out 57^{P} 20′, which resolved

[15] the sort between ☉ ſeu and vmbræ is a small looped figure with a descending tail.

[16] On another page of the same codex there is written of the longitude of Spica as follows: »... the place of ☉ being applied, which at the meridian of the following day stood by observation at 23^{P} 0′ ♈. But there may perhaps be an error in this, because the altitude was taken with the lesser quadrant. But of this I mean to think more fully another time. I have corrected the place of ☾ according to the Alphonsine motion«.

[17] the head-line of this page reads 1577, and this line reads 1576.

into time makes 3^{H} 49′ 20″; so the time was then H. 8 M. 10 S. 40. Then, when ☾ had first struggled one digit through the shadow and was beginning to emerge, the true altitude of ☾ was 19^{g} 0′ — its own latitude and the parallax being added — and it stood in the place of the Shadow at 23.23 ♎, the distance from M. C. being 34^{P} 32′ 20″, which resolved into time makes 2^{H} 18′; so the hour was then 9.42. But ☾ had by that time come out 3 minutes, which make 5 of time, so that the true emergence was at H. 9 M. 37.

☾ by the observation of its own altitude was coming out of the shadow — 9^{H} 37^{M} It was entering entirely — 8 11 Whole delay in the shadow — 1 26 Half of it — 43

So the middle of this eclipse was exactly 8^{H} 54^{M}.

Put the middle by this reckoning at 8^{H} 54^{M}. But it must also be looked at which place is the longer and the more lasting, in the emergence or in the ingress. [18]

Region iii — left column

DIE 4 APRILIS.

At the hour 8¾ ♂ and ♀ were seen exactly in one straight line with Aldeboran, and the same line produced fell upon capram, so that those four stars stood exactly in one line. Therefore the ☌ of ♂ and ♀ had already gone past, which Prutenicus calculus still puts at its closest some hours later. Their distances were of this kind.

Between capram and Aldeboran	30^{g} 38′
♀ and ♂	1 14
♀ and Aldebor.	8 8
♀ and hircus	22 19
♂ and Aldeb.	6 50
♀ and the left foot of Erichthonius	8 8
Regulus and ♃, hora 9½	9 47

DIE 5 APRILIS.

Hora 8[⅓ or ⅛] ♂ and ♀	1 30
Regulus and ♃	9 49
Hircus and ♀	22 8

DIE 6 APRILIS.

[18] In libro I Progymnaſmatum (Pag. 02) the time of the middle is put at 8^{h} 50^{m}.

♀ and ♂, hora 8¾	1 42
♀ and Aldeb.	9 11
♂ and Aldeb.	7 25

Region iii — right column

♂ and the left foot of Erichthonius — 9ᵍ 47′ ♂ and the right foot shared with the horn of ♉ — 9 47 It stands equally distant from either foot. Hora 9¼, ♂ and the southern horn of ♉ — 11 24 ♀ and the southern horn of ♉ — 10 36 ♀ and the right foot comm. with the horn of ♉ — 7 56

DIE 7 APRILIS.

Hora 8, ♀ and ♂	2 7
♀ and Aldeb.	10 1
♂ and Aldeb.	7 55
The left foot of Erichthonius and ♀	7 54
♀ and the right foot shared with the horn of ♉	6 58
♀ and the southern horn of ♉	9 42
Hora 8¾, ♂ and the southern horn of ♉	10 55
♂ and the right foot of Erichthonius shared with the horn of ♉	[9 11] [19]
♂ and the left foot of Erichthonius	9 40
Regulus and ♌	9 46

DIE 8 APRILIS.

♀ and ♂, hora 8¼	2 31
Regulus and ♌	9 46
♂ and the left foot of Erichthonius	9 32

Left column

DIE 9 APRILIS.

♀ and ♂, hora 9¾	2ᵍ 53′
♂ and the southern horn of ♉	9 32
♂ and the northern horn shared with the right foot of Erichthonius	8 2
♂ and the left foot of Erichthonius	9 24
♀ and the southern horn of ♉, hora 10,	7 46
♀ and the northern horn of ♉, shared	4 56

[19] A lacuna in the codex. Bartholinus has 9° 11′.

♀ and the left foot of Erichthonius	8 3
Regulus and ♃, hora 10¼	9 42

20

DIE 11 APRILIS.

♂ and Aldeb., mediata 9,	9 33
♀ and Aldeb.	13 25
♂ and the southern horn of ♉	8 24
♂ and the right foot shared with the horn of ♉	6 58
♂ and the left foot of Erichthonius	9 20
♂ and ♀, hora 8¾,	3 42
♀ and the southern horn of ♉	6 20
♀ and the right foot shared with the horn of ♉	3 17
♀ and the left foot of Erichthonius	8 40
Regulus and ♃	9 37

21

DIE 17 APRILIS.

♂ and ♀, hora 9¼ — 6 16 Regulus and ♃ — 9 28 ♂ and the right foot of Erichthonius shared with the horn of ♉ — 4 37

The right foot of Erichthonius and the bright star of Erichthonius were seen, together with ♂, in one straight line.

♂ and the southern horn of ♉ — 5 5 ♀ and the right foot of Erichthonius — 5 5 ♀ and the southern horn of ♉ — 5 28

DIE 22 ARILIS.[22]

Hora 8¾, the distance of ♂ and ♀ — 8 28 ♂ and ☾ (the semidiameter to be added) — 19 10

Moreover at that time ♂ and ♀ and [the head of the following ♊ and][23] the northern limb of ☾ were seen in one straight line.

♀ and ☾, hora nona cum quadrante — 10 40 ♂ and the right foot of Erichthonius, shared — 4 35 Regulus and ♃ — 9 34

Right column

This observation was repeated and did not vary, except that once it gave... one minute.

DIE 26 APRILIS.[24]

[20] in the sixth row *commune* stands with no complement after it; the leaf prints none.
[21] what the participle in `mediata 9,` governs is not settled by the leaf.
[22] The heading is set exactly so, with no `P`. The bracketed words in the prose are a supply, carrying a raised footnote key.
[23] These are not in the codex but are found in Bartholinus alone.
[24] An ellipsis in a value stands where the leaf prints one.

Hora 9, Regulus and ♃	9^{g} 42′
♂ and ♀	10...

Conjunction of ☾ and ♃ at hora 9.20: the northern latitude of ☾ from Ioue was then 1 gr. 20 min.

DIE 29 APRILIS.

Hora 9, Regulus and ♃	9 46
♂ and ♀	11 9

DIE 3 MAIJ.

Hora 9½, ♂ and ♀	12 38
Regulus and ♃	9 53

DIE 7 MAIJ.

Regulus and ♃	10 5
♀ and Regulus	42 35

DIE 15 MAIJ.

Regulus and ♃, hora 9¼	10 32
The middle star in the shoulders of ♍ and ♃	13 8

DIE 16 MAIJ.

Hora 10, [♃ and][25] Regulus	10 38
♃ and the tail of ♍	15 28
The middle star in the shoulders of ♍ and ♃	13 10
♀ and Regulus	33 36
The second of ♊ and ♀	4 46

DIE 17 MAIJ.

[25]So in Bartholinus. Our codex has a gap here.

Hora 10, Regulus and ♌	10 44
The middle star in the shoulders of ♍ and ♌	13 15
♌ and the tail of ♍	15 27
♀ and Regulus	32 40
The second of ♊ and ♀	5 25

DIE 21 MAIJ.

Hora 10. The second of ♊ and ♀	8 18

DIE 22 MAIJ.

Hora 10. Regulus and ♌	11 10
The middle star in the shoulders of ♍ and ♌	13 35
♌ and the tail of ♍	15 10
The first of the Gemini and ♀	13 24
The second of ♊ and ♀	9 5

Region 1 — two files at the head

DIE 23 MAIJ.

Mediata decima, ☾ and ♌	5^{g} 18′
The first of the Gemini and ♀, hora 10,	14 1
The second of the Gemini and ♀	9 52
Regulus and ♌	11 16
The middle star in the shoulders of ♍ and ♌	13 38
♌ and the tail of ♍	15 9

DIE 25 MAIJ.[26]

Hora 10, Regulus and ♌	11^{g} 28′
The middle star in the shoulders of ♍ and ♌	13 53
♌ and the tail of ♍	15...

DIE 11 SEPTEMBRIS.[27]

[26] The third value is broken off with an ellipsis, which is printed.
[27] An ellipsis stands in the first entry itself, after the sort; it is printed.

Mediata 9, ♃ and ♐...	4 28
♃ and the lower bow of ♐	3 43

Region ii — the lunar eclipse and the night of 29 September

DIE 26 SEPTEMBRIS.

I observed a total eclipse of ☾, whose beginning and middle could not be seen because of clouds. But the first beginning of the emergence was at H.1 M.56 after midnight by the clock corrected to the Sun, which showed single minutes. The bright star in the right shoulder of Orion was then distant from the meridian line towards the east partibus 47⅔, by an exact observation in degrees of the Horizon. But when a third part of ☾ had recovered its light, the same star was removed 32⅚ from the meridian towards the east on the Horizon. By the observation taken from the bright star of Orion, the time of emergence from the shadow was H.2 M.10 after midnight, and this one is rather to be given [credence].[28]

Nota. The observation that was made by the shoulder of Orion is not good enough. But you may be in error by more than 2 gradibus, because the meridian line was not well found, and for another reason too — the wooden instrument. So trust the clock instead.

DIE 29 SEPTEMBRIS.

H M

14 16 — Prima ſtella ♈ and the eastern limb of the moon [lunæ] were distant — 22ᵍ 58′ The moon [luna] was then on the meridian. 14 23 — The same limb of ☾ and the eye of ♉ — 15 57 14 28 — The northern limb of ☾ and the head of Algol — 19 5 14 35 — The northern limb of ☾ and the middle of the left foot of Perſej — 10 50 14 58 — The middle of the left foot of Perſei and the eastern limb of ☾ and the lower jaw of Ceti were seen in one straight line. 15 1 — The lower jaw of Ceti and the southern limb of ☾ — 18 36 16 45 — Regulus and ♀ — 6 23 18 — ♀ and the little star in the belly of ♌ were joined in longitude; but ♀ stood 30 minutis towards the south, or the first diameter of the moon [lunæ]. At the same time ♀ and ♃ — 28 30[29]

Region iii — distances of the fixed stars

DISTANTIÆ FIXARUM.

The distances of the fixed stars.

[28] the word inside the square brackets at the end of the paragraph is a supply in the printed text and carries no footnote key.

[29] Perſej and Perſei are both printed, on successive lines.

The right shoulder of Orion and Canis Major	25^{g} 50′
Canis Major and Minor	25 40
Canis Minor and the same shoulder	25 50
The same shoulder and hircus	39 10
Hircus and Canis Minor	50 44

Hircus and the first of the Gemini	30^{g} 5′
The right and the left shoulder of Orion	7 24
The left shoulder and the left knee	14 4
The right shoulder and the left knee	18 25

30

Left file

Left shoulder and right knee	16° 43′
Right shoulder and right knee	16 56
Left shoulder and the first of the girdle	6 52
The same and the second	8 2
The same and the third	9 6
The same and the fourth	9 30
The third of the girdle and the right knee	7 52
Both knees	8 14
Oculus ♉ and the right shoulder of Orion	21 6
Hircus and the first ♊	30 16
Hircus and the second ♊	34 40
Both ♊	4 32
Canis Minor and the first ♊	26 50
Canis Minor and the second	23
The left shoulder of Orion and the first of the Geminorum	34 11
The left shoulder of Orion and the second ♊	32 36
Oculus ♉ and the first ♊	43 50
Oculus ♉ and the second	45 44
Hircus and the right shoulder of Orion	40 16
Hircus and the left shoulder of Orion	40
Hircus and Oculus ♉	30 38
The first and the second of Coronæ ſeptentr.	2 34
The second and the bright star	2 40
The bright star and the fourth	1 51
The fourth & the fifth	1 36
The fifth and the sixth	2 4

[30] `Canis maior` / `canis minor` are printed with and without a capital.

The sixth and the seventh	3 6
The first and the seventh	6 28
The bright star and Arcturus	19 20
Arcturus and the last in the tail of the Great Bear	30 18
The last of the tail of the Great Bear and the bright star of the Crown	30 36
The bright star of the Lyre and the bright star of the Crown	39 30
The bright star of the Lyre and the last of the tail of the Great Bear	50 28
Between both knees of Erichthonius	7 44
Hircus and the right shoulder	7 32
Hircus and the left knee	13 21

31

32

33

34

Right file

Hircus and the brighter knee	17^{g} 15′
Right shoulder and the [dimmer][35] knee	10 48
Right shoulder and the bright star of the head	7 40
The bright star of the head and hircus	7 25

Here in the observation with the Radius 4 minutes are everywhere lacking, as I afterwards observed by another instrument.

Breast and loins [of Caßiopeæ]	4 34
Breast and the topmost of the throne	4 54
Loins and the topmost throne	6 6
Neck and the topmost throne	6 30
Neck and breast	2 40
Breast and girdle	1 40
Girdle and the topmost of the throne	5 14
Girdle and loins	2 58

[31] the fourth row from the end prints `Erichtonij`, without the *h* that the established form carries.

[32] one row joins its two members with `&` where all the others use `et`.

[33] two rows — Canis minor et ſecundus and Hircus et ſiniſter humerus Orionis — carry a single figure only.

[34] the third row from the top is set tight, the figure `6` running hard against `cinguli` with no space between them.

[35] So in Bartholinus. The codex has a lacuna.

Loins and the lowest of the throne	3 33
The topmost and the lowest of the throne	4 44
Breast and the lowest of the throne	6 32
Loins and knee	3 29
Knee and Breast	6 52
Knee and foot	4 46
Foot and loins	7 14
Foot and the lowest of the throne	9 6
Knee and the lowest of the throne	6 44
The bright star of the Lyre and the bright star of the Arrow	33 50
The bright star of the Lyre and the breast of the Swan	19 58
The bright star of the Lyre and the belly of the Swan	[23][36] 25
Breast and the belly of the Swan	6
The breast of the Swan and the bright star of the [Arrow][37]	32 4

PEGASUS.

The head of Andromeda and the right wing of Pegasus	13 48
The wing and Mar[cab]	16 28
Marcab [and Scheat Alfaras][38]	12 46
[Scheat][39] and the first of the right foot	4 58
The first and the second of the right foot	7 32
[Scheat][40] and the first in the breast	4 34
The first and the second of the breast	1 6
[Scheat and Enif][41]	25 45
[Marcab and Enif][42]	20 13
[The right wing and deneb Kaitos	34 10][43]
Marcab and the right shoulder of Aquarij	21 20
Right shoulder of ♒ [and elif][44]	11 27

45

46

[36]So in Bartholinus. The codex has a lacuna.
[37]So in Bartholinus. The codex has a lacuna.
[38]So in Bartholinus. The codex has a lacuna.
[39]So in Bartholinus. The codex has a lacuna.
[40]So in Bartholinus. The codex has a lacuna.
[41]So in Bartholinus. The codex has a lacuna.
[42]The codex has »Macr... alæ«.
[43]In Bartholinus alone.
[44]The codex has »... alæ«.
[45]`cathedra` and `cathedræ` both stand in this file, on successive lines; `Pectus` and `pectus`, and `Hircus` and `hircus`, likewise vary within it.
[46]in the third row from the end the square bracket opens in the label and closes only after the value, with the raised key outside it.

47
48

Upper area, left file

[Enif][49] and the tip of the right wing of the Swan	21 40

CYGNUS.

The tip and the middle of the right wing	6 46
The middle of the right wing and the breast	7 53
Breast and belly	6
Breast and the middle of the left wing	8 21
The same and the belly	9 50
Belly and the middle of the right wing	11 20
Belly and the tip of the right wing	11 14
The tip of the right wing and the breast	9 33

Upper area, right file

N.B. If you should ever wish to refine the places of the planets obtained earlier by this observation and with the same instrument, so that they may have as little defect as possible, you will be able to do it more conveniently by means of the distances of the fixed stars observed afterwards[50] in the same way — that is, by discerning what more or what less of discrepancy has been [committed][51] in them against the true distance which they hold in the heavens, ascertained afterwards.

Division rubric and pole altitudes

OBSERVATIONES ASTRONOMICÆ HUENENSES A SOLSTITIO HYBERNO ANNI LABENTIS 77[52].

[ASTRONOMICAL OBSERVATIONS AT HVEN FROM THE WINTER SOLSTICE OF THE CLOSING YEAR 77.]

[47] the penultimate row spells `Aquarij` out as a word and the last row sets the sort ≈.
[48] three supplies — `[Caßiopeæ]`, `Mar[cab]` and the reading in `Ala et Mar[cab]` — carry no raised key; the other bracketed supplies on this side do. Recorded, not reconciled.
[49] So in Bartholinus. The codex has a lacuna.
[50] So in Bartholinus; the codex has »inſtrumentum«.
[51] So in Bartholinus. The codex has a lacuna.
[52] Folio 2r of codex B, in Tycho's hand. The observations of the Sun from 13 Dec. 1577 to 30 January 1578 are found on folio 1v, all of them (like the observations that follow) written by Tycho himself.

I found the greatest altitude of the pole star — 58^{g} 52^{m} the least — 52 56½

I find it therefore distant from the pole p.2 M.58, and so the elevation of the pole at the place of observation is 55^{g} 54′.

DECEMBRIS DIE 19.

In the morning I observed the altitude of Spica on the meridian, p.25 M.6, but the meridian itself is uncertain. The declination of Spica is therefore exactly 9.0 — increased by 20 minutes since Copernicus, over 52 years. That indicates that the fixed stars have moved forward 50 and more minutes from his time down to ours, although on his own hypothesis they ought to have completed at least 31 minutes. I found the same in the same star three years ago at Rostock.[53]

At the same time, about 7 in the morning, I observed the distance of Spica and ♎: 6^{p} 36′.

On the following night I observed these meridian altitudes of fixed stars.

The meridian-altitude group (two files under the lower rule)

Oculus ♉	*49^{p} 42′*
Algebor Orionis	*25 21½*
Bellatrix	*39 58*

Media Balthei	*32^{p} 35′*
Vltima Balthei	*31 49*

DIE 20 DECEMBRIS.

At hour 5, M10 50, P. M. the pole star stood in azimuth 20′ from the meridian towards the west, and its altitude was then found to be 58 50. At that instant the Right Ascension M. C. was p.6 M.10, the 7th parte of ♈ culminating.

But on the circle itself the pole star stood beyond the meridian by exactly 3 partes, and so its Asc. recta is 3.10 M.[54]

DIE 21 DECEMBRIS.

At hour 5 M. 38 A. M. the pole star was seen on the meridian below the pole, having

___[55]

…altitude 52.53. At that time there were in the meridian `p. 4 M. 40` *of the equator, to which correspond* ♎ ♈ `gr. 5 M. 5`*, with which the pole star culminates.*

[53] The preceding note is struck through with lines.

[54] `inueni` and `inventa` stand on the same side with *u* and *v*; `Stella polaris` and `ſtella polaris` differ in case within three lines.

[55] ITALIC: everything in regions i and iii is set in ITALIC — Tycho's own hand by Dreyer's rubric. Region ii, both files, is set in ROMAN. The footnote is roman.

From these follows an elevation of the pole of part. 55. 52*, and this reckoning is the surer one and agrees better with the solar altitudes if the parallax of those same altitudes is applied.*

On the same day at hora 5 M. 35 P. M. *the same star was in the meridian above the pole, and I found its altitude then to be 58.52. Elevation of the pole 55 52½.*

DIE 23 DECEMBRIS.

At hora 5 M. 8 *before noon I saw that ☽, before noon, was very close to the horn of ♉ which it shares with the foot of Erichthonius, standing off from it towards the south by* parte 1 M. 30 *reckoned from centre to centre, and this along the line drawn from ☽ through that star as far as the foot of Caßiopeæ, which is a star of the third magnitude. A good enough observation.*

At hora 5 M. 22 S. 40 *(in the morning; at the most* H. 5 M. 24*)*[56] *the pole star was in the meridian below the pole; its altitude* p. 52 M. 53*.*

- *At* hora 5 M. 52 S. 5 *Jupiter was in the meridian, having an altitude of — 30ᵖ 24′*
- *Spica was in the meridian at* H. 6 M. 7 S. 50*; I then observed its altitude — 25 10*
- *A good observation, one you can rely on.*

From this follows a declination of the star of 8.57½, the altitude of the pole being put at 55.52½ as the pole star gives it. Copernicus in the year of Christ 1525 observed the same declination as partium 8 M. 40*. The declination has therefore changed in the 52 years from Copernicus to our own observation by* p. 0 M. 18*, to which there answer in longitude 48′.*

Left file

Otherwise. Let the observed declination of the star be	8ᵖ 57½′
It has grown since Copernicus up to this point by	0 17½
To which there answer in longitude	0 46
By so much have the fixed stars advanced since Copernicus	32.

Right file

The place of Spica from Copernicus	17.21
The star's motion since Copernicus	46
The longitude of Spica in the year 77	18. 7 ♎

The Landgrave of Hesse ten years ago observed the same star in 17.57 ♎ with a latitude of ***1^p^ 59′*** *of two degrees, and that agrees well with our observation; but by*

[56] Written in afterwards above the line.

Copernicus's annotation the place of Spica ought now to be in 17.52 ♎ — a difference of 15 minutes.

- *On the 23rd, at hora 5 M. 22, the pole star in the meridian; altitude — 58.51*
- *The least altitude I found on the following day — partium 52.55*
- *But both observations must be examined more carefully, to see whether they agree more often.*

DIE 24 DECEMBRIS.

- *Jupiter was in the meridian at hora 5 M. 45; altitude — 30ᵖ 23′*
- *The clock was not set right.*
- *At hora 6 M. 1 Spica was in the meridian, having the altitude as above — 25 10*
- *On the 24th. In the evening I observed the greatest altitude of the pole star — 58 51*

— but not even at this time did I observe it accurately enough at its transit across the meridian; there could, however, be no appreciable difference.

57

58

59

___[60]

DIE 26 DECEMBRIS.

At hora 5 M. 12 P. M. the pole star was in the meridian; I then observed its altitude as p. 58 M. 52 — a good observation.

☽ was rising a little before hora 4 51½′.

DIE 27 DECEMBRIS.

In the morning at Hora 6 39½′ ♃ was in the meridian, having an altitude of partium 30 M. 16.[61]

___[62]

OBSERUATIONES ANNI 1578.

OBSERUATIONES ALTITUDINIS SOLIS.

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[57] the leaf sets Erichtonij, without the second *h* that the established form Erichthonius carries.

[58] the leaf prints Caßiopeæ, with ß.

[59] the leaf prints paralaxis, with a single *l*.

[60] ITALIC: both date headings and all three prose lines are set in ITALIC — Tycho's own hand by Dreyer's rubric. Nothing on this side is roman except the head-line.

[61] the figure 39½′ carries a prime on a TIME argument — Hora 6 39½′ — and so does hora 4 51½′ in the entry above. The prime is set on the leaf in both places.

[62] ITALIC — Tycho's own hand by Dreyer's rubric. The first display heading OBSERUATIONES ANNI 1578. is ROMAN capitals; the second, OBSERUATIONES ALTITUDINIS SOLIS., is ITALIC capitals. Of the month headings, JANUARIJ., MENSE MARTIO. and MAIJ. are italic; APRILIS., JUNIJ. and JULIJ. are roman. **The whole of the LEFT file — day figures, altitudes and judgements alike — is set in italic**, with a small number of roman words let into it. **The RIGHT file is mixed**: its day figures are italic while its altitudes and judgements are roman, except for two passages that are wholly italic — the Declinatio ⊙ subtraction and the six-line computation of the declination and the elevation of the pole. The prose paragraph beginning Ergo vera in ſolſtitio is roman.

[The two headings read: "Observations of the year 1578" and "Observations of the altitude of the Sun."]

Left file

JANUARIJ.

Day, and what stands left of the value	Altitude	Remark
Die 1	***12^g^ 18′***	
3	*12 38*	
5 — 13.0, at the least	*12 59*	*and this is the better*
9 — ἐν πλάτει	*13 44*	⊙ *not well seen*
12	*14 24*	*good*
22	*16 57*	
24	***17 32½***	*good*
30	*19 25*	*middling*

MENSE MARTIO.

Day, and what stands left of the value	Altitude	Remark
1	*30 23*	*middling*

By the new division — | ***91 30⁴⁄₆*** | ***88 29⁴⁄₆*** | ***69 23²⁄₈*** | ***49 16⁵⁄₁₀*** |

Day, and what stands left of the value	Altitude	Remark
2	*30 47*	*middling*
3	*31 9*	ἐν πλάτει
4 — 94 33 (flanked on the leaf by two short vertical rules)	***31 33½***	
5	*31 56*	ἐν πλάτει
5 — Azimuth 3	*31.53*	*Az.* ***5⅙****, 31.50; Az.* ***6⅙****, 31.47*
7 — at the greatest	***32 44½***	*good*
— at the least	*32 44*	
8	*33 6*	ἐν πλάτει
8 — Azimut ***6⅙***	*32.57*	*The following ones are good*
9	***33 29½***	*good; trust this one*
11	*34 17*	*good; trust this one*
13	***35 4¼***	*good; you can trust it*
15	*35 52*	*good enough*
— at the least	***35 51½***	*better*
16	*36 15*	*good*
17	***36 38⅓***	
18 — ***37 2½****, at the least*	*37 2*	*better*
20 — Azim. ***2¼****, Altit.*	*37 47*	*therefore M. 37.49*
21	*38 10*	ἐν πλάτει
23	*38 58*	
28	*40 52*	
29	***41 14½***	*good*

Day, and what stands left of the value	Altitude	Remark

APRILIS.

Day	Altitude	Remark
5	*43 49*	
7	*44 33*	
8	*44 55*	
10	*45 35*	
11	*45 55*	
13	*46 36*	
14	*46 56*	
15	*47 15*	
17	***47 51½***	
23	*49 43*	
28	*51 7*	*carefully taken*
30	*51 41*	*good — trust these two*

MAIJ.

Day	Altitude	Remark
18	*55 35*	
22	***56 10⅓***	
24	*56 25*	
30	*57 3*	

RIGHT FILE

JUNIJ.

[A single tall brace stands at the left of the first eleven entry lines (the 1st to the 11th), enclosing them all. To the left of that brace, set across those lines in roman — except 2. M., which is italic — stand the words: ***Error eſt in his 2. M. propter diuiſionem inſtrumenti*** — *"There is an error of 2. M. in these, because of the division of the instrument."*]

Day, and what stands left of the value	Altitude	Remark
1	*57 14*	*good; at the greatest* ***14½***
2	*57 18*	*good*
3	*57 21*	
4	*57 25*	*good; trust this one*
6	*57 30*	*good; trust this one*
7	*57 33*	
8	*57 35*	*good; at the greatest* ***35½***
9	*57 37*	

Day, and what stands left of the value	Altitude	Remark
10	*57 38*	(one brace over this row and the next:) *otherwise 57.36, for there is an error of 2M. in the division*
11	*57 38*	
Die 14	***57 32 25″***	
16	***57 33½***	
100 63.5.25	*gives 57 31*	
96 ***61⅔***	*gives 57 30*	
95 ***60⅘***	*gives 57 29*	
25	*57 0*	*exactly*
By another division		
99 ***62⅘***	*gives 56 58 11*	

- *Declination of ⊙ — 23 28*
- *— 22 52*
- [short horizontal rule]
- *36 — by only so much has the altitude of ⊙ decreased.*

Therefore the true altitude at the solstice would have been 57.36, and that by the topmost division; but by division 99 the altitude would have been 56 58, and hence the greatest altitude is 57.34, which agrees with the observation made with the larger rectangular instrument, where I found the same greatest altitude, namely 57.34, or rather ***57 33½****.*

	Value	
⊙ *greatest altitude*	*57 35 30*	(one brace over this row and the next:) *parallax added in both cases*
Least altitude	*10 41 30*	
Difference	*46 54 0*	(one brace over this row and the three below:) *trust these*
Therefore greatest declination	*23 27 0*	
Altitude of the Equator	*34 8 30*	
Elevation of the pole	*55 51 30*	

Day	Altitude	Remark
Die 27	56 49	not very carefully taken, because of a thin cloud
29	**56 34½**	

JULIJ.

Day, and what stands left of the value	Altitude	Remark
8	**55 15⅔**	(one brace over this row and the next:) good ones
9	**55 4½**	
13	**54 17½**	not very carefully taken, because of clouds
16	**53 41½**	good
17	**53 27¾**	good
23	52 4	moderately good
100 **57⅚**	gives 52 3	
98 **56⅘**	**52 2½**	
24 — 51 46, or at the least	51 45	moderately good
100 **57⅗**	gives 51 45	
98 **56⅔**	51 44	
25	51 31	good

[The July register is not finished on this side; it runs on to the head of the next leaf's left file.][63]

___[64]

Left file[65]

Day, and what stands left of the value	Altitude	Remark
Die 26	51 16	
99 **56⅔**		
94 **53⅗**	51 14	
29	**50 24½**	good; trust this one

AUGUSTI.

[63] the figures standing at the left of a division line (100, 99, 98, 96, 95, 94, 91, 88, 85, 69, 49) are numbers of divisions of the instrument, and the figure beside each is that division's raw scale reading. the leaf disagrees with itself over the solstitial altitude. Within a few lines it gives 57 38 (the 10th and 11th, with a note that these are 2M. too high), 57.36 as the true solstitial value by the topmost division, 56 58 by division 99, 57.34 from the larger rectangular instrument, **57 33½** as a preferred form of that, and 57 35 30 as the greatest altitude of ☉ in the six-line computation below.

[64] ITALIC — Tycho's own hand by Dreyer's rubric. **The whole of region i is ROMAN — both files, every month heading, every figure and every judgement — with four exceptions, all of them in the September block of the RIGHT file**, where the judgement words alone are italic: mediocris (the 15th), bona, fide huic (the 16th), exquiſitiſſime (the 20th) and mediocris, inter nubes (the 21st). In region ii the display heading is ITALIC capitals and both text blocks beside the figure are ITALIC; the point-letters A, B, C, D, E on the figure are roman.

[65] The July register continues here from the foot of the preceding side; **no month heading stands over it on this leaf.**

Day, and what stands left of the value	Alti-tude	Remark
2	**49 12½**	(one brace over this row and the next:) carefully taken
3	48 56	
4	48 37	middling
7	**47 40½**	good; trust
85 45	gives 47 39	
9	47 3	(one brace over this row and the next:) carefully taken
11	46 24	
13	45 42	
20	43 17	
21	42 56	
22	**42 34¼**	
23	42 11	
24	41 50	
25	41 28	
26	41 6	
27	40 43	good; trust this one
98 **44⅔**	gives 40 43	
28	40 20	good; trust this one
100 **44⅚**	40 21	as above — (one brace joins this row and the next, and the value with its two words stands opposite the brace, ranged between the two lines)
99 **44⅔**		
29 — **39 58½**, or rather	39 58	only
30	39 36	
31	39 12	middling

SEPTEMBRIS.

Day	Altitude	Remark
1	**38 48½**	good
2	38 26	good
3	38 3	good
4	37 40	good
6	**36 54½**	good
8	36 9	good
11	**34 57¾**	good
12	34 34	good
14	33 47	good

Right file[66]

[66]The September register continues here from the foot of the left file; **no month heading stands over it.**

Day, and what stands left of the value	Altitude	Remark
Die 15	**33 23½**	*middling*
16 — at the least **32 59½**	33 0	*good; trust this one*
100 **56⅘**	gives 33 0	
19	31 50	not good enough, because of clouds
20	**31 26⅔**	*most carefully taken*
21	**31 3½**	*middling, among clouds*
29	27 54	good

OCTOBRIS.

Day	Altitude	Remark
2	26 48	not good enough, because of clouds
4	26 1	good
5	25 39	middling
7	**24 54½**	middling
13	**22 45¾**	(one brace over this row and the next:) good ones
14	22 24	
17	21 22	good; trust this one
18	21 1	(one brace over this row and the next:) middling
21	20 3	
22	19 44	middling
23	19 26	good
24	19 5	ἐν πλάτει
25	18 46	moderately good

NOUEMBRIS.

Day, and what stands left of the value	Altitude	Remark
8	14 54	ἐν πλάτει
18	12 50	ἐν πλάτει
19	**12 39⅔**	good
23 — 12 1, at the greatest	**1½**	good
24	11 53	good

DECEMBRIS.

Day, and what stands left of the value	Altitude	Remark
22	11 7	good
100 **12⅔**		
99 **12⅙**		

OBSERUATIONES PER RECTANGULI INSTRUMENTUM INSTRUMENTORUM.

[The first line reads "Observations made with the rectangular instrument"; the second stands alone as a genitive plural, "of the instruments".]

Diagram. A line figure of the rectangular instrument's aperture and the shadow it throws. At the upper left is a drawn sun — a small oval with short radiating strokes all round it. Two straight lines run from the sun downwards and to the right. They converge on a narrow upright oval standing near the middle of the figure, which is the aperture: it is lettered **A** at its head and **B** at its foot, and carries a solid mark within it. Past the aperture the two lines diverge again and run down to the horizontal base line, the upper one meeting it at **E** at the far right, the lower at **D** rather more than half way along. A vertical line drops from **B** to **C**, the left end of the base line, so that B, C and the base line make a right angle at C. The base line itself runs C — D — E from left to right. The figure is uncaptioned; the display heading above it is a section heading, not a caption.

- A (head of the upright oval at the centre of the figure): A
- B (foot of the same oval, directly below A): B
- C (left end of the horizontal base line, at the foot of the vertical dropped from B): C
- D (on the base line, rather more than half way from C to E): D
- E (right end of the base line): E
- (within the sun's disc, upper left): a drawn face — two small dots for eyes, a thin hooked stroke for the nose, a short dash for the mouth. It is not a point-letter of the construction; no letter is committed for it.

[A block of five italic lines stands to the LEFT of the figure, level with its lower half:]

Multiply CD or CE by the whole, and divide the product by BC or AC; out comes the number to be sought in the second canon.

[A block of three italic lines stands to the RIGHT of the figure, above the level of the base line:]

Aperture	
I	*440*
II	*74*
III	*100*

67

68

[67] on the 23rd of November the value column carries only the minutes — the leaf sets `12 1` at the left of the measure, then `ad ſummum`, then 1½ in the value column, the degrees standing over from the figure at the left.

[68] on the 7th of August the judgement is left incomplete on the leaf. It reads `bona, fide` and stops there, the line below being the division line `85 45 facit 47 39`. Compare the full form `bona, fide huic` on the 27th and 28th of the same month.

69

___[70]

DIE 15 MARTIJ.

[The 15th day of March.][71]

Diameter ⊙, and the block numeral	(first pair)	(second pair)	*facit*	*Altitudo ⊙ centri*
Diameter ⊙ 30.48 — I	*BC 8795*	*CD 12066*	*53.54.42*	*35.49.12*
	AC 8805	*CE 12310*	*54 25 30*	
Diameter ⊙ 30. 6 — II	*BC 13163*	*CD 18040*	*53.53. 0*	*35.51.57*
	AC 13237	*CE 18485*	*54.23. 6*	
Diameter ⊙ 30.44 — III	*BC 17547*	*CD 24050*	*53.53. 7*	*35.51.31*
	AC 17653	*CE 24653*	*54.23.51*	

Therefore the true altitude of ⊙ was **35ᵖ 51′ 40″** on the 15th day of March — good.

DIE 16 MARTIJ.

[The 16th day of March.]

Diameter ⊙, and the block numeral	(first pair)	(second pair)	facit	(altitude)
Diameter ⊙ 30.50 — I	*CD 11900*	*135304*	*53.32. 0*	*36.12.35*
	CE 12140	*137876*	*54. 2.50*	
II	*CD 17789*	*135144*	*53 30 2*	*36.15.27*

[69] the leaf disagrees with itself on the 28th of August. The entry line gives `40 20`, while the braced pair of division lines immediately below gives `40 21` with the words vt ſupra, and the vt ſupra points back to the 27th, whose entry and division line both give `40 43`. The same pattern stands on the 23rd of July on the preceding side (`52 4` against `52 3` and **52 2½**) and on the 16th of September here (`33 0` on the entry line and `33 0` again from division 100, but **32 59½** as the least).

[70] ITALIC — Tycho's own hand by Dreyer's rubric. **The whole of this side is italic apart from four passages and the apparatus.** Italic: all four day-headings; every figure, letter-pair and head-word inside all four tables, including `facit` and Altitudo ⊙ centri; the line In ſolſtitio æſtiuo die **14** Junij deprehendi; the paragraph Cumque ⊙ abſit…; the paragraph Idem deprehendi die **12** Junij…. ROMAN: the head-line (1578, 57); Ergo vera altitudo ⊙ **35ᵖ 51′ 40″** die **15** Martij, bona.; the two lines Altitudo ⊙ die **16 36ᵖ 15′ 0″** bona and Iuxta æquinoctium Diameter ⊙ **30′ 50″**; the words Colligitur itaque ex duobus poſtremis Altitudo ⊙; Dreyer's footnote; the signature `8`. **One fount change falls mid-line** and is censused here at word level: in the `Colligitur` line the running words are roman while the value that ends the line, **57ᵖ 32′ 25″**., is set italic — roman statement, italic figure, on one line.

[71] Each numbered block sets two lines of figures; the leaf's brace closing the two `facit` lines onto the single altitude is described here rather than set in a cell.

Diameter ⊙, and the block numeral	(first pair)	(second pair)	facit	(altitude)
	CE 18216	*137561*	53 59 5	
III	*CD 23717*	*135162*	53 30 14	36.15. 0
	CE 24303	*137614*	53 59 43	

The altitude of ⊙ on the 16th day, **36ᵖ 15′ 0″** — good.
Near the equinox, the diameter of ⊙ **30′ 50″**.

In ſolſtitio æſtiuo die 14 Junij deprehendi

[At the summer solstice, on the 14th day of June, I found.]

Diameter ⊙, and the block numeral	(first pair)	(second pair)	*facit*	(altitude)
Diameter ⊙ 30. 4 — I	*CD 18853*	*CB 29918*	32 13. 2	57 32 fere
	CE 19327	*CA 30082*	32.43. 6	
Diameter ⊙ 30. 8 — II	*CD 25122*	*CB 39880*	32.12.30	57.32.26
	CE 25767	*CA 40120*	32.42.38	
Diameter ⊙ 29.30 — III	*CD 29423*	*CB 46700*	32.12.50	57.32.25
	CE 30125	*CA 46900*	32.42.20	

And so from the last two there is gathered the altitude of ⊙ ***57ᵖ 32′ 25″***.

*And since ⊙ was at most **2⅙ᵖ** short of the summer solstice at noon on that day, this amounts to **1′ 5″** in declination. The full altitude of ⊙ at the summer solstice itself was therefore **57ᵖ 33′ 30″** at Hven.*

*I found the same on the 12th day of June, for at that time, from the topmost aperture, CD was 29400 and CE 30100, which give the solstitial altitude of ⊙ as **57ᵖ 33′ 30″**.*

DIE 16 SEPTEMBRIS.

[The 16th day of September.]

Block numeral	(first pair)	(second pair)	(facit)	(altitude)
I	*CD 30527*	*CB 19990*	(blank)	
	CE 31195	*CA 20010*	(blank)	
II	*CD 45687*	*CB 29918*	56.46.52	
	CE 46827	*CA 30082*	57.16.58	
III	*CD 61528*[72]	*CB 39880*	(blank)	
	CE 62410	*CA 40120*	57 15 54	*Alt.* 32.44.6

[72] [Dreyer's apparatus, roman:] A line was drawn through it by Tycho. Above it he wrote: »Error«. It ought to be about 60865.

___[73]

Tabula Paralaxium ☉

[Table of the parallaxes of ☉.]

Altitudo	*Paralaxis*	*Altitudo*	*Paralaxis*
0	*2 58*	*50*	*1 54*
5	*2 57*	*55*	*1 42*
10	*2 55*	*60*	*1 29*
15	*2 51*	*65*	*1 15*
20	*2 47*	*70*	*1 1*
25	*2 42*	*75*	*0 46*
30	*2 35*	*80*	*0 31*
35	*2 26*	*85*	*0 15*
40	*2 16*	*90*	*0 0*
45	*2 6*		

[The block of prose standing to the right of this table:]

According to Copernicus, ☉ in the apogee of the eccentric makes the greatest parallax near the horizon 2.55; but in the perigee of the eccentric it makes the same 3′ 7″. The mean of these is 3′.

And so at the winter solstice the parallax is 3 minutes.

At the equinoxes, 2½.

At the summer solstice, 1½ — and these are everywhere to be added to the observed altitude for the true one to result.

Tabula mutationis declinationis ☉ circa Æquinoctia in Horis vbi vna hora mutat declinationem 0′ 58″ 35‴.

[Table of the change in the declination of ☉ near the equinoxes, in hours, where one hour changes the declination by 0′ 58″ 35‴.]

H	(change)	*H*	(change)
1	*0′ 59″*	*13*	*12′ 42″*

[73] ITALIC — Tycho's own hand by Dreyer's rubric. **This side is italic almost throughout, with two roman passages and a mixed heading.** ROMAN: the head-line (58, 1578); the title line Tabula Paralaxium ☉ standing over the first framed table; and — the substantial one — the whole of the final entry, Hora 4 M. 32 fuit ſtella polaris in Meridiano infra polum, cuius tunc altitudinem minimam accepi 52.55, bona obſeruatio., which is set upright where the entry immediately above it, under the same day-heading, is italic. ITALIC: both framed tables entire, including their column heads Altitudo, Paralaxis and H; the two-line title Tabula mutationis declinationis ☉ …, which is therefore in the opposite fount to the first table's title; both prose blocks at the right; the display heading OBSERUATIONES QUARUNDAM STELLARUM IN AZIMUTO ET ALTITUDINE.; both day-headings; and all four entries of the 2nd of January together with the first entry of the 3rd. **The two table titles differ in fount from one another** — the first roman, the second italic.

H	(change)	*H*	(change)
2	*1 57*	*14*	*13 40*
3	*2 56*	*15*	*14 39*
4	*3 54*	*16*	*15 37*
5	*4 53*	*17*	*16 36*
6	*5 52*	*18*	*17 35*
7	*6 50*	*19*	*18 33*
8	*7 49*	*20*	*19 32*
9	*8 47*	*21*	*20 30*
10	*9 46*	*22*	*21 29*
11	*10 44*	*23*	*22 27*
12	*11 43*	*24*	*23 26*

[The block of prose standing to the right of this table:]

To find the time answering to a given declination, take for each minute of declination one hour, and in addition one and a half minutes — so that if the declination were ***20′ 30″****, it gives in time* ***21***^{H} ***0***^{M}.

OBSERUATIONES QUARUNDAM STELLARUM IN AZIMUTO ET ALTITUDINE.

[Observations of certain stars in azimuth and altitude.]

DIE 2 JANUARIJ.

[The heading carries the subject into the entry, which opens with a lower-case verb.]

The pole star was observed by me at `Hora P. M. 5 M. 18 S. 10`*, in azimuth toward the setting* `G. 0 M. 37`*, altitude* `58 52` *or* `51`*.*

At ***Hora 5.42′ 35″*** *I observed the same star in azimuth* ***1***^{g} ***18′****, altitude* `58.49`*.*

At `Hora 6 M. 0` *I observed again, and found the pole star in azimuth toward the setting, in the meridian,* ***1***^{P} ***40′****, altitude* `58.42` *or* ***41½****.*

At `H. 7 M. 16 S. 40` *the brighter of the two forward stars of the Lesser Bear was in the meridian, having an altitude of* ***41***^{P} ***41′****.*

DIE 3 JANUARIJ.

In the morning ☽ was seen to rise, `Hora 4 M. 0 S. 0`*.*

At `Hora 4 M. 32` the pole star was in the meridian below the pole, and I took its least altitude then as `52.55` — a good observation.

———[74]

You can therefore use an elevation of the pole of `55.53` *without an error of one minute.*

[74] ITALIC — Tycho's own hand by Dreyer's rubric. **The whole of the composed body of this side is italic, without exception, from the first line to the last line of the 13th of August**, headings and figures alike: the five continuing entries, `DIE 4 JANUARIJ.`, `DIE 5 JANUARIJ.`, `DIE 10 MARTIJ.`, `DIE 15 MARTIJ.`, `DIE 17 MARTIJ.`, `DIE 15 JULIJ.`, `DIE 16 JULIJ.`, `DIE 13 AUGUSTI.` and every entry under them.

The meridian altitude of Jupiter was after 5 M. 18 *or thereabouts, for he had only just entered the meridian line; a little afterwards,* **30^{P} 10′**.

The meridian altitude of Spica **25^{P} 10′**. *At hour* 5.40 *Spica was in azimuth* 86.40, *altitude* 25.5.

At hour 6 the distance between Mars and cor Scorpij [the heart of the Scorpion] *was* p. 4.38, *by the Radius.*

A little afterwards, between the middle star in the forehead of ♏, *and* ♂, p. 7 M. 18.

DIE 4 JANUARIJ.

[The 4th day of January.]

At hour 5 M. 11 *the pole star was in azimuth* **0^{g} 48′**, *having an altitude of* **58^{P} 51′**, *or* **51½** *at the most. At hour* 5 M. 30 *the same star was in azimuth* p. 1 M. 20, *having an altitude of* partium 58 M. 47. *You can work upon this one.*

DIE 5 JANUARIJ.

[The 5th day of January.]

At hour 5 the pole star was in azimuth 58.49 ἐν πλάτει [Greek: *en platei*, "in breadth"].

At H. 5 M. 42 *I saw that the end of the tail of the Great Bear was in the meridian, having an altitude of* 17 M. 23.

DIE 10 MARTIJ.

[The 10th day of March.]

The least altitude of the tail of the Swan **9^{P} 50′**.

Note. The true meridian altitude of Spica is **25.10½** *— trust this one.*

DIE 15 MARTIJ.

[The 15th day of March.]

Petrus Jacobi observed these things on ☋ *when it was as good as acronychal, with the Sextant, as I suppose.*[75]

At hour 12 M. 37 *Spica in the meridian, altitude* 25.11.

But the meridian altitude of ☋ *a little before,* 31 57.

At the same time ☋ *stood from Spica, towards the preceding signs,* **p. 9.22½**.

But the parallax of the instrument is to be subtracted — you can gather it from the other observations made with the iron Sextant, which are found further on.

At hour 1 M. 51 *the southern scale of* ♎ *had a meridian altitude of* **19 51¼**.

And you can use this observation, the first of them all, in verifying the place of the apogee of ☋, *comparing the rest from the following years right through the eccentric.*

DIE 17 MARTIJ.

[The 17th day of March.]

[75] [Dreyer's apparatus, roman:] A line was drawn through it by Tycho. Above it he wrote: »Error«. It ought to be about 60865.

At ***H. 12½*** ♃ *stood from Spica* `9.38`*, which proves that the earlier figures are right.*

DIE 15 JULIJ.

[The 15th day of July.]

At ***H. 9½*** *the centre of* ☽ *in the meridian* `4.48`*.*

DIE 16 JULIJ.

[The 16th day of July.]

At ***H. 10⅓*** *the same* `4.58` *— good. Understand the centre of the Moon everywhere.*

DIE 13 AUGUSTI.

[The 13th day of August.]

(statement)	(value)
At hour ***9¼*** ***P. M.*** *the altitude of the uppermost circumference of* ☽ *in the meridian was*	***6ᵍ25ᵐ***
The altitude of ♄ *in the meridian*	`11 42`
The distance in latitude between ♄ *and the upper surface of* ☽	`5 5`

___[76]

DIE 25 AUGUSTI.

[The 25th day of August.]

8ᴴ 3ᴹ the pole star was in azimuth `gr. 5 M. 5`; afterwards I corrected it so that

`8 18` it was in azimuth **5° 14′**.

Upon this I observed that the Flying Vulture [vultur volans] was in the meridian at hour

`8 39`, `correct.` [corrected] `8 M. 38`, having an altitude of `Partium 42 M. 0.`

10 18⅔ The left shoulder of ♒ was in the meridian, having an altitude of — **26ᴾ46ᵐ**

`10 38` The Mouth of Pegasus [Os Pegaſi] was in azimuth `2 g. M. 0` towards the setting, having an altitude of — `altitud. 42 6`

`10 53` the right shoulder of ♒ — `31 50`

`11 10` ☽ was in conjunction with the foot of Erichthonius, which it shares with the horn of ♉, in such a way that its uppermost circumference was removed from that same star towards the south by the amount of the diameter of its own body.

[76] A word-level census was taken along every line of this side, including the three day-headings, every figure and every marker, and **not one italic sort stands anywhere on it**: the whole side is roman, head-line, headings, entries, tables, footnotes alike. By Dreyer's rubric that assigns the whole of this side to the assistants' hand and none of it to Tycho's own.

11 52 The Spine in the wing of Pegasus [Spina in ala Pegaſi] was in the meridian, having an altitude of[77] — **47**^{m}

12 3 Scheat of Pegasus was in azimuth p. 5 M. 7 towards the setting, having an altitude of 59 53

Note. In 24 hours the clock showed 3 minutes faster than it should have, and so from the time of the preceding observations 1 M. [is to be subtracted].[78]

DIE 26 AUGUSTI.

[The 26th day of August.]

☉ set at hour 6 M. 49 by the clock.

At hour 8 I rectified the instrument...[79] so that the pole star should fall in azimuth 5.15.

Upon this rectification, which I measure from the preceding one, I observed the following.

8^{H}**23**^{M} ♄ was in the meridian, having altitude — **11**^{g}**43**^{m} good

8 37 the bright star of the Vulture [Lucida Vulturis] — **41 59** vel **59½**

At the following noon the clock had come back exactly to the point of the 12th hour, so that the preceding observations, made last evening, are accurate enough in their times.

The place of ☉ at noon on the 27th day, from an accurate observation, was in **13 gr. 18 M.** ♍.

Note. The latitude of ♄ agrees better with the Alphonsine calculation, taking the observation of the 26th day; for if the place of ♄ is put in **17** ♑, the declination without latitude will be **22° 23′**, and from that the altitude 11.45 — but the observation gave it 2 minutes less. So the latitude of ♄ is next to nothing, or rather 2 minutes towards the south, whereas the Prutenic calculation has ¾ of one degree towards the north, from Stadius's note, and the Alphonsine at least 5 in northern latitude, from which the observation differs by at least 7 M.

DIE 27 AUGUSTI.

[The 27th day of August.][80]

(time)	(object)	(altitude)
8^{H}**16¾**^{M}	♄ was in the meridian, having an altitude of	**11° 46′**
8 31⅓	the bright star of the Vulture [Lucida vulturis]	42 0
8 50½	the bright star of Antinous [Lucida Antinoi]	32 10
8 56	the Upper Horn of ♑ [Superius Cornu ♑]	20 26
8 58	the Lower Horn of ♑ [Inferius cornu ♑]	18 10
10 10⅓	the left shoulder of ♒ [Siniſter humerus ♒]	26 48

[77] The degrees are wanting in the codex.

[78] the square brackets around "is to be subtracted" are the edition's own supply, printed on the leaf; the words stand in square brackets there and are not in the codex.

[79] We could not read this word — perhaps »ponendo«; it stands at the side of the page.

[80] Below it the measure is divided by **one vertical rule** into two files.

10ᴴ24⅔ᴹ The Mouth of Pegasus [Os Pegaſi] — **42° 10′**
10 28 ☽ was rising.
10 45 The right shoulder of ♒ [Dexter humerus ♒] — 31 52
10 49 The Head of Pegasus [Caput Pegaſi] — 38 20
The clock was running 3 minutes slow by the following noon.
___[81]

DIE 28 AUGUSTI.

[The 28th day of August.]
[Left file.]
- 6ᴴ **40½ᴹ** — by the clock, ☉ set.
- 8 25 — Lucida Vulturis [the bright star of the Vulture] — **42° 0′**
- 8 **44¼** — Lucida Antinoi [the bright star of Antinous] — 32 11
- 8 **49½** — **Sup. cornu ♑** [the upper horn of ♑] — 20 25

[Right file.]
- 8 57 — the pole star was in azimuth **4° 47′**, and from this you can verify the preceding azimuths.

The clock fell 13 minutes short of the time of the meridian, perhaps because it had met with some delay in the interval; and so the preceding observations are not true in their times.

DIE 29 AUGUSTI.

[The 29th day of August.]
[Left file.]
- 8 2 — ♄ in the meridian, altitude — **11° 46′**
- 8 16 — Vultur [the Vulture] in the meridian — 42 0
- — or a little less
- 8 **35⅚** — Lucida Antinoi — 32 10

[Right file.]
- 8 41 — **Sup. cornu ♑** — **20° 26′**
- 8 **43⅚** — **Inferius cornu ♑** [the lower horn of ♑] — 18 9
- — The clock was running slow by 22 minutes up to the following noon.

DIE 15 SEPTEMBRIS.

[The 15th day of September.]

[81]ITALIC — Tycho's own hand by Dreyer's rubric. **ROMAN:** the head-line (1578, 61); DIE 28 AUGUSTI. and every word and figure of both its files; the full-width paragraph Nota. Horologium in 13 minutis…; DIE 29 AUGUSTI. and every word and figure of both its files; and the two footnote lead-ins In margine:. **ITALIC:** DIE 15 SEPTEMBRIS. and **every word and figure under it**, down to …erat in obſeruatione.; and, inside each of the two footnotes, the guillemeted matter quoted from the codex margin (»Correcte per globum 27 4«, »25 54«). **The fount change in the body falls exactly at the DIE 15 SEPTEMBRIS. heading**, between blocks, and no fount change falls inside any line of the body.

11 57 — ☽ was in the meridian, having an altitude of ***35° 10****, and that reckoned to its uppermost circumference. ☽ in* ***1.20*** *♈ at hour 12. The heaven culminates at H. 11 M. 57, the Sun being in* ***2.11*** *♎.*

Note. This agrees with the motion of ☽; therefore the clock was right at that time.

12 25 — The beginning of the obscuration by the clock; the mid-heaven ***10.0*** *♈. The greatest altitude of the shoulder of Orion* ***14⅚****. Azimuth* ***8⅚*** *from the east towards the south. Answering to it,* ***Asc. R. M. C. 9.0*** [the right ascension of the mid-heaven]*, which gives in time* $12^H\ 28^M$.

Diagram. An uncaptioned, unlettered figure standing alone in the outer right margin, beside the entries of 12 40. It is a single plain circle — the disc of the Moon — across which a second, shallower arc is drawn from the upper right of the circumference down to its lower left. The lune cut off between that arc and the circle's own lower-left circumference is filled with close parallel hatching; the rest of the disc is left blank. Nothing else stands inside or outside the circle: no point-letters, no caption, no scale, no rule, no shading beyond the hatching of the one lune. **Label census: nil — the figure carries no lettering of any kind.** It is the drawing the text of the facing leaf refers back to.

12 40 — ☽ had perceptibly gone into eclipse, so far that mid-eclipse fell at hour 12.45 Min. by the clock, ἐν πλάτει [Greek: *en platei*, "in breadth"]*. The same star: altitude* ***17° 30′****, azimuth* ***12° 50′****. A fifth part of ☽ appeared darkened to the eye — that is, nearly* ***2½*** *digits.*

With the Radius the diameter of that body was observed as ***29′****, but with the Sextant* ***25′****,* ἐν πλάτει.

1 10 — ☽ still laboured so in the darkness that I could scarcely make out for certain whether it had passed mid-eclipse; but I judge that it has.

1 30 — Between the nearer limb of ☽ and Mars (N.B. ♂ next to ☉ ☍) — 11^g ***40′***[82]

1 45 — The nearer limb of ☽ stood off from the brighter star in the right horn of ♈ — 26 45[83]

1 55 — From the first star of ♈ the same limb of ☽ stood off — 25 20[84]

2 10 — ☽ was seen to have taken back its whole light, by the clock.

The same bright star of the shoulder of Orion had ***Az. 32° 22′****, Alt. — 28 16* ***Asc. R. M. C. 34****, the time hour 2 M. 10.*

2 52 — the diameter of ☽ was 32 M., taken with the Sextant and the Radius.

Mid-eclipse therefore fell at hour 1 M. 17 P. M. noctem [after midnight]. Of ☽ there were eclipsed ***2½*** *digits or a little more, for a fifth part of the diameter of ☽ was seen to be hidden.*

At the following noon the clock was running 2 minutes fast, which was imperceptible in the observation.

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[82] the sort ☍ is the opposition mark; the parenthesis records that Mars was then near opposition to the Sun. The leaf spells Martem out in words in the same line and prints ♂ only inside the parenthesis.

[83] In the margin: »*Correctly, by the globe, 27 4*«.

[84] In the margin: »*25 54*«.

___[85]

ECLIPSIS ☽ ANNO 78 15 SEPTEMB.

[An eclipse of ☽ in the year 78, 15 September.]

Note. For the place of ☽ to agree with the Prutenic tables at our meridian, one must take `1 H. 5 M.` *off the tables' time, so that the longitude of our place comes out* `partium 28 M. 0`.

	Initium — H M	Medium — H M	Finis — H M
Iuxta calculum Alphonſi — By Alphonsus's calculation	13 35	14 15	14 55
Iuxta calculum Stadij — By Stadius's calculation	12 35	13 25	14 15
Iuxta obſeruationem — By observation	12 25	13 17	14 10

The time having been rectified from the shoulder of Orion, the eclipse was:[86]

Initium [Beginning]	*12 28*
Medium [Middle]	*1 22*
Finis [End]	*2 16*

— all three braced together as bonæ [good ones].[87]

The Prutenic calculation gives the mid-time of the eclipse of ☽ as `H. 1 M. 50 P. M. N.`*; the difference is* ***28′***.

At hour `0 M. 22 p. M. N.`*, when the eclipse was coming on, ☉ was in* `2 gr. 11 M. 20 S.` *of ♎, and ☽ in the first degree of ♈ at* ***20′ 9″***. *The difference is* ***51′ 10″***. *The true ☍ therefore fell at* `H. 1 M. 53 P. M. M.`

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[85] ITALIC — Tycho's own hand by Dreyer's rubric. **ITALIC:** the heading ECLIPSIS ☽ ANNO 78 15 SEPTEMB.; the paragraph Nota. Vt conueniat locus ☽…; the line Facta rectificatione temporis ex humero Orionis fuit Eclipſis; the three words and the six figures of the braced group (`Initium 12 28`, `Medium 1 22`, `Finis 2 16`); every following paragraph down to the broken-off last line; and the heading N. B. DE ECLIPSI ☽ ANTECEDENTE. **ROMAN:** the head-line (`62`, `1578`); **the whole of the ruled table —** its header words `Initium`, `Medium`, `Finis`, its `H M` sub-heads, its three row-labels and all nine of its figures; the word bonæ standing against the brace, with its footnote figure; and the whole of footnote 1. **The fount change therefore falls at the table's own boundaries —** italic prose, a roman table let into it, italic prose again — and, at the brace, **inside a line**: the italic `Medium 1 22` is followed on the same line by the roman bonæ. **A pair of opposite founts for the same three words stands on this one side:** `Initium` / `Medium` / `Finis` are ROMAN in the table's header row and ITALIC in the braced group four lines below it.

[86] Three displayed lines sharing one value column, joined at the right by a single brace that spans all three; against the brace stands the one word bonæ ("good ones"), carrying the footnote figure.

[87] Struck out with lines. In the book of the *Progymnasmata* Tycho says that mid-eclipse was $13^{h}\ 17^{m}$ (page `02`). Longomontanus (*Aſtr. Dan.* p. 192) has $13^{h}\ 24^{m}$.

N.B. The place of ☉ at the preceding noon, from our modern tables as afterwards corrected, was in **1.45½** ♎*; but at the following midnight it is in* **2.15** ♎*; and at hour* 1 M. 22*, when mid-eclipse fell, ☉ was in* **2.18⅓** ♎.

N. B. DE ECLIPSI ☽ ANTECEDENTE.

[N.B. On the foregoing eclipse of ☽.]

When the Moon began to enter the shadow, reckoned from the azimuth of the bright star of the shoulder of Orion, p. 8 M. 50*, the time of first ingress is gathered to have been* M. 26 P. M. N. *— which exceeds the clock's indication by a single minute at most. It may be that the Moon was touching the earth's shadow one minute earlier, though that was not open to the eye; and so the truer beginning of the eclipse agrees the better with the clock itself. The altitude of the shoulder of Orion does indeed give a time nearly* 2 *minutes later, but that is rather on account of refraction, since the star appeared higher than it really was, being seen refracted.*

The last end of the eclipse came when p. 34 M. 40 *of the equator held the meridian, which agrees well enough both with the altitude and with the azimuth of that same brighter star in the shoulder of Orion; and the star was then higher, and not liable to refraction. It gives the time as* H. 2 M. 10 *from midnight, which agrees well enough with the clock. From the beginning to the end of the visible eclipse, then, there ran* H. 1 M. 44*, or at the very most hour* 1 M. 45*, of which the half is* **H. 0 M. 52½***. That would indeed be the time of incidence, as they call it, if it were equal — as men vainly suppose. But since the Moon is found to have spent from first ingress to mid-eclipse very nearly one and a half times [ſeſquialterum] as much time, and from the middle to the end, the earlier incidence will be* H. 1 M. 2 *very nearly and the later one of at least 43 minutes; and so mid-eclipse fell at hour* 1 M. 27 *as nearly as may be. But you can gather these very things more scrupulously another time by a mechanical investigation — namely, how much passed from the beginning of the eclipse to the middle, and afterwards from that to the end. The place of ☉ was then in* **2.19** ♎.

Note. The Moon did indeed appear to be in mid-shadow earlier, but in truth it was not yet at ☌ with the Sun, as is plain from the drawing. I made the trial mechanically, and in this way the Moon would have spent, in passing through the shadow, if a fifth part of it lay hidden there[88]

— from beginning to end H. 1 M. 50*; therefore the beginning was at hour* 0 M. 23 *and the end at hour* 2 M. 13*. Put the middle, then, at* $1^H\ 18^M$.

N.B. Besides this I worked out the parallaxes of ☽ from the Prutenic calculation for certain times about this eclipse, in the following way.[89]

H M	*Alt. ☽*	*Dupla a vertice*	*Paralaxes in verticali*	*Paralax. long.*	*Paral. latitud.*
11 57	34 55	110	**45′ 1″**	0 18	0 41
1 30	32 10	116	46 22	0 28	**0 36½**
1 55	30 30	119	47 0	**0 31½**	0 35

[88]The drawing referred to is the hatched circle printed in the margin of the preceding page.

[89]**Head row: present on the leaf —** H/M and Alt. ☽ in ITALIC, the four remaining heads in ROMAN.

H M	*Alt.* ☽	*Dupla a vertice*	*Paralaxes in verticali*	*Paralax. long.*	*Paral. latitud.*
—	—	—	—	ſubt.	ſubt.

90

91

I took the doubled [distance] *of* ☽ *from the Sun, and the equated anomaly, from the Prutenic tables; the altitude of* ☽ *by the great globe.*

If the reckoning of the lunar and not of the solar path is applied to the motion of ☽*, then* ☽ *spent at least* 47 M. *from the beginning of the darkening to mid-eclipse, and* 57 *from the middle to the very end. This seems to square better, so that on this reckoning mid-eclipse fell at* H. 1 M. 12 *— which also squares better with what was noted down during the observing.*

The beginning of the eclipse 0^H 25*, the end* h. 2 M. 10*. So the middle was* ***H. 1 M. 17½****. But with respect to the pole of the ecliptic,* ☽ *was not then exactly at* ☍ *with the Sun, but two minutes before it. Its place at the hour just named, then, was in* p. 2 M. 16 ♈.[92]

Locus cap. draconis prut. [the place of the dragon's head by the Prutenic]	22.39 ♓
Ex Alphonſino [by the Alphonsine]	22 46
Differentia vtriusque [the difference of the two]	7
Verus locus ☊ [the true place of ☊]	22 43 ♓
Diſtantia ☽ *a nodo* [the distance of ☽ from the node]	9 33
Latitudo ☽ *ad med. eclipſis* [the latitude of ☽ at mid-eclipse]	0 50 *Borea* [north]

93

H M	☽ *longit.*	*lat.*
0 25	1 50 ♈	0 48
1 18	2 16 ♈	0 50
2 10	2 42 ♈	0 52

94

These are en plati [in the rough]*; you can search them out more accurately another time.*

N.B. At 1^H 30^M*, putting the Moon's seen place in* p. 1 M. 54 ♈ *and latitude* 0.14 *north — as can be gathered from what precedes — and taking the latitude of* ♂

[90] the head words in English — Alt. ☽ the altitude of ☽; Dupla a vertice twice the distance from the zenith; Paralaxes in verticali the parallaxes in the vertical; Paralax. long. the parallax in longitude; Paral. latitud. the parallax in latitude; ſubt. to be subtracted.

[91] Right of the last rule, a block of four prose lines, set ROMAN — given as prose, not as a table:

[92] Measure 2 — split into **three** files by two vertical rules. The whole file is ITALIC.

[93] **Head row present on the leaf**, set ROMAN against the ITALIC of the figures.

[94] Right file — four short prose lines, ITALIC.

as p. 4 M. 47*, his longitude, from the distance to the limb of the Moon nearest him, comes out in* p. 12 M. 40 ♈. *But if I consider the distance of the nearest limb of* ☽ *from the bright star of* ♈*, keeping everything strictly within bounds and reducing it to this time, the longitude of* ♂ *comes out in* **p. 12 M. 51¼** ♈. *We shall therefore go astray imperceptibly if we take Mars's place at that time as* p. 12 M. 45 ♈*, or at most* p. 12 M. 50*, which will perhaps be the truer. The Prutenic calculation* 9.36 ♈*, the Alphonsine* 16.18 ♈. *In this place it exceeds the Prutenic calculation by* **p. 3¼** *and falls short of the Alphonsine by* p. 3 M. 28.

And from this you can gather when the star of Mars stood at ☌ *with the Sun, putting it rather that on that day and hour his longitude was in* p. 12 M. 50 ♈*; for it will not be possible to come nearer the truth in this place. I took the distance of the nearest limb of* ☽ *from the second star of* ♈ *at hour* 1 M. 45 *as* p. 26 m. 48*, a little greater than the observation itself gave, and from this I reasoned out the rest, carrying the place of* ☽ *forward by eight minutes at a time to* H. 1 M. 30*. And I worked it all out on the great globe, so that scarcely a perceptible difference can lie hidden, if you put the place of* ♂ *at* **1½ H. P. M. N.** *of the 15th day of September in* p. 12 M. 50 ♈*, and from this work out his* ☌ *to the Sun.*[95]

You can test all this against the calculation and the demonstration in the acronychal motion of Mars.[96]

Note. As for the earlier investigation of the motion of ♂*, I derived it from the place of* ☽ *at its* ☌ *with the Sun, and assumed as follows.* H. 1 M. 30*, the centre of* ☽ *in* 2 22 ♈[97]

H. 1 M. 30 ☽ *centrum in 2 22* ♈ ⎫
latitudo 0 51 borea ⎬ *vera*
longitudo viſa 1 54 ♈
latitudo viſa 0 14 borea[98]

From this, from the limb of ☽ nearest Mars, the assumed latitude of ♂, 4 47 M., came out very nearly midway between the two calculations, the Alphonsine and the Copernican, just as —

———[99]

— just as I found out from the correction of the 23rd day of October, as is plain from what follows. I gathered from the great globe that the longitude of ♂ *was in* p. 12 M. 40 ♈*. But from the distance of the limb of* ☽ *at* $1^{H}45^{M}$*, drawn back backwards*

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[95] ROMAN, standing between two italic paragraphs:

[96] ITALIC again:

[97] Measure 3 — a braced group entered from the running prose, so the first line above is also the first line of the group. The first line is ITALIC; lines 2–4 and the brace label vera are ROMAN. The brace spans lines 1 and 2 only.

[98] the group in English — ☽ centrum the centre of ☽; latitudo the latitude; longitudo viſa the seen longitude; latitudo viſa the seen latitude; borea north; vera "true ones", the brace label standing against the first two lines only. ROMAN:

[99] **Fount: the opening paragraph — the tail of the sentence begun on the preceding leaf — is ITALIC, and the change to ROMAN falls exactly at the first day-heading; the whole of the rest of the side is ROMAN except the two-line N.B. that closes it, which is ITALIC again.**; ITALIC:

by 8 minutes to 1^H30^M from the star which is the second of ♈, so that it should then be taken as p. 26 M. 48, the longitude at hour 1 M. 30 comes out at nearly p. 12 M. 52 ♈. We shall therefore do more fittingly if the longitude of ♂ is taken as p. 12 M. 50.

DIE 29 SEPTEMBRIS.

[The 29th day of September.][100]

6ʰ26ᵐ the Flying Vulture was in Azimuto towards the west 5ᵍ50′
having altitude 41 48
6 45 Lucida Antinoi in azimuto towards the west 5 42, altitude 31 59
7 45 the left shoulder of ♒ 26 48
7 53 the leading one of the two in the tail of ♑, altitude 15 42
8 0 the mouth of Pegasus 42 10
8 11½ the hinder one of the two in the tail of ♑, azim. towards
the west 2 52, altitude 16 4½

DIE 3 OCTOBRIS.

[The 3rd day of October.][101]

6 0 Aquila, Azim. towards the west 2° 10′, Alt. 41 55

---

6 23	the hinder one in the horn of ♉	18° 4′
7 36	the left shoulder of ♒	26 47

7ʰ48ᵐ the hinder one of the two
in the tail of ♑ 16 10
8 10 the right shoulder of ♒ 31 59

DIE 5 OCTOBRIS.

[The 5th day of October.][102]

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6 8	Aquila, alt.	41 59½
7 48	the left shoulder of ♒	26 49

---

8 2½	the mouth of Pegasus	42 10
8 22½	the right shoulder of ♒	31 51½

[100] The fount changes from italic to roman at this line.
[101] One full-width line, then a measure split into two files by a vertical rule.
[102] A measure split into two files by a vertical rule.

DIE 7 OCTOBRIS.

[The 7th day of October.]

6 3 Aquila 41 59

6 10½ ☽ was in the meridian, and its upper horn had altitude 7 25
its diameter being 34′, from which the true altitude
of the centre was 7 8

6½ it was in azimuto 3½, alt. 7° 20′

6 35 azimut 5, alt. 7 17

6 38 azimut 6¾, alt. 7 15, its diameter being 34′.

At the next following noon the clock ran past the 12th hour by nearly 22 minutes. Because of this error of the clock, **5′ 40″** was subtracted from the time of the observation of ☽ — namely from **H. 6 M. 10½**.

Calculation of the motion of ☽ to the year 1577, the month of September, d. 6, **H. 18 M. 21 ſecund. 15**, equated and reduced time.

The true place of ☽ from the true equinox 4ſex **51° 35′ 42″**. Therefore ☽ is in **21 gr. 35 M. 42 ſecund.** of ♍. The true latitude of ☽ southern, with ☽ ascending, **4° 19′ 28″**.

Die 8	$6^h\ 2^m$	Aquila	**41 59½**
Die 11	5 44	Aquila	42 0
Die 13	5 37	Aquila	**41 59 50″**

DIE 23 OCTOBRIS.

[The 23rd day of October.][103]

6^h40½ the left shoulder of ♒ 26 49 vel 48 [or 48]

6 48½ the spine in the tail of ♑ 15 41

6 54½ the mouth of Pegasus 42 11 vel 10 [or 10]

7¼ the right shoulder of ♒ 31 52 (½)

7 51½ the brighter of the two
in the neck of Pegasus 42 51

8^h**13⅚**^{m}	Scheat of Pegasus	60 0
9 17	the head of Andromeda	60 55
9 21⅔	the hinder star of the wing of Pegasus	**46 58½**
9 51½	♂	34 44

[104] *N.B. ♂ near his ☌ with the Sun, nearly stationary.*

[103] A measure split into two files by a vertical rule, decided separately.
[104] ITALIC:

___[105]

At the next following noon the clock was running fast by at least 50 seconds.[106]

N.B. For the 23rd day of October at ***H. 9 M. 51½*** *from noon there comes out the right ascension of Mars* p. 5 M. 25 *and the declination* 0.36 *north. The limitation having been carefully made, and therefore:*[107]

	Long. ♂	*Latitud.*
Ex obſeruatione [*from the observation*]	***5 12½*** ♈	***2 5½ Merid.***
Calc. Prut. [*the Prutenic calculation*]	*2 24* ♈	*2 35 M.*
Calc. Alph. [*the Alphonsine calculation*]	*6 59* ♈	*1 33 M.*

[108]

[109]

Put ♂ *at* 5.12 ♈ *with latitude* 2.5 M., *and you will go astray imperceptibly.*

DIE 18 NOUEMBRIS.

[The 18th day of November.][110]

- 5^{h} 37^{m} P. M. — ♀ was distant from ♄ in consequence [forwards, in the order of the signs] … 2^{g} 23′

DIE 24 NOUEMBRIS HÆC OBSERUAUI.

[The 24th day of November: I observed these things.][111]

- *6* ***1½*** — the limb of ☽ nearest Spica was distant from Spica … 12 36[112]

There seemed, however, to be a visible conjunction with the star that is the second in the left wing of Virgo; for the line drawn through the horns of ☽ *fell upon that star, and* ☽ *was distant from the star itself* p. 4 M. 0, *and that by the Radius, and reckoned to the circumference of* ☽ *nearest the star.*

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[105] **Fount: the side alternates throughout. The two opening lines are ITALIC; the three-line reduction group is ROMAN under ITALIC heads, with an ITALIC block beside it; both day-headings are ITALIC; and inside the 24 November run the clock times in the left margin are ITALIC figures while the entry text and the values ranged at the right are ROMAN, with six wholly ITALIC annotations standing between the entries.** The Corrigenda (p. 429) direct that the first opening line (v. 1) and the day-heading DIE 18 NOUEMBRIS with its line (v. 8–9) be upright; the markup below follows them. ROMAN:

[106] ITALIC:

[107] **Head row: present on the leaf**; on the leaf Long. stands over the first figure-group, Latitud. over the second, and the sort ♂ stands between them, over neither. The three data lines and the head words are ITALIC.

[108] Merid. and M. in the last column stand for *meridionalis*, southern.

[109] To the right of that group, two lines set ITALIC — given as prose, not as a table, since neither line is a ranged value:

[110] One displayed line, ROMAN:

[111] The clock times at the left are ITALIC; the entry text and the ranged values are ROMAN.

[112] ITALIC annotation:

- *6 12* — the same distance by the Sextant, 4 p. 22 min., taken with the parallax; and it is the better one.
- *6 23* — ☽ from Spica, as above … 12 24
- *7 16* — between the nearest limb of ☽ and Spica, by the Radius … 11 56
- by the Sextant … 12 5
- *7 36 30*^{s} — the outer illuminated limb of ☽ was in the meridian, and the topmost circumference of ☽ had altitude … 30 10[113]

But at that time the limb of ☽ was distant from Spica 11 56 or 57½. More truly 11 43.

- *8 24* — or a little before, ☉ was rising.
- *8 43* — between the limbs of the two luminaries, by the Radius … 65 55[114]

And since the place of Spica has been verified as 18^{g} *8′ ♎, the seen place of ☽ reckoned to its limb, at hour 7 36½, when it was in the meridian, will be 6.25 ♎. But one hour and seven minutes later the seen place of ☽ was — for the hourly motion is 36′ — in 7*^{g} *5′ ♎. And so the apparent place of the Sun at hour 8 M. 43, a little after its rising, was in 13*^{g} *0′ ♐, which does not square at all, because of the magnitude of the distance; but try it again on the following days.*

- *9 55* — the limbs of the luminaries were distant … 65 40[115]

☽ was in 7.48 ♎ reckoned to the limb; ☉ would therefore be in 13.28 ♐. Note: the side of the true distance is at least 2 minut. less, on account of the latitude of ☽.

- *10 9* — they were distant … 65 34[116]

The place of ☽ then in 7.57 ♎. Therefore ☉ in 13.29 ♐, two minutes having been subtracted from 34; and even so the place of ☉ comes out too great.[117]

11 53 — by the clock, ☉ was in the meridian; therefore between the transit of ☽ and that of ☉ across the meridian there were horæ 4 minuta 16 by the clock, which was not sufficiently corrected.

The right ascension of ☽ at the time of its transit across the meridian, 185.6, putting the latitude at 2 p. south. To the time elapsed there answer 64.10. Therefore the right ascension of ☉ is 249.16, answering to 10.50 ♐, which does not square at all with the former; but the error is in the time.[118]

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[113] ITALIC annotation:
[114] ITALIC annotation:
[115] ITALIC annotation:
[116] ITALIC annotation:
[117] ITALIC annotation, entered from the clock time 11 53, which is itself italic like the other times:
[118] Hæ quatuor annotationes a Tychone inter obſervandum ſcriptæ ſunt. — These four notes were written by Tycho in the course of observing.

___[119]

DIE 22 DECEMBRIS.

[The 22nd day of December.][120]

In the morning at hour **6¾** *I saw that* ♎ *was very close to the brighter and more southerly star of the Scales; for it was distant from that star at least* **50** *minutes towards the north, and that along the line which is drawn from that star to Arcturus. A good observation — trust it; I observed the same thing twice.*

- 7^h 8^m — they were distant in the same way 48 minutes, twice, by the Sextant.
- 7 18 — 49, once, by the Sextant.[121]
- 6 42 — ☽ was distant from Spica backwards, against the order of the signs, seen at the same latitude as it,
- grad. 2 M. 25
- 6 58½ — it was distant 2 21
- 7 58 — it was distant 2 8[122]

2 m. always subtracted, for the parallax of the instrument. The upper part of ☽ had the same latitude.

DECEMBRIS[123]

[Of December.]

Die 25	the greatest altitude of the pole star was	58° 56′
Die 29	the same was found to be	58 56
Die 31	the altitude was the same	58 55⅔

[119] **Fount: the side divides exactly at the second heading. Everything above DECEMBRIS is ITALIC — the day-heading, the prose entry, both full-width lines and both files of the split measure, times and figures alike. Everything from DECEMBRIS down is ROMAN — that heading, the three pole-star lines and Dreyer's footnote.** The Corrigenda (p. 429) direct that v. 6–15 be upright — from the 7^h 8^m line down — so that only the day-heading and the prose entry under it remain italic; the markup below follows them.

[120] ITALIC:

[121] Measure 1 — split into two files by white space, with **no vertical rule** between them.

[122] Right file — three prose lines, ROMAN, standing opposite the last three lines of the left file and beginning on the level of its continuation line.

[123] These observations of the pole star are found in the codex at the end of the »Libri diſtantiarum« [the *Book of Distances*]. They were made by Petrus Jacobi Flemløſe [Peder Jacobsen Flemløse], a pupil of Tycho.

___[124]

- Liber distantiarum Stella„
- rum affixarum per sextan-
- tem Astronomicum et RA„
- dium, ab initio Anni
- 1 5 · 7 8
- in Insula Huena
- diligenter obserua
- tarum[125]

Book of the distances of the fixed stars, diligently observed with the Astronomical Sextant and the Radius on the Island of Hven, from the beginning of the year 1578.

Drawing. Beneath the title, occupying rather more than the lower half of the plate, stands a pen drawing in the same ink and the same hand as the title. An observer in a knee-length cloak and hose stands in three-quarter profile facing to the right, his head tilted back, sighting along the arm of a large sextant. The instrument is a graduated arc — its limb drawn as a long hatched band, the two radial arms crossing at a pivot and projecting well past it to the upper right — carried on a short cross-piece above a **fluted classical column** with a moulded capital and a spreading foot, which is bedded in a low hummock of ground. The observer's near hand steadies the instrument at the head of the column; his far hand holds the free sighting arm to his eye, and a cord or chain runs in a curve from the instrument's head down to his hand. Behind and to his left stands a heavy tree trunk cut off short, with a slender sapling springing from its foot; small tufts of grass and three or four spindly plants are scattered across the ground line, which is worked in close hatching and runs the full width of the drawing. The page below the ground line is blank.

- **Labels: none.** The drawing carries **no letter, no numeral and no caption of any kind —** an enumerated nil return, not an unread margin. Nothing has been supplied to it, and **no point-letter has been inferred from the instrument's construction**.
- **No printed caption, credit or descriptive line stands anywhere on the plate**, above or below the drawing. The plate therefore **does not**

[124] This side is **neither narrative, nor a ruled observation table, nor a register, nor a mixed side**: it is a **full-page facsimile plate —** a photomechanical reproduction of a manuscript title-page, comprising eight lines of handwriting above a pen drawing. the manuscript title, transcribed line for line as the plate sets it, with the scribe's own line-end marks. Two different break marks stand on this one page: a **doubled raised stroke** („) after `Stella` and after `RA`, and a **single long dash** (-) after `sextan`; the break between `obserua` and `tarum` carries **no mark at all**. Word division and capitalisation are the plate's, including the capitals `RA` standing inside the word *Radium*.

[125] the year stands on its own line, the five sorts set wide apart with a raised stop between the `5` and the `7`, exactly as given above. `et` is written as an **et-ligature** whose form approaches a modern `&`; it is transcribed as `et` because that is the word, and the ligature form is recorded here rather than reproduced.

itself say whose hand wrote the title or drew the figure, and no attribution has been supplied.

___[126]

LIBER DISTANTIARUM STELLARUM AFFIXARUM PER SEXTANTEM ASTRONOMICUM ET RADIUM AB INITIO ANNI 1578 IN INSULA HUENA DILIGENTER OBSERUATARUM.[1]

[The Book of the distances of the fixed stars, diligently observed with the Astronomical Sextant and the Radius on the Island of Hven from the beginning of the year 1578.]

Parallaxis inſtrumenti

[The parallax of the instrument.]

[G. is *gradus*, M. is *minuta*; the leaf spells neither out and neither has been expanded in the table.][127]

G.	M.	G.	M.	G.	M.
1	1	11	12½	21	24
2	2	12	14	22	25
3	3½	13	15	23	26
4	5	14	16	24	27
5	6	15	17	25	28
6	7	16	18	26	29
7	8	17	19	27	30
8	9	18	20½	28	31
9	10	19	21½	29	32
10	11½	20	23	30	33

[128]

This parallax must be subtracted from the arc of the distance of the stars observed with the sextant.

With the parallax of the lesser, en plati[2][129]

- *Absque omni paralaxi* [without any parallax] … *34 50*
- *Inter lyram et vulturem ſunt* [between Lyra and the Vulture there are] … *34 10*
- (rule drawn across the two figures above)

[126] **This side carries no composed matter of any kind.** It is the verso of the facsimile plate.

[127] The six columns and the two vertical rules dividing them are the leaf's; the argument runs continuously 1–30 from the left block through to the right.

[128] ITALIC — the whole right-hand file, from here to the last sum:

[129] en plati is printed **in Latin sorts**, in the same roman fount and body as the words around it — not in Greek type. It is the phrase this work elsewhere sets as Greek ἐν πλάτει ("in breadth"; broadly, approximately). It is transcribed here as the sorts stand and has **not** been promoted to Greek. Dreyer's own footnote 2 concerns precisely these words.

- *Paralaxis* [the parallax] … *40*[130]
- *Alias* [otherwise] … *34 49*
- (no label) … *34 11*
- (rule drawn across the two figures above)
- *Paralaxis* [the parallax] … *38*

And this agrees well enough with the parallax of the instrument, for *35 grad.* *give* *38 minuta* [35 degrees give 38 minutes].

- (no label) … *28 30*
- (no label) … *28 2*
- (rule drawn across the two figures above)
- *Paralaxis* [the parallax] … *28 — tabula dat 31* [the table gives 31].[131]

DIE 21 JANUARIJ.

[The 21st day of January.]

(distance measured)	(value)
De Quadrato Pegaſi. — Inter Scheat Pegaſi et caput Andromedæ [On the Square of Pegasus. — Between Scheat of Pegasus and the head of Andromeda]	**14° 14′**
Inter primam alæ et caput Andromedæ [Between the first star of the wing and the head of Andromeda]	20 5
Inter primam et poſtremam alæ [Between the first and the last of the wing]	16 33
Inter primam alæ et Scheat [Between the first of the wing and Scheat]	12 45
Inter poſtremam alæ et Scheat [Between the last of the wing and Scheat]	20 39
Inter caput Andromedæ et poſtremam alæ [Between the head of Andromeda and the last of the wing]	13 58

DIE 22 JANUARIJ.

[The 22nd day of January.]

- Between the head of Andromeda and the bright star in her girdle … 14 14
- Not sufficiently exact, because of intervening clouds.

DIE 4 FEBRUARIJ.

[The 4th day of February.]

- Between the more northerly star of the third magnitude of the right horn of ♈ and the last of
- (continuation of the same entry, ranged right) the wing of Pegasus … 24 31

[130] to the right of that sum the leaf sets a second, parallel one, headed by the printed alternative Alias ("otherwise"). Its second line carries **no label at all —** a continuation line whose label is supplied by the left sum.

[131] the leaf itself lets the last two figures stand apart: the sum yields 28 where its own table gives 31 at that argument. That is the writer's own reckoning and his own note of the discrepancy; **it is left standing and no [recte:] is offered**.

- Between the head of Andromeda and the same star of the horn of ♈ … 25 8
- But the distance of the head of Andromeda and the last of the wing of Pegasus was noted earlier.
- Between the head of Andromeda and the bright star of the girdle … 14 16
- Between the same star of the girdle and the more northerly star in the right horn of ♈, of the third magnitude [3^{æ} mag.] … 17 38
- Between the bright star of the girdle and the bright star at the top of the head of ♈ … 17 10
- Between the same star of the head of ♈ and the bright star in the left foot of Andromeda … 18 44
- Between this star in the foot of Andromeda and the bright star of her girdle … 12 16
- The preceding observations are not reliable, because of the uncertainty of the instrument.

5 ET SEQUENTIBUS DIEBUS FEBRUARIJ.

[On the 5th and following days of February.]

(distance measured)	(value)
De quadrato Pegaſi. — Inter Scheat et caput Andromedæ [On the Square of Pegasus. — Between Scheat and the head of Andromeda]	14 6
Inter primam alæ et caput Andromedæ [Between the first of the wing and the head of Andromeda]	19 58
Inter primam et poſtremam alæ [Between the first and the last of the wing]	16 33
Inter primam alæ et Scheat [Between the first of the wing and Scheat]	12 45
Inter poſtremam alæ et Scheat [Between the last of the wing and Scheat]	20 36
Inter caput Andr. et poſtremam alæ [Between the head of Andromeda and the last of the wing]	13 54

132

Footnotes (printed at the foot of the side, in the smaller body):

1 This »Liber diſtantiarum« is written in the hand of Petrus Jacobi [Peter Jacobsen].

2 I do not know whether I read these words correctly, for they are written at the top of the page, where the leaf was afterwards trimmed back a little.

- Between the more northerly star of the third magnitude in the right horn of ♈ and the last
- (continuation of the same entry, ranged right) of the wing of Pegasus … **24° 28′**
- Between the head of Andromeda and the same star in the right horn of ♈ … 25 10

[132] the leaf prints **De Quadrato Pegaſi.** with a capital Q at the 21 January group and **De quadrato Pegaſi.** with a minuscule q here.

- The distance between the head of Andromeda and the last of the wing of Pegasus was noted above.
- Between the head of Andromeda and the bright star of her girdle … 14 16
- Between the same star of the girdle and the more northerly star of the right horn of ♈, of the third magnitude [magn. 3^{æ}] … **17 45 30″**
- The distance between the head of Andromeda and the more northerly star of the right horn of ♈ was given above.
- Between the bright star of Andromeda's girdle and the bright star at the top of the head of ♈ … **17 15½**
- Between the same star of the head of ♈ and the left foot of Andromeda … **18 43½**
- Between this foot and the bright star of Andromeda's girdle … 14 16
- Between the unformed star of the fourth magnitude above the back of ♈ and
- (continuation of the same entry, ranged right) the most northerly star of the Triangle … 11 26
- Between the same star of the Triangle and the bright star at the top of the head of ♈ … **11 23½**
- Between the unformed star above the back of ♈ and …[1] … 10 16 30
- Between the more northerly star of the third magnitude in the right horn of ♈ and the eye of ♉ … 37 15
- Between the eye of ♉ and the head of Medusa … 30 57
- Between the more northerly star of the third magnitude in the right horn of ♈ and
- (continuation of the same entry, ranged right) the bright star of the head of Medusa … 21 33
- Between the same star of Medusa and the left foot of Andromeda … 11 49
- Between the left foot of Andromeda and the more northerly star of the right
- (continuation of the same entry, ranged right) horn of ♈ — the distance was given above.
- Between Algenib of Perseus and the left foot of Andromeda … 15 35
- Between Algenib and the bright star of the head of Medusa … 9 10
- Between Algenib of Perseus and the star that is in his left knee … **11 13½**
- Between this star and the head of Medusa … **9 19½**
- Between the same star of the head of Medusa and the sole of Perseus's left foot … 12 46
- Between this sole of Perseus and his own left knee … 8 5
- Between the left foot of Andromeda and the right shoulder of Perseus … 14 57
- Between this shoulder of Perseus and the bright star of the head of Medusa … 12 27

- Between the left foot of Andromeda and the head of Medusa … 12 6
- Between the sole of Perseus's left foot and the eye of ♉ … 17 58½
- Between the same sole of Perseus and the left horn of ♉ … 19 54
- Between the eye of ♉ and its left horn … 16 33
- Between the eye of ♉ and the left shoulder of Orion … 15 52
- Between the shoulder and the left horn of ♉ … 22 10
- Between the right shoulder of Orion and the left foot, of the third
- (continuation of the same entry, ranged right) magnitude, of the more southerly of the Twins … 13 32
- Between the same shoulder of Orion and the left horn of ♉ … 22 4½
- Between the left foot of the more southerly of the Twins, of the third magnitude,
- (continuation of the same entry, ranged right) and the left horn of ♉ … 20 10½
- Between Canis Minor and the right shoulder of Orion … 25 59
- Between the same shoulder and the left foot of the more southerly of the Twins … 13 29
- Between the same foot of the more southerly of the Twins and Canis Minor … 18 38 30″
- Between the two Dogs … 25 36
- Between the left foot of Orion and his right shoulder … 18 33½
- Between Canis Major and the left foot of Orion … 23 42
- Between Canis Major and the right shoulder of Orion … 27 0½
- Between the right knee of Orion and his own right shoulder … 17 7
- Between the right knee and the left foot of Orion … 8 24½[133]

Footnote (printed at the foot of the side, in the smaller body):

[1] The name of the other star is missing.

DISTANTIÆ STELLARUM CASSIOPEÆ INTER SE ET POLAREM STELLAM.

[The distances of the stars of Cassiopeia from one another and from the pole star.][134]

[133] the leaf's own Latin for the recurring descriptions: borealiorem tertiæ mag. in cornu dextro ♈ (the more northerly star of the third magnitude in the right horn of ♈); informem quartæ magnitudinis ſupra ♈ dorſum (the unformed — i.e. unconstellated — star of the fourth magnitude above the back of ♈); borealiſsimam trianguli (the most northerly star of the Triangle, printed with the ß ligature); lucidam baltej and lucidam in balteo eius (the bright star of the girdle); plantam pedis ſiniſtri Perſej (the sole of Perseus's left foot); auſtralioris Geminorum (the more southerly of the Twins); canem minorem / canem maiorem (Canis Minor / Canis Major); utrumque canem (the two Dogs). The leaf spells baltei and baltej, magn., mag., magnitudinis and magnitud., and Geminorum and geminorum, all within these two sides. at the fourteenth line the leaf sets **three spaced points** (. . .) where the second star's name should stand, and hangs footnote marker 1 on them. The points are the edition's, and the gap is the manuscript's.

[134] The Roman numerals IV, XI, II, XII, V are the leaf's star-numbers within the constellation.

(distance measured)	(value)
Inter IV et XI [Between IV and XI]	6° 4′
Per Radium, ad ſummum [By the Radius, at most]	6 5
Inter II et XII [Between II and XII]	4 56
IV et V [IV and V — set indented, with no Inter]	3 29

- V et VI [V and VI] … **4° 45′**
- VI et IV [VI and IV] … 7 10
- Inter IV et Cynoſuram [Between IV and Cynosura] … 28 30
- *Obſerva inter II et Cynoſuram.*[1] [*Observe between II and Cynosura.* — italic, no value; a note to himself]

DIE 8 MARTIJ.

[The 8th day of March.]

A little after the middle of the first hour, the meridian altitude of Spica was 25 10.

DISTANTIÆ.

[The distances.]

- The breast of ♉ and the sole of Perseus's left foot **19° 28′**, indistinctly, because of the nearness of ☾. [Pectus ♉ et planta ſiniſtri pedis Perſej … obſcure propter vicinitatem ☾.]
- The eye of ♉ and the breast of the same … **9 18½**
- Both shoulders of Orion [Vterque Orionis humerus] … 7 26
- The left shoulder of Orion and the last star of the girdle … 9 9
- This girdle star and the right shoulder of Orion … **9 56½**
- The first and the last of the girdle … 2 42
- Dexter[2] horn of ♉ and the right shoulder of Ericht. [Erichthonius] … 16 51[135]
- The right horn of ♉ and the right hand of Erichthonius … **13 24½**
- This hand of Erichthonius and his right shoulder … 7 36
- The right hand of Erichthonius and the left horn of ♉ … **11 0½**
- Both horns of ♉ [Vtrumque cornu ♉] … 7 42
- The right hand of Erichthonius and the She-Goat … 11 49
- The She-Goat and the right shoulder of Erichthonius … **7 27½**

DIE 15 MARTIJ.

[The 15th day of March.]

[135] the seventh entry is printed Dexter[2] cornu ♉ et dexter humerus Ericht. — the masculine Dexter where the neuter cornu calls for Dextrum. The raised 2 standing on it is the leaf's own footnote marker, and footnote 2 reads Sic in codice ("thus in the codex"). The leaf spells the name Erichtonij with a capital at five occurrences and erichtonij with a minuscule at one.

♄ and ♂ were 1 g. 3 m. apart in latitude at 4 o'clock after midnight, as far as sight indicated.

N.B. ♃ *near opposition with the Sun; it was in opposition on 20 March.* [*N.B.* ♃ *iuxta ☍ Solis, fuit in ☍ die 20 Martij.*][136]

DIE 17 MARTIJ.

[The 17th day of March.]

At 6 hours 10 minutes after noon, when ☉ was near the western horizon, I observed with the Sextant that its apparent diameter was thirty first minutes.

DISTANTIÆ.

[The distances.]

- Algenib of Perseus and the She-Goat [Algenib Perſej et capra] … **18° 53⅓**

(distance measured)	(value)
Algenib et dextrum cornu ♉ [Algenib and the right horn of ♉]	**23° 47′**
Hoc cornu ♉ et capra [This horn of ♉ and the She-Goat]	**13 19¼**

The bright star of Hydra, on 18 March,[2] had a meridian altitude of 27 16.

DISTANTIÆ.

[The distances.]

- The left shoulder of Orion and the eye of ♉ … 15 53
- Canis Minor and Pollux [Canis minor et Pollux] … 22 40
- Pollux and the bright star of the foot of the southern Twin [lucida pedis gemin. auſtr.] … 19 25
- Castor and the bright star of the foot … 20 9
- Castor and Pollux … **4 24½**
- But by the Radius the same distance, carefully taken, came out at [Per Radium vero eadem diſtantia diligenter capta eſt] … 4 28
- Castor and the left horn of ♉ … 27 43
- This horn and the left foot of the southern Twin [auſtral. gemin.] … **20 10½**
- 12^h 35^m I took the altitude of Spica ♍ … **25 10½**
- ♃ was distant from Spica, backwards against the order of the signs [in antecedentia] … 9 38

Footnotes (printed at the foot of the side, in the smaller body):

[1] Poſtea a Tychone additum. [Added afterwards by Tycho.]

[2] Sic in codice. [Thus in the codex.]

- At 4 in the morning ♄ was distant, forwards in the order of the signs [in conſequentia], from the bright star in the head of ♐ * * * … **12° 32′**

[136] the italic line is a **forward reference —** written under the heading for 15 March, it reports what happened on 20 March. It stands where the leaf sets it and has not been moved.

- At 4¼ o'clock ♂ was removed from the same star of ♐ … 13 48
- ♂ from the more southerly star of the right horn of ♉ … 7 1
- ♄ and ♂ distant from one another [ab inuicem remoti] … 2 4
- The more southerly star of the right horn of ♉ and the bright star of the head of Sagittarius … 18 0
- *Use the preceding observations for Mars, and correct them.* [*Vtere antecedentibus obſeruationibus pro Marte et corrige illas.* — italic, no value][137]

[Brace-tied note at the right of the opening run:] These observations were made in the morning twilight itself, when ☉ was on the point of rising. [Hæ obſeruationes ſunt factæ in ipſo crepuſculo matutino cum ☉ mox eßet oriturus.]

DIE 18 MARTIJ.

[The 18th day of March.]

- cor ♌ [the heart of ♌] and the bright star of its neck … **8° 17′**
- The left thigh and the hip of ♌ … 5 4
- cor ♌ and the star of the third magnitude [3ᵃᵉ mag.] in its jaw … 12 59
- This jaw-star and the bright star of the neck … 8 43
- The hip and the tail of ♌ … **10 13½**
- The left thigh and the tail of ♌ … **8 22½**
- The bright star in the right wing of the Crow and the third star in the left wing of ♍ … 17 13
- The same star in the left wing of ♍ and Spica … **14 21½**
- Spica and the bright star in the right wing of the Crow … **17° 55½**
- The more northerly of the scale-pans of ♎ and Spica … 27 17
- The more southerly of the scale-pans of ♎ and Spica … 21 17
- Both scale-pans of ♎ [Vtraque lanx ♎] … 9 6
- The inner star in the middle of the right wing of ♍ and the tail of ♌ … **18 4½**
- The tail of ♌ and the third star of the wing of ♍ … 20 26
- This star of the wing of ♍ and the one in the inner part of the right wing of ♍ … **13 24½**

DIE 24 NOUEMBRIS.

[The 24th day of November.]

(distance measured)	(value)
Inter Spicam et ſupremam in ala ♍ [*Between Spica and the topmost star in the wing of* ♍]	*27° 8′ en plati*

[137] in the first entry, three small star-sorts stand between the sign ♐ and the value — the outer two ranged on the line and the middle one dropped below it. They are transcribed as the three sorts they are; **nothing has been read into them. a brace** is drawn at the right of the five valued lines above, gathering them to this note, which is set outboard of the measure in the smaller roman body.

(distance measured)	(value)
Inter propum[?] et ſequentis ♊ caput [Between … and the head of the following ♊]	23 6
Inter eandem ♊ et cor ♌ [Between the same star of ♊ and cor ♌]	36 57

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THADÆI HAGECIJ ALIQUOT OBSERUATIONES MARTIS AD STELLAS FIXAS ET EARUM INTER SE.

[Some observations of Mars against the fixed stars, and of those stars among themselves, by Thaddæus Hagecius.]

My first observation was made in the year 78, on 24 September at 9 P. M., and by the Radius I found the distance of ♂ from the first star of ♈ to be **20 g. 1′**.[1]

- Die 25 Sept. eandem diſtantiam inueni [On 25 Sept. I found the same distance] … **20 27′**.
- Die 29 obſeruaui diſtantiam ♂ a prima ſtella ♈ [On the 29th I observed the distance of ♂ from the first star of ♈] … 21 28
- ſecunda [from the second] … 22 34
- tertia [from the third] … 26 39
- Diſtantia primæ ſtellæ ♈ a ſecunda [The distance of the first star of ♈ from the second] … 1 33
- Diſtantia ſecundæ ſtellæ ♈ a tertia [The distance of the second star of ♈ from the third] … 4 1

On the same day, from the distance of ♂ from the second star of ♈, the place of ♂ was found to be **10 16′ ♈**. But from the distance of ♂ from the third star I found the same place of ♂ to be **8 26′ ♈**. Here, then: the place of ♂, considered at the same time against different stars, does not come out one and the same. Therefore either my observation is false, or the latitudes of the stars are not true.[140]

- 1 Octobris diſtantia ♂ a prima ſtella ♈ [1 October, the distance of ♂ from the first star of ♈] … **21 42′**
- 2 Octobris diſtantia ♂ a prima ſtella ♈ [2 October, the distance of ♂ from the first star of ♈] … 22 3
- ſecunda [from the second] … 23 15
- tertia [from the third] … 27 24

[138] en plati is printed **in Latin sorts**, in the same roman fount and body as the words on its own line — not in Greek type. It is the phrase this work elsewhere sets as Greek ἐν πλάτει ("in breadth"; broadly, approximately), and the same Latin-sort setting was met earlier in this volume. It is transcribed as the sorts stand and has **not** been promoted to Greek.

[139] the second entry's first word is printed propum.

[140] the contradiction, and the verdict drawn from it, are **the observer's own**, set out in his own words.

- 3 Octobris diſtantia ♂ a prima ſtella ♈ [3 October, the distance of ♂ from the first star of ♈] … 22 24
- ſecunda [from the second] … 23 42
- tertia [from the third] … 27 35

Footnote (printed at the foot of the side, in the smaller body):

[1] In margine Tycho adſcripſit: »*NB. Oportet inquirere quantum radius hic in 20 G. aberret*«. [Tycho wrote in the margin: »*NB. One must inquire how far the Radius goes astray here at 20 G.*« — Dreyer's note; the quoted words are set in italic between his German-style quotation marks.]

___[141]

If the longitude and latitude of the fixed stars are taken as given, and the places of ♂ are then sought from the observed distances, they do not agree. So either the places of the stars are suspect, or my own observation is.[142]

- 24 Decembris diſtantia ♂ ab eadem ſtella 7 52 — [24 December: the distance of ♂ from the same star, 7 52]

On the holy day of the Nativity of the Lord [In die ſacro nativitatis D.], at hora 6 P. M., I observed the distance of ♂ from —[143]

- prima [the first star of ♈] … 7 32
- ſecunda [the second star of ♈] … 9 8
- tertia [the third star of ♈] … 12 46[144]
- Diſtantia ſecundæ ſtellæ a tertia Arietis **4 9′** — [The distance of the second star from the third of Aries, **4 9′**]
- Diſtantia primæ ſtellæ a ſecunda ♈ 1 38 — [The distance of the first star from the second of ♈, 1 38]
- *Shared remark, brace-tied to both lines:* maior ſuperiori quæ facta fuit 29 Sept. — [greater than the earlier one, which was made on 29 September][145]

On 26 December, the distance of ♂ from the first star, 7 14.

I have repeatedly observed the meridian altitude of Spica as **31 10′**, the elevation of the pole being taken as 50 7. At the same time the 24th star of

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[141] the running head sets two elements only — 1578 centred and the page figure 73 at the right. No title-word and no rule. The side opens directly in mid-argument, continuing the observations set under the preceding leaf's title of Thaddæus Hagecius, and continues to speak in his first person (mea obſeruatio, obſeruaui).

[142] the line below stands on its own, indented well in from the measure, with its value ranged after the text.

[143] what follows is a **braced** display. Two braces stand on the leaf: a left brace gathering the three ordinals prima / ſecunda / tertia onto the single words ſtella ♈ set between them, and a right brace gathering the three values.

[144] the two lines below are likewise **brace-tied** — a single right brace joins them to one remark, which is set across the two lines at the right of the measure (maior ſuperiori quæ on the first, facta fuit 29 Sept. on the second).

[145] a tertia Arietis and a ſecunda ♈ stand two lines apart and name the same constellation, the one **spelled out in full**, the other **set as the symbol**. Both are transcribed as the leaf sets them; neither has been converted into the other.

Hydra culminated together with Spica, at 19 35. On my own observation the longitude of Spica in that year would be **17 30′** of ♎.[1]

Footnote (printed at the foot of the side, in the smaller body):

[1] Harum obſeruationum duo extant exempla, in duobus foliis iisdem fere verbis ab Hagecio deſcripta. Cfr. epiſtolas Tychonis ad Hagecium anno 1590 die 23. Feb. et die 3. Auguſti ſcriptas. Infra ad finem anni 1579 et ad finem a. 1580 invenies alias obſeruationes ſtellarum fixarum ab Hagecio inſtitutas. [Two copies of these observations survive, written out by Hagecius on two leaves in almost the same words. Compare Tycho's letters to Hagecius written in the year 1590 on 23 February and on 3 August. Below, at the end of the year 1579 and at the end of the year 1580, you will find further observations of the fixed stars made by Hagecius. — Dreyer's note.]

___[146]

OBSERUATIONES ANNI 1579.

[Observations of the year 1579.]

ALTITUDO SOLIS MERIDIANA[1].

[The meridian altitude of the Sun.][147]

JANUARIJ.

[January.]

Day	Altitude	Remark
Die 1	**12°16′**	bona [good]
3	**12 36½**	bona [good]
4	**12 47¾**	mediocris [middling]
13	**14 38** vel **38½**	ad ſummum, bona [at most; good]
21	16 40	bona [good]
27	18 24	bona, fide huic [good; trust this one]
28	18 41	mediocriter bona [moderately good]
29	19 1	bona ſatis [good enough]

[146] the running head on this side sets **one element only** — the page figure 74 at the left. **No year stands centred above it**, where the facing side of this opening sets 1578 centred beside its page figure.

[147] The side is a register of daily meridian altitudes of the Sun, set in **two files divided by a single full-height vertical rule**. **Die stands on the first entry line of each file only** — Die 1 heading the left file, Die23 heading the right file (set solid, with no space before the figure). Every line beneath in both files gives the day-numeral bare. The word has not been carried down either run. **fount.** JANUARIJ., APRILIS., MAIJ. and every entry beneath them are **roman**; so is the whole of the right file. FEBRUARIJ., MARTIJ., POST ÆQUINOCTIUM VERNUM and every entry beneath them, **including the day-numerals and the figures**, are **italic**. Within the single italic entry of MARTIJ. the closing words per foramen revert to **roman** — a fount change mid-line.

FEBRUARIJ.
[February.][148]

Day	Altitude	Remark
1	*19 59*	*bona, fide huic* [good; trust this one]
2	***20 18 vel 18½***	*bona, fide huic* [good; trust this one]
6	*21 41*	*bona, admodum fide* [good; trust it thoroughly]
7	*22 0*	*non satis exquisita* [not precise enough]
8	***22 21½***	*satis bona* [fairly good]
27	*29 29*	*bona, fide* [good; trust it]

MARTIJ.
[March.]

Day	Alti-tude	Remark
1	*30 15*	ἐν πλάτει [Greek: *en platei*, "in breadth" — that is, roughly], per foramen [through the aperture]

POST ÆQUINOCTIUM VERNUM
[After the vernal equinox.]

Day	Altitude	Remark
18	*36 56*	*bona* [good]
19	*37 19*	*mediocris* [middling]
20	*37 42*	
23	*38 51*	*optima* [excellent]
26	***40 1½***	*bona* [good]

APRILIS.
[April.]

Day	Altitude	Remark
4	43 20	mediocris [middling]
5	43 43	mediocris [middling]
7	44 26	bona [good]
8	44 45	mediocris [middling]
12	**46 8¾**	bona [good]
14	46 50	

[148] the whole of this block — heading, day-numerals, figures and remarks — is set in **italic**, which by the standing rubric of this edition is **Tycho's own hand**.

Day	Altitude	Remark
15	47 8	bona [good]
17	**47 46½**	bona [good]
18	**48 5½**	bona [good]
20	48 43	bona [good]
22	49 20	
23	49 38	
24	**49 56½**	
27	50 47	bona [good]

MAIJ.
[May.]

Day	Altitude	Remark
2	52 7	mediocris [middling]
4	52 37	bona [good]
5	52 50	optima [excellent]
14	**54 47½**	
17	55 20	
20	55 50	bona [good]

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Day	Altitude	Remark
Die23	**56 16⅔**	bona [good]
24	56 24	
27	56 45	bona [good]
31	**57 7⅓**	bona [good]

JUNIJ.
[June.]

Day	Altitude	Remark
1	**57 11½**	bona [good]
2	57	bona [good]
	17	
3	57	bona [good]
	20	
5	57	bona, fide huic, niſi error eſt in diuiſione inſtr. [good; trust this one, unless there is an
	27	error in the division of the instrument]

[149] **the right file opens with NO heading of any kind.** Its first line is `Die23`, and four entry lines stand above the first heading printed in that file (`JUNIJ.`).

Day	Alti-tude	Remark
6	57 30	bona [good]
7	57 33	
8	57 35	
16	**57 33½**	ad ſummum 34, bona [34 at most; good]
17	57 33	bona [good]
18	57 29	ad ſummum 29⅓ [**29⅓** at most]
19	55 26	bona [good]
22	57 16	bona [good]
23	**57 10⅔**	ad ſummum 11 [11 at most]
24	**57 6⅓**	bona [good]
25	57 0	bona [good]
27	**56 49¾**	bona [good]

JULIJ.
[July.]

Day	Altitude	Remark
2	56 14	bona [good]
3	56 5	bona [good]
4	55 57	bona [good]
5	55 48	bona [good]
6	**55 38½**	bona [good]
7	55 29	bona [good]
8	**55 18½**	bona [good]
9	55 8	bona [good]
11	**54 46¼**	bona [good]
12	54 35	ἐν πλάτει, propter raras nubes [roughly; on account of thin cloud]
16	53 44	bona [good]
18	53 16	mediocris [middling]
19	53 2	bona [good]
20	52 49	
22	52 20	bona [good]
27	51 1	bona [good]
30	50 12	bona [good]

AUGUSTI.
[August.]

Day	Alti-tude	Remark
5	48 22½	ἐν πλάτει propter nubes tranſeuntes C. M. [roughly, on account of passing cloud; C. M.]
10	46 48	bona [good]
11	46 29	bona [good]
14	45 27	bona [good]
18	44 3½	
24	41 54	bona [good]
27	40 47	mediocris [middling]
28	40 25	bona [good]
30	39 39½	bona [good]

Footnote (printed at the foot of the side, in the smaller body, running the full measure across both files):

[1] Declinatio et longitudo Solis ex altitudine ſupputatæ ſæpe in codice reperiuntur, ſed eas hic imprimere operæ pretium eße non videbatur. Alt. æquat. 34° 6½′ poſita eſt. [The declination and longitude of the Sun, computed from the altitude, are often found in the codex, but it did not seem worth the trouble to print them here. The altitude of the equator is taken as 34° 6½′. — Dreyer's note.]

___[150]

SEPTEMBRIS.

[September.]

Day	Altitude	Remark
3	38 7¾	bona [good]
8	36 13	bona [good]
9	35 50	bona [good]
10	35 26	bona [good]
11	35 2	bona [good]
13	34 15	ἐν πλάτει propter nubes [roughly; on account of cloud]
20	31 30	optima, fide [excellent — trust it]

[150] the running head sets two elements only — 1579 centred and the page figure 75 at the right. No title-word and no rule. The side opens directly with the continuation of the register of meridian solar altitudes begun on the preceding leaf: the left file opens on a month heading (SEPTEMBRIS.), and the right file opens on **entries standing above its first rubric**, with no heading of its own. **fount.** The register — both files, all four month headings, every day-numeral, figure and remark — is **roman**, which by the standing rubric of this edition is an assistant's hand. The narrative section changes fount twice: the heading ECLIPSIS SOLIS DIE 25 FEBRUARIJ. and the whole of the timed run and the paragraph beginning Poſito autem loco canis maioris are **italic**, i.e. Tycho's own hand, **day-figures, time-figures and values included**; then the two short paragraphs beginning Anno 1597 and Parallaxis revert to **roman**. Dreyer's own footnote to the first of them says as much (Alia manu ſcripta). Dreyer's two footnotes are roman.

Day	Altitude	Remark
24	29 58	bona [good]
25	**29 35¼**	bona [good]
26	29 11	bona [good]

OCTOBRIS.
[October.]

Day	Altitude	Remark
1	**27 16½**	bona [good]
6	**25 23 20″**	bona [good]

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Day	Altitude	Remark
9	**24 17 15″**	bona [good]
10	23 55	bona [good]
21	**20 7½**	mediocris [middling]
22	**19 48½**	bona [good]
23	**19 29½**	bona [good]
31	17 4	bona [good]

NOUEMBRIS.
[November.]

Day	Altitude	Remark
12	14 3	bona [good]

DECEMBRIS.
[December.]

Day	Altitude	Remark
5	10 52	
11	**11 40½**	ad minim. 40′, bona [at the least **40′**; good]
14	10 43	bona [good]
21	11 3	ἐν πλάτει [roughly]

[151] **the right file opens with no heading.** Six entry lines (days 9, 10, 21, 22, 23, 31) stand above the file's first rubric, NOUEMBRIS. Their altitudes continue the fall of the left file's October block without a break (**25 23 20″** → **24 17 15″** → 23 55 → …), and their day-numerals continue that block's run, but **the leaf prints no heading over them.**

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ECLIPSIS SOLIS DIE 25 FEBRUARIJ.

[Eclipse of the Sun on the 25th day of February.]

- *4^H^20^M^ — by the clock, the altitude of the Sun was — p. 9 10′*
- *4 30 — the Sun stood in azimuth 22 p. 40, having the altitude — 7 55*
- *4 45 — the Sun was seen still wholly bright over his whole circumference, so completely that nothing of him was then hidden from us; and so too at Mto 50 he was wholly round, at the least at Mto 56 or 55 — put 56.*
- *4 57 — he began to be darkened a little at a point towards the horizon, precisely so; for at Mto 58 it was perceptible.*
- *5 [0] — perceptibly it was seen to be wanting thus:*
- *5 5 — one digit appeared darkened.*
- *5 17 — the illuminated part measured 20 minuta.*
- *5 27 — a third part was seen to be wanting, judged by eye, and the Sun was such:*
- *5 30 — the Sun was such:*
- (continuation line, no time-figure) — *the instrument gave Mta 17 of the bright part.*
- *5 35 — the Sun was seen to set, because the ſupr. part of him was not visible; therefore in the preceding time there was an error of M. 7. In the clouds after the Sun's setting a crimson, ruddy colour appeared, and nothing … I was seeing …*[*1]
- *6 45 — the pole star appeared in azimuth 4^g^ 42′ when it ought to have been 5^g^ 18′. The Sun had begun to be darkened from the lower part, which lay in the same vertical circle as the Sun's centre.*
- *7 18¼ — with the instrument corrected, Canis Major [Canis maior] stood on the meridian, having a mean altitude of 17^g^ 55′, or at most 56, which is better.*[153]

Now, taking the place of Canis Major as 8.35 ♋ with a latitude of 39.33 towards the lowest, its right ascension comes out p. 96.53, and the right ascension of the Sun 347.42. From this the time from noon was H. 7 M. 16 S. 45; the difference is 1 M. 30 S. The true beginning of the eclipse is H. 4 M. 55, and you may trust it.[154]

In the year 1597, what was done in this eclipse.[2]

The parallax of the Moon from the Sun in the altitude circle, 56 M. Therefore longitude 45, latitude 32, on account of refraction. Of the time we cannot be at all certain, the luminaries being close —

[152] below the register the vertical rule between the files stops and the measure opens out to the full width of the side. What follows is the narrative / mixed section.

[153] ſupr. in the 5 35 line is printed abbreviated, with the point. The reading of the following word in that line is Dreyer's own concern and is carried under his footnote 1; the ellipses … on either side of videbam are **printed on the leaf** and are his, marking what he could not read.

[154] the two paragraphs below revert to **roman** — a second hand, as Dreyer's footnote 2 states.

Diagram. A plain circle standing outboard at the right of the measure, level with the lines `4 57` and `5 [0]`, reproducing a sketch of the Sun's disc. A narrow hatched crescent, drawn with close parallel ruling, occupies the lower-left edge of the circle; the rest of the disc is left blank. **No label of any kind stands in or beside this circle** — an enumerated nil return, not an unread label. The circle runs out to the outer edge of the type area on the leaf.

Diagram. A circle standing outboard at the right of the measure, its top level with the line `5 30`, the outer of the two circles set side by side there. Roughly the lower-right third of the disc is filled with close parallel hatching, bounded by a curve drawn across the disc. In the upper part of the circle stand **four drawn strokes forming a face**: two short wavy strokes side by side (the right one set a little lower) for the eyes, a longer curved stroke running down between them for the nose, and below it a short down-turned arc for the mouth. They are drawing, not letters or figures.

Diagram. A circle standing outboard at the right of the measure, inboard of and slightly below fig-p117-2, level with the continuation line **Inſtrumentum dabat Mta 17 partis lucidæ**. Roughly the lower-left half of the disc is filled with close parallel hatching, bounded by a curve drawn across the disc. Across the middle of the disc, on a slight slant following that curve, stands one label:

- `MIN 17` (across the centre of the disc, set in small capitals for the letters and lining figures for the number)

Footnotes (printed at the foot of the side, in the smaller body, running the full measure):

[1] Hic verba nonnulla ob atramentum decoloratum legere non potui. [Here I could not read a number of words, on account of the discoloured ink. — Dreyer's note.]

[2] Alia manu ſcripta. [Written in another hand. — Dreyer's note.][155]

___[156]

— the horizon. But I have put the middle of this eclipse at H. 5⅚, as better agreeing with our own restitution[1]; at that time the Sun's place was ♓ 16.37.

[155] **square brackets standing in composed matter on this side — one**, and it is Dreyer's: the minute-figure `[0]` in the `5 [0]` line of the timed run.

[156] the running head sets two elements only — the page figure `76` at the **left** and `1579` centred. No title-word and no rule. The two elements stand in the opposite order to the facing side, where the page figure is at the right. **fount.** The side changes fount four times. **Roman**: the opening paragraphs down to Tempus incidentiæ H. 1 M. 1.; then again the two-line centred heading `OBSERUATIONES RELIQUORUM PLANETARUM ET FIXARUM.`, the three headings `DIE 1 JANUARIJ.` / `DIE 2 JANUARIJ.` / `DIE 3 JANUARIJ.` and their entries; and Dreyer's two footnotes. **Italic**: the `Initium` / `Medium deliquij` / `Finis` run and the sentence beside it, **figures included**; and everything from the heading `DIE 2 FEBRUARIJ.` to the foot of the side, again **day-figures, time-figures and values included**. By the standing rubric the italic matter is Tycho's own hand and the roman an assistant's — and Dreyer's own footnote `2` says of the roman computation above it that it is in another hand and that the times and the note following were added by Tycho.

The Moon's true longitude was ♓ **17.16**, the latitude **0.16¼ B.** [north], by our restitution.[157]

The reckoning of the ecliptic new moon, drawn from the Prutenic Tables[2].

`H. 17 M. 44 S. 49` from midnight of the 24th day of February, under the meridian of `Regij Montis`. Digiti Ecliptici [the digits of the eclipse] **5° 17′ 11″**. Tempus incidentiæ [time of immersion] `H. 1 M. 1`.[158]

Stage	Time
Initium [beginning]	*4^h^44′*
Medium deliquij [middle of the eclipse]	*5 45*
Finis [end]	*6 46*

Right file, set beside the three lines above: *So the beginning of the eclipse ought to have appeared to us here at* `hora 4 mto 4` *— although in fact it was seen* ***50*** *ſcrupulis later.*

OBSERUATIONES RELIQUORUM PLANETARUM ET FIXARUM.

[Observations of the remaining planets and of the fixed stars.]

DIE 1 JANUARIJ.

[The 1st day of January.]

The least altitude of the pole star, **52^g^ 56½.**

Its greatest altitude, **58^g^ 55′**, in azimuth **20′** towards the west — for it could not be seen on the meridian, on account of cloud.

DIE 2 JANUARIJ.

[The 2nd day of January.]

The least altitude of the pole star, **52^g^ 56′**; the greatest, **58^g^ 55¼′**[159]

DIE 3 JANUARIJ.

[The 3rd day of January.]

The greatest altitude of the pole star, **58^g^ 55⅔′**.

DIE 2 FEBRUARIJ.

[The 2nd day of February.][160]

[157] the leaf sets the Sun here as the **symbol with a superscript case-ending** — ☉^lis^ locus, that is *Solis locus*. Two lines below, the same side spells `Solis` out in full in occaſum Solis.

[158] the run below splits the measure into two files **by white space alone** — there is no rule between them. Both files are italic.

[159] this entry is **one line and ends without a full stop** — the leaf prints none after **55¼′**, where the entries on either side of it are stopped. The leaf also abbreviates the star here (ſtellæ pol.) where the entries of the 1st and the 3rd spell it out (ſtellæ polaris).

[160] Centred **italic** capitals — the first italic heading on the side, and the point at which the hand changes.

At the 6th hour after noon I saw ☿ showing very clearly; right after sunset, a little after ♀, he began to be made out among the stars. At the hour named I twice observed his distance from ♀ with the Radius, and each time found `partes 14 M. 50` *exactly. To verify the place of ♀, at* `hora 6¾` *I observed its distance from the first star of the neck,* `p. 15 20′`*, and that twice; and then the distance of the same from the outermost star of the wing,* `p. 10 M. 45`*, and found the same twice. These observations were precise enough.*[161]

DIE 3 FEBRUARIJ.

[The 3rd day of February.]

At `Hora 6 P. M.` *Between ♀ and ☿, by both instruments,* `p. 13 M. 53` *— a good observation.*

`6^h^ 37^m^` ☿ *set, to appearance.*

Hour	Observation	Distance	Remark
`6½`	*Inter primam colli Pegaſi et* ☿ [between the first star of the neck of Pegasus and ☿]	`19 7`	*per ſextantem, bona* [by the sextant; good]
`6⅚`	*Inter extremam alæ Pegaſi et* ♀ [between the outermost star of the wing of Pegasus and ♀]	`10` `31`	
`7`	*Inter* ♀ *et primam alæ* [between ♀ and the first star of the wing]	`15` `19`	*bona.* [good]

All the foregoing observations were repeated twice with each instrument. They are therefore good, and you may trust them in verifying the place of ♀ and ☿.

DIE 5 FEBRUARIJ.

[The 5th day of February.]

`8 38` *P. M. I saw that ☾ had passed the star in the horn of ♉ shared with the foot of Erichthonius, by twice her own diameter, between the nearest limb —*[162]

Footnotes (printed at the foot of the side, in the smaller body):

[1] Cfr. Aſtr. inſt. Progymn. p. 02, vbi medium eclipſis 5^h 50^m eveniſſe dicitur. [Compare the *Astronomiae instauratae Progymnasmata*, p. 02, where the middle of the eclipse is said to have fallen at `5^h^ 50^m^`. — Dreyer's note.]

[2] Alia manu ſcriptus. Hic finem ſolum ſupputationis damus. Tempora initii, medii, finis et annotatio ſequens a Tychone addita ſunt. [Written in another hand. Here we give only the end of the computation. The times of the beginning, the middle and the end, and the note that follows, were added by Tycho. — Dreyer's note.]

[161] `a prima colli` and ab extrema alæ name **no constellation on this line** — the leaf gives the neck and the wing bare, and Pegasus is named only in the table of the following day (primam colli Pegaſi, extremam alæ Pegaſi).

[162] the leaf spells the star's name `Erichtonij` — **with no `h` after the `t`** — and terminal `j`.

___[163]

— *of the star and the Moon; the upper part of* ☾*, however, had the same apparent latitude as the star itself.*

DIE 6 FEBRUARIJ.

[The 6th day of February.]

- *Hora 6 P. M. I observed the distance between* ☿ *and* ♀, ***11^p^ 20′****, precisely enough with both instruments. Then —*
- ***Hora 6½*** *between* ☿ *and the first star of the neck of Pegasus, the one that is by the wing —* ***17 40***
- *en plati* [in the rough]*, because* ☿ *was by now setting and so showing less distinctly.*
- *7 Inter* ♀ *et primam colli* [between ♀ and the first star of the neck] — ***14 30***
- ***7¼*** *Inter* ♀ *et extremam alæ* [between ♀ and the outermost star of the wing] — ***10 0***
- [The brace joins the two lines above and carries beside them: ſ*atis bon*æ [good enough].]
- *Inter Scheat et genu boreale Pegaſi* [between Scheat and the northern knee of Pegasus] — ***5 0***[164]

DIE 7 FEBRUARIJ.

[The 7th day of February.]

Left file:

- ***Hora 6⅓*** *Inter* ☿ *et* ♀ [between ☿ and ♀] — ***10^p^ 55′***
- ***6½*** *Inter* ♀ *et primam colli* [between ♀ and the first star of the neck] — ***14 23***
- *Inter* ♀ *et extremam alæ* [between ♀ and the outermost star of the wing] — ***9 55***

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[163] the running head sets two elements only — 1579 centred and the page figure 77 at the right, the same order as the last recto. No title-word and no rule. **braces on this side — two.** (1) Under DIE 6 FEBRUARIJ a brace opening to the right joins the two lines ending 14 30 and 10 0 and carries ſatis bonæ outside it. (2) Under DIE 7 FEBRUARIJ a brace opening to the right joins the two lines ending 14 23 and 9 55 and carries bonæ outside it. **fount.** The side changes fount twice. **Italic** — Tycho's own hand by the standing rubric — from the opening completion down to the foot of the DIE 26 MARTIJ entry, headings, day-figures, time-figures and values included; then **roman** — an assistant's hand — from the heading DIE 17 APRILIS. through DIE 24 APRILIS, DIE 22 JULIJ and DIE 10 AUGUSTI, again headings and figures included; then **italic** again for the heading DIE 17 SEPTEMBRIS. and its single line. **Mid-line fount change: none on this side** — a nil return, taken along every line in both directions, including the braced remarks (ſatis bonæ, bonæ), the right file of the April measure and the right file of the July measure, all of which keep the fount of the lines they stand beside.

[164] the last line of this run carries **no time-figure** — the leaf prints none. Hora is spelled out at the first two loci and the bare figures 7 and 7¼ stand at the next two.

- [The brace joins the two lines above and carries beside them: *bon*æ [good].]

Right file, set beside the three lines above and running across all three: ♀ *around these days stationary, tending towards* ♂ ☉.

So since yesterday evening ☿ *has closed on* ♀ *by* `M. 25`*, which agrees with the Prutenic calculation, where the diurnal motion of* ☿ *is* **25′** *and Venus stands stationary — whereas the Alphonsine calculation gives nearly a whole degree of diurnal motion*[165]

DIE 26 MARTIJ.

[The 26th day of March.]

At `8^H^ 13^M^ P. M.` *the pole star stood in azimuth* `p. 4 M. 5`*, and that towards the west. From this you will be able to verify the setting of the instrument in the azimuths that follow.*

DIE 17 APRILIS.

[The 17th day of April.][166]

Left file (parted from the right by a vertical rule):

- **9^H^ 50′ 35″** Schedir Caßiopeæ, Altit. **20° 10′**
- `10 5 20` IV Caßiopeæ — `24 23`
- `10 31 56` V Caßiopeæ — `23 59`
- `10 57 25` VI Caßiopeæ — `27 31`

Right file:

- **11^H^ 29′ 0″** VII Caßiopeæ — **31° 22′**
- *en plati* [in the rough]; the last observation is not to be trusted.
- ♃ was distant from the southern scale-pan by `56` minutes, the distance taken with the Sextant and the Radius.[167]

`11 58 48` Iovis altitudo meridiana [the meridian altitude of Jupiter] — `20 56`[168]

DIE 24 APRILIS.

[The 24th day of April.]

- `9 18 15` XII Caßiopeæ stood in azimuth **2 gr. 20′** towards the east, having altitude **22° 51′**
- `9 39 39` II — [altit. merid.] `20 10`
- `9 49 20` IV — [altit. merid.] **24 22½**[169]

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[165] the paragraph **ends without a full stop** on `in motu diurno`, at the foot of its own measure and with blank paper below it; the sentence is not completed anywhere on this side.

[166] Centred **roman** capitals — the first roman heading on the side, and the point at which the hand changes.

[167] below the two files the vertical rule stops and the measure opens to the full width for one line:

[168] the leaf spells Jupiter's name out here (`Iovis`) where six lines above it sets the symbol (Diſtabat ♃). Neither has been converted to the other.

[169] the two `[altit. merid.]` brackets are **the edition's**, not the translation's — Dreyer supplies the head-word for a column the manuscript leaves unlabelled.

DIE 22 JULIJ.

[The 22nd day of July.]

Left file (parted from the right by white space alone):

Time	Object	Altitude
10 44	Aquila habuit altitudinem [Aquila had altitude]	**41° 59′**
11 8¾	Prius cornuum ♑ [the earlier of the horns of ♑]	**20 25½**

Right file, set beside the two lines above: At the following noon the clock was running 3 minutes slow.

DIE 10 AUGUSTI.

[The 10th day of August.]

9 32 by the greater clock, Aquila **41 59¼**. This observation is not much to be trusted, on account of intervening cloud. The lesser clock was running 2 minutes fast.

DIE 17 SEPTEMBRIS.

[The 17th day of September.][170]

- ***7 16¼** The bright star of the Vulture stood on the meridian, having altitude — 41 59*

___[171]

Left file (parted from the right by a vertical rule):

Time	Object	Altitude
*7 35 25^s^*	*Antinoi manus* [the hand of Antinous]	***32° 9½′***
7 41 10	*Sup. cornu* ♑ [the upper horn of ♑]	*20 21*

[170] Centred **italic** capitals — the hand changes back here.

[171] the running head sets two elements only — the page figure 78 at the **left** and 1579 centred. No title-word and no rule. The two elements stand in the opposite order to the facing side, as they did at the last opening. The side **opens with entries standing above its first rubric**: a two-file run of four lines whose time-figures and altitudes continue the DIE 17 SEPTEMBRIS block begun at the foot of the facing side, whose heading is **not repeated** here. **fount.** The side changes fount five times. **Italic** — Tycho's own hand by the standing rubric — for the opening unheaded run; **roman** for the heading DIE 24 SEPTEMBRIS. and its entry; **italic** for DIE 25 SEPTEMBRIS, DIE 5 DECEMBRIS and DIE 11 DECEMBRIS with all their matter, headings, day-figures, time-figures and values included — **except** the single full-width line **Eodem die ſtella polaris habuit altitudinem maximam 58 57**, which is **roman**; then **roman** for DIE 12, DIE 13 and DIE 14 DECEMBRIS and all their matter. Dreyer's three footnotes are roman. **Mid-line fount change: none on this side** — a nil return, taken along every line in both directions, including both files of all five split measures and the vel **46½** alternative. the four lines below stand **above the side's first rubric**, with no heading of their own. Their time-figures (7 35 25^s^ … 7 50 0) run on from the **7 16¼** of the facing side's DIE 17 SEPTEMBRIS block and their altitudes continue it, but **the leaf prints no heading over them.**

Time	Object	Altitude

Right file:

- *7^h^ 43^m^ 30^s^ Inferius cornu* [the lower horn][1] — [no altitude on the line]
- *7 50 0* ♄ — ***13° 7′***

DIE 24 SEPTEMBRIS.

[The 24th day of September.][172]

6^H^ 50^M^ 20^S^ Aquila **41° 59¾′**. At the following noon the clock was moving slow by **1 M. 20″**.

DIE 25 SEPTEMBRIS.

[The 25th day of September.][173]

Left file (parted from the right by a vertical rule):

Time	Object	Altitude
6 46 5	*Aquila*	***41° 59⅔′***
7 5 32	*Manus Antinoi* [the hand of Antinous]	*32 10*
7 10 42	*Super. cornu* ♉ [the upper horn of ♉]	*20 20*

Right file:

Time	Object	Altitude
7^h^ 13^m^ 28^s^	*Infim. cornu* [the lowest horn]	***18° 8′***
7 20 50	♄	*13 5*

Nota. [Note.] *At the following noon the clock was running slow by at least* *10* *seconds.*

DIE 5 DECEMBRIS.

[The 5th day of December.]

In the morning I observed the stars of Cassiopeia on the meridian below the pole, in this way.

Left file (parted from the right by a vertical rule):

- *6 32 30 Lucida Cathedræ* [the bright star of the Chair] — ***22° 47′*** *bona* [good]
- *7 2 45 Schedir — . . .*[2] *bona* [good]
- *7 18 25 Flexura* [the Bend] — *24 22 bona* [good]

Right file:

[172] Centred **roman** capitals — the hand changes here.
[173] Centred **italic** capitals — the hand changes back here.

- *but I think it had gone a little past, and so it must be re-done.*
- *7 44 27 ad pedem lucida* [the bright star at the foot] — ***24° 0′*** *en plati* [in the rough].[174]
- *Stella polaris habuit altitudinem minimam* [the pole star had least altitude] — *52 56*
- *Altitudo maxima fuit* [the greatest altitude was] — *58 54*

7 49 Spica was on the meridian; from this you can correct the clock. — At the following noon the clock was running 14 minutes fast, and account must be taken of them.[175]

DIE 11 DECEMBRIS.

[The 11th day of December.]

I corrected the clock by the transit of ☾ across the cardinal point [cardinem], putting the place of ☾ at the hour of transit at ***9½*** *♎ and the time of transit at H. 6 M. 39; from this you can test both this time and those that follow.*

Left file (parted from the right by a vertical rule):

- *6 46 15 Lucida cathedræ* [the bright star of the Chair] — ***22^g^ 47′*** *vel* ***46½*** [or **46½**] *bona* [good]
- *7 16 30 Schedir* — ***20 10½*** *bona* [good]
- *7 31 30 Flexura* [the Bend] — *24 22 bona* [good]
- **7 59 20 ...*3* — *24 9*

Right file:

- *8^H^ 9^M^ 55^S^ Spica stood in azimuth* ***2^g^ 0′*** *towards the west*
- *8 13 45 rurſus in* [again in] — *3 0*
- *8 17 40 — 4 0*
- *Hinc potes reſtituere errores Horologii.* [From this you can make good the errors of the clock.]
- *8 2 10 Spica was on the meridian.*[176]

Eodem die [on the same day] the pole star had greatest altitude — 58 57

DIE 12 DECEMBRIS.

[The 12th day of December.]

The pole star had greatest altitude 58 54, a little off the meridian on account of cloud. Afterwards the instrument was corrected.

DIE 13 DECEMBRIS.

[The 13th day of December.]

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[174] below the two files the vertical rule stops and the measure opens to the full width:

[175] The dash before Horologium is the leaf's own.

[176] the last line of this right file gives an **earlier** time (8 2 10) than the three lines above it (8 9 55, 8 13 45, 8 17 40). The reversal is the leaf's. The vel **46½** of the left file is the leaf's own alternative. below the two files the measure opens to the full width for one line, and the fount changes to **roman** for that line alone:

It had greatest altitude 58 55[177]

DIE 14 DECEMBRIS.

[The 14th day of December.]

Left file (parted from the right by a vertical rule):

Time	Object	Altitude
	Habuit altitudinem minimam [it had least altitude]	**52 56½**
5 47 26	Lucida cathedræ [the bright star of the Chair]	22 48
6 17 48	Schedir	20 11

Right file:

Time	Object	Altitude
6^H^ 30^M^ 40^S^	Flexura [the Bend]	24 23
6 56 43	Lucida ad pedem [the bright star at the foot]	24 1

Footnotes (printed at the foot of the side, in the smaller body):

[1] Nulla altitudo in codice. [No altitude in the codex. — Dreyer's note.]

[2] In codice 19 58 lineis inducta. [In the codex 19 58, struck through with lines. — Dreyer's note.]

[3] Nullum nomen; fortaße »Lucida ad pedem«. [No name; perhaps »Lucida ad pedem«. — Dreyer's note.][178]

___[179]

At the time of these observations the air was hazy from the first glowing [ex prima candente]. At the following noon the clock was running fast by **9½ M.**

DIE 16 DECEMBRIS.

[The 16th day of December.]

- The pole star had its greatest altitude — **58 54½**

[177] this entry is **one line and ends without a full stop** — the leaf prints none after 58 55. The subject is not named on the line.

[178] At the two loci where his marker stands in a column, the **edition** prints three spaced dots in place of the manuscript's reading (...², ...³); those dots are his, not the translation's.

[179] the running head sets two elements only — 1579 centred and the page figure 79 at the right, the same two elements and the same order as the last recto. No title-word and no rule. **no heading stands at the head of this side.** The side opens with a two-line paragraph standing **above** its first rubric — the close of the day-block begun at the foot of the preceding leaf, whose heading is not repeated. **fount.** The whole side is **roman** — an assistant's hand by the standing rubric — and no italic word stands anywhere on it: an enumerated nil return taken word by word along every line, in both directions, over the opening paragraph, the day-rubric, its line, the section rubric, both paragraphs beneath it and the footnote. **Mid-line fount change: none** — a nil return. (Two type sizes stand on the side — body size and the smaller footnote size — and these have **not** been treated as a fount change.)

OBSERUATIONES HAGECIJ[1].

[Observations of Hájek.]

In the year 79, on the 14th day of October, I took the meridian altitude of Fomahaut, **8.30′**, and found the same by observations often repeated. It stood then on the meridian at 23 or 24 in the outpouring of the water [in effuſione aquæ]. From that altitude, with the latitude of Fomahaut put at 23 gr., the calculation gives its place as **3.43** ♓, whereas according to Copernicus it is placed in that year at **28.12** ♒.

On the 11th day of December the meridian altitude of the first star of ♈ was **57 5′**. From this its longitude would be [eßet] **26 50′** ♈. So either my observation is not correct, or the star's latitude is not.

[1] Continuatio obſeruationum anni 1578, ſupra p. 73. [A continuation of the observations of the year 1578, above, p. 73. — Dreyer's note.]

___[180]

OBSERUATIONES ANNI 1580.

[Observations of the year 1580.]

OBSERUATIONES SOLIS.

[Observations of the Sun.]

JANUARIJ.

Day	Value
Die 1	Alt. merid. 12°16′ ἐν πλάτει [meridian altitude; Greek: *en platei*, "in breadth" — in the rough]
22	16 51 fere, ἐν πλάτει [nearly; in the rough]
23	17 7½ ἐν πλάτει
25	17 45 bona [good]
26	18 1 bona
30	19 17

[180] the running head on this side sets **one element only —** the page figure 80 at the left. **No year stands in it**, and no title-word and no rule. This breaks the pattern of the facing side, which sets 1579 centred beside its page figure; the year 1580 stands on this side in the body rubric instead. The measure is parted down the whole side by a **vertical rule** into two files. The leaf prints the word Die on the **first line of each file only** (Die 1 in the left file, Die 14 in the right) and the label Alt. merid. on the **first line of the left file only**. **fount.** Every Latin word and every figure on this side is **roman —** an assistant's hand by the standing rubric: the two section rubrics, all ten month rubrics, both day columns, every value, and every Latin remark (fere, bona, fide, iuxta, ad ſummum, vel, propter nubes, ſequitur per nouam quadrantis diuiſionem). **No italic Latin word stands anywhere on the side —** an enumerated nil return, taken word by word along every line of both files in both directions. The only italic on the side is the **Greek ἐν πλάτει** at seven loci, which is italic by the fount's Greek design and has not been counted as a hand-marker. **Mid-line fount change: none —** a nil return.

FEBRUARIJ.

Day	Value
3	20 34½
11	23 21 bona, fide [good — trust it]
17	25 34 30″
18	25 57
22	27 27½
23	27 50½
24	28 13½
27	29 23½
28	29 47 0

MARTIJ.

Day	Value
4	31 44
6	32 31
7	32 55 ἐν πλάτει
11	34 30 bona
12	34 53
13	35 17
15	36 3½
16	36 27
18	37 14½
26	40 19 bona
29	41 26½
30	41 48

APRILIS.

Day	Value
1	42 33½
6	44 20
7	44 41
8	45 1½
9	45 22
27	49 51
28	51 16
29	51 31 iuxta ſuper. diuiſionem [by the upper division]

MAIJ.

Day	Value
2	52 18 iuxta ſuperiorem inſtrumenti diuiſionem, ſed reſpectu inferioris diuiſionis fuit 52 18½. [by the upper division of the instrument; but with respect to the lower division it was 52 18½.]
3	52 32½ ἐν πλάτει
4	52 47 30
6	53 15¼
7	53 29
9	53 55⅔
10	54 8 30
11	54 20 30
13	54 44

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Day	Value
Die 14	55° 55½′
15	55 6½ ἐν πλάτει
18	55 38
19	55 46
20	55 56¼
27	56 48⅔

JUNIJ.

Day	Value
15	57 32½
16	57 31 20
17	57 30 0
27	56 43½

JULIJ.

Day	Value
4	55 50
20	52 39
21	52 24
22	52 8
23	51 54 ad ſummum 54¼ [at most 54¼]
24	51 38½ bona
27	50 49

[181] **six entry lines stand above the first rubric of the right file.** They carry day-figures `14`, `15`, `18`, `19`, `20` and `27` and no month heading of their own; the first of them prints the word `Die`, as the first line of the left file does.

Day	Value
29	50 16 bona
30	49 59 bona

AUGUSTI.

Day	Value
1	49 23½ bona
2	49 5 bona
3	48 47 bona
6	47 50½
8	47 13
11	46 13 30″
14	45 10½
15	44 50½
24	41 38½
25	41 16
27	40 31
28	40 8½
29	39 45½ vel 46 [or 46]

SEPTEMBRIS.

Day	Value
15	33 10½ ſequitur per nouam
29	27 45½ quadrantis diuiſionem

182

OCTOBRIS.

Day	Value
1	27 0½
3	26 15 ἐν πλάτει propter nubes. [in the rough, on account of clouds.]
4	25 53
5	25 29½
6	25 6½
8	24 22½
10	23 40
11	23 18
12	22 55
13	22 36⅛

[182] the two lines of Latin in the cells above form **one continuous remark** set across the two entries — **ſequitur per nouam quadrantis diuiſionem**, "what follows is by the new division of the quadrant." **No brace joins the two lines —** none is drawn.

183

___184

Left file

Day	Time	Note
Die 22	19 35⅓	
29	17 24½	
30	17 9	
31	16 51	bona [good]

NOUEMBRIS. [November]

Day	Time	Note
11	14 4 40	
13	13 39 20	
30	11 11	

Right file

***DECEMBRIS*[1].** [December]

Day	Time	Note
Die 13	*10 42*	
19	*10 54*	*bona*
24	*11 20*	*fere* [*about*]
27	*11 36½*	*post rectificata pinnacidia* [*after the sights had been set right*]
30[2]	*12 1½*	*bona*

185

OBSERUATIONES LUNÆ ET PLANETARUM ET QUARUNDAM FIXARUM. [Observations of the Moon, of the planets, and of certain fixed stars]

Diagram. A facsimile of a sketch in Tycho's own hand, reproducing the Square of Pegasus together with the head of Andromeda. Four asterisks stand

[183] **No November and no December block stands on this side.**

[184] On this leaf italic type reproduces Tycho's own hand and roman that of his assistants; the edition's own footnote 4 on the facing side ("Etiam hæc manu Tychonis") uses the same distinction. The upper part of this side is a register in two files divided by a vertical rule. The leaf prints no head row and no foot label row in either file. The left file opens with four entry lines standing above its first rubric: a continued block whose month heading is not repeated.

[185] Left file wholly roman; right file wholly italic, rubric included. The two files end at unequal heights — the left stops three entries into November, the right runs five entries into December.

for stars — one at the left, one at the centre-right, one at the upper right, one at the lower right — joined by dotted lines, each dotted line carrying a pair of figures (and in several places a fraction) for the distance measured along it. A solid curved stroke runs down from the upper right toward the centre-right star. At the right stand three or four lines of cursive annotation, one of which contains a word struck through by the writer.

Labels standing on the block — 16 in all: 13 read entire, 1 figure group uncertain, 2 cursive annotations unresolved or only partly resolved.

- Above the sketch: *Circa mediū Januarij a° 80* [About the middle of January, year 80]
- Upper left, written along a slanting line: *caput Andr.* [head of Andr(omeda)]
- Centre top, in large letters: *Quadratum pegasi* [the Square of Pegasus]
- Upper dotted line: 18 · 33
- Second dotted line: 14 · 14
- Beside the centre-right star: 5 · 1
- Diagonal at right, upper: 51 ½
- Diagonal at right, lower: 36 · 5 [?]
- Centre vertical, read upward: 12 ⋯ 55 ½
- Right-hand diagonal, lower: 10 ⋯ 5 ½
- Left-hand diagonal: 20 … 21 ½
- Left-hand vertical, read upward: 13 … 57 ¼
- Lowest dotted line: 16 … 37 ½
- Right margin, upper: [?] (one cursive word)
- Right margin, beneath it: *genũ dextr.* [right knee]
- Right margin, lower block: *superior ~~inferior~~ duarū in pectore q̄* [?] [?] *in lucidior* — the word between *superior* and *duarū* is struck through by the writer; the two words of the fourth line are unresolved [?][186]

DIE 31 JANUARIJ, ECLIPSIS ☽. [31 January, an eclipse of the Moon][187]

- *The left foot of Orion on the meridian³ — Hora 7 M. 22 | H. 7 M. 11*
- *The left shoulder of Orion was on the meridian — | 7 18½*
- *The topmost star of the Belt — 7 38 | 7 26 35*
- *The middle star of the Belt — 7 44 | 7 44*
- *The lowest star of the Belt — 7 47 | 7 48 14*
- *The right Shoulder — 7 59 |*
- *Canis Major — 8 53 |*
- *Canis Minor — 9 44 |*
- *The pole star crossed at a last azimuth of 5^{D} 18′ — 8 25 |*[188]

[186] The strike-through is the writer's own, in the manuscript reproduced, not an editorial deletion.

[187] The leaf prints no head row over either figure column and no foot label row; the markers *Hora* / *M.* and *H.* / *M.* stand at the first line of each column only.

[188] Every line of this run, figures included, is set in italic.

[1] The observations of 13 December and of the following days are preceded by the title: »Astronomicæ obseruationes a Solstitio Hyberno Anni Christi 1580. Factæ in Insula Huena in nouis ædibus Vraniæ« [Astronomical observations from the winter solstice of the year of Christ 1580. Made on the island of Hven, in the new building of Urania].

[2] You will find the azimuths and altitudes of the Sun below, among the observations of the planets for 30 December.

[3] In the codex these transits of the fixed stars are found twice, on facing pages; the time indications of the second column (H. 7 M. 22 etc.) have probably been corrected.

When the right shoulder of Orion was crossing the meridian, the clock showed *(I set the clock so that it should show)* 7^{H} 59^{M} — bona. (Correctum M. 57½.)[189]

- 8^{H} 17^{M} | 8^{H} $16\frac{1}{6}^{M}$ — ☽ seemed to lose something of its own disc. *But nothing is certain unless the calculation agrees[2].*
- 8 34 | 8 33⅚ — A fifth part of ☽^{æ} was darkened.
- 8 38 | bonum — Nearly a fourth part of the Moon was darkened.
- 8 44 | 8 44¼ — A third part of ☽ was darkened.
- 8 50⅔ | 8 51⅙ — Canis Major was on the meridian, and at that moment between a third and a half was wanting from the Moon.
- *iuxta horologium* (57)[3] [by the clock (57)] — set in small type beneath the two figure columns of the preceding line, inside the measure, not in the margin
- 8 55 | 8 55⅔ — ⅔ were wanting — bona.
- 9 0 | 9 (2) — A half part was wanting, at the least, or a little more; for it could not be seen exactly through the thin scattered clouds.
- 10 48 | 10 53 — The Moon had recovered the light of nearly a sixth part of her body, the part that is painted black here.
- *(11 8) | 11 10⅔ — A third part was lit; and the lighting seemed to carry the horns perpendicularly, a line being drawn almost through both extremities.*
- (22) — set in small type above the first figure column of the following line, inside the measure
- 11 19 | 11 25⅙ — A little more than half had come out, or thereabouts.
- *I was not able to observe this eclipse more carefully, nor to catch its end, because of thicker clouds, which by their repeated interposition prevented the sight of ☽.*
- (9) — set in small type above the first figure column of the following line, inside the measure
- 12 5 | 12 13 — ☽ was wholly lit, when, the clouds having broken up, she could be seen again; for between H. 11 M. 19 and H. 12 M. 5 she could not be seen because of clouds.

[189] The second figure column is headed *Correctum*[1] [Corrected]; the first column carries no head, and there is no foot label row. Figures set within parentheses are the edition's reproduction of the codex, not the translation's — see footnote 3.

Diagram. A small circle drawn in the margin beside the entries for 8 44 to 8 55, its lower left-hand portion filled with close hatching — the darkened part of the Moon at that stage of the eclipse. No labels are drawn on the figure: a nil.

Diagram. A second small circle in the margin, beside the entries for 10 48 to 11 19, with a narrow hatched crescent along its left-hand limb — the part still in shadow, answering to the words "the part that is painted black here". No labels are drawn on the figure: a nil.

From the restitution of the fixed stars made by the Landgrave of Hesse [*Langrauium Haßiæ*]*, the right ascension of the right Shoulder of Orion is 83.31. So it crossed the meridian at H. 7.59, just as the earlier calculation has it, and the numbers immediately following therefore differ only a little. Canis Major, however, crossed with 96.53, the hour being 8 M. 52½; but the clock then showed nearly 51 minutes after sunset, and so it was running slow by one minute and a half over a space of nearly one Minute* [*in sesquialtero scrupulo tardius ibat spacio fere vnius Minuti*]*. The time, then, was at that moment Hora 8 M. 52½, when, on the reckoning of the note above, the minutes darkened and wanting from ☽ came to at least 12; the rest I have restored above, so that they answer to the true time.*

Nota[4]*. Marsias Mœnius wrote to me from Regiomontum that Arcturus had an altitude of 22 degrees at the first emergence, and of 36⅔ at the last end. From this it is gathered, by a calculation of triangles, that there it was:*[190]

	H · *M*		
in primo egreßu [*at the first emergence*]	*10.54*	*In fine* [*at the end*]	*12.36*
At hic colligitur fuiße [*but here it is gathered to have been*]	*10 40*	*In fine*	*11 56*
	14		*40*

and these two do not answer to each other.

Having therefore compared and examined the several times against the transit of the stars across the meridian, I found that at H. 8 17′ she was seen to enter the shadow

[1] These corrected numbers were afterwards written into the codex above the uncorrected ones.

[2] Added afterwards.

[3] The numbers enclosed in brackets were added afterwards.

[4] This too is in Tycho's hand, but was added afterwards.

[190] The printed head row *H* · *M* stands over the first figure column only; the second pair carries no head, and there is no foot label row. A rule is drawn above the last figure of each of the two figure columns, as in a subtraction.

___[191]

H. 8 35′	*quinta pars latuit — a fifth part was hidden*
8 45	*tertia pars latuit — a third part was hidden*
8 52½	*intra ⅓ et ½ latuit — between ⅓ and ½ was hidden*
8 57 ⅔	*latuerunt — were hidden*
9 2	*dimidia pars latuit. — half was hidden.*

After that, cloud made it impossible to watch the further ingress or the duration; but when she was seen again at H. 10 M. 51, a sixth part had returned.[192]

- *11 8 — tertia pars redijt* [*a third part had returned*]
- *11 22 — dimidia egreßa est* [*half had come out*]
- *12 8 — nullum vestigium apparuit.* [*no trace appeared.*]

There was no other way of observing and testing these things, and that is why the times have been noted here more minutely, with the earlier notes taken into account — that is, where the certainty of agreement was greater or less with the quantity of the shadow and of ☽, and with the times assigned both by the others and on our own reckoning.

ECLIPSIS ☽ ANNO 1580 EX SUPPUTATIONE [An eclipse of ☽ in the year 1580, from computation][193]

	Alphonſina [*Alphonsine*]	*Coperniana* [*Copernican*]	*Noſtra* [*ours*]
Initium [*beginning*]	$9^H\ 24^M$	$7^H\ 46^M$	$8^H\ 16^M$
Medium [*middle*]	*11 7*	*9 33*	*10 5*
Finis [*end*]	*12 50*	*11 20*	*11 54*
Dimidia dur. [*half the duration*]	*1 44*	*1 47*	*1 49*
Lat. ☽ [*latitude of ☽*]	*0 22½*	*0 26½*	*0 25¼*
Digiti eclipt. [*eclipsed digits*]	*12 25*	*11 25½*	*11 55*
Loca ☉ et ☽ [*places of ☉ and ☽*]	*21 50 ♌*	*20 56½ ♌*	*21 25 ♌*

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[191] On this leaf, as on the preceding ones, italic type reproduces Tycho's own hand and roman that of his assistants. The whole body of this side is italic; roman stands only in the running head, the three footnotes and the signature. This side opens with a displayed run of entry lines standing directly beneath the running head — no rubric and no prose line above them. The sentence broken off at the foot of the preceding leaf is not completed in words here; the run below simply carries its list forward. The marker *H.* stands at the first line alone.

[192] The three lines that follow are set beneath it in the same two columns.

[193] The head row is printed over the three figure columns; the row-label column carries no head-word. The markers H and M stand at the first figure line of each column only.

[194] A brace is drawn immediately to the right of the *Noſtra* column, embracing its first three figure lines, with the words *in longitudine* set against it and the figure *37* beneath them. The lines the brace embraces are: - *Initium — $8^H\ 16^M$* - *Medium — 10 5* - *Finis — 11 54*

195

Vitteberga [*Wittenberg*] *lies about one degree further south than we do, which adds 4 minutes in time.*

At Hora 13 M. 47 ☽ *was in the 90th degree from the ascendant, free of parallax in longitude.*

N.B. This eclipse was observed by J. Bocholt in southern Iceland, at a place called Beſtet[1]*, a royal residence, near the middle of the island's length.*[196]

- *The beginning — Hora 6¼*
- *The end — Hora 9*

— by a clock set right at midday from the Sun, with a compass on the meridian and from a mountain lying exactly toward the south.

But[2] *because he could not make out exactly either the beginning of the eclipse or the end, I judge that this eclipse began earlier and ended later among the Icelanders, so that the beginning was at Hora 6 and the end at about Hora 9¼, and thus the middle at* $7^H\ 40^M$ *— here 10.0*[3]*, a difference of 2.20, a distance of 35°* [*35 partium*].

DIE 22 FEBRUARIJ. [22 February]

At Hora 8 M. 18 after midday I observed carefully that ☽ *was joined, exactly so far as sight goes, with the star in the right knee of Erichthonius — the one shared with the horn of* ♉ *— for a straight line drawn through the horns of the Moon, which was then nearly half full, fell at that moment exactly upon the star itself. But since a little more than half was lit, the quadrature falling about midday, I shall put this visible conjunction as having occurred at hora 8 M. 20. At that time the upper horn of* ☽ *was distant from the star itself by exactly one diameter of the lunar body, so far as sight goes; with the Radius, however, this distance was found to be about 28 minutes* [*28 ſcrupulorum*]*, so that one may set, without any appreciable error, half a degree for the distance of* ☽ *toward the south, reckoned to its more northerly limb. And from this you will be able to correct the star's place for the said time by the observed place of* ☽*.*

[1] Probably Beßaſtadir (near the town of Reykjavik), which was the residence of the king's governor.

[2] The rest added afterwards.

[3] In the *Progymn.*, p. 02, Tycho gives $10^h\ 9^m$; Longomontanus (*Aſtr. Dan.* p. 192) has $10^h\ 10^m$.

Sequenti Meridie horologium tardius ibat 2 minutis. — At the following midday the clock was running 2 minutes slow.

[195] At the right of the table, still inside the measure, a narrow file of five short lines runs alongside the rows *Initium* to *Lat.* ☽. It is text, not a marginal note.

[196] A brace joins the two entry lines below to a single remark, which itself runs across both lines. The braced lines are: - *Principium — Hora 6¼* - *Finis — Hora 9* and the remark set against them reads: *per horologium in meridie rectificatum ex sole per compaßum meridiano et ex monte versus meridiem exquisite locato.*

DIE 23 JULIJ. [23 July]

Hora 9 M. 22. By the clock, set right, the Moon stood on the Meridian near the winter solstice point; I found her altitude, taken exactly to the uppermost circumference, to be p. 6 M. 35.

The parallax of altitude comes out 0.59. At that time, by the Eph. Regiomontan., ☽ had long. 3.25 ♑, true declination of ☽ 26.50′, apparent 27.48, parallax 58.

For 23 July, H. 9.22, the parallax of the centre of ☽ comes out, the working completed, 61, whereas the Prutenic tables give 63; so the difference is at least 2 minutes, which is almost imperceptible. It is therefore plain that what Copernicus assigned about the parallaxes of ☽ is near enough right.

AUGUSTI. [August][197]

- Die 25, H. 10¾ — ♂ was distant from the eye of ♉ 4° 5′, having nearly the same longitude as the said star.
- Die 27, H. 11 — ♂ was distant from the eye likewise — 4° 5′
- Die 28, H. 11 — the same stars were distant — 4 10
- At the same time ♂ was distant from the northern eye of ♉ — 2 41
- Die 31 — ♂ was distant from the eye of ♉ — 4 46[198]

Vera latit. oculi ♉ [*true latitude of the eye of* ♉]	*5° 30′*
	4 5
Latitudo ♂ [*latitude of* ♂]	*1 25*

I think these observations were made with the Radius.

DIE 12 NOUEMBRIS. [12 November]

N.B. Among the observations of the comets I found these. In the year 1580, on 12 Nouemb., carefully observed with the Radius, when ♂ was not far from ♌ with ☉.[199]

- *10^{H} 17^{M} — ♂ was distant from the upper foot of Erichthonius — 9° 0′*
- *10 33 — from the foot of Erichthonius shared with the other horn of ♉ — 8 47*
- *10 48 — from the left horn of ♉ — 10 56*
- *11 2 — from the eye of ♉ — 8 24*
- *11 44 / 12 16 corr. — Aldeboran* [Aldebaran] *on the meridian, having alt. — 49 45*
- *12 0 — ♂ on the Meridian, Alt. — 57 24*

[197] The markers ° and ′ stand at the first two lines only.

[198] A small worked subtraction is set in italic to the right of the three middle entry lines above, inside the measure, at a smaller size. Its middle line carries no label, and a rule is drawn above that line's figures, as in a subtraction.

[199] A brace joins two time lines to a single entry, and the first of those two lines (*11 44*) carries no remark of its own. The braced lines are: - *11 44* - *12 16 corr.* The markers ° and ′ stand at the first line only.

From this the place of ♂ can be looked into, not far from ☍ with ☉, for at least six days had gone by; and the times can be amended by the transit of Aldeboran across the Meridian, and also from her altitude, which is three minutes [*tribus ſcrupulis*] *too great — the meridian altitude of Mars being corrected by as much.*

You have better observations in the preceding treatise, among the observations inserted there concerning ♂. For examining the latitude of ♂ about the ☍ of ☉:[200]

Left file

- Die 12 Nouemb. — the observed Altitude of Aldeboran — 49° 45′
- True altitude, reduced — 49 40 15
- The difference by which the quadrant is in excess — 4 45
- Altitude of ♂ observed on the meridian — 57 24
- True altitude of ♂ — 57 19½
- Therefore declination B. [north] — 23 14

Right file

- *H. 10⅚ — ♂ from the southern horn of ♉ — 10° 56′*
- *Angle of the difference of ascension — 11 31*
- *Right ascension of the horn of ♉ — 28 8*
- *Right ascension of ♂ — 66 37*
- *Therefore the Longitude —* *8.36¼ ♊*[*1]
- *The Latitude — 1 16⅙ B.* [*north*]

[1] Compare Kepler, *Comment. de mot. ſt. Martis*, chap. XV (*Opera omn.* III, p. 235). This opposition is the first of those which Kepler used in investigating the orbit of Mars.

___[201]

DIE 17 NOUEMBRIS. [17 November][202]

Left file

- 9^{H} 3^{M} — Dist. of ♂ from the upper foot of Ericht. — 9° 31′
- 9 19 — ♂ from the foot of Ericht. in the horn of ♉ — 10 36
- 9 43 — ♂ from the left horn — 12 51
- 9 51 — ♂ was distant from the eye of ♉ — 7 41
- 10 14½ — ♂ from the upper foot of Ericht. — 9 31½
- 10 31 — ♂ from the foot of Ericht. in the horn of ♉ — 10 35⅓

[200] The measure now divides into two files, parted by a vertical rule that runs the full depth of the block. The left file is roman throughout, the right file italic throughout. The markers ° and ′ stand at the first entry of each file only.

[201] On this side italic type reproduces Tycho's own hand and roman that of his assistants.

[202] The measure divides into two files, parted by a vertical rule. The markers °, ′ and ″ stand only where shown; the raised double tick in the right file marks seconds of TIME, at the moment of a meridian transit.

Right file

- 10 42 — ♂ was distant from the left horn of ♉ — 12 51½
- 11 56 30″ — the eye of ♉ crossed the meridian, having altitude — 49 44
- 12 15 — ♂ was distant from the eye of ♉ — 7 41
- 12 39 25″ — the left foot of Orion crossed the meridian, having alt. — 25 24

Nota. On this day there was an ☌ of ☉ and of Mars, and so this observation was a good one for restoring the motion of ♂. I think these observations were made with the Radius.[203]

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17. Nov. H. 10	*Calculus Prut.* [*the Prutenic calculation*]	*6.15* ♊	*lat. 0*
	Calculus Alphon. [*the Alphonsine calculation*]	*5.48* ♊	*1½*
	Obſeruata [*observed*]	*6.47* ♊	*1⅗*

[204]

N.B. From all these compared with one another I gathered — by means of the great brass globe, with the places of the stars rightly laid down upon it, and by taking the mean of the places — that the longitude to come out is 6.47 ♊*, lat. 1.35 B.* [*north*]

DIE 10 DECEMBRIS. [10 December]

Hora 6 M. 22. When the pole star was on the Meridian above the pole, its greatest altitude, taken with the quadrant after that had been set right by the new division, was p. 58 M. 50 — or rather 50¼, for it could hardly have been 58 50½. This observation is a good enough one.

Hora 12 M. 15. I observed that ♂ was almost on the straight line drawn from Aldeboran to the head of Meduſæ, but that it departed from this line towards the west and the horizon by about the diameter of its own body, or at most 10 minutes [*ad ſummum 10 minut.*]*. Its distance from Aldebora I observed exactly with the Radius as p. 8 M. 52. From this you can verify the place of ♂ about the ☌ with ☉.*

Diagram. A facsimile of Tycho's own sketch, set into the left part of the measure beside the propositions that follow. It is a long, very narrow figure: a single point at the top from which two nearly parallel lines run down the full height of the figure, the right-hand one straight and the left-hand one bowed slightly outward, the two closing at the foot on a short base at the lower right. Three asterisks — the conventional star-mark — stand on the left-hand line and at the foot: two on the bowed left line, upper and lower, and one at the foot. Two further strokes are drawn inside the figure from the apex down to the lower of the two left-hand star-marks and on to the foot, dividing the whole into the two triangles the propositions work in. A short line closes the figure

[203] The row-label column carries no head-word. The marker *lat.* stands at the first line alone.

[204] The N.B. below begins as a narrow file of five short lines set to the right of the computation, still inside the measure, and then runs on into the full measure. It is text, not a marginal note.

across the bottom left. Four letter-labels are drawn on the figure, all in Tycho's italic; each of the three lower ones stands beside its asterisk.

- a (apex, above the point where the two long lines meet): *a*
- b (on the bowed left line, upper, beside its asterisk): *b*
- c (on the bowed left line, lower, beside its asterisk): *c*
- d (at the foot of the figure, to the right of its asterisk): *d*[205]
- d — Aldeboran
- c — ♂
- b — Cap. Med.

The working completed and the deviation from the straight line taken into account, ♂ comes out with long. 0.15 ♊, lat. 2½ B. [*north*]. *The Alphonſinus calculation gives Mars's longitude as 29.8 ♉, lat. 2.8; the Prutenicus, 29.45 ♉, lat. 1.25. It is plain, then, that the observation exceeds both, whereas elsewhere it usually falls between them.*

I. Since in the triangle abd the two sides ab and ad are given, by the complements of the stars' latitudes, together with the included angle, by the difference of the longitudes of the two, bd is therefore given by VI, and then by the IX dogma the angle bda.[1]

II. In the triangle cda, since the side ad is given — the complement of Aldeboran's latitude — and cd, the distance of Mars from the star as observed, p. 8 M. 52, while the included angle has just become known, ca will therefore be given by VI, the complement of the latitude of ♂, and by the IV dogma[2] the angle cad, the difference of longitude from Aldeboram, which comes out to be subtracted.

N.B. Afterwards I gathered, by means of the great brass globe — the places of all the fixed stars having first been restored and well laid down — that the longitude of ♂ then fell at 0.5 ♊ and the latitude at 2.32. But you will be able to make the trial over again, both mechanically by the globe and also geometrically by numbers.

[1] Here the dogmata of the »Triangulorum Praxis« are mentioned for the first time.

[2] It should be »per IX dogma«.

A more careful examination, from the verified place of the head of Algol.[206]

Nota. I found that the head of Meduſæ was distant

- *from the bright star of ♈ — 21.38½*
- *from Aldeboran — 30.54⅔*

— twice, with the Sextant △.

Then on the great brass globe the longitude of the head of Algol is gathered as 20.15 ♉, latitude 22.25. But if one draws on the globe a line from Aldeboran to this place of Cap. Meduſæ, and takes the distance along that line as p. 8 M. 52, as above — yet so that at that place ten minutes [*dena minuta*] *are taken towards the west — the longitude of ♂ comes out 0.2 ♊, the latitude 2.30. This, however, is by the great brass*

[205] Beneath the sketch the leaf prints a three-line key in roman, identifying three of the four letters. The fourth letter, *a*, has no key entry.

[206] A brace is drawn at the right of the two lines, joining them to the single shared remark *bis per Sextantem* △, which is set against the brace and governs both.

globe; you can also make the trial by triangles. If you set the place of ♂ at 0^{P} 5′ ♊, lat. 2½, you will go wrong imperceptibly.

N.B. The calculation gives the place of Meduſæ at that time as 20.20 ♉, lat. 22° 22′ B. [*north*]*. So the place of ♂ comes out a little differently.*

DIE 13 DECEMBRIS. [13 December]

In the morning before the rising of ☉^{is} I observed the star ♀, which was then about the limits of its greatest distance from ☉, in this way.[207]

6^{H} 55^{M}	♀ *was distant, with the Radius, from the more southerly of the pan of the Balance*	6 15
7 2	*the same was distant from the northern star of the pan of the Balance*	5 13
7 11	*the same was distant from Spica* ♍	27 36

And all these observations were made with the Radius.

To verify the time I observed Spicam ♍ *at azimuth 0 30 west of the meridian, at the altitude it has at midday, and the clock then showed H. 6 M. 58 S. 30. Then again, with the larger clock showing H. 7 M. 9 S. 40, the Azimut of the same star from the south towards the west was p. 3 M. 32, altitud. 25 11; and you may rather trust this last one, for it was more exact than the earlier.*

Then I observed ♀ in Azimut and in Altitudes as follows, counting the times by the Horologium.[208]

7^{H} 17^{M} 0^{S}	*Altit.* ♀ 18° 21′	*Azim.* ♀ 67° 3′
7 24 50	18 44	68 56
7 32 25	19 7	70 56

[209]

The Azimuts of ♀, however, are counted from the equinoctial rising towards the Meridian. The Horologium was running slow by about 6 minutes in one revolution.

An inquiry into the longitude and latitude of the stars in the pans of ♎ for the year 1580.

From their distances from Spica ♍ and from their meridian altitudes, the right ascension of Spicæ being 195° 48′, there are found:[210]

[207] The superscript markers H and M stand at the first line alone.

[208] The words *Altit.* ♀ and *Azim.* ♀, and the markers ° ′ and the superscripts H M S, stand at the first line of each column and nowhere below it.

[209] At the right of that table, still inside the measure, a narrow file of four short lines runs alongside the three table rows and one line below them. It is text, not a marginal note.

[210] The head row is printed on the leaf; it is set at a smaller size than the table body — a size difference, not a fount change. The row-label column carries no head-word. The markers ° and ′ stand at the first figure line of each column only — with one exception, the ″ that stands after *30* in the second row of the *Aſc. R.* column.

	Declinatio [declination]	Aſc. R. [right ascension]	Punctum culminans [culminating point]	Long. [longi-tude]	Lat. Bor. [northern latitude]
Auſtralis lancis [the southern pan]	14° 12½′ M	216° 56½	9° 20′ 45″ ♏	9° 12′ 28″ ♏	0° 25′ 21″
Borealis lancis [the northern pan]	7 45½ M	223 38 30″	16 7 10 ♏	13 30 48 ♏	8 34 21

From this the place of ♀ was traced out, and we find the longitude of ♀ to be 14° 39′ 55″ ♏, Latit. B. [north] 3° 28′ 58″. From the Prutenic tables the place of ♀ falls, in the year 1580, Dec. d. 12, H. 19.0′ P. M., at 14° 52′ 37″ ♏.

DIE 19 DECEMBRIS. [19 December][211]

6^{H} 25^{M}	♀ *was distant from the northern of the pan, with the Radius*	*9° 15′*
6 30	*the same was distant, with the Radius, from the more southerly of the pan*	*12 12*
6 55	*the same was distant from Spica Virginis, with the Radius*	*33 36 bona* [*good*]
7 0	*I found the same distance with the Radius*	*33 40*

But the earlier one is rather to be trusted — or better, the mean between the two observations should be taken. These times are good enough, because they were afterwards corrected against the lesser clock.

___[212]

- *6 59 30 — Spica's azimuth [Azim.] 70.22 from the west towards the south [ab occaſu verſus merid.]; the altitude of the same 23.26 — but* ἐν πλάτει, *because of the excessive light of the dawn. You can nevertheless verify from this, after a fashion, the clock-times that follow.*[213]

Left file

Time	*Azimut* ♀	*Altitudo*
7 16 20	*78.0*	*18.23*
7 24 40	*80.0*	*18.32*

[211] The markers ° and ′ and the superscripts H M stand at the first line alone.

[212] On this side italic type reproduces Tycho's own hand and roman that of his assistants. Nothing in the body is roman.

[213] The four figure-lines that follow stand in two files, parted by a short vertical rule that does not run the full depth of the measure. The words *Azimut* ♀ and *Altitudo* stand inline in the first line of the LEFT file only; the right file carries no printed label at all. No head row is printed over either file, and the first column is unheaded.

Right file

Time	*Azimut* ♀	*Altitudo*
7 32 50	*82. 0*	*18.46*
7 43 30	*84.40*	*18.50*

This last one was thoroughly ἐν πλάτει, *in that it was already day and* ♀ *was not showing clearly as a star. Indeed the last two could scarcely be made out, because of the excessive light of day.*

The clock was not running correctly, because it had not been rectified for many days, and so the times taken then for the azimuths are not exact enough.

[*Between 5 and 6 in the afternoon I observed the greatest altitude of the pole star, quite exactly, 58.54*][1]

DIE 20 DECEMBRIS. [20 December]

When it was on the meridian again, I found its greatest altitude to be 58.51, or perhaps 58.50½. And this observation was good and exact enough.

DIE 21 DECEMBRIS. [21 December]

The sky being clear enough, I observed in the evening the greatest altitude of the same star, on the same line as yesterday, namely p. 58.50½, or at most [ad ſummum] p. 58.51 — for I could not make out well enough whether it was a half-minute more [ſemiſcrupulo plus]. This observation agrees with the earlier one and is good enough for you to trust, taking 58.50½.

DIE 22 DECEMBRIS. [22 December]

In the morning the same star was at its least altitude, having it 52.56½.

Then, as Spica was crossing the meridian, I set the clock to the moment at which it is on the meridian on that day, namely H. 6 M. 16 S. 45; and I found its greatest altitude p. 25 M. 12, or rather 25 12½.[214]

- *[Per Ma. H. 7.14.20* ⎫
- *Per Mi. H. 7. 6.55* ⎭ — *Arcturus was on the Meridian, having greatest altitude 55 p. 32 M.]**[2]

But since, on comparing the altitude of the pole observed by means of the pole star with the altitude observed from the sun about the solstices, the former exceeds by 2½, the altitudes of stars observed through the pinnules [pinnacidia] will be 2½ greater than they should be. Hence Spica's true altitude will be 25 p. 10′, and its declination 8.59 Merid. [southern]. From this its longitude this year will be 18.10 ♎, *which agrees*

[214] A BRACE stands at the right of the two time-lines below, joining them to the single shared remark set against it. The abbreviations *Per Ma.* and *Per Mi.* stand abbreviated; lower on this same side the leaf spells *per maius horolog.* and *per minus horolog.* in full. The whole block stands inside the edition's square brackets and carries the edition's footnote marker 2.

with the observation made three years ago, where I found the longitude of the same star to be 18.7 ♎, three minutes earlier; but a larger quadrant will give greater certainty in this.

Then I observed ♀ at certain azimuths and altitudes, in this way.[215]

- *6^H 47^M 30^S per maius horolog.* ⎫
- *6 42 50 per minus horolog.* ⎭ *— Azimuth ♀ 60.0, Altitudo 13.53. And this observation was exact and good enough.*

DIE 24 DECEMBRIS. [24 December]

Again I observed Spica at its greatest altitude, 25.12½ — a good one; but the time I set down only ἐν πλάτει, *which can be corrected from Arcturus's transit.*[216]

- *6^H 32^M 0^S — the more westerly foot of Bootis was on the meridian, having altit. — 54° 40′*
- *6 52 20 — Arcturus was on the Meridian, having greatest altitude — 55 32*
- *7 14 5 — ♀ was at Azimuth 70°, having altitude 15° 42⅓′ — vel 32½*
- *7 24 45 — 73 — 16 15½*
- *7 35 40 — 76 — 16 42*
- *7 45 5 — 78 — 16 56½*
- *7 50 15 — 80 — 17 10*[217]

1. Hæc obſeruatio eſt lineis inducta. — "This observation is struck through with lines."
2. Lineis inducta. — "Struck through with lines."

In the evening ♂ was observed with the Radius to be distant from the fixed stars as follows.[218]

- 6 9 — ♂ was distant from the eye of ♉ — 6° 28′
- 6 16 — distant from the star of 3 magn. in the breast of ♉ — 11 0
- — or at most [aut ad ſummum] — 11 0½
- 6 32 — distant from the horn of ♉ shared with the foot of Ericht. — 14 14
- 6 47 — distant from the other horn of ♉ — 18 2

6 57 — The bright star in the head of Ceti crossed the meridian, by the marked plane of the quadrant.

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[215] A second BRACE stands at the right of the two time-lines below, joining them to the one pair of figures beside it and to the remark carried across both baselines at the far right. The words *Azimuth* ♀ and *Altitudo* are printed on the upper baseline, over the values *60.0* and *13.53* on the lower; the remark *Fuitque hæc obſeruatio ſatis exquiſita et bona* begins on the upper baseline and finishes on the lower.

[216] The markers ° and ′ stand at the first line of each figure column and nowhere below.

[217] *vel 32½* stands at the far right of the *7 14 5* line, right-aligned in the right-hand figure column directly beneath *55 32* of the Arcturus line above it. It may therefore be an alternative to either figure. Dreyer's two footnotes, set in small roman at the foot of the page:

[218] A BRACE stands at the right of the five figure-lines below, joining them all to the single shared remark set against it: *Hæ omnes diſtantiæ ſunt bis factæ, cælo ſereno* — "All these distances were taken twice, the sky being clear." The markers ° and ′ stand at the first line of the figure column and nowhere below. *Ericht.* stands abbreviated.

11 0 0 — Canis Major on the meridian, altit. 17° 51′, after the pinnules had been restored.

N.B. By means of the great brass globe I gathered the intermediate place of ♂ to be 1.20′ ♊, Lat: 0.35 B. [north]. *Calculus Alph. 28.10 ♉, lat. 2.9 B; calculus Prut. 29.0 ♉, lat. 1.46 B. It is clear, then, that everywhere the place of ♂ lies further on than either the calculation of Alphonsi or that of Copernici, and is not intermediate between them as it usually is. You can look this over again another time, for much turns on it. At other times ♂ very rarely exceeds both calculations in the heaven. On this day it was stationary.*

DIE 25 DECEMBRIS. [25 December][219]

- In the morning. The pole star had its least altitude — 52° 56¼′
- [Spica had on the meridian the altitude — 25 12][1]

DIE 27 DECEMBRIS.[2] [27 December]

In the morning the distance of ♀ from three stars of ♏ that could be seen was observed with the Radius.[220]

- 6^{H} 57^{M} 50^{S} — it was distant from the heart of ♏ — 8° 16′
- 7 5 5 — distant from the northern of the three bright ones in the forehead of ♏ — 5 54
- 7 8 40 — distant from the middle one of the forehead of Scorpij — 3 17
- 8 37 — ♀ was distant from ☉ just risen 45° 40′, which is a good observation, except that the wobbling of the wood to which the Radius was applied during the observation could have caused a little error — an error which even so will hardly be perceptible.
- 6 59 45 — P. M. the more northerly of the two towards the tail of ceti in its quadrilateral was on the meridian, having altitude — 23° 41⅔′
- 7 20 50 — the bright star in the middle of the jaw of ceti was on the meridian, having altitude 35 30
- 7 40 10 — the bright star at the far end of the jaw of ceti on the merid., alt. — 36 30 fere
- 8 4 — the distance of ♂, by the radius, from that star which is in the breast of ♉ — 11 1
- 8 13 50 — ♂ was distant from the eye of Tauri — 6 25
- — About this time ♂ was seen with the eye to lie in the middle of the straight line between the ear of ♉ and the pleiades; yet by 4′, or else 5′, it appeared nearer the ear — by the Radius.
- 8 39 15 — The breast of ♉ was on the meridian, having altitude — 45 16
- 8 45 25 — ♂ was on the meridian, having altitude — 56 20

[219] The second member is the edition's bracketed line, carrying its footnote marker. ° and ′ stand at the first line only.

[220] The markers ° and ′ stand at the first line of the figure column and again at 45° 40′ and 23° 41⅔′ where a fresh measure begins, and nowhere else.

- 8 58 20 — the first of the Hyades [ſucularum], the one in the nostrils of ♉, on the merid., alt. — 48 36
- 9 1 30 — the one that lies between this and the northern eye of ♉, on the merid., alt. — 50 32
- 9 7 50 — the middle one between the first and the southern eye of ♉, on the merid., alt. — 48 55½
- 9 15 10 — the ruddy one in the southern eye of ♉, on the merid., having altit. — 49 42

DIE 28 DECEMBRIS. [28 December]

The clock having been corrected to the sun at the preceding noon but its weight not yet properly set — the difference this makes in the time the following noon will show — Spica was on the meridian at H. 6.27′ 10″. Then the more westerly foot of Bootis was on the meridian at H. 6.58.50, having altitude 54 33.[221]

1. Linea inducta. — "Struck through with a line."
2. Manu Petri Jacobi Flemløſe. — "In the hand of Petri Jacobi Flemløſe."

___[222]

- *7^H 22^M 0^S — Arcturus was on the meridian, having altitude 55 30.*

After the sights of the quadrant had been corrected [Poſt correcta pinnacidia quadrantis].[223]

Left file

- 7 37 55 — ♀ was in Azim. 64^g, altit. 13^g 5′
- 7 46 50 — 66 — 13 38

Right file

- 8^H 0^M 0^S — ♀ Az. 69^g Alt. 14^g 15′
- 8 12 50 — 72 — 14 55

DIE 29 DECEMBRIS. [29 December]

At 5 in the evening, the pole star being at its greatest altitude, this was found to be p. 58.50 — and that after the instrument had been rectified in its sights [pinnacidia] and in everything else.

- 8 21 45 — ♂ crossed the meridian, having altitude 56 27½.

This time was corrected to the transit of the eye of ♉ across the meridian.

- 8 52 35 — the eye of ♉ crossed the meridian, having altitude 49 42.[1]

DIE 30 DECEMBRIS. [30 December]

At 5 in the morning I found the least altitude of the pole star 52.55, and you can trust these two; nor can the difference be greater than 50¼ above and 55½ below. Elevation

[221] Dreyer's two footnotes, set in small roman at the foot of the page:

[222] Italic type reproduces Tycho's own hand, roman that of his assistants.

[223] The four figure lines that follow stand in TWO FILES, parted by a short vertical rule that does not run the full depth of the measure. Unit markers as printed: the raised **g** stands on the first line of each file only, on both the azimuth and the altitude figure, and nowhere on the second line of either; the prime ′ likewise stands on the first line of each file only.

of the pole 55.52.30. Or, if one takes it at the greatest that could be got by sight from this difference, the greatest altitude will be 58.50.15, the least 52.55.30, and the elevation of the pole 55.52.52½. You can therefore use, without any perceptible error, the pole's altitude 55.52.40 — as far, that is, as one can discern with the smaller quadrant; and this you can trust.

- *6^H 36^M 45^S — the more easterly limb of the moon, lit at its outermost surface, was on the meridian, and its upper horn had, at its own extremity, altitude* ***17 9***
- *6 46 25 — Spica was in azimuth 76.23 from the west towards the south,* ***Altitudo 24 17***
- *7 16 25 — Spica was in azimuth 68.22 from the west towards the south,* ***habens Altitudinem 23 3***

From this you can verify the time of the clock at the moment of ☽'s transit across the meridian, and from that enquire into the apparent place of ☽ at the same moment, so that the place of ☉ may be established from it.

Then, once ☉ had risen, and ☽ being about 90 degrees from its rising and therefore having an imperceptible parallax of longitude [paralaxim longitudinis], I observed ☽ itself at fixed times in fixed azimuths and altitudes, in this way.[224]

Time	*Azimut*	*Altitudo*
9^H 11^M 30^S	53^g 30′	9^g 56′
9 19 45	51 40	9 16
9 24 55	50 25	8 45

In the azimuths I took the edge of ☽'s circumference that was lit towards ☉'s rising; in the altitudes, on the other hand, I took the topmost point of its more northerly horn. These observations were good enough, as far as seeing allowed. You can compare them with one another, fit them to the place of ☽ found on the meridian, and from there restore the place of the sun by verification of the times.

Afterwards I took the Sun too at various altitudes and azimuths, as follows.[225]

Left file

[224] The three figure lines that follow are ONE file, with a block of prose standing beside them at the right, parted from them by WHITE SPACE ALONE — no vertical rule. The leaf prints no head row over the file; *Azimut* and *Altitudo* stand as inline labels in its first line, and the first column is unheaded. Unit markers as printed: raised **g** and prime **′** on the first line only, on both the azimuth and the altitude figure; nothing below. The prose beside the figures is a SIDE FILE standing inside the measure, and it is NOT a marginal note.

[225] The nine figure lines that follow stand in TWO FILES, parted by a vertical rule that runs the depth of the LEFT file only — the left file has FIVE lines, the right FOUR. LEFT FILE: no printed head row; the words *Azimut* and *Altitudo* stand as printed inline labels in its first line; no foot label row. RIGHT FILE: no printed head row, and no label words of its own; no foot label row. UNIT MARKERS DIFFER BETWEEN THE TWO FILES: the LEFT file sets the raised **g** (58^g 50′, 6^g 55′) on its first line only; the RIGHT file sets the DEGREE SIGN ° (62° 0′, 7° 54′) on its first line only. Both files carry the prime **′** on the first line only.

Time	*Azimut*	*Altitudo*
9^{H} 59^{M} 20^{S}	*58^{g} 50′*	*6^{g} 55′*
10 1 40	*59 24*	*7 8*
10 3 35	*59 52*	*7 18*
10 6 15	*60 30*	*7 27*
10 8 30	*61 0*	*7 37*

Right file

Time	*Azimut*	*Altitudo*
10^{H} 12^{M} 55^{S}	*62° 0′*	*7° 54′*
10 17 25	*63 0*	*8 11*
10 21 40	*64 0*	*8 28*
10 25 50	*65 0*	*8 45*

[1] On another leaf of the codex this observation is repeated, but with the altitude 49° 41′.

___[226]

From this you can verify the Sun's place, once the time has been corrected and the degree of the M. C. found from the preceding observation of ☽ — and so be certain about ☉'s entry into the solstice. This too can be of use: that when ☉ was rising you had taken with the Radius its distance from ♀, p. 45.25, and that between the limb nearest to Venus and the star ♀. It was good enough, and the time then was hora 8 M. 35. But in order to verify ♀'s place at that time, I had observed ♀ itself earlier, namely at H. 8 M. 19 S. 20, in azimuth 80° 0′ from the east towards the south, altitude 15.33.

The clock had been corrected the evening before from the transit of the eye of ♉ across the meridian at hora 8 M. 52½. You can therefore see what hour it was when Spica stood at a given azimuth, correct the time from that, and see by how much the clock has run fast or slow over so long an interval; and then make the proportion for the rest. The place of Spica ♍ you will be able to take from its corrected meridian altitude, which is 25.10.

Nota. At the following noon the clock had run fast by 14′ 40″. It had been set the evening before, when the eye of ♉ was crossing the Meridian, at H. 8.52½; so 15 hours had elapsed, and it therefore runs fast by one minute in each single hour. From this you can correct the times noted down, taking as your root the transit of Spica ♍ across the given azimuth.

The same day, in the evening,[227]

[226] On the three displayed lines of the 30 December moon-and-Spica run above, the figure group at the far right of each line carries its own printed label, set on the same baseline and well away from the sentence: *altitudinem* on the first line (completing the sentence, "had … altitude"), *Altitudo* on the second and *habens Altitudinem* on the third. Those two label words stand as labels over the outboard figure group rather than inside the sentence; they mean "Altitude" and "having altitude" respectively. The words are the leaf's own.

[227] Unit markers as printed: the degree sign ° and the prime ′ stand on the FIRST figure line only (11° 8′) and not on the second (6 19).

- 7^{H} 55^{M} — ♂'s distance, taken with the Radius from the breast of ♉, was **11° 8′**
- 8 4 — the distance of the same from the southern eye of ♉ was **6 19**
- 8 44 — the eye of ♉ crossed the meridian by the marked plane of the quadrant.

DIE 31 DECEMBRIS. [31 December]

At about 5 o'clock the least altitude of the pole star was found with the quadrant to be partium 52.55½, or at most [ad ſummum] 55⅔. The sky here was moderately clear.

- 5^{H} 47^{M} 50^{S} — Spica ♍ was on the meridian, having altitude 25.10′ ἐν πλάτει [Greek: *en platei*, "in breadth" — that is, roughly]. For the air was so murky that Spica could not be seen well enough through the instrument.
- 7 23 40 — the outermost surface of ☽'s limb, lit and facing the east, was on the meridian, and its upper horn, by reason of its own extremity, had altitude 12.36.
- 7 48 50 — ♀ was in azimuth 73.0 from the east, having altitude 14° 25′
- 7 56 50 — ♀ was in azimuth 75.0 from the east, having altitude 14 41½.

These three observations were made ἐν πλάτει on account of the frosty and murky air.

If you posit the pole's altitude 55.53 and Spica's altitude 25.10, its longitude comes out at 18.5 ♎. But if you posit the pole's altitude 55.52.30 and Spica's altitude 25.9.40, which is about what it is, its longitude comes out at 18.8 ♎ this year. The true precession according to Copernicus is 27.54; therefore according to him the longitude of Spica is 17.54 ♎. Its motion is accordingly faster by 14 minutes.

SEQUENTES OBSERUATIONES SUNT THADÆI HAGECIJ. [The observations that follow are those of Thadæi Hagecij][228]

1580	DIE 13 FEBRUARIJ	15 FEB.
Altitudo meridiana [meridian altitude] of the left foot of Orion [ſiniſtri pedis Orionis]	31 25	31 23
of the left shoulder of Orion [Humeri ſiniſtri Orionis]	46 0	45 55
of the right shoulder of Orion [Humeri dextri Orionis]	47 18	

[228] The head row below is the leaf's OWN — *1580*, *DIE 13 FEBRUARIJ* and *15 FEB.* are printed, the year standing over the label column and the two dates over the two figure columns, exactly where the leaf sets them. The LABEL column has NO printed head. One CONTINUATION feature is present: the governing words *Altitudo meridiana* are printed ONCE, on the first row only, and rows two and three are set indented under them, continuing them. The cell at row three under *15 FEB.* is BLANK on the leaf — no figure is set there.

___[229]

Syrij [Sirius]	24 3	24 0
Procyonis [Procyon]	46 20	46 20
Cordis ♌ [the heart of ♌]	54 0	

I also observed afresh a number of distances between stars in Cassiopeia [Obſeruaui etiam denuo diſtantias aliquot ſtellarum in Caßiopæa.]

Left file:

- The distance of the second from the third [Diſtantia ſecundæ a tertia] — 1.45
- from the fourth [quarta] — 4.42
- from the twelfth [duodecima] — 4.57
- The distance of the first from the third [Diſtantia primæ a tertia] — 4.21
- The distance of the eleventh from the twelfth [Diſtantia vndecimæ a 12ma] — 4.52

Right file:

- The distance of the fourth from the twelfth [Diſtantia quartæ a 12ma] — 6.14
- The distance of the third from the fourth [Diſtantia tertiæ a quarta] — 3. 2
- The distance of the fourth from the eleventh [Diſtantia quartæ ab 11ma] — 3.36
- The distance of the fourth from the fifth is the same. [Eadem eſt quartæ a quinta.] — no value printed
- The distance of the fifth from the sixth [Diſtantia quintæ a ſexta] — 4.48

These distances are thoroughly reliable and were repeated many times over. [Hæ diſtantiæ veriſßimæ ſunt et multoties repetitæ.]

OBSERUATIONES ANNI 1581

[Observations of the year 1581]

FACTÆ IN INSULA HUENA IN NOUIS ÆDIBUS VRANIÆ.

[Made on the Island of Hven, in the new house of Urania.]

[229] Its two figure columns were headed on the preceding leaf; those head words are NOT repeated here. The label column is likewise unheaded on this side. The third row's second cell is blank on the leaf.

OBSERUATIONES ALTITUDINUM SOLIS MERIDIANARUM.

[Observations of the meridian altitudes of the Sun. — the printed rubric carries Dreyer's footnote reference 1 after MERIDIANARUM and before the point.][230]

JANUARIJ.

[January]

Die 6	13ᵍ10½	good [bona]
7	13 24	middling [mediocris]
8	13 36	good
9	13 46	
10	14 0	
14	14 56	middling

FEBRUARIJ.

[February]

4	21 6½	ἐν πλάτει [Greek: *en platei*, "in breadth"], on account of scattered cloud [propter raras nubes]
16	25 26	good
17	25 48½	
25	28 52	
26	29 14½	not clear enough [non ſatis ſerenum]
28	30 1	ἐν πλάτει, on account of cloud [propter nubes]

[231]

MARTIJ.

[March]

9	33 35	good enough [ſatis bona]
14	35 33	middling

[230] The only label word standing anywhere in the figure area is *Die*, which stands inline in the FIRST row of each file only, at *Die 6* in the left file and at *Die 25* in the right. A second figure column, holding five-figure numbers, is set between the day column and the altitude column in four of the seven blocks; it is unheaded and unexplained on the leaf.

[231] In the 4 February entry the last word of the remark, *nubes*, is turned over and set at the right-hand end of the following line, above the word *bona*. It belongs to the 4 February remark.

15		35 56⅔	good
16		36 19¼	good
20		37 53½	
21		38 15	per Min. *There was too much wind, and it was not properly corrected* [*Erat ventus nimius, nec ſatis correctum*]
	78900	38 16 25″	
23	81200	39 4 35	*but the circle of* ⊙ *was not distinct at the time* [*ſed non erat circulus tunc* ⊙*is diſtinctus.*]
		39 2¾	per min.
24		39 24⅔	Minus
		39 25 12	Maius
30		41 40¼	at most 41 41 [ad ſummum]
31		42 2	ἐν πλάτει, on account of cloud

APRILIS.
[April]

1		42 24¾	per minus
	91445	42 26½	per maius
5		43 51	per minus, ἐν πλάτει, on account of cloud
9		45 15½	
15		47 16	
16		47 35 30″	
22		49 27	per minus
23		49 44½	
24		50 2 15	
	83870	50 1	per maius

232
233

Die 25	50 19 0	per minus, ἐν πλάτει, on account of cloud
28	51 9 30	per minus

[232] A brace stands to the right of the altitude column in this block, gathering two lines to a single shared remark, *per minus*. Its lines are: - 23 — 49 44½ - 24 — 50 2 15 The remark is not repeated against either line on the leaf.

[233] The 5 April remark is printed *prropter nubes*, with a doubled r. The reading is the ordinary *propter nubes* of the neighbouring entries.

MAIJ.
[May]

1		51 57	
6		53 10½	
8		53 37¾	
12		54 27½	
13		54 39	
24		56 24	

234

JUNIJ.
[June]

1		57 10½	
2		57 14	
11		57 32½	*Petrus observed it* [*Petrus obſeruauit*]
12	63480	57 35½	Maius
14		57 33	Minus
	63535	57 34⅙	Maius
15		57 31	per minus, good
	63575	57 33¼	the greatest [maxima]. *But it must be looked into why these do not agree with the lesser ones* [*Sed videndum quare non concordent cum minoribus.*]
16		57 30	per minus
25		56 57	
29		56 30	per minus

235

JULIJ.
[July]

234 A single tall brace stands to the right of the altitude column, gathering all six lines of this block to one shared remark, *per minus*. Its lines are: - 1 — 51 57 - 6 — 53 10½ - 8 — 53 37¾ - 12 — 54 27½ - 13 — 54 39 - 24 — 56 24 The remark is printed once, against the middle of the brace, and is not repeated against any line.

235 A brace stands to the right of the words *Minus* and *Maius*, gathering two lines to one shared remark, *I observed it carefully enough myself — ego ſatis diligenter obſeruaui*, which is set in italic across the two lines the brace spans. Its lines are: - 14 — 57 33 Minus - 63535 — 57 34⅙ Maius The remark is not repeated against either line.

7		55 20	per minus
8		55 10⅓	per minus
10		54 47½	ἐν πλάτει, on account of cloud
11		54 38½	
13		54 15	
15		53 49⅔	
16		53 35	
17		53 22	it was not clear enough [non fuit ſatis ſerenum]
18		53 8	it was clear enough [fuit ſatis ſerenum]
21		52 24	
22		52 9	fere [nearly]
23		51 54	Not accurate enough [Non ſatis exquiſita], *verified by the greater* [*maius verificatum*]
	78285	*51 56⅔*	*the great quadrant also agreeing, a little less, 51 57* [*concordante etiam quadrante magno paulo minus 51 57*]
24		51 39	per minus
	79020	51 41 3″	per maius, the great quadrant corresponding [correſpondente quadrante magno]

236

Dreyer's note: **1** In the codex a table written in Tycho's hand is prefixed, entitled »Paralaxes Solis in circulo Altitudinis«, giving the Sun's parallax for each degree of altitude from 1° up to 60° (π = 2′ 58″). For almost all the days of this year the declination and the longitude have been computed, the altitude of the equator being put = 34° 7′. [Præmittitur in codice tabula manu Tychonis ſcripta, cui titulus »Paralaxes Solis in circulo Altitudinis«, exhibens pro ſingulis gradibus altitudinis ab 1° usque ad 60° parallaxim ſolis (π = 2′ 58″). Pro omnibus fere diebus huius anni declinatio et longitudo ſupputatæ ſunt, altitudine æquatoris poſita = 34° 7′.]

___[237]

Left file.[238]

[236] *Minus* and *Maius*, and the phrases *per minus*, *per min.*, *per Min.* and *per maius*, are the leaf's words. What the leaf does NOT do anywhere on this side is say what noun they qualify. The only nouns the side sets beside them are *quadrans magnus*, the great quadrant, in the two July entries, and *minoribus*, "the lesser ones", in the June remark.

[237] The only label word standing anywhere in the figure area is *Die*, which stands inline in the FIRST row of each file only, at *Die 28* in the left file and at *Die 22* in the right. A second figure column holding five-figure numbers is set between the day column and the altitude column in the two upper blocks of the left file; it is unheaded and unexplained on the leaf.

[238] The opening block stands under no rubric. A brace is set to the right of its first three lines, gathering them to one shared remark, *non ſatis exquiſitæ propter nubes*. Its lines are: - Die 28 — 50 33½ - 82155 — 50 35 43″ - 50 36 quadr. mag. The remark is printed ONCE, against the middle of the brace, and is not repeated against any line.

Die 28		50 33½	per minus
	82155	50 35 43″	per maius
		50 36	quadr. mag.
30		49 59⅓, 59½ at most [ad ſummum]	per minus, middling [mediocris]

239

AUGUSTI.
[August][240]

1		49 23	
2		49 5⅔	
	86460	*49 9 10″*	*per maius*
3		48 46	per minus, ἐν πλάτει [Greek: *en platei*, "in breadth"], on account of cloud [propter nubes]
5		48 11	fere [nearly], per minus
6		47 53	per minus
7		47 34	per minus
13		45 34	per minus
23		42 3	fere; you cannot rely on this one enough, on account of cloud [huic non ſatis potes fidere propter nubes.]
24		41 40	It was not clear enough. [Non ſatis fuit ſerenum.]
25		41 17	
26		40 54½	It was not clear enough. [Non ſatis ſerenum fuit.]

241

Note. The following observations of the Sun's altitude are not accurate as far as the beginning of October, because the centre of the quadrant about which the alhidade turns had been widened too far and was slack; so it is no wonder if they disagree by so much from the true motion of the Sun demonstrated earlier. [*Nota. Hæ ſequentes obſeruationes altitudinis ☉ non ſunt exquiſitæ vsque in principium Octobris, eo quod centrum quadrantis circa quod voluitur Alhidada erat nimis ampliatum et laxum, quare non mirandum ſi in tantum diſconueniant a vero ☉ motu prius demonſtrato.*][242]

[239] Shared brace remark for the first three rows above: not accurate enough, on account of cloud [non ſatis exquiſitæ propter nubes].

[240] A brace stands to the right of the altitude column at the head of this block, gathering two lines to one shared remark, *per minus*. Its lines are: - 1 — 49 23 - 2 — 49 5⅔ The remark is printed once, against the brace, and is not repeated into either cell.

[241] Shared brace remark for rows 1 and 2 above: per minus.

[242] This note stands inside the measure of the left file, parted from the register rows by white space alone. Dreyer's reference mark 1 is set after the word *Nota* and before its point; his note is at the foot of the side.

SEPTEMBRIS.
[September]

2	38 17	
7	36 20	fere
8	35 56	
9	35 34	
13	34 0	
14	33 37	
15	33 14	
16	32 49⅔	It was not clear enough, for the sky was overcast with thin white cloud. [Non fuit ſatis ſerenum, cœlum enim obductum erat raris et albis nubibus.]
17	32 26½	Nor was it clear enough here, for the air was murky with mist and thin cloud. [Neque hic ſatis erat ſerenum, aër enim obſcurus fuit nebula et raris nubibus.]
19	31 39 30″	
21	30 50	This observation is not good enough, on account of a fault in the quadrant's rule which M. Johannes made in correcting it. [Hæc obſeruatio non eſt ſatis bona propter vitium regulæ quadrantis quod commißum eſt a M. Johanne in eius emendatione.]

Right file.

Die 22	30 29	ἐν πλάτει, on account of scattered white cloud [propter raras et albas nubes]
24	29 43	The sky was not clear, for the Sun was covered with white cloud. [Cœlum non fuit ſerenum, nam ☉ erat obductus albis nubibus.]
25	29 20	A clear day [Serena dies]
26	28 56 20″	The sky was clear. [Serenum fuit cœlum]
27	28 33	
28	28 11 20″	

OCTOBRIS.
[October]

The observations that follow are better. [*Sequentes obſeruationes meliores ſunt.*][243]

2	26 43 39	
3	26 18 30	
9	24 5	
10	23 43	good [bona]

[243] That line stands inside the measure of the right file, between the month rubric and the first register row, parted from both by white space alone.

12	23 1	good
13	22 40¼	good
16	21 39	
18	20 57	
20	20 16	
21	19 57	
30	17 10	*after the quadrant had been rectified* [*poſt rectificatum quadrantem.*]

NOUEMBRIS.
[November]

2	16 20	The sky was not clear enough. [Non fuit ſatis ſerenum cœlum.]
4	15 47½	Not good enough, on account of cloud by which the Sun was covered at midday. [Non ſatis bona propter nubes quibus ⊙ obducebatur in meridie.]
9	14 35	
12	13 57	

DECEMBRIS.
[December]

5	10 48½	This observation was made through misty air. [Hæc obſeruatio eſt facta per aërem nebuloſam.]
14	10 40⅔	*or at most 41, and that is better. It was not clear enough.* [*vel ad ſummum 41 et eſt melius. Non fuit ſatis ſerenum.*]

Least altitude 10.39, or at most 39⅓. [*Minima altit. 10.39 vel ad ſummum 39⅓.*][244]

19	10 54	*but not quite certain* [*ſed non ſatis certa*]
23	11 13	ἐν πλάτει
24	11 17½	per minorem
	11 18½	per magnum quadrantem
25	11 20	per minus
	11 25	per maius
28	11 44½	at most [ad ſummum], per minus
30	12 0	good, per minus [bona, per minus.]

[244] That line stands inside the measure of the right file, between the 14 December row and the 19 December row, parted from both by white space alone.

245

Dreyer's note: **1** In the margin. [In margine.]

ECLIPSIS ☾ ANNO 1581 JANUAR. 19

iuxta calculum.

[An eclipse of the Moon in the year 1581, January 19, according to calculation.][246]

	Alphonſinum	Prutenicum	Noſtrum
First beginning [*Initium primum*]	$9^H\ 25^M$	$7^H\ 32^M$	$8^H\ 6^M$
Beginning of total obscuration [*Initium abſconſi*]	10 39	8 44	9 18
Middle of the eclipse [*Medium eclipſis*]	11 14	9 31	10 5
Beginning of emergence [*Initium egreßus*]	11 49	10 18	10 52
Last end [*Finis vltimus*]	1 3	11 30	12 4
Places of the luminaries [*Loca luminarium*] ☉ / ☾	10 27 ♒ / ♌	9 33½ ♒ / ♌	10 3 ♒ / ♌
Digiti Ecliptici [the digits of the eclipse]	14 34	16 48	16 12

ALIA ECLIPSIS JULIJ DIE 15.

[Another eclipse, on July 15.]

	Alphonſinum	Prutenicum	Noſtrum
First beginning [*Initium primum*]	$15^H\ 54^M$	$15^H\ 41^M$	$15^H\ 20^M$
Beginning of total obscuration [*Initium abſconſi*]	17 13	16 56	16 35
Middle of the eclipse [*Medium eclipſis*]	17 38	17 29	17 8
Beginning of emergence [*Initium egreßus*]	18 3	18 2	17 41
Last end [*Finis vltimus*]	19 22	19 17	18 56
Places of the luminaries [*Loca luminarium*] ☉ / ☾	2 43 ♌ / ♒	2 39 ♌ / ♒	2 40 ♌ / ♒
Digiti ecliptici	13 16	14 8	14 28

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[245] A brace stands to the right of the words *per minus* and *per maius* in this block, gathering two lines to one shared remark, non fuit ſerenum ſatis — the sky was not clear enough. Its lines are: - 25 — 11 20 per minus - 11 25 per maius The remark is printed once, against the middle of the brace. The second of those two lines carries no day figure on the leaf; the same is true of the line 11 18½ per magnum quadrantem above.

[246] The three column heads *Alphonſinum*, *Prutenicum* and *Noſtrum* are the leaf's OWN, printed in upright roman over the three figure columns of both blocks. The label column at the left is UNHEADED on the leaf. The measure is closed on the right by a further vertical rule with nothing beyond it; there is no fourth column. In the *Loca luminarium* row the figures are printed ONCE in each column, with a zodiac glyph set on the upper line against ☉ and a second glyph on the lower line against ☾ — the two luminaries standing in opposition at the same degree. The figures have not been repeated into a second row; each cell below gives the figures once, then the upper glyph, then the lower.

[247] The last row is printed *Digiti Ecliptici* with a capital E in the first block and *Digiti ecliptici* with a lower-case e in the second.

All of it verified and rectified in apparent time for our meridian, 37^{g} 0′ par. The Sun rises at hour 3.53. The eclipse therefore begins 33′ before sunrise. [*Omnia verificata et rectificata in tempore apparenti ad noſtrum meridianum 37^{g} 0′ par. ☉ oritur hora 3.53. Ergo Eclipſis incipit 33′ ante ☉ ortum.*]

The last eclipse will scarcely be visible here, since its beginning will fall at least ½ an hour before sunrise; but at Augsburg, which lies in nearly the same longitude as we do, that same eclipse will fall a full hour before sunrise, so it can be observed better there. [*Vltima Eclipſis vix apparebit apud nos, nam eius initium erit ſaltem ½ hora ante ſolis ortum, verum Auguſtæ Vindelicorum in eadem fere nobiscum longitudine erit eadem Eclipſis integra hora ante ☉ ortum, quare ibi melius obſeruari poterit.*]

Note. At hour 1¼ the Moon is in the 90th degree from the horizon and free of the parallax of longitude; take then its distance from the heart of ☊ [*a corde ☊*]*, for its place can be verified in this eclipse from the opposition of the Sun, and so in consequence the longitude of Regulus can be restored.* [*Nota. Hora 1¼ luna eſt in 90 gradu ab Horizonte, carens paralaxi longitudinis, cape tunc eius diſtantiam a corde ☊, nam locus eius poteſt verificari in hac Eclipſi ex ☍ Solis et ſic per conſequens reſtitui longitudo Reguli.*][248]

Take also the Moon's distance from the tail of ☊ while it lingers in the shadow, at several different times. [*Cape etiam diſtantiam ☾ a cauda ☊ dum moratur in vmbra diuerſis temporibus.*]

And take also the Moon's distance from the neck of ☊, so as to verify its latitude at the time of the eclipse, while it labours in the shadow. [*Et cape etiam diſtantiam ☾ a ceruice ☊ pro latitudine eius verificanda tempore deliquij cum laborat in vmbra.*]

OBSERUATIONES LUNÆ.

[Observations of the Moon.]

DIE 19 JANUARIJ.

[January 19.]

Veſperi fuit Eclipſis ☾ totalis.

[In the evening there was a total eclipse of the Moon.]

7^{H} 58^{M} 30^{S} The first beginning of the Moon's entry into the shadow; for then the outermost limb of the Moon, the one facing the point of sunrise, seemed to be growing darker, its light thin and mingled with shadow. [Primum initium ingreßus ☾ in vmbram, tunc enim extremus lunæ limbus ortum ſpectans obſcurior, raro lumine tenebris admixto fieri videbatur.]

Dreyer's note: **1** Written above it is: *H. 1 M. 20.* [Supra adſcriptum eſt: *H. 1 M. 20.*]

[248] Dreyer's reference mark 1 stands immediately after the fraction of *Hora 1¼* and before the word *luna*; his note is at the foot of the side.

Difference between the right ascension of ☾ and that of the mid-heaven, 58.53. From this the calculation gives H. 8.2′.24″.[249]

At 8^{H} 4^{M} 35^{S} ☾ stood in azimuth 16° 44′, reckoned from the illuminated limb, with an altitude of 31° 45′ reckoned from the uppermost limb.[250]

At this point the eclipse of the outer limb was plain.

- 8 15 30 / 8 12½ corr. — The left shoulder of Orion crossed the meridian.
- 8 21 30 — The uppermost star of Orion's belt was on the meridian.
- 8 26 30 — The middle star of the belt was on the meridian.
- 8 31 50 — The lowest star of the belt was on the meridian, and a third part of the moon was darkened.
- 8 44 / 8 42⅓ corr. — The right shoulder of Orion was on the meridian, observed through the pinnules; and since this meridian transit was more reliable than the rest [I drew back the index of the clock 1° 30′][251] — half the moon, moreover, appeared to be immersed in the shadow.[252]

The transits across the meridian of the stars earlier than the right shoulder of Orion were noted by the plane of the quadrant, because of the clouds. This time, together with all the earlier ones, has been corrected to the transit of the right shoulder of Orion.

- 8 52 — Two-thirds of the lunar body appeared darkened.

During the eclipse I observed the distance of ☾ from corde ♌ as follows, so as to verify the place of cordis ♌.[253]

- 9 6 — Cor ♌ was 13° 42′ from the eastern limb of ☾^{æ}; some cloud was still present.
- 9 16 — The Architect said that ☾ was wholly darkened.
- 9 18 — To me she seemed only now wholly darkened, because the western limb of ☾ — in some part of it, facing upward — had up to that point been lit with a brighter light than the remaining parts of the lunar body.

At the time just noted Canis Major stood in azimuth 85° 9′ from the east towards the south; altitude 17° 48′.

- 9 50 — Cor ♌ was 13 18 from the limb of ☾ inclining towards the east.
- 10 6 — The bright star of the neck of ♌ was 15 47½ from the limb of ☾ nearest it.
- 10 30 — In the same way the neck of ♌ was 15 42 from the moon.[254]

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[249] [Dreyer's apparatus, roman:] A line was drawn through it by Tycho. Above it he wrote: »Error«. It ought to be about 60865.

[250] The degrees are wanting in the codex.

[251] We could not read this word — perhaps »ponendo«; it stands at the side of the page.

[252] Two braces in this stretch, each joining a pair of time lines to a single remark, and the remark is printed once only: (i) `8 15 30` and **8 12½ corr.**; (ii) `8 44` and **8 42⅓ corr.** The square brackets around "indicem horologij retraxi 1° 30′" are **the edition's**, keyed to Dreyer's note 3.

[253] The two lines above are italic **entire**.

[254] A brace joins the three value lines above — 13 18; 15 47½; 15 42 — to a single remark, set in smaller roman type to the right of the brace and printed once: "Because of the misty air I do not know whether these are to be trusted."

- 10 40 — The moon appeared to be beginning to grow brighter at the emerging limb.
- 10 43 — Canis Major stood in azimuth 73.42 from the west towards the south, at altitude 16.40⅔.

Then I clearly saw that the moon had recovered some light at the outer limb.

- 10 49 — The moon appeared to me like this.

Diagram. Set in the right-hand part of the measure, level with the line "10 49 — The moon appeared to me like this": a facsimile of a pen sketch of the Moon. A plain circle, with a second arc drawn along its left side which springs from near the top of the circle and meets it again near the bottom, cutting off a narrow crescent-shaped lune at the left of the disc. The figure carries **no drawn labels** (count: 0) and **no printed key** (nil).

The Architect drew the remaining phases [faces] of the moon as it emerged from the shadow, each at its own time, as is contained on another sheet.[255]

- 11 11 — The neck of ♌ was 15.27 from the limb of ☾ nearest it, or nearly so, ἐν πλάτει [Greek: *en platei*, "in breadth"]. The remaining distances of the stars of ♌ from the moon were made with difficulty, because of the misty air and the dimness of the moon, so I do not know whether they are to be trusted at all.
- 11 57 0 — The lunar body appeared to us illuminated as a full circle, although the surface that recovered its light last was a little dimmer than the remaining parts of ☾.

[256]

- 11 59 — The moon stood in azimuth 87.45 from the east towards the south, reckoned from the eastern limb, and at altitude 50.59 reckoned from the uppermost circumference, brightly and evenly illuminated over every part of her body.

Difference between the right ascension of ☾ and that of M.C., 1° 30′. From this the calculation gives H.11.57′8″.

Since ☾ was in apparent longitude 11ˢ 8 ♌ and apparent latitude 0 50 Merid., and had azimuth 88.0 at her centre and altitude 50.44 likewise at her centre — from which comes the time I gave, 3 minutes before midnight.[257]

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[255]This sheet is not found in the codex.

[256]Notes 1–4 are Dreyer's, printed at the foot of the side. Notes 1 and 2 report that the matter stood **in the margin of the codex**; they are not marginal notes on this printed leaf. The »…« in note 2 are the edition's quotation marks, and what stands inside them is Latin, not vernacular.

[257]The four lines above are italic **entire**, figures and symbols included. The printed spanner head *Differentia a ratione* stands over the two columns *Alphon.* and *Cop.*; the first two columns carry no head on the leaf. The row labels are printed *Initium eſt*, *Init. obſcur.*, *Initium egreßus*, *Finis totus*. The raised ᴴ and ᴹ are set once, on the first row of the time column, and are not repeated down it. The leaf sets no unit mark on the figures in the last two columns. The whole table, heads and figures alike, is italic.

		Alphon.	*Cop.*
The beginning is	$8^H\ 0^M$	*1 25*	*0 28 6*
Beginning of the obscuration	*9 17*	*1 22*	*0 34 0*
Beginning of the emergence	*10 43*	*1 6*	*0 25 9*
End of the whole	*11 57*	*1 6*	*0 27 7*

Examination of the eclipse of ☾ which took place this year on 19 January.

- *The first ingress, both by the corrected clock and from the altitude of ☾, was … H. 8 M. 0*
- *First total darkening — 9 18*
- *First emergence from the shadow — 10 40*
- *Final release from the shadow — 11 57*
- *Therefore the whole duration 3.57 · Alphonſus 3.38 · Copernicus 3.58*
- *Delay in the shadow 1.22 · 1.10 · 1.34*[258]

It is clear, then, that by our observation the delay in the shadow falls between the Alphonsine assignment and Copernicus's positions, just as the reckoning of the time and of the places of the luminaries also requires; but the time of the whole duration agrees more closely with Copernicus's calculation. As for drawing out the middle of the eclipse from this, we shall be certain of it in the following way. The difference made by the delay of ingress and of egress is 1^M and about 20 seconds, by which the beginning of the whole occultation, taken up to the opposition of ☉^{is}, is later than the egress; and there correspond to this in time about 3 minutes, according to the hourly motion of ☾ away from ☉, which are to be added to the half-delay found earlier, which was 41, so that the first delay is 44 for as long as the moon is entering, while the delay of egress is 38.[259]

First total darkening	$9^H\ 18^M$
Time from this to the ☍ of ☉	*44*
☾ at the opposition of the Sun	*10. 2*

First total emergence	$10^H\ 40^M$
Delay in the emergence	*38*
	10. 2

[258] In the last two lines the figures stand in three vertical columns: 3.57 over 1.22, 3.38 over 1.10, 3.58 over 1.34, so that the authorities named inline in the upper line — *Alphonſus*, *Copernicus* — govern the two lower figures as well. The leaf prints no separate head row for them; the names stand inline in their own line. *Alphonſus* here labels a computed column, not the person.

[259] In each of the two blocks below a horizontal rule is printed above the last figure, in the manner of a sum; the last row of the right-hand block carries a figure with no label beside it. Neither block is headed on the leaf. Both are italic entire.

So ☾ was opposite the Sun at 10^{H} 2^{M}. The true place of ☾, restored from the ☍ of the Sun, in 10^{g} 2′ ♏. But because at hour 9 M. 50 the eastern limb of ☾ was 13.18 from corde ♏ by observation, ☾ was at that time 5 scruples further forward, according to her hourly motion away from ☉; so her place was in 9.57 ♏, to which the semidiameter adds 15, making the longitude of the eastern circumference of ☾ 10^{g}.12′ ♏. The parallax of longitude, by our own demonstration, was then found to be 25 scruples, so that the apparent longitude of the eastern limb is 10^{p}.37′ ♏; and if we add 13.18 to this, the longitude of cordis ♏ comes out at 23.55 ♏. But bringing the latitude of each into account, we proceed as follows. ☊ is in 7.16 ♒, from which ☾ is distant by about p. 2.56′, and these give a latitude of 15′ Merid. The parallax of latitude is then 29, so that the apparent latitude is 44′. And so the apparent longitude of the eastern limb of ☾ is in 10.37 ♏, lat. 0.44 M; and to these there correspond, from the table of Regiomontanus, for the apparent ☾:

Declination	*16.52 B*
Right ascension	*132.52*

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Diagram. Set in the left of the measure, running from the level of the first composed line down to the level of the line "cœli eſt 24.1 ♏ cuius declinatio 13.31…": a plain line figure of the spherical triangle the text reduces. Two long arcs spring from a single point at the head and bow outward as they descend, closing on a short straight base at the foot. A second straight line, shorter than the base and drawn parallel to it, crosses the figure about three-quarters of the way down. **Drawn labels: 5 —** all lower-case, all legible, none flagged:

- a (at the apex, where the two arcs meet)
- d (at the left end of the upper cross-line)
- e (at the right end of the upper cross-line)
- b (at the left end of the base)
- c (at the right end of the base)[261]

In the triangle ade, then, let a be the pole of the equator, whose arc is bc, d cordis ♏, and e ☾. The side ae is the complement of the declination of ☾, 73.0; ad is the complement of the declination of cordis ♏, which comes out as 76.3 from the meridian altitude 48.4 and the declination 13.57 that follows from it; and the side de is, by observation, 13.18. From these the angle dae will not be unknown — the angle that measures the arc bc, the difference between the right ascension of the moon and that of the star, which by calculation is 13.28. Added to the right ascension of ☾, it gives the right ascension of the star as 146.20; and from this and the star's declination we shall

[260] A brace joins the two lines above to the label *viſa* ☾ standing to their left, printed once. *B* and *M* are the leaf's own abbreviations of direction (*Borealis*, *Meridionalis*). The word *ſcrupulis* / *ſcrupulorum* is spelled out on the leaf; the order it names is the minute of arc.

[261] The labels are set in lower case here, against the capitals A, B, C of the figure on the facing side.

investigate its longitude and latitude in the following way. The angle between the meridian and the ecliptic is 70.39; the point of the heavens is 24.1 ♏, whose declination is 13.31; and since the star's is 13.57, the difference will be 0.26. By the triangles, therefore, the latitude of the star is given as 0.24½, while the difference between the longitude of the culminating point and the longitude of the star is 8½′ — so the longitude falls in 23.52½ ♏. But this observation does not seem reliable enough. I shall therefore examine the next one as well — which was nevertheless made earlier — against the same cordis ♏; and in examining it I shall also take the earlier observation, made at hora 9 minuto 6, of the same cordis ♏ and the eastern limb of ☾ at a distance of 13.42. At that moment ☾ was further forward than at mid-eclipse by 25′ of her hourly motion with respect to the sun; and this, subtracted from 10.2 ♏, gives the longitude of ☾ as 9.37 ♏. To this the semidiameter adds 15, making the true longitude of the eastern limb 9.52; and on top of this the parallax of longitude adds what it then was by our calculation, 29′, so that the apparent place of the eastern limb is 10.21′ ♏. If to these you add the distance of cordis ♏ from the same limb, which was 13.42, you will work out the true place in longitude of cordis ♏ as 24.3 ♏. This observation is the more reliable and the more consistent of the two, and it agrees with the distance of cordis ♏ from the upper star in the feet of ♊, which I observed at the eclipse of the year 73 in 29.28 ♊; and when its place has been reduced to this present one, and since cordis ♏ is distant from it by observation 54.35, the place of cordis ♏ comes out at 24.3 ♏ as before. But I shall examine this business through the latitudes as well, a little more accurately, as follows.

The true latitude of the eastern limb of ☾ at this time is 13½ south, and the parallax of latitude 28¾, so the apparent latitude is 42′, while the apparent longitude was in 10.21 ♏. To these corresponds a declination of 16.58, and a right ascension of 132.37. Let the earlier triangle now be repeated: ae will be the complement of the declination of ☾, 73.2; ad the complement of the declination of the star, which is 76.3 as before; and the side de is, by observation, 13.42. From these the angle dae comes out, the angle that measures the arc bc. I found this angle to be p. 13 M. 52, so that bc, added to the right ascension of ☾, gives the right ascension of cordis ♏ as 146.29. From this and the given declination the latitude comes out as 0.27′ north, and the longitude exactly in 24.0½ ♏ — which differs from the other by some three minutes, and these are of course imperceptible.

Now let us look into the place of the bright star of the neck of the Lion from the same eclipse as well. At Hora 10 M. 6 the bright star of the neck was 15.47½ from the limb of ☾ nearest it; and at that moment the true place of the centre of ☾ was in 10^{g} 4′ ♏, to which the semidiameter adds 15, making 10.19 ♏, while the parallax of longitude is 23′. The apparent place of that limb is therefore in 10.42 ♏; and since the true latitude is then 16 and the parallax of latitude 29, the apparent latitude of the eastern limb will be 45′ south. From the given apparent longitude of the Moon in 10.42 ♏, then, together with the apparent latitude 45, the apparent declination comes out as 16.50 and the apparent right ascension as 132.58. So once again, in the foregoing triangle, ae is given as 73.10, and ad from the star's altitude and the declination derived

from it: the meridian altitude is 56.1, and therefore the declination 21.54 north, whose complement is ad, 68.6,[262]

the side de is 15.47½, and so bc is given by the ninth proposition [nonum dogma]. But let us rather carry the enquiry to the centre of ☾, so that the distance of the star from the centre of ☾, with 15 minutes added, is 16 degrees and 3 minutes; while the apparent place of the centre is in 10.27 ♌, its apparent latitude being 44, and therefore its declination 16.55 and its right ascension 132.43. From this we shall track down the place of the star in the following way. The angle dae, which measures the difference between the right ascension of ☾ and that of the star, is 16.11; added to the right ascension of ☾, it gives the star's right ascension as 148.54. And since its declination stands at 21.54, the operation by triangles gives the latitude of the middle star of the neck of ♌ as B. 8.42, its longitude being 23.29.

Repetitio obſeruationis ad cor ♌ quæ primum facta eſt.

A repetition of the observation of cor ♌ which was made first.

Weighing everything a little more scrupulously, I find from the correction of the time that the first observation of the distance of cordis ♌ from the western limb of ☾ was made at H.9 M.7, when the true longitude of the centre of ☾ was 9.38 ♌. To this the parallax of longitude adds 29¼, making the apparent longitude of the centre 10.7 ♌; the true latitude is 12¼ and the parallax of latitude 28¾, so the apparent latitude of the centre of ☾ is 41′. From this the right ascension of ☾ comes out as 132.23 and the declination as 17.3. Now by observation it was then 13.57 from the centre of ☾, since from the circumference it was 13.42 away; from this the arc of the ascensional difference is given as 14.7, so that the true right ascension of cordis ♌ is 146.30. From this, and from the given declination 13.57, the calculation by triangles gives the latitude of cordis ♌ as 0ᵍ 27⅓′ north, while the longitude stands in 24.1½ ♌ — and this you may rather trust, for it agrees with the others.

II. Ceruix ♌.

II. The neck of ♌.

The second observation of the neck of ♌, which was made at hora 10 M. 30, stands as follows. The true place of ☾ was then 10.14½ ♌ with latitude 15½; the parallax of longitude 23, of latitude 29; and so the apparent longitude of the centre is 10.37½ ♌ and the latitude 44½. From this the declination comes out as 16.52½ and the right ascension as 132.53. The side ae is therefore 73.8, ad 68.6, and the side de, of the distance to the centre, is 15.57. The angle dae, which measures the ascensional difference, is 16.3, so the right ascension of the neck of ♌ is 148.56. The culminating point is 26.42 ♌, whose declination is 12.37; the angle of inclination of the meridian and the ecliptic is 70.4, and the difference of declination 9.17. Hence the latitude is 8.43⅓, the longitude standing at 23.31½ — which in both quantities exceeds the earlier result by a very few minutes only. So if you set the longitude of the star in 23.30 of the Lion, with latitude 8.42, our error will be imperceptible.

[262] The leaf spells *Leonis* in full at "lucidæ ceruicis Leonis", where every other mention of the sign on this side is set as the symbol ♌.

III. Obſeruatio ceruicis.

III. Observation of the neck.

At Hora 11 Mto 11, the time verified against the clock, the true place of ☾ was in 10.32½ ♌ and the true latitude 17. Since the parallax of longitude was then 16 and of latitude 29, the apparent longitude will be in 10.49 ♌ and the latitude 47′ M.; to these corresponds a declination of 16.46½ and a right ascension of 133.4. The side ae is therefore 73.16, ad 68.6, and de 15.42, by an observation reduced to the centre. The angle dac, of the difference in right ascension, is 15.44, and so the right ascension is 148.48. The corresponding point is 26.34 ♌, whose declination is 12.40, and this differs from the star's declination by 9.14. Therefore, the angle of inclination standing at 70.6, the latitude of the star comes out as 8.41 fere, the longitude standing at 23.24. But this last observation was not reliable enough, because of intervening clouds and mists; the earlier ones are the more to be trusted, and especially the first, which was made under a clearer sky at H. 10 Mto. 6.

Diagram. Set in the left of the measure, running from the level of the line "15.44, ideoque Aſcenſio recta 148.48…" down to the last composed line of the side: a plain line figure of a long, narrow spherical triangle. A single point stands at the head; from it two nearly straight lines run far down the measure, converging very slightly, and close on a short base at the foot. A further straight line is drawn inside the figure from the left-hand foot-corner obliquely upward to a point on the right-hand side, a little above the base. **Drawn labels: 3 —** all capitals, all legible, none flagged:

- A (at the apex)
- C (at the point on the right-hand side where the oblique line meets it)
- B (at the left-hand foot-corner, from which the oblique line springs)[263]

Having examined and weighed each of them, then, the longitude of cordis ♌ comes out for that time in 24 et 2 ♌, and that of the bright star of the neck in 23 et 29 ♌, the latitude of cordis ♌ standing at 0.27 north and that of the neck at 8.42 B., so that the difference of longitude is 0.33 or thereabouts. Therefore, in the triangle BAC[264]

there is given AB, the complement of the latitude of cordis 89.33, and AC, the complement of the latitude of the neck, 81.18. The angle BAC is the difference of longitude, and so by the 6th proposition [per 6 dogma] the side BC is given, the distance of the stars, 8.16 — just as the celestial observation of those same stars also asserts it to be that much, so that there is no doubt that the places of these stars have been rightly found by us in this way, and that [?] we can use them without perceptible error.

[263] Its labels are capitals, against the lower-case labels of the figure on the facing leaf, and the text's closing words "in triangulo BAC" set the same three capitals. The foot-corner at the right of the base carries no label.

[264] Of the three rubrics the first carries no number, while the two that follow are numbered II and III. The leaf spells *Leonis* in full at "in 23.30 Leonis", where the sign is elsewhere set as ♌ on this side. *Fere* is the leaf's own limit word. "24 et 2 ♌" and "23 et 29 ♌" are the leaf's own way of setting degrees and minutes at these two places, against the point-form used everywhere else on the side.

- *Spica — 18g.5′ ♎*
- *Diſt. of cordis — 54 2; longitude of cordis — 24g 3 ♌.*

ECLIPSIS ☾ DIE 15 JULIJ.

Eclipse of ☾ on 15 July.

Early, at dawn, I observed an eclipse of ☾, whose beginning appeared by all the clocks to be at H.3.16 after midnight.

- ***Hora 3 M.26** — the Moon was thus; her centre was distant from the visible Horizon p. 2½, by the Radius.*
- ***H.3 29½** — ☾ thus, and her altitude by the Radius, as before, 1g.45′.*
- ***H.3 34** — ☾ was thus, and the altitude of her centre p. 1¼.*
- ***H.3 40** — the Moon had entered the shadow by about half, so that the circumference of the shadow touched her centre; and her visible altitude by the Radius was then, as above, about ½ a degree, for ☾ was setting soon after and prevented any further sight of her. The Sun was seen to rise at H.3 M.50, but that is deceptive because of the refraction of the rays. The true rising of ☉, from Mästlin, 3.58.*

Diagram. The first of four small circular figures set in a vertical column at the left of the measure, the text being indented to clear them. A plain circle representing the Moon's disc, with a lune-shaped area at the upper left filled with close ruled hatching; the boundary between the hatched and the open part is a curve. It stands beside the entries at H.3 29½ and H.3 34. **Drawn labels: 0** — none read entire, none uncertain, none unresolved, because none is drawn.

Diagram. The second of the four discs. Same construction: a plain circle with a hatched area at the upper left, bounded by a curve, and noticeably larger than that of the first disc. It stands beside the lines running from "cumferentia eius centrum contingeret" to "bat ſuique vlteriorem aſpectum prohibebat". **Drawn labels: 0.**

Diagram. The third of the four discs. A plain circle with a hatched area at the upper left, again bounded by a curve and larger than in the second disc. It stands beside the lines from "Mæſtlino 3.58." to "horæ vel 16 ſcrupulis poſt tertiam". **Drawn labels: 0.**

Diagram. The fourth and last of the discs. A plain circle whose hatched area lies along the left side, bounded by a curve, and is the largest of the four. It stands beside the lines from "fiebat, quia tempus moræ a principio ad medium" to "loco ſit maius 2 quaſi minutis". **Drawn labels: 0.**[265]

From this it is gathered that the true beginning of this Eclipse was a quarter of an hour, or 16 ſcrupula, after three; whereas my own reckoning of the motions gave the beginning as H.3 M.20, four ſcrupula later at the least. That came about because I had made the time of duration from the beginning to the middle equal, as I usually do, to that from the middle to the end, when in this case the former is greater by about 2

[265]The four discs stand in a column down the page; the leaf prints no number, letter or caption tying any one of them to a particular timed entry. The word *talis* ("thus") in the entries above is the leaf's own way of pointing to them.

minutes — which the Moon traverses in four minutes of time. So if these are taken from our beginning, the true and the apparent beginning of the Eclipse result, and it follows that the middle of this eclipse agreed with ours exactly. In the same way, by the Alphonsine reckoning, account being taken here too of this longer duration in the ingress than in the egress, the time of the beginning was H.3 M.54, which exceeds the truth by 38 ſcrupula, more than half an hour. By the Prutenic calculation the beginning would have been H.3 M.41, which exceeds the truth by 25 minutes; for at that moment ☾ was half within the shadow, as is clear from what stands above. Mästlin, in his new Ephemerides, where he set out eclipses restored (as he says) by himself from recent observations, puts the middle of this eclipse at H.5 M.51; and since he makes the time of incidence H.1 M.22 and the half-duration 0.23, the interval from the beginning to the middle of the eclipse will be H.1 M.45. The beginning of this eclipse on the meridian of Tübingen would therefore, by Mästlin's reckoning, have been H.4 M.6; and since we are half an hour east of the people of Tübingen, the beginning of the Eclipse here ought to have been H.4 M.36 — which exceeds it by a whole hour and twenty ſcrupula besides. It is clear, then, how exact Mästlin's calculations are where the restoration of the luminaries is concerned. He says further that, when ☾ sets, by his own note 3 digits there — that is, a fourth part of the lunar body — are wanting; whereas with us, who are half an hour further east, ☾ had entered the shadow by half before her setting. So with them, according to the truth, she ought to have been almost wholly darkened when she passed below the horizon, and I do not doubt that this is what happened in a comparable tract of country as well.

DIE 2 NOUEMBRIS.

2 November.

- ***5^{H} 10^{M}*** *— the centre of ☾ was on the meridian, having an altitude of 15^{g} 20′ exactly, as regards the uppermost circumference.*[266]
- ***7 41 50*** *— I observed with the armillae, rectified by the bright star of the Vulture over 25 55 ♍, the apparent longitude of ☾ as regards the illuminated western limb, in* ***4 25 ♒***
- ***7 54 10*** *— by the Armillae, the longitude of ☾ from the Vulture as before,* ***4 27 ♒***
- *and this observation is the more reliable of the two, as I think; the parallax of longitude was 32′.*
- *Os pegaſi, by way of the Vulture, was seen from the armillae in 25 52 ♍*
- ***7 47½*** *— ☾ was seen on her own limb as before, from the Vulture,* ***4 38 ♒***
- ***7 56*** *— again I observed the Moon on her own limb as before, and found her apparent longitude* ***4 44 ♒***
- *and this observation was exact enough.*
- ***8 2 40*** *— the tail of ♓ on the meridian, altit.* ***38 40***
- ***8 3 51*** *— again I observed ☾ against the Vulture and found the apparent longitude of the limb as above, 4 46½ ♒, or rather* ***4 47 ♒***

[266] The leaf sets *Mæſtlinus / Mæſtlino / Mæſtlini* with the æ ligature on this side; the facing side sets *Meſtlini* without it.

- *8… — the far end of the wing of pegaſus crossed the meridian, having an altitude of* **47 8**
- *and at the same instant I observed with the armillae the apparent longitude of ☾ as before, in 4.51½ M., or at most* **4 52**[267]

The parallax of longitude was 37′. At the next following midday the clock was running slow by 51′ 40″.

Examinatio obſeruationis ☾ per armillas.

Examination of the observation of ☾ by the armillae.

At Hora 7.54, when the observation was being made with the armillae, the time reduced and equated, the true place of ☾ from Meſtlin's Ephemerides was in 4.21 ♒ — but, because of the error of the equinoxes, in 4.35 ♒. From these the parallax of longitude took away 30, so that the true apparent place of ☾ as regards her centre was in 4 p. 5′ ♒; but, on account of the semidiameter, as regards the place of the more westerly limb, in 3.50 ♒, whereas that same limb was observed by us with the armillae in 4 p. 27′ ♒. So the difference is 37 minutes, by which the longitude of the Vulture would have to be set earlier. For the last consideration, the time reduced and equated, the Moon's longitude from Meſtlin's Ephemerides was in 4.48 ♒, the Prutenic tables agreeing as well; and here, as in the earlier longitude, the exact varied precession of the equinoxes adds 14, so that the true place of the centre of ☾ is 5^{p} 2′, from which the parallax takes 35, leaving the apparent place of the Moon in 4.27. For the western limb, though, subtract 17, so that the apparent place of the western limb is 4.10 ♒ — whereas the observation caught it in 4.50, so that the difference is about 40 ſcrupula. It is clear, then, that by this reckoning it would have to be set nearly ⅔ of one degree earlier, while in the other observation, which you have under the 7th day, the place of the star seemed to fall short by about half a degree [in ſemiße gradus].

DIE 7 NOUEMBRIS.

7 November.

One minute before the bright star of the neck of pegaſus crossed the meridian, I observed ☾ with the armillae from the bright star of the Vulture, and found her western limb in 15 30 ♈. The clock then showed 6 M. 47. But this observation was made when the pointer on the Armillae showed 15.20 on the one side and 15.40 on the other, of which I took the half, namely 15½.

At Hora 7 M.40 (38) by the clock, the said limb of ☾ was, from the Vulture, in 16 0 ♈; and ☾ then had an altitude of about 40 0. You can work upon this, for I set both pointers fixed on 16 ♈ and 25 55 ♍.

[267]One brace stands on this side, printed at the outer edge of the measure to the right of the figure column. It gathers **four** lines — the entries at 7 47½ (value 4 38 ♒), at 7 56 (value 4 44 ♒), at 8 2 40 (value 38 40) and at 8 3 51 (value 4 47 ♒) — and carries a single shared remark, printed once and given here once: "Hæc tempora non ſunt correcta vt priora" — *these times are not corrected as the earlier ones are*. The remark is set in roman, against the italic of the whole rest of the side.

At about Hora 8 M. 10 the same limb stood at 16 parts 15 minutes, so far as could be made out, because of the dimness of the star towards its setting. The altitude of the uppermost circumference of ☾ was seen as 43 0.[268]

At the next following midday ☉ could not be seen; but when it was in azimuth 4½ from the meridian towards the west, the clock showed Minute 16½.

I Examen.

First Examination.

Considering the apparent longitude of ☾ en plati [in the rough]*, I found from Mästlin's Ephemerides — reduced and equated to hour 6 M. 47 — that the true place of ☾ was 16.3 ♈. The parallax in the vertical is about 52′; and so, in that position, ☾ standing at least 17 ſcrupula from the 90th degree, I found that the parallax of longitude was at least about 2 minutes. The apparent longitude of ☾ from the Ephemeris would therefore be in 16 & 1^{m} ♈; and since the equinox differs by 14, the true place of ☾ at that time was in 16.15 ♈. The observation, though, with the semidiameter of ☾ added, gave at most 15.48, so that the difference is about 27 ſcrupula, very nearly half a degree, by which the place of the Vulture would have to be set further on. Still, it must be seen how the following ones agree.*

Examen II obſeruationis.

Examination of the second observation.

Considering the other observation in the same way — the more careful of the two, the armillae having been rectified more surely — the longitude of ☾ at H. 7 M. 40 was found from the Prutenic tables, after it had been duly reduced and equated, to be p. 16 M. 37. To these I added 14 ſcrupula for what has been observed to be wanting in the precession of the equinoxes, and the true place of the longitude of ☾ answers in 16.51 ♈. From the same tables the parallax of ☾ in the circle of altitude was 46 ſcrupula, which, resolved into longitude, will make 6 minutes to be subtracted; so the apparent place of ☾ was in 16.45 ♈. And since the semidiameter of ☾, found at that time from its own anomaly, was ſcrup. 18, the apparent western limb of ☾ at that time was in 16.27 ♈ — whereas by the armillary observation against the bright star of the Vulture it was seen in 16.0. It is clear, then, that by this observation too 27 first ſcrupula come to be added to the longitude of the Vulture, so that, the place of ☾ being established in this way, its own longitude may correspond exactly.

[268] The leaf sets *paralaxis* with one l at two places on this side and *Parallaxis* with two at a third. It likewise sets *Meſtlini* without the æ ligature here, against *Mæſtlinus / Mæſtlino / Mæſtlini* on the facing side. *Vulturis lucida / lucida Vulturis / Vulturem / vulturis* are the forms the leaf sets. *Os pegaſi*, *ala pegaſi* and *colli pegaſi* are set with a lower-case p on this side. The parenthesised "(38)" beside "Hora 7 M.40" is the leaf's own alternative reading of the time; *vel potius*, *vel ad ſummum*, *quaſi* and *fere* are likewise the leaf's own qualifying and limiting words.

Examen tertiæ obſeruationis.

Examination of the third observation.

In the last observation the longitude of ☾, the time rectified as before, was in 16.54½ ♈; with the restitution of the equinoxes added, this comes out 17 8½ ♈. And since the parallax in the circle of altitude was 44 ſcrupula, the parallax of longitude found on that account being 9′ 17″ S., the apparent longitude of ☾ will be in 16.59 ♈. The semidiameter of ☾, for its western limb, at which the observation was made, takes away 18, so that the apparent longitude of that same limb is p. 16.41. But the observation with the armillae gave 16.15, which again precedes the place of ☾ presupposed from the computation by 26 ſcrupula — and that agrees very nearly with the figures above, the only difference being one ſcrupulum.

It is clear, then, from these observations of the Vulture and of ☾ made this evening that, the place of ☾ being presupposed according to this verification, the place of the longitude of the Vulture must be set about 27 ſcrupula further on than we restored it before, so that it falls in 26ᵍ 22′ ♑. Its certainty, however, will have to be looked into further.

DIE 10 NOUEMBRIS.[269]

10 November.

- **11^{H} 54^{M} 55^{S}** — the western limb of ☾ crossed the meridian, having an altitude, as regards the upper limb, of **58° 17′**
- **12 10 40** — the eye of ♉ crossed the meridian, marked by the plane of the quadrant.
- **12 16 20 — 2 0**
- **12 21 45 — 4 0**[270]

[271]

[272]

- **12 53 0** — the left foot of Orion crossed the meridian, marked by the plane of the quadrant.

At the next following midday the clock was running slow by 14 M. 25 S. This was the clock's error over two days, for on the 10th day ☉ could not be seen at midday.

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[269] [Dreyer's apparatus, roman:] A line was drawn through it by Tycho. Above it he wrote: »Error«. It ought to be about 60865.

[270] Two braces stand on this side, both in the displayed run and both gathering the same two lines, the entries at 12 16 20 and 12 21 45. The first is printed immediately after the two times, at the left of the measure; the second immediately before the two values, at the right. The remark they share is printed **once**, broken across the two lines: *Oculus ♉ fuit in azimuto / a meridie verſus occaſum* — "the eye of ♉ was in azimuth, from the south towards the west". The leaf writes *a meridiano* ("from the meridian") in the roman sentence at the head of this side and *a meridie* ("from the south") here.

[271] The three *Examen* rubrics on this side are set in three different forms: the first prints the numeral **before** the word (*I Examen.*), the second prints it **after** (*Examen II obſeruationis.*), and the third prints no numeral at all but an ordinal spelled out (*Examen tertiæ obſeruationis.*).

[272] Dreyer's footnote stands below the measure and is his, not the leaf's.

DIE 12 NOUEMBRIS.

12 November.

- ***14 4 15** — Petrus observed the western limb of ☾ to be distant from Aldebora **27g 50′***
- ***14 8 40** — the western limb of ☾ was on the Meridian itself,*
- ***14 10 55** — and the eastern limb was on the same. In both cases the altitude of ☾, as regards its uppermost circumference, was **59 7***
- ***14 11 45** — Petrus observed the western limb of ☾ at a distance from Aldebora of **27 55***
- *so the centre is 28.7; and these observations were exact enough for you to use them without perceptible error.*
- ***14 19 40** — the brighter star in the feet of ♊ was on the meridian, having altit. **50 44**,*
- *this observation, though it was not exact and certain enough, because of thin clouds running back across from time to time, was nevertheless fair, so that you may use this one too without any great error.*
- ***15 11 20** — the eastern limb of ☾ was in azimuth **24g 59′**, having an altitude, as regards the uppermost circumference, of **57 15***

From this you can verify the clock's motion over the interval. Meanwhile the Moon had advanced 33 minutes.

DIE 19 DECEMBRIS.

19 December.

- In the morning, greater Horol. **6H 49M**, lesser **7 29** — ☾ was distant, by the Radius, from Spica ♍ **3g 47′**

It was the upper limb of ☾; and Spica stood above ☾ at nearly the same longitude, except that ☾ had passed Spica in longitude by about one degree.

DIE 20 DECEMBRIS.

20 December.

- **7H 53M 20S — 14° 6½′**
- **8 1 35 — 14 9⅓**

At the next following midday the lesser clock was running fast by 26½′; the greater stood still.

DIE 30 DECEMBRIS.

30 December.

Under a perfectly clear sky I made these observations with the astrolabic Armillae.

At hour 1.43 after midday I saw that, the place of ☉ being put in 19.5 ♑ as our own restitution gives it, the place of the western lunar limb — the limb that was nearest the Sun — was in 21.7 ♓, by a moderately good observation.

☾ was then not far from the 90th degree of the rising ecliptic, and so had an imperceptible parallax of longitude; that parallax was at least 1 minute. All things considered, at hour 1⅔ that limb of the Moon was in 21.5 ♓. Parallax of latitude

58⅔; the longitude of the centre of ☾ from the Prutenic calculation was in 20.51 ♓, the true latitude 4.24 B. So the western limb was in 20.34 ♓, to which the precession adds 14, making it 20.48 ♓ — which is 19 ſcrupula earlier than the observation itself makes it.

At Hora 2 Mto 0 the same limb of ☾ was seen with the Armillae, the Sun being placed in 19.7 ♍, in 21.15 ♓, by an observation good and careful enough. The Prutenic calculation gives the true longitude in 21.1 ♓, the parallax of longitude being 2½′; and the latitude 4.25, the parallax being 56¾. So the western limb was seen in 20.56 ♓ — which again is 19 ſcrupula earlier.[273]

At hour 3, minute 17⅛, with the Sun's place put at 19.10 ♍, ☾ was seen, as to its western limb, at 21 32 ♓. And afterwards, right up to sunset, less and less of ☾ kept showing[1] *— so much so that at sunset itself the place of ☾ appeared well short of the 21st degree, as though ☾ or the Sun had been made retrograde. That variation, however, came about because the Sun near the horizon, by a refracted ray, was showing a different place from the one it really held; experience shows the same thing often enough, as others too have observed and as Witelo and Ibn al-Haytham have demonstrated. At that time, by the Prutenic reckoning, the Moon's longitude was 21.48 ♓, its latitude 4.27, the parallax of longitude 12⅛, of latitude 52′. Therefore the place of ☾ as seen, as to the western limb, was 21.33 ♓ — which agrees tolerably with the observation, the difference being no more than 1 minute. I judge, though, that this arose rather from the Sun's nearness to the horizon, which, by a refracted ray as I said, makes the seen place differ from the true place.*[274]

At hour 4, minute 2, second 55 the western limb of ☾ crossed the meridian, having an altitude — taken to the topmost horn of the more northerly circumference — of 35.2; the centre, therefore, stood at an altitude of 34 M. 45. At that time the Sun's place, by our own reſtitution, was 19.12 ♍, whose right aſcension is 290.47; the hours elapſed since midday give 60.44, and ſo the right aſcension of the mid-heaven at that moment was 351.31. And ſince the Moon's true place at that time was, from the Prutenic tables, 22.16 ♓, the latitude being 4° 28′ B, while the parallax of longitude was 21½ and of latitude 48′, the western limb will ſtand at 21.38½ ♓; to theſe the varied preceſſion

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[273] Three braces stand on this side. (1) In the 19 December entry, one brace gathers the **two** clock readings, *Horol. maius* at 6^{H} 49^{M} and *minus* at 7 29; the remark and the single value they share, ☾ *diſtabat per Radium a Spica* ♍ — 3^{g} 47′, are printed once. (2) and (3) In the 20 December entry, two braces gather the same **two** lines: the first stands immediately after the two times, 7^{H} 53^{M} 20^{S} and 8 1 35; the second immediately before the two values, 14° 6½′ and 14 9⅓. The remark they share is printed once, broken across the two lines: *Diſtabat ſuperius cornu ☾ in conſequentia / a Spica ♍ per Radium* — "the upper horn of ☾ was distant, in consequence [*in conſequentia* — forwards, in the order of the signs], from Spica ♍, by the Radius". The leaf spells the star *Aldebora* at both of its occurrences. *Horol.*, *altit.*, *Mto* and *B.* stand exactly as printed.

[274] Dreyer's footnote 1, printed in roman type at the foot of the page and keyed to *apparebat* in the paragraph above: "Id eſt ſemper minuebatur diſtantia inter ſolem et lunam" — "that is, the distance between the Sun and the Moon was continually diminishing". No terminal point is printed. The note is the edition's; it glosses the text and names neither a hand nor a folio.

adds 14, so that the western limb as seen is 21.53 ♓. The latitude as seen was 3^{p} 40′ north; and with this, together with the right ascension given, entering Regiomontanus's canon of Right Ascensions with latitude, the longitude of the limb as seen answers to 22^{g} et 22′ ♓ — which likewise does not differ much from the observation given above. For if at hour 2 that limb was seen at longitude 21.15 ♓, then to the motion of the hours elapsed in the interval — namely 2 hours 3 minutes, the daily motion being 14.35 — there answers G. 1.15′, so that it then stands at 22.30 ♓; and from this the parallax, varied by 19 in the interval, takes away as much, so that the seen place of the limb is 22 et 21 ♓. That differs from the former by a single ſcrupulum only, which is as good as imperceptible. It is plain, then, that the place of the limb of ☾ has been found in this way by two separate routes.

At hour 4, minute 8, when the same limb stood in azimuth 1 40 towards the west, I observed with the two-formed sextant that that western limb was 23.57 distant from the star of ♀.

Now, with the latitude of ♀ put at 1.30 south — which squares better with the Prutenic calculation for the observation just past, of ♄ and ♀ in conjunction, where the latitude was almost the same — in triangle ABC, B will be ☾, BD the northern latitude, C ♀ with the southern latitude EC. And since side BC is, by observation, 23.57, while the Moon's latitude as seen is 3.40 north, side AB will therefore be 86.20, and side AC, with the latitude of ♀ added, 91.30. From the three sides thus given, the angle BAC is given by the third of the fifth of Regiomontanus; it measures the arc DE, the difference of longitude between ♀ and the place of the limb of ☾ as seen. This angle, once the operation was carried through, was found to be p. 23.24′, representing the arc DE; and that, taken away from the place of the limb of ☾ as seen, which was 22.24 ♓, yields the longitude of ♀ as 29.0 ♒. The Prutenic has 28.48 ♒; Alphonſ. has 29.34 ♒.[275]

Diagram. A tall, narrow figure standing at the left of the lower half of the text block, with the prose set around it to the right. Two long, slightly curved lines rise from the foot of the figure and meet in a point at the top. At the foot, the left-hand line carries two points one above the other, joined by a short segment; the right-hand line likewise carries two points one above the other. A line runs from the upper left point down to the lower right point, and another from the lower left point across to the upper right point, the two crossing between. The figure has no caption, no key and no legend.

- A (apex, top of the figure): A
- B (left side, the upper of the two left points): B
- D (left side, below B): D
- E (right side, the upper of the two right points): E
- C (right side, below E): C[276]

At hour 6, minute 58, with the place of ☾ put at 24.10 ♓ as to the limb

[275] "per 3 quinti Regiomontani" — the leaf cites the proposition by bare number, "the 3rd of the fifth"; it names no work.

[276] The leaf gives the figure no caption and ties it to no particular entry by name.

…the western one: the mouth of Pegasus stood, by the armillae, at 26 55 ♒, the latitude being 21 47.

But since the Moon's place had been taken without allowing for parallax, the parallax — which has varied (for at that time the parallax of longitude was 46′, of latitude 38′, the true Prutenic longitude as to the centre 24.2 ♓, the true latitude 4.32 B.) — takes away just as much from the Moon's place in the 41 minutes of the interval; and so the place of the star in the mouth of Pegasus falls 44 ſcrupula earlier, so that its own true place, as to longitude, is 26.11 ♒. That does not differ much from the place in longitude we observed earlier in the year 78 — by 3 imperceptible ſcrupula only — and it agrees exactly with the first. But since in three years the fixed stars have advanced just that much as well, it is plain that the place of the mouth of Pegasus has been rightly settled in this way.

At the following midday the greater clock I was using had gone astray imperceptibly. So these observations stand correct as regards the times noted.

OBSERUATIONES RELIQUORUM PLANETARUM.

Observations of the remaining planets.[277]

DIE 6 JANUARIJ.

6 January.

♀ was observed with the Radius, in the morning.

- **6^H^ 33½^M^** — ♀ distant from the left knee of Ophiuchus — **11° 42′**
- 6 46 — ♀ distant from the heart of ♏ — **11 16**
- 7 4 — ♀ was distant from the most northerly of the three bright stars in the forehead of ♏ — **14 14**
- 7 14 — ♀ from the middle star in the forehead of ♏ — **15 27**
- 6 21 — Arcturus crossed the meridian, by the upright support of the quadrant; noted ἐν πλάτει [Greek: *en platei*, "in breadth"].

At sunrise the clock was running 2 min. slow. ♂ was observed in the evening with the Radius.

- 5 25 — ♂ was distant from Aldeb. — **8 57¼**
- 5 37 — from the breast of ♉ — **11 31½**
- 6 18 — from the left foot of Erichthonius, *in antecedentia* [backwards, against the order of the signs] — **13 24**
- 6 36 — from the right foot of Erichthonius — **16 52½**
- **7 45 35″** — the breast of ♉ crossed the meridian; and this time was found to be the true one, only 35″ being taken away, so that the other times do not go far astray.

[277] This rubric is printed in roman capitals across the full measure. Below it the page is set in **two columns** divided by a vertical rule; the left column is read down first and its last line, "Fuit ♂ fere in recta linea inter vtrumque ♉ cornu ducta, cum ea tantum", is completed by the first line of the right column, "quantitate qua ipſe maius cornu ſuperat".

DIE 7 JANUARIJ.

7 January.

- Mane hora 7 — ♀ *from the left foot of Ophiuchus* — **12° 40′**
- 7 11 — ♀ *from the heart of* ♏ — **11 7**

DIE 27 FEBRUARIJ.

27 February.

♂ stood very nearly on the straight line drawn between the two horns of ♉; and it was seen to lie further back than both, by just the amount by which it itself rises above the greater horn. Its distance from each of the two stars of the horns of ♉ was therefore taken with the Radius.

- 8 4 — ♂ was distant from the northern horn of ♉ — **3° 27′**
- 8 14 — ♂ was distant from the auſt. horn of ♉ — **4 22**
- Between the horns of ♉ the distance was found at the same time, twice over, with the Radius — **7 48**

DIE 12 MARTIJ.

12 March.

- 8 32 — ♂, by the Radius, was distant from the more northerly horn of ♉ — **7° 58′** very nearly. Because of clouds coming up, no more distances could be taken here.

DIE 18 MARTIJ.

18 March.

- **5 58½** — ♂, by the Radius, was distant from the southern horn of ♉ — **9 4**
- 9 31 — ♂ was distant from the northern horn of ♉ — **10 49**
- Between the two horns of ♉ the distance taken with the Radius was — **7 48**

DIE 22 APRILIS.

22 April.

- I took the distance between the more southerly head of ♊ and ♂ with the Radius — **5 4**
- Between the more northerly head and ♂ — **8 28**
- This distance was repeated — **8 27**

But because nobody was at hand who could watch the clock for the times of these observations, I took the same distances over again, having got hold of the man who could tell me the times.[278]

[278] The leaf prints these words abbreviated: *ſin.* (*a ſin. genu Ophiuchi*), *diſt.*, *auſt.* (*a cornu auſt.* ♉), *Aldeb.*, *min. Erichtonij* is the leaf's spelling.

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- **11 28½** — with the Radius I found, between ♂ and the more southerly head of ♊ — **5° 2′**
- Between ♂ and the northern head of ♊, however — **8 27¼**

At the next following midday the clock had not erred at all.

DIE 2 MAIJ.

2 May.

With the sky moderately clear, by the Radius:

- `10^H^ 29^M^ 20^S^` — ♂ was distant from the northern head of ♊ — **11° 1′**
- `10 37 40` — ♂ from the southern head of ♊ — **6 36½**

At this time ♂ stood in front of the straight line drawn through both heads of ♊, by a space equal to a quarter part of the [distance of] the other head of ♊. For it was very nearly in a straight line with the heads of ♊.

At the next following midday the clock was running 7 minutes fast.

DIE 3 MAIJ.

3 May.

- `10 25` — with the Radius, ♂ was distant from the more southerly head of ♊ — **7 6**
- `10 36` — from the northern head of ♊ — **11 18**

It seemed, by the rule, to follow the straight line drawn through the heads of ♊ at a distance equal to its own body taken three times over. The magnitude of ♂ at the same time appeared equal to the magnitude of the heads of ♊.

DIE 6 SEPTEMBRIS.

6 September.

That evening Saturn crossed the meridian exactly together with the right shoulder of ♒.

DIE 26 SEPTEMBRIS.

26 September.

- `7 37 26 Med.` — Jupiter was distant from the left shoulder of ♐ — **2° 9′**
- `7 40 50 Ferr.`[280]

DIE 30 OCTOBRIS.

30 October.

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[279] Below the running head the side is set in **two columns divided by a vertical rule**, down to the foot of the *DIE 30 NOUEMBRIS* block; from *DIE 1 DECEMBRIS* onward the type runs across the full measure.

[280] A single brace joins the two time lines *7 37 26 Med.* and *7 40 50 Ferr.*, and the remark "Diſtabat Jupiter a ſiniſtro humero ♐" together with the one value **2° 9′** is printed once, across both rows. *Med.* and *Ferr.* are the leaf's own designations of two clocks; they are not units.

6 44 25 Med. — Saturn was on the meridian, having an altitude of 15° 31½′. At the next following midday ☉ was not seen. At the second midday, however, the clock was running fast by 31′ 45″.

DIE 26 NOUEMBRIS.

26 November.

Jupiter and Venus were distant, by the Radius:

- 4^H^ 24^M^ 10^S^ — 2° 7½′
- 4 27 55 — 2 7½
- 4 36 35 — 2 6
- 4 42 35 — 2 5⅛
- 4 50 30 — 2 7[281]

And that on the straight line which is drawn from ♀ *through* ♃ *towards the Foal, more or less.*

DIE 30 NOUEMBRIS.

30 November.

Jupiter and ♀ were distant, by the Radius:

- 4 50 — 2 48
- 4 52 — the same distance was found
- 4 58 — 2 50
- 5 15 — 2 51
- 5 21 — 2 52[282]

So that the true distance at hour 5.0 is 2 50.

DIE 1 DECEMBRIS.

1 December.

5^H^ 9½^M^ — ♃ and ♀ were distant, by the Radius, 3° 43′.

From this you can look into the place of ♃ *from the place of* ♀ *newly observed — how much it now differs from Alfonso's calculation or from the other — and from this restore the place of* ♃ *as it then was; and from there, for the 16th day, whose observation follows, correct the place of* ☿ *from the corrected place of the Sun, and that at least as regards longitude. As for the latitude, the reckoning must be made by conjecture.* ♃ by our own true restitution: longitude 23.52½ ♓, latitude 0.16⅓ M.

[281] The first two rows of this run carry a brace on each side of an inserted parenthesis, so that one brace groups the two time cells and a second brace groups the two value cells, with the leaf's own round parenthesis standing once between them and spanning both rows: "(non satis hic potuerunt videri propter vicinitatem radiorum solarium)" — "(they could not be seen well enough here because of the nearness of the sun's rays)". The remark is printed once and belongs to both rows.

[282] A brace joins the row *5 21 … 2 52* to the line below it, and the remark shared by the two is printed once: "quo tempore ♃ exacte non videbatur propter nubes" — "at which time ♃ could not be seen exactly, because of clouds."

DIE 16 DECEMBRIS.

16 December.

4^H^ 43^M^ p.m. — ♃ and ☿ were 33½ minutes apart, very nearly on a line parallel to the horizon, except that ☿ was a little nearer the horizon, by the amount of ♃'s body. They were at an altitude noted ἐν πλάτει, of about 3 degrees — about the height of a man. ☿ was further east, having passed ♃'s place. At the same time ♃ was in azimuth 47 degrees from the meridian towards the west. Mercury was distant from it towards the south as before.

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At that time ♃ was in 24 ♍, near the Ecliptic; and since no conspicuous fixed stars were so near, there is no doubt that this star seen beside ♃ was the star ☿.

N.B. Because Mercury had passed the place of ♃ towards the east by a lunar diameter — but by the observation, by 34 minutes — it is plain that his place agrees excellently with the Alphonsine calculation, where ♃ is 23.31 ♍ and ☿ is in 24.8 ♍, so that the difference is 37 minutes, by which ☿ has passed the place of ♃. ♃ is also a little further south, as it appeared in the sky (but the Prutenic calculation, following Mästlin, puts ☿ then at 20.58 ♍ and ♃ at 23.57 ♍, so that ☿ is three degrees in front of Jupiter, whereas in the sky itself it was half a degree and more behind, towards the east. It is clear, then, that the Alphonsine reckoning squares here in the case of ☿, and not the Copernican.[284]

DIE 19 DECEMBRIS.

19 December.

In the evening, at H. 5 M. 0 by the lesser clock, ♀ was distant by the Radius from ♃ — or ☿ — 20° 40′. ♃ was also setting at the very time at which it was observed, and it could not be seen well enough because of the nearness of ☉.

But I am not certain enough whether it was ♃ or ☿, for I saw no other star besides this one, which, because of the nearness of the Sun, was also very faint. Putting the place of ♀ at the point in 15.35 ♒, the observed place falls, from the distance given, at about 25 and 0 ♍, which is more than one degree beyond ♃'s place. By the Alphonsine reckoning the place of ♀ would be in 16.20. Hence the observed place falls in 25.45 ♍; in both cases, therefore, it lies further on than the place of ♃ — than on Copernicus's calculation by about ½ a degree, and than on Alfonso's by about 1½ degrees — nor does it differ much from the Alphonsine assignment of ☿, which is in 26 ♍. For that reason I am uncertain which star this was, unless the following observations make it sure. This star set to the eye at hour 5, minute 1, when at the same time 26.30 ♍ was setting for us — if the clock is right, which the next day's revolution makes plain

[283] The side runs across the full measure except for the *DIE 23 DECEMBRIS* block, which is set in **two columns divided by a vertical rule**.

[284] The round parenthesis opened at "(aſt Prutenicus calculus…" is **not closed** anywhere in this paragraph; the paragraph ends "et non Copernianam." with no closing parenthesis printed. The parenthesis is the leaf's own, not an editorial bracket. "per obſeruationem vero Mtis 34" — the leaf abbreviates the unit word with a raised ending, *Mtis*, read here as *minutis*. The same abbreviation form recurs on this side as *Mto* ("hora 5 Mto 1").

to see. Hence I still guess that it was ☿ *and not* ♃*, since the Alphonsine place of* ☿ *corresponds exactly with this very place which was seen to set, whereas they fall short in the place of* ♃ *by about 2 degrees; from which it is more likely to have been* ☿ *than Jupiter.*

At the next following midday the lesser clock was running fast by 26½ minutes. The greater stood still.

DIE 23 DECEMBRIS.

23 December.

By the Radius and the greatest clock.

- 4^H^ 44^M^ — ♄ and ♀ were distant — **5° 8′**
- 4 52 — better, **5 6**
- 6 27 — ♀ was distant from the left shoulder of ♒ — **10 48**
- 6 33 — **10 46**
- 6 46 — ♀ was distant from the right shoulder of ♒ — **13 54**
- 6^H^ 55^M^ — ♄ was distant from the left shoulder of ♒ — **13° 3′**
- 7 3 — **13 4** very nearly; the shoulder of ♒ could not be seen well because of the nearness of the horizon.
- 7 11 — ♄ was distant from the right shoulder of ♒ — **12 8**

All these observations are repeated ones and good.

Because at the next following midday the greatest clock had stopped, the two must be compared — the greatest, that is, and the middle one. At 6 in the morning of the 24th of December the greatest showed exactly hour 6, but the middle one showed the 6th hour and 4 minutes; and the middle one was running slow by 16 minutes. At midday of the 24th.[285]

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DIE 24 DECEMBRIS.

24 December.

By the lesser clock	By the greater clock		By the Radius
5^h^ 10^m^	**5^h^ 7^m^**	♀ and ♄ were distant	**3° 52′**
5 16	5 13	The distance was the same	**3 51**
5 44	5 39	♀ and the left shoulder of ♒	**11 9⅓**
5 48	5 44	the same distance was found	**11 10** very nearly
6 24	6 30	♄ and the left shoulder of ♒	**13 4**
6 32		♀ was distant from the left shoulder of ♒ towards the preceding signs	**11 10** very nearly

[285] The side ends with the fragment "Meridie diej 24." — an ablative of time with no verb and no following matter on this leaf.

[286] The side runs across the full measure from the head down to the end of the *OBSERUATIONES FIXARUM PER QUADRANTEM* rubric; **only the last block, under *DIE 7 IANUARIJ*, is set in two columns divided by a vertical rule**.

By the lesser clock	By the greater clock		By the Radius
6 40		♄ was distant from the left shoulder of ♒ in the same way	13 4½
6 48		♀ from the right shoulder of ♒	13 11

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At the next following midday the lesser clock was running slow by 41 minutes, while the greater stood still.

DIE 28 DECEMBRIS.

28 December.

At hour 4, minute 40 p.m., Venus had passed beyond the conjunction with ♄ towards the east, and was distant from it, on that line which is drawn from ♄ through the body of ♀ to the bright and first star of the lower jaw of Cetus, 0 20.

- *Again, H. 4 M. 50 — 0° 20′ — for when it stood at 19, less was seen of ♀.*
- *A third time, 5 10 — 0 20. Petrus observed it three times, and we ourselves found the same by trial.*

Their visible conjunction ought to have fallen at about the same instant by the Prutenic calculation; by the Alphonsine reckoning, however, it had been at the 5th hour of the morning, which agrees more correctly — yet neither hit the matter exactly. ♀'s latitude, moreover, was about equal to ♄'s, except that ♀ was a little further south, by about the diameter of its own body, whereas by the Prutenic calculation it ought to have been further south by more than a whole moon, and by nearly 35 minutes by Alfonso. From that line I spoke of you will be able to look into ♀'s latitude. Their true conjunction, then, was at about hour 10 before midday — 7 hours earlier, that is; and since the Prutenic calculation gives ♄'s place then in 26.20 ♒, the place of ♀ was in 26.18 ♒, which agrees imperceptibly, the two differing by only 2 minutes. So ♀'s longitude stands well enough, for ♄'s longitude is truer in Copernicus.

- *Afterwards, at hour 5½, I observed the distance of ♀ from the lower and more westerly shoulder of ♒, and found it — 13° 37′*
- *Repeating, I found the same — 13 39*
- *But repeating a third time I again found — 13 37. The later is better.*

At hour 6, between it and the other star in the upper and more easterly shoulder of ♒: 12° 10′. A little later, repeating again by the Radius, I found the same distance, 12 10.

[287] The three printed column heads stand verbatim as *Per Minus* — over the first time column — *Per Maius Horologium* — over the second time column, its setting running on over the description matter — and *Per Radium*, over the value column. The leaf's own distinction between the **lesser** and the **greater** clock is the whole point of the first two columns.

[288] A remark is set at the outer right of the measure, spanning the second, third and fourth rows of this run and reading downward across them: "quod Gellius etiam videbat" — *which Gellius also saw*. It is **printed once** and belongs to those three rows together. **No brace is printed with it.** The leaf names him bare, as *Gellius*.

- *With the lesser sextant, the parallax not subtracted, Andreas found about this time, between the former shoulder of ♒ and ♀ — **14 5** — uncertain*
- *Between the other shoulder and ♀ — **12 21** — which, the parallax being subtracted, agrees with the following.*

At hour 6⅝, ♀ was distant from the lower horn of ☾ nearest to it, by the Radius, 4 4, twice over; and ☾ was closely applying to conjunction with ♀, at an interval of longitude of about one degree as far as sight went. Both, however, were very near the horizon.

OBSERUATIONES FIXARUM PER QUADRANTEM.

Observations of the fixed stars with the Quadrant.[289]

DIE 7 IANUARIJ.

7 January.

- *Petrus observed the least altitude of the pole star — **52° 56′***
- *And the same morning, Spica at its greatest altitude, after the sights had been corrected — **25° 10′***

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- *Arcturus had greatest altitude — **55° 29½′***

DIE 8 IANUARIJ.

8 January.

- *Arcturus at greatest altitude — **55 30***

DIE 9 IANUARIJ.

9 January.

- *Spica, greatest altitude — **25 10***
- *Least altitude of the pole star — **52 56***

DIE 10 IANUARIJ.

10 January.

- Greatest *altitude of Spica* ♍ — ***25° 9′ 40″*** — *good*
- *The pole star — **52 56***
- *Arcturus — **55 29½***

And these observations were exact and sure enough, the sky being perfectly clear and still.

But afterwards I attended carefully and saw that Spica could not have an altitude greater than 25° 9′ 30″; and you can trust this.

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[289] This is a section rubric, not a date rubric; the date rubrics that follow stand under it.

[290] **This side is two-column for two separate stretches and full measure between and after them**: a two-column block divided by a vertical rule runs from the head of the side down to "nißimo et tranquillo."; the measure is then full from "Verum ego poſtea…" to "…Nicolaus Copernicus."; and a second two-column block, again divided by a vertical rule, runs from the *DIE 16 FEBRUARIJ* rubric to the foot.

Spica ♍ had this year a greatest altitude of 25.9.30. Take that from the altitude of the Equator, which is 34.7.30, and Spica's declination comes out 8.58. Then, putting its latitude at 2.0, as all my predecessors have done, you will look for its longitude in this way.

Diagram. A single circle, drawn in the left part of the measure with the text of the next two paragraphs set beside it on the right. Inside the circle three arcs cross: one running from the left of the circumference to the upper right, one from the lower left up to the top, and one from the lower left across to the right-hand side of the circumference. A **dashed** line runs from the point where the first two arcs meet, down to the right, towards the right-hand side of the circumference. **Twelve letters are drawn on the figure**, counted off the plate itself:

- A (on the circumference, at the left)
- B (on the circumference, upper right)
- C (on the circumference, at the top, to the left of F)
- D (on the circumference, lower right)
- E (on the circumference, lower left)
- F (on the circumference, at the top)
- G (on the circumference, upper left)
- H (on the circumference, at the right)
- I (interior, below and right of L)
- K (interior, below L)
- L (interior, just below and left of M)
- M (interior, at the crossing of the two upper arcs)[291]

Let the equator be A M B, the southern pole D, the Zodiac E M F, the southern pole H, the place of Spica I, the declination I L 8° 58′, the latitude K I 2 0.

Therefore in the triangle H I D all three sides are given: H I 88 0, the complement of the latitude; D I 81 2, the complement of the declination; and H D is the difference of the poles, equal to the greatest declination, 23 27. Therefore by the 9th of the Spherics *the angle I H D will be given, whose complement to 90 is the angle M H I, which measures the distance of Spica from the equinox M. On working it out I found this complement to be 18° 8′ 40″. And this is the longitude of Spica, M K, from the autumnal equinox; so that its place is in ♎ 18.9, very nearly. By Copernicus's theory of the anticipation of the equinoxes — since this year the precession of the equinoxes, on his own principles, is 27.54 — the longitude of Spica would have been in 17.54 ♎, and so earlier by almost a quarter of one degree. Therefore, from Copernicus's observation to this time, through 55 complete years, the fixed stars have advanced a quarter of a degree faster than Copernicus reckoned. For by his account Spica in the intervening time has advanced only 33 minutes, whereas in the sky it has really gone forward 48 minutes, so that the difference is nearly 15 minutes. The hypothesis of the motion of the eighth sphere must therefore be far other than the one Nicolaus Copernicus devised.*

[291] **C and G are drawn on the figure but are cited nowhere in the prose beside it.** The figure carries **no caption and no key**.

DIE 16 FEBRUARIJ.

16 February.

- *7^H^ 44^M^ 55^S^ — Sirius was on the meridian, having an altitude of — 17° 55′*

DIE 17 FEBRUARIJ.

17 February.

- 7 42 50 — Sirius[1] — **17 55**

There follow altitudes of stars whose times are wanting, because of the clock's uncertainty.

- The right foot of Sirius — **16 19½**
- The star beneath the belly of Sirius, between the two thighs — **8 22½**
- The star which is in the left shoulder of Canis Minor — **43 8**
- Canis Minor — **40 19¼**
- The bright star of Hydra — very nearly **27 13**
- Cor ♌ — **48 3**
- The bright star of the neck of ♌ — very nearly **56 0**
- The first of the two which is the more northerly, in the third bend of Hydra — **20 6**
- The left thigh of ♌ — **51 46**
- The tail of ♌ — **51 1**
- The lower of the two in the square of the Crow, the one that precedes — **13 52½**

[1] In the following observations we have omitted the words »habuit in meridiano altitudinem« or »fuit in meridiano habens altitudinem«, which in the codex are always found after the star's name.[292]

___[293]

- The latter of the same — **13 2**
- The preceding of the two which are in the upper side of the square of the Crow — **18 55**
- The one following it in the same side of the □[ti] — **19 59**
- The second and following in the left wing of ♍ — **35 0**
- Vindemiator — **47 20**
- Spica ♍ — **25 9½**[294]

[292] That note is the edition's, set in smaller type at the foot of the leaf below a short rule; the superscript 1 stands in the body after "Sirius" in the *DIE 17 FEBRUARIJ* line. The two phrases inside the guillemets are quoted by the edition in Latin and are left in Latin here: "had in the meridian an altitude" and "was in the meridian, having an altitude".

[293] **The whole side is ONE two-column block divided by a vertical rule, running the full depth from the running header to the foot**; the measure never opens to full width.

[294] The third entry sets a printed square sort □ with a raised *ti*, standing for *quadrati*; the leaf writes *quadrati* out in full two lines above and abbreviates it by the sort here. In the fourth entry the leaf abbreviates *ſiniſtra* to *ſin.*

DIE 27 FEBRUARIJ.

27 February.

- Canis Minor — **40 19**
- The bright star of Hydra — **27 14**
- Cor ♌ — **48 4**
- The bright star of the neck of ♌ — **56 0½**

DIE 10 MARTIJ.

10 March.

- Procyon — **40 19½**
- The bright star of Hydra — **27 14**
- Cor ♌ — **48 4**

DIE 18 MARTIJ.

18 March.

- Spica ♍ — **25 9⅔**
- Cor ♌ — **48 3**
- The bright star of the neck of ♌ — **56 0**

DIE 22 MARTIJ.

22 March.

- The left thigh of ♌ — **51 46⅔**
- The star of the first magnitude in the hip of ♌, very nearly — **56 53**

DIE 23 MARTIJ.

23 March.

- The bright star of Hydra — good — **27 13**
- The first of the third magnitude in the head of ♌ — **59 44**
- The one above this, and smaller — **62 1**
- repeat this one
- The one between cor ♌ and the neck, a little further forward — **52 50½**
- The one in the neck of ♌, above the bright star — **59 31**
- The small one which follows cor ♌ lower down — **45 30**
- The one of the third magnitude which is in the third bend from the bright star of Hydra — **20 5**
- The bright star of the hip of ♌ — **56 52**
- Here the sky was clear enough.
- The tail of ♌ — **51 0**
- The lower preceding star of the square of the Crow — **13 52**
- The upper preceding — **18 54**
- The lower following — **13 3**
- The upper following — **19 58**
- The second and following in the left wing of ♍ — **34 59½**

- The upper following star on the right side, below the girdle of ♍ — **39 49**
- The star in the right wing of ♍, called Vindemiator — **47 19**
- Spica ♍ — **25 9½**
- Arcturus — **55 28½**

DIE 24 MARTIJ.

24 March.

- The one which is between the heart and the neck of ♌, drawn back a little against the order of the signs — **52 50½**
- The one in the neck of ♌, above the bright star — **59 31** — very nearly
- The one which follows cor ♌ lower down — **45 30** — very nearly
- The small one in front of the hip of ♌ — **56 28**
- The hip of ♌, of the first magnitude — **56 52**
- The thigh of ♌ — **51 46½**[295]

DIE 5 APRILIS.

5 April.

- The tail of ♌ — **51 0**

DIE 14 APRILIS.

14 April.

- With the great instrument, Spica 46975, answering **25 10**

DIE 16 APRILIS.

16 April.

- `10^H^ 45^M^ 50^S^` — with the great instrument, Spica 47000, answering **25° 10′ 33″**
- At the next following midday the clock was running slow by **9 55**

DIE 22 APRILIS.

22 April.

- `10 22 0` — with the great instrument, Spica 47015, answering **25 11** — very nearly

DIE 24 APRILIS.

24 April.

- `10 15 25` — Spica 46965, answering **25 9**
- At the next following midday there was no error in the clock.

DIE 25 APRILIS.

25 April.

[295] In the second and third of these entries the word *fere* is printed on a line of its own, set to the right below the value, and belongs to that value alone.

• 10 8 5 — Spica 47015, answering **25 11** — very nearly[296]
___[297]

AUGUSTI.

August.

Day	By the middle clock	By the iron clock		
22	9^H^ 3^M^ 50^S^	9^H^ 4^M^ 40^S^	The left hand of Antinous	**32° 6′**
	9 13 25	9 11 44	The lower horn of ♉	**18 7**
	9 39 59	9 40 45	The left hand of ♒	**23 11**
	10 9 51[1]	10 10 55	The outermost star of the left wing of Cygnus	**62 41**
	10 23 25	10 25 20	The left shoulder of ♒	**26 46**
	10 58 8	11 0 40	The right shoulder of ♒	**31 48¼**

[298]

At the next following midday both clocks had run fast — the iron one by 5 minutes, the middle one by 13.[299]

• 25 — 9 34 55 — The left hand of ♒ — **23 10**
• 10 6 20 — The outermost star of the left wing of Cygnus — **62 41**
• 10 19 45 — The left shoulder of ♒ — **26 46½**
• 10 33 50 — The mouth of Pegasus — **42 6**
• 10 54 55 — The right shoulder of ♒ — **31 48½**
• 11 31 25 — The bright star of the neck of Pegasus — **42 47**

At the next following midday this clock anticipated noon by 15 minutes.

SEPTEMBRIS.

September.

[296] The leaf abbreviates *reſpondet* as *Reſp.* under 14 and 16 April and as bare *R.* under 22, 24 and 25 April.

[297] **The whole side runs at full measure in a single column**: no column rule, no part-depth two-column stretch, and no narrowing of the measure at any point. The rubric form also changes here: the preceding side heads each entry *DIE* , whereas this side sets a bare month name as the rubric and carries the day in a printed *Die* column.

[298] The printed head row reads *Die* over the day column and *Per horologium* centred over the two clock columns, which are separately headed *Medium* and *Ferreum*; the head is set in a smaller size than the entries. The leaf's own prose calls the two clocks *horologium ferreum* and *medium*.

[299] The run that follows carries only one column of times. **No head row is repeated over it**, and the leaf's own following sentence calls it simply *horologium hoc*, "this clock", without naming which.

Day	By the iron clock	By the middle clock		
2	8 31 30	8 34 0	The lower horn of ♉	**18 6½**
	8 46 55	8 49 50	The star in the tail of the Dolphin	**44 4**
	8 58 40	9 1 10	The left hand of ♒	**23 8**
	9 28 15	9 31 55	The outermost star of the left wing of Cygnus	**62 41**
	9 42 40	9 45 45	The left shoulder of ♒	**26 46½**
	9 56 40	9 59 40	The mouth of Pegasus	**42 7**
	10 17 25	10 20 10	The right shoulder of ♒	**31 48**
	10 22 5	10 24 55	The head of Pegasus	**38 18**
	10 53 45	10 56 35	The bright star of the neck of Pegasus	**42 47**

300

At the time of this observation the sky was not clear enough. At the next following midday we found, by the wall, an error of 8 minutes in the iron clock, by which it was running slow; in the middle clock we found no perceptible error.

Day	By the greatest clock	By the middle clock		
4	8 0 25	7 59 30	Aquila	**41 59**

301

At the next following midday there was no error in the greatest clock, while the middle one was running slow by 4 minutes.[302]

- 5 — 9 36 10 / 9 34 35 — The left shoulder of ♒ — **26 47**
- 10 10 10 / 10 8 50 — The right shoulder of ♒ — **31 48½** — very nearly
- 10 26 25 / 10 24 55 — The right elbow of ♒ — **30 41**
- 10 40 10 / 10 38 30 — The following of the southern stars in the right hand of ♒ — **31 52½**
- 10 46 55 / 10 45 47 — The bright star of the neck of Pegasus — **42 47**
- 11 9 45 / 11 8 27 — The first star of the wing of Pegasus — **47 8** — very nearly
- 11 21 25 / 11 19 25 — The more southerly star in the back of the head of the southern ♓ — **37 7⅔**
- 11 32 35 / 11 31 0 — The earlier star of the back of the more southerly Fish — **38 12⅔**

[300] The printed head row over this run reads *Ferreum* over the first clock column and *Medium* over the second — **the reverse of the order printed under *AUGUSTI***, where *Medium* stands first. The reversal is on the leaf.

[301] The printed head over this single row reads *Max.* and *Med.*, abbreviating *Maximum* and *Medium*; the sentence immediately below names *maximi horologij* and *Medium* in full, which is what the two abbreviations stand for.

[302] The run that follows carries two columns of times in the same positions as the *Max.* / *Med.* row above, but **that head is not repeated over it.**

• 11 44 0 / 11 42 47 — The later star in the back of the same ♓ — **37 29**[303]
[1] Fortaſſe 59.[304]
___[305]

• **Die 5**
• $12^h\ 3^m\ 25^s$ / $12^h\ 2^m\ 5^s$ — the tail of the same ♓ — **38° 41′**
• $12^h\ 12^m\ 0^s$ / $12^h\ 10^m\ 40^s$ — the head of Andromeda — **60° 54⅓′**
• $12^h\ 17^m\ 15^s$ / $12^h\ 15^m\ 43^s$ — the last star of the wing of Pegasus — **46° 58½′**
— repeat this one, because of the uncertain lines drawn on the quadrant.

At the next following midday the greatest clock was running fast by $2^m\ 40^s$, the middle one slow by 2 minutes.

• **Die 6**
• $6^h\ 44^m\ 40^s$ / $6^h\ 44^m\ 23^s$ — Lyra — **72° 37′**

This observation is not accurate enough, because of the scattered clouds that covered the sky at the time of the observation; the star was also dimmed by the light of the Sun.

• $7^h\ 51^m\ 25^s$ / $7^h\ 51^m\ 37^s$ — Aquila — **41° 59′**
• $53^m\ 25^{s1}$ / $52^m\ 17^{s1}$
• $8^h\ 10^m\ 15^s$ / $8^h\ 10^m\ 37^s$ — the hand of Antinous — **32° 7′**
• $8^h\ 15^m\ 20^s$ / $8^h\ 16^m\ 11^s$ — the Upper Horn of ♍ — **20° 23′**, very nearly
• $8^h\ 18^m\ 10^s$ / $8^h\ 18^m\ 55^s$ — the Lower Horn of ♍ — **18° 8′**
• [Margin: This observation, with the two immediately preceding it, was made under a sky not altogether — indeed not sufficiently — clear.]
• $8^h\ 40^m\ 15^s$ / $8^h\ 41^m\ 20^s$ — the more southerly star of the preceding side in the Rhomboid of the Dolphin — **48° 37′**
• $8^h\ 44^m\ 45^s$ / $8^h\ 46^m\ 8^s$ — the left hand of ♒ — **23° 11⅓′**
• $8^h\ 47^m\ 20^s$ / $8^h\ 48^m\ 35^s$ — the more northerly star of the following side in the rhomboid of the Dolphin — **48° 48′**

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[303] In the seventh and eighth of these entries the descriptive matter overruns its measure and the word carrying the value — *auſtralis* in the seventh, and nothing in the eighth — is carried onto a second line set to the right, with the value standing on that second line. The leaf spells *piſcis* out in the eighth entry and sets the sign ♓ in the seventh and ninth; neither has been substituted for the other.

[304] That note is the edition's, set in smaller type at the foot of the leaf; the superscript 1 stands in the body after the seconds figure of 10 9 51 in the first August run. The note reads "Perhaps 59." — the editor's conjecture for that figure, offered without alteration of the printed value, which stands as 51 above.

[305] **The side is FULL MEASURE throughout.** There is no column rule, no two-column block and no part-depth block; the observation lines are set as one column of figures with a narrow band of small-type remarks standing at the right-hand end of the measure, and the prose paragraphs run the full width. One head row is printed on this side, at the top of the page: *Die* over the day column, and *Max.* and *Med.* over the two columns of clock times. The star column and the altitude column carry no printed head. *Max.* and *Med.* abbreviate *Maximum* and *Medium*, the names of two clocks, and the prose set beneath each day's run names *maximum horologium* and *Medium* in full. The day figure stands once at the head of each day's run; the cells beneath it are blank on the leaf.

- $9^h\ 14^m\ 15^s$ / $9^h\ 16^m\ 0^s$ — the outermost star of the left wing of Cygnus — **62° 41⅓′**
- $9^h\ 28^m\ 15^s$ / $9^h\ 30^m\ 24^s$ — the left shoulder of ♒ — **26° 46′**
- $9^h\ 42^m\ 29^s$ / $9^h\ 44^m\ 30^s$ — the mouth of Pegasus — **42° 7′**
- $10^h\ 2^m\ 20^s$ / $10^h\ 4^m\ 48^s$ — the right shoulder of ♒ — **31° 49′**

♄ crossed the meridian that evening exactly together with this shoulder.

- $10^h\ 7^m\ 15^s$ / $10^h\ 9^m\ 49^s$ — the head of Pegasus — **38° 20′**
- $10^h\ 25^m\ 15^s$ / $10^h\ 27^m\ 45^s$ — of the southern stars in the right hand of ♒, the preceding — **32° 1′**
- $10^h\ 31^m\ 55^s$ / $10^h\ 34^m\ 23^s$ — the following star in the same hand of ♒ — **31° 51′**
- $10^h\ 46^m\ 55^s$ / $10^h\ 49^m\ 42^s$ — the breast of Pegasus — **56° 32⅔′**
- $11^h\ 0^m\ 55^s$ / $11^h\ 4^m\ 0^s$ — the first star of the wing of Pegasus — **47° 7′**
- $11^h\ 12^m\ 5^s$ / $11^h\ 15^m\ 35^s$ — the more northerly star in the back of the head of the southern ♓ — **35° 8′**

At the next following midday the greatest clock was running slow by $6^m\ 5^s$, and the middle one slow as well by $1^m\ 50^s$.

- **Die 7**
- $6^h\ 43^m\ 5^s$ / $6^h\ 41^m\ 33^s$ — Lyra — **72° 42′**
- $6^h\ 55^m\ 45^s$ / $6^h\ 54^m\ 6^s$ — Lyra stood in azimuth 7.56 from the meridian towards the west, having an altitude of — **72° 36′**
- $7^h\ 10^m\ 45^s$ / $7^h\ 9^m\ 23^s$ — Lyra in azimuth 18.0, altitude — **72° 8½′**
- $7^h\ 49^m\ 30^s$ / $7^h\ 48^m\ 15^s$ — Aquila on the meridian, and it had an altitude of — **41° 58⅔′**
- $8^h\ 8^m\ 45^s$ / $8^h\ 7^m\ 46^s$ — the hand of Antinous — **32° 7′**
- $8^h\ 16^m\ 45^s$ / $8^h\ 15^m\ 49^s$ — the Lower Horn of ♈ — **18° 8′**
- $8^h\ 39^m\ 25^s$ / $8^h\ 38^m\ 32^s$ — the more northerly star of the preceding side in the Rhomboid of the Dolphin — **48° 38′**
- [Margin: This observation is not good enough.]
- $8^h\ 45^m\ 50^s$ / $8^h\ 45^m\ 30^s$ — the more northerly star of the following side in the Rhomboid — **48° 48′**
- $9^h\ 13^m\ 35^s$ / $9^h\ 13^m\ 6^s$ — the outermost star of the wing of Cygnus — **62° 41′**
- $9^h\ 28^m\ 0^s$ / $9^h\ 27^m\ 27^s$ — the left shoulder of ♒ — **26° 46½′**

[1] In the codex these figures were added afterwards.[306]

[306] The two figure groups printed on each line stand in the *Max.* and *Med.* columns headed at the top of the page. The head is not repeated over the runs of 6 and 7 September; each day's closing sentence names *maximum horologium* and *Medium* in full. The line "53 25[1] / 52 17[1]" carries no star name and no altitude on the leaf; the edition's footnote marker stands on both figure groups. The line "Cauda)(eiusdem" and the line "Borealior in occipite)(auſtralis" set ♓ with the printed)(sort, two mirrored arcs joined by a bar.

___[307]

- **Die 7**
- $9^h\ 42^m\ 5^s$ / $9^h\ 41^m\ 29^s$ — the mouth of Pegasus — **42° 6⅓′**
- $10^h\ 2^m\ 40^s$ / $10^h\ 2^m\ 23^s$ — the right shoulder of ♒ — **31° 48′**
- $10^h\ 7^m\ 40^s$ / $10^h\ 7^m\ 27^s$ — the head of Pegasus — **38° 18⅔′**
- $10^h\ 18^m\ 0^s$ / $10^h\ 17^m\ 50^s$ — the right elbow of ♒ — **30° 40′**
- $10^h\ 25^m\ 25^s$ / $10^h\ 25^m\ 13^s$ — of the southern stars of the right hand of ♒, the preceding — **32° 0′**
- $10^h\ 38^m\ 35^s$ / $10^h\ 38^m\ 37^s$ — the bright star of the neck of Pegasus — **42° 47′**
- $10^h\ 32^m\ 5^s$ / $10^h\ 32^m\ 0^s$ — of the southern stars of the right hand, the following — **31° 51½′**
- $10^h\ 47^m\ 25^s$ / $10^h\ 47^m\ 35^s$ — the breast of Pegasus — **56° 31½′**
- $11^h\ 1^m\ 45^s$ / $11^h\ 1^m\ 58^s$ — the first star of the wing — **47° 5′**
- $11^h\ 12^m\ 57^s$ / $11^h\ 13^m\ 30^s$ — Merid. in the back of the head[1] of the southern Fish — **35° 7⅓′**
- $11^h\ 24^m\ 35^s$ / $11^h\ 24^m\ 55^s$ — the preceding star in the back of ♓ — **38° 12′**
- $11^h\ 35^m\ 50^s$ / $11^h\ 36^m\ 27^s$ — the following star in the back of ♓ — **37° 27′**
- $11^h\ 55^m\ 0^s$ / $11^h\ 55^m\ 52^s$ — the tail of the southern ♓ — **38° 41′**
- $12^h\ 8^m\ 40^s$ / $12^h\ 9^m\ 50^s$ — the outermost star of the wing of Pegasus — **47° 0′**

At the next following midday the greatest clock was running slow by 4 minutes 20^s, but the middle one was moving fast by $2^m\ 38^s$.

- **Die 8**
- $7^h\ 40^m\ 25^s$ / $7^h\ 43^m\ 27^s$ — Aquila — **41° 58⅔′**
- $8^h\ 38^m\ 5^s$ / $8^h\ 42^m\ 45^s$ — the middle star of the left wing of Cygnus — **66° 37′**, very nearly
- $9^h\ 3^m\ 30^s$ / $9^h\ 7^m\ 22^s$ — the outermost star of the wing of Cygnus — **62° 41½′**
- $9^h\ 31^m\ 20^s$ / $9^h\ 35^m\ 53^s$ — the mouth of Pegasus — **42° 6′**
- $9^h\ 51^m\ 25^s$ / $9^h\ 56^m\ 23^s$ — the right shoulder of ♒ — **31° 50′**
- $10^h\ 27^m\ 0^s$ / $10^h\ 32^m\ 35^s$ — the bright star of the neck of Pegasus — **42° 47¼′**

[307] **The side is FULL MEASURE throughout** — no column rule, no two-column block, no part-depth block. One head row is printed on this side, at the top of the page: *Die*, *Max.*, *Med.*, again over the day column and the two clock columns, and again with no head over the star column or the altitude column. The head is not repeated over any later run on the side.

- $10^h\ 49^m\ 40^s$ / $10^h\ 55^m\ 40^s$ — the first star of the wing of Pegasus — **47° 6′**, very nearly[308]

At the next following midday the greatest clock was running slow by 20^m, but the middle one was likewise moving slow by 5 minutes.

- **Die 9**
- $7^h\ 40^m\ 50^s$ / $7^h\ 40^m\ 42^s$ — Aquila — **41° 58⅔′**
- $8^h\ 39^m\ 20^s$ / $8^h\ 39^m\ 0^s$ — the middle star of the left wing of Cygnus — **66° 36½′**

At the next following midday we came late from the sermon[2], so I noted the errors of the clocks by azimuths, when ☉ stood in azimuth 4 from the meridian towards the west. The greatest clock showed 4^m past midday, the middle one 11^m, also past midday.

- **Die 13**
- $6^h\ 55^m\ 35^s$ / $7^h\ 0^m\ 55^s$ — the tail of Aquila — very nearly **36° 32′**
- [Margin: but not accurate enough]
- $7^h\ 20^m\ 45^s$ / $7^h\ 26^m\ 29^s$ — Aquila — **41° 58½′**
- [Margin: or at most 58⅔]
- $7^h\ 39^m\ 5^s$ / $7^h\ 45^m\ 50^s$ — the hand of Antinous — **32° 7½′**

At the next following midday the greatest clock was running slow by 19^m, and the middle one slow as well by $10^m\ 30^s$.

- **Die 14**
- $7^h\ 22^m\ 50^s$ / $7^h\ 22^m\ 15^s$ — Aquila — **41° 58⅔′**
- $8^h\ 21^m\ 15^s$ / $8^h\ 20^m\ 34^s$ — the middle star of the left wing of Cygnus — **66° 35¼′**
- [Margin: not accurate enough]

[1] Afterwards added: »or of the lower jaw«. [2] It was a Sunday.[309]

[308] Two braces stand on this side, and both are on this run. **Brace 1** gathers two lines — "the outermost star of the wing of Cygnus — 62° 41½′" and "the mouth of Pegasus — 42° 6′" — and its remark is printed once, at the right: But this observation was not good enough, on account of the nearness of ☾ and the scattered clouds. **Brace 2** gathers the two lines that follow — "the right shoulder of ♒ — 31° 50′" and "the bright star of the neck of Pegasus — 42° 47¼′" — and its remark is likewise printed once: ἐν πλάτει [Greek: *en platei*, "in breadth", i.e. roughly] on account of the rather scattered clouds and the nearness of ☾. Neither remark is repeated on the leaf.

[309] The phrase "in occipite piſcis auſtralis" needs a head noun, and the parallel entry on the facing page reads *Borealior in occipite)(auſtralis*; the abbreviation therefore stands for *Meridionalis*, "the southern one", and not for *in meridiano*. The same stem carries the other sense elsewhere on this opening: the facing page sets "Aquila in merid.", lower-case and followed by ", habuitque altit.", where it is *in meridiano*, "on the meridian".

___[310]

- **Die 14** (clocks: Max. / Med.)
- $10^h\ 34^m\ 35^s$ / $10^h\ 34^m\ 18^s$ — the first star of the wing of Pegasus — **47° 6′**

At the next following midday the greatest clock was running slow by $0^m\ 20^s$, the Middle one by 5^m exactly.

- **Die 15**
- $7^h\ 21^m\ 35^s$ / $7^h\ 20^m\ 38^s$ — Aquila — **41° 58⅔′**
- $7^h\ 40^m\ 40^s$ / $7^h\ 40^m\ 29^s$ — the hand of Antinous — **32° 7′**
- $7^h\ 48^m\ 30^s$ / $7^h\ 48^m\ 32^s$ — the Lower Horn of ♉ — **18° 7′** — not good enough, because of the rather scattered clouds that came between
- $8^h\ 8^m\ 45^s$ / $8^h\ 8^m\ 39^s$ — the more northerly star of the preceding side in the Rhomboid of the Dolphin — **48° 38′**

At the next following midday the greatest clock was running slow by $2^m\ 10^s$, while the Middle one was running fast by 5^m.

- **Die 16**
- $7^h\ 34^m\ 7^s$ / $7^h\ 37^m\ 0^s$ — the hand of Antinous — **32° 6½′**

At the next following midday the greatest was running slow by $15^m\ 10^s$, the Middle one fast by $6^m\ 24^s$.

- **Die 17** (clocks: Horol. Medium / Ferreum)
- $6^h\ 50^m\ 42^s$ / $6^h\ 55^m\ 45^s$ — the beak of Cygnus — **61° 12′** — not accurate enough

At the following midday the Middle one was running fast by $4^m\ 20^s$; the Iron one was running slow by $2^m\ 40^s$.

- **Die 18**
- $7^h\ 9^m\ 4^s$ / $7^h\ 8^m\ 5^s$ — Aquila — **41° 58½′**
- $7^h\ 28^m\ 35^s$ / $7^h\ 26^m\ 55^s$ — the hand of Antinous — **32° 7′**
- $7^h\ 33^m\ 38^s$ / $7^h\ 33^m\ 20^s$ — the Upper Horn of ♉ — **20° 25′** — not good enough
- $8^h\ 3^m\ 45^s$ / $8^h\ 3^m\ 5^s$ — the hand of ♒ — **23° 6½′**
- $8^h\ 33^m\ 55^s$ / $8^h\ 33^m\ 25^s$ — the outermost star of the left wing of Cygnus — **62° 39′**
- $9^h\ 2^m\ 0^s$ / $9^h\ 1^m\ 15^s$ — the mouth of Pegasus — **42° 6′**

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[310] **The side is FULL MEASURE throughout** — no column rule, no two-column block, no part-depth block. The observation lines are set as one column of figures with a narrow band of small-type remarks standing at the right-hand end of the measure; the prose sentences run the full width. **Two head rows are printed on this side, and they name different clocks.** (i) At the top of the page: *Die* over the day column, *Max.* over the first clock group, *Med.* over the second. (ii) At the 17 September run: *Horol. Medium* over the first group, *Ferreum* over the second — a different pair of clocks, and the change of pair is the head row's whole content. The star column and the altitude column carry no printed head on this side. *Max.*, *Med.*, *Horol. Medium* and *Ferreum* are clock names — *maximum horologium*, *Medium*, *Ferreum* are spelled out in full in the sentences beneath the runs — **not the *Medii* sense of M., and not unit markers.** The day figure stands once at the head of each day's run; the cells beneath it are blank on the leaf.

- $9^h\ 22^m\ 31^s$ / $9^h\ 21^m\ 30^s$ — the right shoulder of ♒ — **31° 48½′**
- $9^h\ 58^m\ 40^s$ / $9^h\ 57^m\ 55^s$ — the bright star of the neck of Pegasus — **42° 47′**
- $10^h\ 21^m\ 45^s$ / $10^h\ 20^m\ 50^s$ — the first star of the wing of Pegasus — **47° 6′**, very nearly
- $11^h\ 29^m\ 19^s$ / $11^h\ 28^m\ 30^s$ — the outermost star of the wing — **46° 59′**, very nearly

At the next following midday the Middle clock was running fast by 30^s, the Iron one slow by $5^m\ 30^s$.

- **Die 19**
- $7^h\ 4^m\ 0^s$ / $7^h\ 5^m\ 10^s$ — Aquila — **41° 58⅔′**
- $7^h\ 24^m\ 5^s$ / $7^h\ 25^m\ 15^s$ — the hand of Antinous — **32° 7¼′**
- $7^h\ 30^m\ 53^s$ / $7^h\ 33^m\ 20^s$ — the Lower Horn of ♑ — **18° 7½′**
- $7^h\ 47^m\ 35^s$ / $7^h\ 49^m\ 30^s$ — the tail of the Dolphin — **44° 3′**
- $7^h\ 52^m\ 27^s$ / $7^h\ 54^m\ 20^s$ — the more southerly star of the preceding side in the Rhomboid of the Dolphin — **47° 19′**, very nearly
- $7^h\ 54^m\ 34^s$ / $7^h\ 56^m\ 15^s$ — the more northerly star of the same side — **48° 37′**
- $7^h\ 58^m\ 6^s$ / $7^h\ 59^m\ 40^s$ — the more southerly star of the following side in the Rhomboid of the Dolphin — **47° 45½′**
- $8^h\ 1^m\ 25^s$ / $8^h\ 2^m\ 40^s$ — the more northerly star of the same side — **48° 47′**
- $8^h\ 43^m\ 32^s$ / $8^h\ 45^m\ 0^s$ — the left shoulder of ♒ — **26° 46½′**
- $8^h\ 57^m\ 41^s$ / $8^h\ 59^m\ 30^s$ — the mouth of Pegasus — **42° 6½′**
- $9^h\ 18^m\ 47^s$ / $9^h\ 19^m\ 25^s$ — the right shoulder of ♒ — **31° 48½′**
- $9^h\ 23^m\ 46^s$ / $9^h\ 24^m\ 25^s$ — the head of Pegasus — **38° 19′**, very nearly
- $9^h\ 33^m\ 43^s$ / $9^h\ 35^m\ 35^s$ — the star that stands in the bend of the elbow of ♒ — **30° 40′**
- $9^h\ 40^m\ 46^s$ / $9^h\ 42^m\ 40^s$ — of the two southern stars in the hand of ♒, the preceding — **31° 59⅔′**
- $9^h\ 47^m\ 17^s$ / $9^h\ 49^m\ 20^s$ — the outermost star in the same hand of ♒ — **31° 52¾′**[311]

[311] The small-type remarks set at the right-hand end of three lines on this side — *non ſatis bona propter nubes rariuſculas interuenientes*, *non ſatis exquiſita*, *non ſatis bona* — stand **inside the measure**, in the narrow band at the right of the altitude column. They are not marginalia. Three lines of this side are set with the star-name running over into a second, right-set line that carries the altitude with it: "Borealior præcedentis lateris in / rhomboide delphini 48 38" (Die 15) and "Auſtralior præcedentis lateris in / rhomboide delphini 47 19 fere" and "Auſtralior ſequentis lateris in / rhomboide delphini 47 45½" (Die 19). Each is a single entry.

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- **Die 19** (continued; clocks: Horol. Medium / Ferreum)
- $9^h\ 56^m\ 47^s$ / $9^h\ 58^m\ 40^s$ — the right knee of Pegasus — **62° 10′**
- $10^h\ 3^m\ 35^s$ / $10^h\ 5^m\ 5^s$ — the breast of Pegasus — **56° 32′**
- $10^h\ 16^m\ 50^s$ / $10^h\ 18^m\ 25^s$ — Scheat — **59° 57′**
- $10^h\ 28^m\ 34^s$ / $10^h\ 30^m\ 30^s$ — the lower star of the jaw of the southern Fish — **35° 8′** — or at most 8¼′
- $10^h\ 40^m\ 8^s$ / $10^h\ 42^m\ 15^s$ — the star that precedes, in the back of ♓ — **38° 12′**
- $10^h\ 51^m\ 20^s$ / $10^h\ 53^m\ 45^s$ — the hinder star in the back of ♓ — **37° 29⅔′** — or at most 30′
- $11^h\ 10^m\ 46^s$ / $11^h\ 12^m\ 35^s$ — the tail of ♓ — **38° 41′**
- $11^h\ 19^m\ 25^s$ / $11^h\ 21^m\ 30^s$ — the head of Andromeda — **60° 54½′**

At the next following midday the Middle one was running slow by one minute. The Iron one was also running slow, by $2^m\ 15^s$.

- **Die 20** (clocks: Max. / Med.)
- $7^h\ 0^m\ 50^s$ / $7^h\ 1^m\ 55^s$ — Aquila — **41° 57′**
- $8^h\ 37^m\ 0^s$ / $8^h\ 40^m\ 32^s$ — the left shoulder of ♒ — **26° 45′**
- $8^h\ 51^m\ 47^s$ / $8^h\ 55^m\ 25^s$ — the mouth of Pegasus — **42° 4½′**
- $10^h\ 10^m\ 20^s$ / $10^h\ 14^m\ 33^s$ — the first star of the wing of Pegasus — **47° 3′**

These observations were made after the rule had first been corrected, and so they are not to be relied on. At the next following midday the greatest clock was running slow by $12^m\ 0^s$, the Middle one slow by $0^m\ 15^s$.

- **Die 21**
- $7^h\ 0^m\ 15^s$ / $6^h\ 59^m\ 7^s$ — Aquila — **41° 57½′**
- $7^h\ 19^m\ 40^s$ / $7^h\ 18^m\ 13^s$ — the hand of Antinous — **32° 7′**
- $7^h\ 24^m\ 25^s$ / $7^h\ 23^m\ 9^s$ — the Upper Horn of ♉ — **20° 23′**
- $7^h\ 27^m\ 0^s$ / $7^h\ 25^m\ 53^s$ — the Lower Horn of ♉ — **18° 6½′**
- $7^h\ 54^m\ 0^s$ / $7^h\ 53^m\ 24^s$ — the left hand of ♒ — **23° 10′**
- $9^h\ 28^m\ 17^s$ / $9^h\ 27^m\ 29^s$ — the right elbow of ♒ — **30° 40′**, very nearly
- $9^h\ 36^m\ 0^s$ / $9^h\ 35^m\ 16^s$ — of the southern stars in the right hand of ♒, the preceding — **31° 59′**
- $9^h\ 42^m\ 40^s$ / $9^h\ 42^m\ 5^s$ — of the same southern stars, the following — **31° 51′** — not good enough, because of the sky-rifts [chasmata]

[312] **The side is FULL MEASURE throughout** — no column rule, no two-column block, no part-depth block. **Three head rows are printed on this side, and each names a different pair of clocks.** (i) At the top of the page: *Die* over the day column, *Horol. Medium* over the first clock group, *Ferreum* over the second — the pair already in force at the foot of the preceding leaf, repeated here at the page top. (ii) At the 20 September run: *Max.* and *Med.* (iii) Partway through the 24 September run, after its first two lines: *Med.* and *Ferr.* — a change of clock inside a day's run, not the head of a new run. Each head row matches the block it governs, and each is confirmed by the sentence beneath, which names *maximum horologium*, *Medium* and *Ferreum* in full. The star and altitude columns carry no printed head.

- $9^h\ 52^m\ 5^s$ / $9^h\ 51^m\ 37^s$ — the right knee of Pegasus — **62° 9⅔′**
- $10^h\ 12^m\ 35^s$ / $10^h\ 11^m\ 36^s$ — Scheat of Pegasus — **59° 57′**

At the next following midday the greatest clock was running fast by $10^m\ 45^s$; the Middle one also fast, by $2^m\ 10^s$.

- **Die 22**
- $6^h\ 59^m\ 55^s$ / $6^h\ 55^m\ 2^s$ — Aquila — **41° 57⅔′**
- $8^h\ 23^m\ 40^s$ / $8^h\ 19^m\ 23^s$ — the outermost star of the wing of Cygnus — **62° 41½′**
- $8^h\ 38^m\ 45^s$ / $8^h\ 34^m\ 46^s$ — the left shoulder of ♒ — **26° 46′**
- $8^h\ 52^m\ 15^s$ / $8^h\ 48^m\ 3^s$ — the mouth of Pegasus — **42° 6′**
- $9^h\ 13^m\ 25^s$ / $9^h\ 8^m\ 47^s$ — the right shoulder of ♒ — **31° 48¼′**
- $9^h\ 28^m\ 50^s$ / $9^h\ 24^m\ 12^s$ — the right elbow of ♒ — **30° 40′**
- $9^h\ 42^m\ 45^s$ / $9^h\ 38^m\ 13^s$ — the following of the two southern stars in the right hand of ♒ — **31° 52′** — not accurate enough
- $9^h\ 58^m\ 55^s$ / $9^h\ 53^m\ 54^s$ — the breast of Pegasus — **56° 32′**, very nearly

At the next following midday the greatest clock was running fast by 15 minutes. The Middle one too was fast, by 2^m.

- **Die 24**
- $6^h\ 43^m\ 20^s$ / $6^h\ 47^m\ 18^s$ — Aquila — **41° 58½′**, very nearly
- $7^h\ 46^m\ 50^s$ / $7^h\ 50^m\ 35^s$ — the middle star of the wing of Cygnus — **66° 36′**, very nearly
- (clocks from here: Med. / Ferr.)
- $8^h\ 11^m\ 50^s$ / $8^h\ 13^m\ 5^s$ — the outermost star of the wing of Cygnus — **62° 41⅔′**
- $8^h\ 26^m\ 9^s$ / $8^h\ 26^m\ 55^s$ — the left shoulder of ♒ — **26° 46′**
- **Die** — $8^h\ 40^m\ 20^s$ / $8^h\ 41^m\ 40^s$ — the mouth of Pegasus — **42° 6′**[313]

[313] The last composed line of this side carries the word *Die* in the day column with **no day figure beside it** — the figure falls at the leaf turn. The small-type remarks set at the right-hand end of four lines on this side — *vel ad ſummum 8¼*, *vel ad ſummum 30*, *non ſatis bona propter chasmata*, *non ſatis exquiſita* — stand **inside the measure**, in the narrow band at the right of the altitude column. They are not marginalia. The two *vel ad ſummum* remarks are the leaf's own alternative readings. Three lines of this side are set with the star-name running over into a second, right-set line that carries the altitude with it: "Stella inferior mandibulæ / piſcis auſtralis 35 8" (Die 19), "Auſtralium in manu dextra ♒ / præcedens 31 59" (Die 21) and "Sequens duarum auſtralium in / manu dextra ♒ 31 52" (Die 22). Each is a single entry.

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- **Die 24** (clocks: Med. / Ferr.)
- $9^h\ 1^m\ 0^s$ / $9^h\ 2^m\ 10^s$ — the right shoulder of ♒ — **31° 48′**
- $9^h\ 16^m\ 35^s$ / $9^h\ 17^m\ 55^s$ — the right elbow of ♒ — **30° 40′**
- $9^h\ 23^m\ 53^s$ / $9^h\ 25^m\ 10^s$ — of the southern stars of the right hand of ♒, the preceding one — **31° 59½′**
- $9^h\ 30^m\ 28^s$ / $9^h\ 31^m\ 30^s$ — of the same southern stars, the following one — **31° 52′**
- $9^h\ 37^m\ 8^s$ / $9^h\ 38^m\ 20^s$ — the bright star of the neck of Pegasus — **42° 47′**
- $9^h\ 46^m\ 45^s$ / $9^h\ 48^m\ 20^s$ — the breast of Pegasus — **56° 32′**
- (dot leaders stand in both clock groups; no time is printed) — Scheat — **59° 58′** — not good enough
- $10^h\ 35^m\ 0^s$ / $10^h\ 36^m\ 20^s$ — the hinder star in the back of)(, the southern one — **37° 30′**, very nearly
- $11^h\ 2^m\ 58^s$ / $11^h\ 4^m\ 20^s$ — the head of Andromeda — **60° 53½′**[315]

At the next following midday the greatest clock was running slow by 20^m. The Middle one was running fast by $2^m\ 5^s$; the Iron one was running slow by $1^m\ 30^s$.

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[314] **Where this page begins.** The first composed line of the page is a head row: the word *Die* over the day column, *Med.* over the first clock group, *Ferr.* over the second. The first composed line of text beneath it carries the day figure **24** in the *Die* column, and the entry "Dexter humerus ♒". The day figure therefore stands at the head of this page, one composed line below the word *Die*, which is the same relation the two carry in the run at the foot of the facing page (*Die* on one line, **27** on the next). **Structure of this page.** The page is full measure throughout: no column rule, no two-column block, no part-depth block. The observation runs are set as two groups of clock figures, a star column, and an altitude column at the right, with a narrow band of small-type remarks standing at the right-hand end of the measure — inside the measure, not in the margin. The prose sentences run the full width. **Five head rows are set on this page, of three distinct forms, and two of them fall part-way through a run.** (i) at the top of the page, *Die · Med. · Ferr.*; (ii) before the first entry of the 25th, *Max. · Med.*; (iii) part-way through the run of the 25th, after "Sinister humerus ♒", *Med. · Ferr.*; (iv) before the first entry of the 26th, *Max. · Med.*; (v) after the first entry of the 26th, *Med. · Ferr.* The star column and the altitude column carry no printed head. *Max.*, *Med.* and *Ferr.* are clock names, not unit markers and not the *medii* sense of M.: the sentences beneath the runs spell all three out — *maximum horologium*, *Medium*, *Ferreum*. Because the pair in force changes, the difference between the two clock groups on this page is **three series, not one**: Med. − Ferr. for the 24th; Max. − Med. and then Med. − Ferr. for the 25th; Max. − Med. and then Med. − Ferr. for the 26th — five segments drawn from two distinct pairings. This page is set in roman throughout the observation runs and the clock sentences, and in italic from the rubric *DATO TEMPORE…* to the foot. On this leaf italic is Tycho's own hand and roman his assistants'.

[315] In the third entry above, the star's description overruns its line and the altitude **31° 59½′** stands on a second, right-set line, beneath and to the right of the description, reading "præcedens 31 59½". The altitude column is therefore blank on the line carrying the description itself. The *Scheat* entry prints three spaced dots in each of the two clock groups in place of figures.

- **Die 25** (clocks: Max. / Med.)
- $6^h\ 40^m\ 45^s$ / $6^h\ 43^m\ 46^s$ — Aquila — **41° 58¼′** — or at most 58⅓′
- $7^h\ 38^m\ 25^s$ / $7^h\ 42^m\ 20^s$ — the middle star of the wing — **66° 36½′**
- $8^h\ 4^m\ 25^s$ / $8^h\ 8^m\ 19^s$ — the outermost star of the wing — **62° 40⅔′**
- $8^h\ 18^m\ 20^s$ / $8^h\ 22^m\ 32^s$ — the left shoulder of ♒ — **26° 46′**
- (the head row changes here: clocks Med. / Ferr.)
- $8^h\ 57^m\ 25^s$ / $8^h\ 59^m\ 55^s$ — the right shoulder of ♒ — **31° 49′**, very nearly
- $9^h\ 2^m\ 25^s$ / $9^h\ 4^m\ 20^s$ — the head of Pegasus — **38° 18½′**[316]

At the next following midday the greatest clock went slow by 15^m. The Middle one was running fast by $0^m\ 45^s$; the Iron one also fast, by $2^m\ 30^s$.

- **Die 26** (clocks: Max. / Med.)
- $6^h\ 35^m\ 40^s$ / $6^h\ 39^m\ 0^s$ — Aquila — **41° 58⅓′**
- (the head row changes here, after a single entry: clocks Med. / Ferr.)
- $8^h\ 3^m\ 26^s$ / $8^h\ 6^m\ 45^s$ — the outermost star of the wing — **62° 40¾′** — or at most 41′
- $8^h\ 17^m\ 50^s$ / $8^h\ 20^m\ 40^s$ — the left shoulder of ♒ — **26° 46′**
- $8^h\ 32^m\ 10^s$ / $8^h\ 35^m\ 20^s$ — the mouth of Pegasus — **42° 6½′**
- $8^h\ 49^m\ 5^s$ / $8^h\ 52^m\ 20^s$ — the right shoulder of ♒ — **31° 49′**
- $8^h\ 57^m\ 8^s$ / $9^h\ 0^m\ 40^s$ — the head of Pegasus — **38° 18′**
- $9^h\ 28^m\ 35^s$ / $9^h\ 32^m\ 25^s$ — the bright star of the neck of Pegasus — **42° 47′**
- $9^h\ 37^m\ 38^s$ / $9^h\ 41^m\ 20^s$ — the breast of Pegasus — **56° 31′**
- $9^h\ 51^m\ 27^s$ / $9^h\ 55^m\ 20^s$ — Scheat of Pegasus — **59° 58′**
- $10^h\ 14^m\ 49^s$ / $10^h\ 18^m\ 20^s$ — the first star in the back of)(— **38° 10½′**
- $10^h\ 26^m\ 13^s$ / $10^h\ 29^m\ 50^s$ — the last star in the back, and next preceding the tail of)(— **37° 30′**
- $10^h\ 45^m\ 27^s$ / $10^h\ 49^m\ 35^s$ — the tail of)(— **38° 40′**, very nearly
- $10^h\ 54^m\ 21^s$ / $10^h\ 58^m\ 30^s$ — the head of Andromeda — **60° 53½′**[317]

At the next following midday the greatest clock was running slow by 15^m. The Middle one likewise came in slow, by 2^m. The Iron one, however, was moving fast by 6^m.

[316] The remark on the Aquila entry is broken across two lines: "aut ad ſum-" stands at the right-hand end of the Aquila line and "mum 58⅓" at the right-hand end of the next line, beside the entry for the middle star of the wing. The figure **58⅓** belongs to Aquila, not to that entry.

[317] The remark on the second entry of the 26th is likewise broken across two lines: "vel ad ſum-" at the right-hand end of that line, "mum 41" at the right-hand end of the next, beside the entry for the left shoulder of ♒. The figure **41** belongs to the outermost star of the wing. In the entry for the last star in the back of)(, the description again overruns and the altitude **37° 30′** stands on a second, right-set line reading "præcedens caudam)(37 30". The altitude column is blank on the line carrying the first half of the description.

GIVEN THE TIME, AND GIVEN THE STAR'S ALTITUDE AND AZIMUTH, ITS DECLINATION AND RIGHT ASCENSION WILL BE FOUND.[318]

Let DB be the equator and F its pole; EC the horizon and A its pole; IC the given azimuth, IH the altitude. The time will give the right ascension of the mid-heaven, A*ſc. R. M. C. — B. Take the triangle FAH.*

Two sides are given: FA, the distance between the poles of the equator and of the horizon, and AH, the com-

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plement of the altitude, together with the angle FAH that they contain. Therefore, by the sixth theorem [VI dogma], the side FH will be found — the complement of the declination. Then, from the three sides now given, the ninth gives the angle at F, which measures the difference between the right ascension of the mid-heaven [M. C.], given by the time and by the place of ☉ [the Sun]*, and the right ascension of the star.*

In the same way, on the other side, in the triangle FAL the angle at A is given by the azimuth EM, along with the two sides that enclose it. FL, the complement of the declination, will therefore be found, and by the ninth the angle FAL, whose complement to 180 is the distance from the meridian, and so on.

Diagram. An uncaptioned line figure occupying the left-hand side of the upper part of the page. A full circle is drawn. A horizontal diameter runs from E at the left-hand rim to C at the right-hand rim; standing on or immediately beneath that diameter, from left to right, are E, M, G, I, K, C. A straight oblique line runs from D, on the rim at the lower left, up to B, on the rim at the right; it crosses the horizontal diameter at G, and O and P stand on it between G and B, with N just below it a little to the left of G. Two arcs spring from the top of the circle and cross each other a little below the rim: the one lettered F at the left descends through L to M and continues below the horizontal, and the one lettered A at the right descends through H to K. Fifteen letters are drawn on the figure, and none of them is doubtful.

- A (top, right of F, on the rim): terminal of the right-hand arc
- B (right rim, above the horizontal): upper terminal of the oblique line
- C (right end of the horizontal diameter, on the rim)
- D (lower-left rim): lower terminal of the oblique line
- E (left end of the horizontal diameter, on the rim)

[318] Printed in italic capitals on two centred lines: *DATO TEMPORE ET DATIS STELLÆ ALTITUDINE ET AZIMUTO / DABITUR DECLINATIO ET ASCENSIO RECTA.*

[319] **Structure of this page.** The upper part of the page is a **part-depth two-column block**: the figure occupies the left-hand side, and the text runs in a narrow column beside it at the right. Below the foot of the figure the measure is full again, and everything from the rubric *DATA STELLÆ CŒLI MEDIATIONE…* to the end of the page is set full width. Nothing is composed to the left of the figure. This page is set in italic from the top down to the end of "…et Meridiani.", and in roman for the two observation entries at the foot. On this leaf italic is Tycho's own hand and roman his assistants'. The letters on the figure are upright roman capitals.

- F (top, left of A, on the rim): terminal of the left-hand arc
- G (on the horizontal diameter, at its crossing with the oblique line)
- H (upper right, on the right-hand arc, above the oblique line)
- I (on the horizontal diameter, left of K)
- K (on the horizontal diameter, right of I, where the right-hand arc meets it)
- L (left of centre, on the left-hand arc, above the horizontal)
- M (on the horizontal diameter, where the left-hand arc meets it)
- N (below the horizontal diameter, on the oblique line, left of G)
- O (on the oblique line, between G and P)
- P (on the oblique line, between O and B)[320]

GIVEN A STAR'S CULMINATION AND ITS DECLINATION, ITS LONGITUDE AND LATITUDE ARE FOUND.[321]

Now let EC be the equator and DB the zodiac, with their poles A and F. From the given declination, and from the declination of the point of the ecliptic with which the star culminates, HI is found, and hence its complement AH. The angle FAH is the complement to 180 of the distance of the right ascension from the nearest tropic. The sixth therefore gives FH, the complement of the star's latitude, and the ninth gives in turn the angle HFA, the difference of longitude from the culminating point of the heaven.

But if you would rather work the same thing by right-angled triangles, proceed as follows in the first case.

I. In the triangle GOI the angle at G is known and the side GI is given. The third will therefore give the side GO, and the first OI, and then the third again the angle GOI. Take OI away from the given declination HI, and OH remains.

In the triangle OHP, then, the side OH is given together with its adjacent angle O, which is equal to the angle GOI just found. The third will therefore give the side HP, the latitude; and from the two known sides OH and HP the first will give OP, the difference between GO and GP. Add that difference to the given GO and it yields the longitude GP, reckoned from the equinox.

II. In the triangle GOI find the angle at O by the third. The angle HOP of the other triangle, which is equal to it, is then given along with the side HO, so that the third will give HP, the star's latitude; and from the known HO and HP the first will give OP, the difference of longitude from the given point of culmination.

From this you can construct a table in which, entering with the declination and the culmination, you will find the longitude and latitude of any star whatever. For that

[320] Two letters are drawn on the figure and cited nowhere in the prose of this opening: **K** and **N**.

[321] Printed in italic capitals on two centred lines: *DATA STELLÆ CŒLI MEDIATIONE ET DECLINATIONE, / DATUR EIUS LONGITUDO ET LATITUDO.*

purpose it will be more convenient if you first compute a table of the angles of the ecliptic and the meridian.[322]

- **Die 27**
- (clocks: Med. / Ferr.) $6^h\ 35^m\ 9^s$ / $6^h\ 37^m\ 55^s$ — Aquila — **41° 58⅓′**[323]
- (clocks: Max. / Med.) $7^h\ 30^m\ 45^s$ / $7^h\ 29^m\ 42^s$ — the hand of ♒ — **23° 10½′**[324]

___[325]

- **Die 27** (clocks: Max. / Med.)
- $8^h\ 0^m\ 25^s$ / $7^h\ 59^m\ 29^s$ — the outermost star of the wing of Cygnus — **60° 40⅔′**
- $8^h\ 14^m\ 40^s$ / $8^h\ 14^m\ 2^s$ — the left shoulder of ♒ — **26° 46′**
- $8^h\ 28^m\ 55^s$ / $8^h\ 27^m\ 13^s$ — the mouth of Pegasus — **42° 6⅓′**
- $8^h\ 49^m\ 15^s$ / $8^h\ 48^m\ 47^s$ — the right shoulder of ♒ — **31° 49′**

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[322] **Head rows in the run at the foot of this page.** Two are set, and the second falls between the run's only two entries: (i) *Med.* over the first clock group and *Ferr.* over the second, with the word *Die* standing at the left of the first entry's line; (ii) *Max.* over the first group and *Med.* over the second, on the line that carries the day figure **27**. The difference between the two clock groups in this run is therefore **two series, not one** — Med. − Ferr. on the first line, Max. − Med. on the second. The word *Die* stands one composed line above its figure, as it does at the head of the facing page.

[323] a small raised mark follows this value; it is the only such mark in the altitude column of the opening and it has not been identified.

[324] A small raised mark stands immediately after the fraction in the Aquila entry. No other altitude on either page of this opening carries such a mark. Whether it is a printed minute sign or a mark of some other kind is not settled here, and no minute sign is printed on the second entry. Nothing is composed below the second entry; the run has no closing clock sentence under it, unlike each of the three runs on the facing page.

[325] **Where this page begins, and what it continues.** The first composed line of the page is a head row: *Max.* over the first clock group, *Med.* over the second, with the word *Die* standing at the left of that same line. The first composed line of text carries the day figure **27** at the left — one composed line below *Die*, the relation this work uses — and the entry "Extrema alæ cygni". **Structure of this page.** Full measure throughout: no column rule, no two-column block, no part-depth block. Each observation run is set as two groups of clock figures, a star column, and an altitude column at the right, with a band of small-type remarks standing at the right-hand end of the measure — inside the measure, not in the margin. The prose sentences and the two footnotes run the full width. **Two head rows are set on this page, of two distinct forms.** (i) at the top, *Max.* over the first clock group and *Med.* over the second, with *Die* at the left; (ii) on the line that carries the month rubric *OCTOBRIS.*, *Med.* over the first group and *Ferr.* over the second. The star column and the altitude column carry no printed head. **The difference between the two clock groups on this page is therefore two series, not one** — Max. − Med. for the 27th, and Med. − Ferr. for the whole of October. *Max.*, *Med.* and *Ferr.* are clock names: the sentences beneath the runs spell two of them out, *horologium medium* and *Ferreum*. **The day column changes form part-way down the page.** Above the month rubric the word *Die* is printed, with **27** on the line below it. Below the rubric no *Die* is printed at all: the figures **3**, **4**, **7**, **10**, **12** stand bare at the left of their first entries. This page is set in roman throughout — the entries, the remarks, the clock sentences, the month rubric and the two footnotes alike. On this leaf italic is Tycho's own hand and roman his assistants'.

- $9^h\ 25^m\ 15^s$ / $9^h\ 24^m\ 46^s$ — the bright star of the neck — **42° 47′**
- $9^h\ 28^m\ 20^s$ / $9^h\ 27^m\ 56^s$ — the right knee of Pegasus — **62° 10½′**
- $9^h\ 48^m\ 5^s$ / $9^h\ 47^m\ 41^s$ — Scheat of Pegasus — **59° 58¼′**
- $10^h\ 0^m\ 0^s$ / $9^h\ 59^m\ 27^s$ — the more northerly star in the back of the head of the Southern Fish — **35° 8½′** — or at most 8⅔′
- $10^h\ 11^m\ 20^s$ / $10^h\ 11^m\ 0^s$ — the first star in the back of)(— **38° 11′** — not good enough
- $10^h\ 22^m\ 50^s$ / $10^h\ 22^m\ 29^s$ — the star that follows in the back of)(— (no altitude: three spaced dots stand in the altitude column) [footnote 1]
- $10^h\ 42^m\ 15^s$ / $10^h\ 41^m\ 37^s$ — the tail of)(— **38° 40½′** — or at most ⅔
- $10^h\ 51^m\ 5^s$ / $10^h\ 50^m\ 26^s$ — the head of Andromeda — **60° 53′**
- $10^h\ 56^m\ 10^s$ / $10^h\ 55^m\ 30^s$ — the outermost star of the wing of Pegasus — **46° 58½′**[326]

Because of a cloudy sky it was not possible to correct the clocks on this day.

OCTOBER.[327]

- **3** (clocks: Med. / Ferr.)
- $6^h\ 15^m\ 5^s$ / $6^h\ 3^m\ 35^s$ — Aquila — **41° 58½′**
- **4**
- $8^h\ 4^m\ 12^s$ / $7^h\ 53^m\ 12^s$ — the mouth of Pegasus — **42° 7′** — not good enough
- $8^h\ 23^m\ 15^s$ / $8^h\ 8^m\ 12^s$ — the right shoulder of ♒ — **31° 48′** — because of scattered clouds coming between
- **7**
- $6^h\ 0^m\ 24^s$ / $6^h\ 1^m\ 30^s$ — Aquila — **41° 58¼′**
- $6^h\ 58^m\ 12^s$ / $6^h\ 59^m\ 15^s$ — the middle star of the wing of Cygnus — **66° 35½′**
- $7^h\ 52^m\ 50^s$ / $7^h\ 53^m\ 35^s$ — the mouth of Pegasus — **42° 7′**
- $8^h\ 58^m\ 0^s$ / $8^h\ 59^m\ 20^s$ — the breast of Pegasus — **56° 32′** — not good enough
- $9^h\ 12^m\ 6^s$ / $9^h\ 13^m\ 55^s$ — Scheat of Pegasus — **59° 58½′** — because of scattered clouds coming between.[328]

[326] The remark on the tail of)(is broken across two lines: ”aut ad ſum-” stands at the right-hand end of that entry's line and ”mum ⅔” at the right-hand end of the next line, beside the entry for the head of Andromeda. The fraction ⅔ belongs to the tail of)(, not to that entry. No whole number is printed with it.

[327] The month rubric is printed as a single centred word, *OCTOBRIS.*, in roman capitals, standing on the same composed line as the head row *Med. · Ferr.* at the left of the measure.

[328] Two of the remarks in this run overrun their own entry's line. ”propter nubes” stands beside the right shoulder of ♒ on the 4th, with ”raras inter-” and ”uenientes” carried to the two lines below it, beside the first two entries of the 7th. ”propter raras” stands beside Scheat of Pegasus, with ”nubes inter-” and ”uenientes.” carried to the two lines below it, which are otherwise uncomposed. Each remark belongs to the entry it begins on.

At the next following midday the Middle clock was running slow by $2^m\ 4^s$. The Iron one too was running slow by $12^m\ 0^s$.

- **10**
- $7^h\ 22^m\ 30^s$ / (three spaced dots stand in the second clock group; no time is printed) — the left shoulder of ♒ — **26° 48½′** — not good enough
- $7^h\ 36^m\ 15^s$ / $7^h\ 34^m\ 45^s$ — the mouth of Pegasus — **42° 7⅓′** — three times; it seemed a little better than the previous one, yet not certain enough
- $8^h\ 2^m\ 15^s$ / $8^h\ 0^m\ 10^s$ — the head of Pegasus — **38° 18′** — nor is this one good; when M. Johannes had observed it, he declared that he had not seen the star well enough.[329]

At the next following midday the Middle clock was running slow by $8^m\ 25^s$. The Iron one too was running slow by $20^m\ 0^s$.

- **12**
- $5^h\ 57^m\ 8^s$ / $5^h\ 51^m\ 40^s$ — Aquila was in azimuth 4° from the meridian toward the west, having altitude — **41° 56′**
- $7^h\ 39^m\ 9^s$ / $7^h\ 33^m\ 10^s$ — the mouth of Pegasus on the meridian — **42° 8′**
- $8^h\ 0^m\ 16^s$ / $7^h\ 54^m\ 20^s$ — the right shoulder of ♒ — **31° 50′**
- (no time is printed) — the head of Pegasus was in azimuth from the meridian toward the west:
- at 4° 0′ — **38° 16′**
- at 8° 10′ [footnote 2] — **38° 5′**
- $8^h\ 59^m\ 54^s$ / $8^h\ 53^m\ 55^s$ — the first star of the wing of Pegasus — **47° 7′**
- $10^h\ 3^m\ 0^s$ / $9^h\ 56^m\ 30^s$ — the head of Andromeda — **60° 54′**
- $10^h\ 7^m\ 50^s$ / $10^h\ 1^m\ 10^s$ — the outermost star of the wing — **46° 59⅓′**[330]

At the next following midday the Middle clock was running fast by $7^m\ 12^s$. The Iron one fast by 10^s.[331]

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[329] Both remarks in this run overrun onto the following line and are set toward the right of the measure: "ter, videbatur" on the entry's own line, then "paululum melius priore, non tamen ſatis certa" on the line below; and "neque hæc eſt" on the entry's own line, then "bona, quam cum M. Johannes obſeruaßet affirmauit ſe ſtellam non ſatis vidiße." on the line below. The second turn-line is the longest small-type line on the page. The page prints *M. Johannes*. The abbreviation stands immediately before a personal name and is therefore not the time-minute sort; what it abbreviates is not printed here. No further name, epithet or place is given for him.

[330] A single printed brace joins the two lines of the head-of-Pegasus entry, gathering the two azimuth-and-altitude pairs to the one lead-in. The two lines it joins are "Caput pegaſi fuit in azimuto 4° 0′ 38 16" and "a meridie verſus occaſum 8 10² 38 5"; the lead-in sentence is printed once, across both lines. Neither line carries a clock time in either group. The first entry of this run likewise overruns its line: the description ends and the altitude **41° 56′** stands on a second, right-set line reading "verſus occaſum 4° habens altit. 41 56". The altitude column is blank on the line carrying the opening of the description.

[331] The edition's two footnotes stand at the foot of the page, below a short rule, in small roman type, numbered 1 and 2. They are Dreyer's, not the manuscript's.

1. In the codex, »38 40½ or at most ⅔« (the same figures as belong to the following star), but the figures 40½ were rubbed out at once. The altitude was about 37° 30′.
2. Perhaps 11′.[332]

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- **Die 13** (clocks: Med. / Ferr.)
- $5^h\ 38^m\ 34^s$ / $5^h\ 30^m\ 0^s$ — Aquila — **41° 58′**
- $5^h\ 50^m\ 41^s$ / $5^h\ 41^m\ 55^s$ — Aquila in azimuth 4°, having altitude — **41° 56′**
- $6^h\ 37^m\ 33^s$ / $6^h\ 28^m\ 10^s$ — the middle star of the wing — **66° 35⅓′**
- $7^h\ 4^m\ 7^s$ / $6^h\ 53^m\ 40^s$ — the outermost — **62° 40½′**
- $8^h\ 32^m\ 30^s$ / $8^h\ 20^m\ 20^s$ — the bright star of the neck of Pegasus — **42° 50′** — not good enough
- $8^h\ 52^m\ 8^s$ / $8^h\ 42^m\ 5^s$ — Scheat of Pegasus — **59° 58′** — because of the light of ☾
- $9^h\ 55^m\ 34^s$ / $9^h\ 44^m\ 45^s$ — the head of Andromeda — **60° 54′**[334]

At the next following midday both clocks were in error: the Middle one was running fast by $9^m\ 38^s$, and the Iron one slow by $10^m\ 50^s$.

- **14**
- $5^h\ 35^m\ 47^s$ / $5^h\ 20^m\ 30^s$ — Aquila — **41° 58½′**
- $7^h\ 0^m\ 17^s$ / $6^h\ 45^m\ 40^s$ — the outermost star of the wing of Cygnus — **62° 41′**
- $7^h\ 14^m\ 41^s$ / $7^h\ 0^m\ 0^s$ — the left shoulder of ♒ — **26° 46′**
- $7^h\ 28^m\ 34^s$ / $7^h\ 14^m\ 35^s$ — the mouth of Pegasus — **42° 7′**
- $7^h\ 49^m\ 25^s$ / $7^h\ 36^m\ 5^s$ — the right shoulder of ♒ — **31° 50′**

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[332] The guillemets »…« in footnote 1, and the parentheses within it, are the edition's own. Footnote 1 is keyed to the dot leaders in the altitude column of "the star that follows in the back of)("; footnote 2 is keyed to the figure **8° 10′** in the braced head-of-Pegasus entry.

[333] **Where this page begins.** The first composed line is a head row: *Med.* over the first clock group, *Ferr.* over the second, with *Die* at the left. The first composed line of text carries the day figure **13** — one composed line below *Die* — and the entry "Aquila". **Structure of this page.** Full measure throughout: no column rule, no two-column block, no part-depth block. The runs are set as two groups of clock figures, a star column and an altitude column, with small-type remarks at the right-hand end of the measure, inside it. The prose paragraphs run the full width. **One head row only is set on this page** — *Med.* · *Ferr.* at the top, with *Die* at the left — and it is not repeated for any of the three later runs. **The difference between the two clock groups on this side is therefore one series, not several**, running unbroken from the 13th to the 16th. The star and altitude columns carry no printed head. This page is set in roman except for one line. **The single centred line "Sequentes obſeruationes ſunt ſatis bonæ." is set in italic** — a one-line patch of Tycho's own hand standing inside a page otherwise composed by his assistants. It is the only italic on either side of this opening.

[334] The second entry prints the azimuth as `4 p.`, where the parallel entry on the preceding leaf prints **4°**. The remark on the Scheat entry is set on two lines at the right-hand end of the measure: "propter lumen" on the entry's own line, and the sign ☾ alone on the line below, beside the head of Andromeda. The sign belongs to the Scheat remark.

- $7^h\ 54^m\ 58^s$ / $7^h\ 41^m\ 20^s$ — the head of Pegasus — **38° 20′** — at most
- $8^h\ 25^m\ 34^s$ / $8^h\ 12^m\ 20^s$ — the bright star of the neck of Pegasus — **42° 47½′**
- $8^h\ 48^m\ 59^s$ / $8^h\ 36^m\ 40^s$ — the first star of the wing of Pegasus — **47° 7′**

At the next following midday we could not correct the clocks, since ☉ did not appear that day before evening, and we could not see it set either. Around midday, though, the two clocks stood 7 minutes apart: when the Middle one showed exactly the twelfth hour, the Iron one gave $11^h\ 53^m$. Since I could not tell which of them showed the truer time, I did not dare to move the hand of either or to alter its rate.

- **15**
- $5^h\ 38^m\ 47^s$ / $5^h\ 38^m\ 0^s$ — Aquila — **41° 59′**
- $6^h\ 37^m\ 35^s$ / $6^h\ 37^m\ 30^s$ — the middle star of the wing of Cygnus — **66° 35½′**
- $7^h\ 3^m\ 4^s$ / $7^h\ 3^m\ 20^s$ — the outermost star of the wing of Cygnus — **62° 40¾′**
- $7^h\ 18^m\ 15^s$ / $7^h\ 18^m\ 45^s$ — the left shoulder of ♒ — **26° 46½′**
- $7^h\ 32^m\ 5^s$ / $7^h\ 33^m\ 10^s$ — the mouth of Pegasus — **42° 7′**
- $9^h\ 55^m\ 14^s$ / $9^h\ 57^m\ 45^s$ — the head of Andromeda — **60° 54′**
- $10^h\ 0^m\ 0^s$ / $10^h\ 3^m\ 0^s$ — the outermost star of the wing of Pegasus — **46° 58′**

At the next following midday we found that both clocks had run ahead of noon — the Middle one by $14^m\ 0^s$, the Iron one by $23^m\ 30^s$. This error will apply to the preceding day as well, the day on which we could not correct the clocks because of a foggy sky.

The following observations are good enough.

- **16**
- $5^h\ 24^m\ 0^s$ / $5^h\ 17^m\ 25^s$ — Aquila — **41° 59′**
- $6^h\ 22^m\ 19^s$ / $6^h\ 15^m\ 20^s$ — the middle star of the wing of Cygnus — **66° 35½′**
- $6^h\ 48^m\ 5^s$ / $6^h\ 40^m\ 50^s$ — the outermost star of the wing of Cygnus — **62° 40¾′**
- $7^h\ 2^m\ 40^s$ / $6^h\ 55^m\ 10^s$ — the left shoulder of ♒ — **26° 47′**
- $7^h\ 16^m\ 39^s$ / $7^h\ 9^m\ 10^s$ — the mouth of Pegasus — **42° 8′**
- $7^h\ 37^m\ 19^s$ / $7^h\ 29^m\ 40^s$ — the right shoulder of ♒ — **31° 50′**
- $7^h\ 42^m\ 9^s$ / $7^h\ 34^m\ 40^s$ — the head of Pegasus — **38° 19′**
- $7^h\ 53^m\ 6^s$ / $7^h\ 45^m\ 20^s$ — the right elbow of ♒ — **30° 41′**
- $8^h\ 0^m\ 24^s$ / $7^h\ 52^m\ 40^s$ — of the southern stars in the right hand of ♒, the preceding one — **32° 0′**
- $8^h\ 7^m\ 17^s$ / $7^h\ 59^m\ 20^s$ — the following one of the southern stars in the same hand — **31° 53′**
- $8^h\ 13^m\ 35^s$ / $8^h\ 5^m\ 40^s$ — the bright star of the neck of Pegasus — **42° 48′**

- $8^h\ 22^m\ 44^s$ / $8^h\ 14^m\ 30^s$ — the breast of Pegasus — **56° 33⅔′** — or at the least 33½′
- $8^h\ 35^m\ 22^s$ / $8^h\ 27^m\ 55^s$ — Scheat of Pegasus — **59° 59⅓′**[335]
- **Die 16** (clocks: Med. / Ferr.)
- $8^h\ 48^m\ 16^s$ / $8^h\ 39^m\ 40^s$ — the more southerly star in the back of the head of the southern ♓ — **35° 8′** — very nearly
- $8^h\ 59^m\ 41^s$ / $8^h\ 51^m\ 20^s$ — the first star in the back of the same ♓ — **38° 15½′**
- $9^h\ 11^m\ 5^s$ / $9^h\ 2^m\ 40^s$ — the hinder star in the back of the same ♓ — **37° 30′**
- $9^h\ 30^m\ 34^s$ / $9^h\ 22^m\ 10^s$ — the tail of the southern ♓ — **38° 40¼′**
- $9^h\ 39^m\ 14^s$ / $9^h\ 30^m\ 25^s$ — the head of Andromeda — **60° 55′**
- $9^h\ 44^m\ 12^s$ / $9^h\ 35^m\ 40^s$ — the outermost star of the wing of Pegasus — **46° 58¾′**
- $10^h\ 14^m\ 53^s$ / $10^h\ 6^m\ 35^s$ — the bright star in the tail of Cetus (No. 22) — **13° 53′**
- $11^h\ 22^m\ 34^s$ / $11^h\ 14^m\ 55^s$ — the first of the two stars in the horn of ♈ — **50° 59′**
- $11^h\ 35^m\ 42^s$ / $11^h\ 28^m\ 45^s$ — the following one of the same, in the horn of ♈ — **55° 35′**[336]

At the next following midday both clocks were running slow — the Middle one by $2½^m$, the Iron one by 10.0^m.[337]

- **20** (clocks: Med. / Ferr.; the head row is not repeated)
- $5^h\ 11^m\ 45^s$ / $5^h\ 8^m\ 50^s$ — Aquila crossed the meridian, its altitude as above — (no altitude figure is printed on this line)
- $6^h\ 49^m\ 20^s$ / $6^h\ 39^m\ 30^s$ — the left shoulder of ♒ — **26° 46′** -... /...[1] — the mouth of Pegasus — **42° 7′**
- $7^h\ 24^m\ 5^s$ / $7^h\ 14^m\ 50^s$ — the right shoulder of ♒ — **31° 48½′**
- $7^h\ 28^m\ 55^s$ / $7^h\ 19^m\ 40^s$ — the head of Pegasus — **38° 19′**[338]

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[335] In the ninth entry the description overruns its line: "Præcedens auſtralium in dextra" stands on the entry's own line, and "manu ♒" with the altitude **32° 0′** on a second, right-set line below it. The altitude column is blank on the line carrying the opening of the description. The next entry prints "in eadem manu" with no sign. The remark on the breast of Pegasus is broken across two lines: "aut ad mini-" at the right-hand end of that entry's line, "mum 33½" at the right-hand end of the line below, beside the Scheat entry. The figure **33½** belongs to the breast of Pegasus. The run of the 16th has no closing clock sentence beneath it, unlike each of the three runs above it on this side.

[336] The parenthesis `(No. 22)` is printed on the leaf, at text size, inside the star description.

[337] The leaf prints this sentence's two quantities as **2½** and `10.0`, with the unit word *ſcrupulis* standing once at the end and governing both. The point between the two figures of `10.0` is printed; the leaf does not show whether it separates minutes from seconds.

[338] In the third entry of this run **both** clock groups are printed as three spaced dots, and the edition's footnote marker `1` stands immediately after the second group. The altitude **42° 7′** is printed in full on that line.

At the next following midday the Middle clock came in late by $0^m\ 25^s$, and the Iron one later still, by $4^m\ 40^s$.

DIE 23 OCTOBRIS.

- **23 October** (left-hand column; no head row — the clock is named inline, `Med.,`, in the first two entries only)
- $6^h\ 25^m\ 10^s$ — Med., the outermost star of the wing — **62° 41¼′**
- $6^h\ 39^m\ 5^s$ — Med., the left shoulder of ♒ — **26° 47′** — very nearly
- $6^h\ 53^m\ 15^s$ — the mouth of Pegasus — **42° 7½′**
- $7^h\ 12^m\ 5^s$ — the right shoulder of ♒ — **31° 48′**
- $7^h\ 44^m\ 15^s$ — the following one of the southern stars in the right hand of ♒ — **31° 49½′**
- $7^h\ 50^m\ 14^s$ — the bright star of the neck of Pegasus — **42° 48½′**
- $7^h\ 59^m\ 36^s$ — the breast of Pegasus — **56° 33⅔′**
- $8^h\ 12^m\ 10^s$ — the mouth of the southern Fish — **35° 43¼′** — not good enough
- $8^h\ 24^m\ 51^s$ — the more southerly star in the back of the head of the same ♓ — **35° 7⅔′**
- $8^h\ 36^m\ 6^s$ — the first star in the back of the southern ♓ — **38° 15′**
- $8^h\ 47^m\ 46^s$ — the hinder star in the back of the same — **37° 29⅔′**
- $9^h\ 7^m\ 2^s$ — the tail of the southern ♓ — **38° 40′**
- $9^h\ 15^m\ 55^s$ — the head of Andromeda — **60° 55⅓′**
- $9^h\ 20^m\ 46^s$ — the last star of the wing of Pegasus — **47° 0′**

At the next following midday ☉ could not be seen until it had passed the meridian by about 12^m, at which time the clock showed 10 minutes [recte: *minutum* for *minutorum* — Corrigenda, p. 429] past midday.

DIE 30 OCTOBRIS.

After the quadrant had been adjusted.

- **30 October** (right-hand column; head: Medium Horol.)
- $5^h\ 32^m\ 35^s$ — the middle star of the wing of Cygnus — **66° 35½′**
- $5^h\ 58^m\ 49^s$ — the outermost star of the wing — **62° 41′**
- $6^h\ 13^m\ 11^s$ — the left shoulder of ♒ — **26° 47½′**
- $6^h\ 20^m\ 35^s$ — the preceding star in the hinder thigh — **35° 41′**
- $6^h\ 27^m\ 32^s$ — the mouth of Pegasus — **42° 8⅓′**
- $6^h\ 48^m\ 13^s$ — the right shoulder of ♒ — **31° 48½′**
- $6^h\ 53^m\ 3^s$ — the head of Pegasus — **38° 18½′**
- $7^h\ 4^m\ 3^s$ — the right elbow of ♒ — **30° 40⅔′**
- $7^h\ 24^m\ 31^s$ — the bright star of the neck of Pegasus — **42° 50′** — very nearly
- $7^h\ 47^m\ 37^s$ — Scheat of Pegasus — **59° 58′**

- $7^h\ 59^m\ 38^s$ — the more southerly star in the back of the head of ♓ — **35° 7⅔′**
- $8^h\ 9^m\ 36^s$ — the preceding star in the belly of ♓ — **33° 6⅔′**
- (no clock figure printed) — the first star of the back of ♓ — **38° 17′**
- $8^h\ 22^m\ 45^s$ — the last star of the back of the same Fish — **37° 32′** — very nearly
- $8^h\ 42^m\ 2^s$ — the tail of ♓ — **38° 40½′**
- $8^h\ 50^m\ 54^s$ — the head of Andromeda — **60° 56¼′**
- $8^h\ 56^m\ 6^s$ — the outermost star of the wing of Pegasus — **47° 0′** — very nearly
- $9^h\ 26^m\ 40^s$ — the belly of Cetus — **13° 55½′**[339]

[1] The codex has the times $7^h\ 24^m\ 40^s$ and $7^h\ 14^m\ 50^s$, which are manifestly false.[340]

- **30 October** (continued; head: Med. Hor.)
- $9^h\ 51^m\ 54^s$ — the star in the back of Cetus, number 16 — **21° 44′**
- $10^h\ 7^m\ 38^s$ — the star number 15 in the back of Cetus — **23° 45½′**

At the next following midday ☉ was not seen. At the second midday, however, the clock was running fast by $31^m\ 45^s$.[341]

DIE 1 NOUEMBRIS.

- **1 November** (no head row)
- $6^h\ 21^m\ 46^s$ — the mouth of Pegasus — **42° 8′**
- $7^h\ 18^m\ 58^s$ — the bright star of the neck — **42° 50′**
- $7^h\ 28^m\ 15^s$ — the breast of Pegasus — **56° 32′**
- $7^h\ 40^m\ 50^s$ — the mouth of the Fish — **35° 30′**
- $7^h\ 53^m\ 40^s$ — the more southerly star in the back of the head of ♓ — **35° 9′**
- $8^h\ 4^m\ 5^s$ — the first star in the belly of ♓ — **33° 7¼′**
- $8^h\ 36^m\ 29^s$ — the tail of ♓ — **38° 40′**

DIE 2 NOUEMBRIS.

- **2 November** (no head row)
- $5^h\ 39^m\ 40^s$ — the left shoulder of ♒ — **26° 47½′**
- $5^h\ 53^m\ 21^s$ — the mouth of Pegasus — **42° 8½′** — at most
- $6^h\ 13^m\ 10^s$ — the right shoulder of ♒ — **31° 49′**
- [$6^h\ 48^m\ 15^s$][1] — the bright star of the neck — **42° 49′**
- [$7^h\ 10^m\ 24^s$][1] — the first star of the wing of Pegasus — **47° 8⅔′**

[339] The thirteenth entry of this run — "Prima dorſi)(38 17" — carries **no clock figure at all**: the clock column is blank on that line and the description begins at the star column.

[340] This is the edition's footnote, numbered 1 on this page, keyed to the dotted clock groups of the 20 October run. Its statement about the codex is the editor's judgement.

[341] The leaf sets this interval with the marks of arc — **31′ 45″** — although the quantity is a time.

- *8h 2m 40s — the tail of ♓ — **38° 40′***
- *8h 45m 34s — the belly of Cetus — **13° 54′***[342]

At the next following midday the clock was running slow by 51m 40s.[343]

DIE 10 NOUEMBRIS.

- **10 November** (no head row; no altitude figure is printed anywhere in this run)
- 7h 45m 20s — the head of Andromeda crossed the meridian
- 7h 49m 5s — the outermost star of the wing of Pegasus crossed the meridian marked by the plane of the quadrant.

DIE 12 NOUEMBRIS.

- **12 November** (no head row)
- 12h 18m 40s — the eye of ♉ — **49° 42′**
- 13h 0m 35s — the left foot of Orion — **25° 22′**
- 13h 9m 10s — the left shoulder of Orion — **40° 2′**
- 13h 39m 0s — the right shoulder of Orion — **41° 21⅓′** — very nearly
- *14h 19m 40s — the brighter star in the feet of ♓ [recte: ♊ — Corrigenda, p. 429] — **50° 44′** — not certain enough, because of clouds*

DIE 17 NOUEMBRIS.

- **17 November** (right-hand column; no head row)
- 5h 32m 0s — the right shoulder of ♒ — **31° 48⅓′**
- 5h 55m 20s — the last star but one of the right hand of ♒ — **32° 0′**
- 6h 2m 0s — the last star of the hand of ♒ — **31° 52¼′**
- 6h 32m 3s — the first star of the wing of Pegasus — **47° 6½′**

At the next following midday the clock was running fast by 8m 50s, as we noted from the transit of ☉ across the meridian taken at the plane of the quadrant. In the same way, on 17 November itself, the day on which we made these observations, we observed the transit of ☉ at the plane of the quadrant.

DIE 1 DECEMBRIS.

- **1 December** (no clock figure is printed in this run)
- *the other star in the horn of ♈, shining alone — **55° 32′***
- *or at most — **55° 32½′***

DIE 4 DECEMBRIS.

- **4 December** (no head row)
- 10h 38m 15s — the eye of ♉ — **49° 41⅓′**

[342] The square brackets around the fourth and fifth clock figures are **printed on the leaf** by the edition, and the edition's footnote marker 1 stands immediately after each closing bracket.

[343] This interval too is set on the leaf with the marks of arc — **51′ 40″** — for a quantity of time.

- $11^h\ 19^m\ 55^s$ — the left foot of Orion — **25° 21′** — very nearly
- $11^h\ 28^m\ 40^s$ — the left shoulder of Orion — **40° 1′**
- $11^h\ 36^m\ 5^s$ — the first star of the Belt of Orion — **33° 26½′**
- $11^h\ 40^m\ 30^s$ — the middle star of the Belt — **32° 35½′**
- $11^h\ 45^m\ 5^s$ — the last star of the Belt — **31° 54′**
- $11^h\ 53^m\ 14^s$ — the right foot of Orion — **24° 15⅔′**
- $11^h\ 57^m\ 55^s$ — the right shoulder of Orion — **41° 22′**
- $12^h\ 15^m\ 10^s$ — the outermost star of the left foot of the northern ♊ — **56° 38½′**
- $12^h\ 22^m\ 45^s$ — the heel of the left foot of ♊ — **56° 43′** — very nearly
- $12^h\ 38^m\ 43^s$ — the brighter of the feet of the southern ♊ — **50° 43½′**
- $12^h\ 48^m\ 0^s$ — the other foot of the same ♊ — **47° 25′**
- $12^h\ 51^m\ 40^s$ — Syrius, that is Canis Major — **17° 58′**[344]

At the time of the observations the sky was moderately clear. At the next following midday the clock was running slow by very nearly 9^m.

DIE 16 DECEMBRIS.

- **16 December** (no head row; no clock figure is printed anywhere in this run)
- the bright star above the head of ♈ — **55° 31⅔′**
- *the more westerly star in the lower jaw of Cetus — **32° 37′***
- *the middle star in the same jaw — **35° 33′** — or perhaps a little more, for it was not exactly on the meridian*

[1] Struck through with lines.[345]

- The same was found again to be **35° 31′ 30″**.

Note. The outermost star of the foot of ♊*, which I once observed in a certain lunar eclipse in the year 73, stands in a straight line with the uppermost star of the foot and with the star in the belly of the lower* ♊*, being distant from that same star (that is, from the uppermost of the foot) 13.16; and it stands in a very nearly straight line with the lower horn of* ♉.[346]

- the first and brighter star in the lower jaw of Cetus — **36° 29′** — or at most 29½′
- the eye of ♉ — **49° 44′**
- *or 43; but I am not yet so far certain about this observation.*
- *the bright foot of Orion — **25° 22½′** — at most 23′*
- *Bellatrix — **40° 2½′***
- *the middle star of the Belt — **32° 36′***
- *the last star of the Belt — **31° 56′***

[344] The leaf spells the star `Syrius`.

[345] This is the edition's footnote, numbered `1` on this page, its one marker keyed to both of the square-bracketed clock figures in the 2 November run.

[346] The parenthesis *(fc. fuprema pedis)* is printed on the leaf, within this italic paragraph. The distance is printed `13.16`, with the point set between the two figures; the leaf does not show what the point separates.

- *the other foot of Orion — **24° 16′***
- *the bright shoulder of Orion — **41° 22′** — or 22½′*
- 12ʰ 47ᵐ 50ˢ — the southern head of ♊ — **63° 4′**
- *the heel of the foot of the same — **56° 41′***
- the bright star of Hydra — **27° 13½′**
- cor ♌ — **48° 6′** — not certain
- the tail of ♌ — **51° 0′**
- Spica ♍ — **25° 10′**

DIE 23 DECEMBRIS.

After the greater quadrant had been adjusted.

- 5ʰ 27ᵐ 30ˢ (Max.) / 5ʰ 27ᵐ 10ˢ (Med.) — the bright star in the belly of Cetus, called deneb caitos — **13° 53½′**[347]
- *the first star of ♈ — **51° 18½′***
- *the following star in the horn — by both — **52° 52′***
- *the third star in the other horn — by the smaller **55° 33½′**; by the greater **55° 35′***
- *the bright star of the lower jaw of Cetus — **36° 30′**; but by the greater **36° 32′***
- the breast of ♉ — **45° 21½′**
- the mouth, and the first and more westerly star, of ♉¹ — **48° 40′** -...² ♉ — **49° 2′**
- the eye of ♉ — **49° 42′**; by the greater, exactly, **49° 43′**
- *the first star of Eridanus, by the smaller — **28° 25′***
- *the brighter foot of Orion — by the smaller **25° 22′**; by the greater **25° 24′***
- *the left shoulder of Orion — by the smaller **40° 0′**; by the greater **40° 1½′***
- *the first star of the Belt — **33° 26′***
- *the second of the Belt — **32° 37′***
- *the third of the Belt — **31° 54′***
- *the right shoulder of Orion — **41° 20½′**; by the greater **41° 23½′***
- *the outermost star of the upper foot of ♊ — by the smaller **56° 39⅔′**; by the greater quadrant **56° 39½′***
- *the following star at the heel, which is the uppermost of the foot and the more northerly of the four in the feet of ♊ — by the smaller quadrant **56° 45′**, or 44½′; by the greater **56° 44′***[348]

[347] A brace stands on the leaf at this entry, its two arms enclosing the two clock lines `5 27 30 Max.` and `5 27 10 Med.` and opening to the right onto the star description, which is printed **once** and runs across both lines (*Stella lucida in ventre* on the first, *ceti dicta deneb caitos* on the second). The altitude **13 53½** stands on a third line, right-set, below both.

[348] The three spaced dots on the line below it stand **in the star-name position**, not in a value position; the altitude is printed in full on that line, and the sign ♉ stands at the right-hand end of the name column as it does on the line above.

The time that elapsed while these two little stars crossed the meridian was $0^h\ 7^m\ 35^s$, which agrees with the distance of the stars given above, 1.46, observed the same evening. Trust this one.[349]

- *Canis Major, by both — 17° 58′*
- *the uppermost head of* ♊ *— by the smaller 66° 49′ —* good

At $12^h\ 22\frac{5}{6}^m$ the southern head of ♊ *crossed the meridian, and from this you will therefore be able to verify the clock's time. Its altitude was:*

- by the greater quadrant 63° 4′; but by the smaller 63° 3′ — both good[350]

DIE 24 DECEMBRIS.

Andreas observed these altitudes carefully.

- *the uppermost star of the head of Hydra — 42° 1′*
- *the one that lies about the temples — 41° 37½′*
- *the second star in the lead-out of the neck — 38° 9½′*
- *the bright star of Hydra — 27° 14½′*

[1] It is the star γ Tauri, »in facie, fucularum prima in naribus« [in the face, the first of the Hyades, in the nostrils].

[2] The star's name is missing in the codex. Probably θ′ Tauri.[351]

- *the star in the foot of* ♌ *— 45° 50′*
- *the more southerly star in the head of* ♌ *— 59° 41′*
- *the third star of the neck of* ♌ *— 55° 52′*
- cor ♌ — 48° 3′
- *the middle star of the neck — 56° 1′*
- *the thigh of* ♌ *— 56° 54½′*
- *the tail of* ♌ *— 51° 0⅓′*
- *the middle star of the wing of* ♍ *— 34° 59′*
- *Spica — 25° 10′*

The same night we observed the following altitudes with the Greatest Quadrant; it was the architect who made the observations. But the quadrant had not yet been exactly adjusted at its sights, and you also have some earlier observations taken with it, under the 23rd, which are on that account not settled enough and must be weighed afresh.

- *the bright star of Hydra — 27° 16′*
- cor ♌ — 48° 6′
- *the middle star of the neck of* ♌ *— 56° 2½′*
- *the thigh of* ♌ *— 56° 56′*

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[349] The distance is printed `1.46`, with the point set between the figures; the leaf does not show what the point separates.

[350] A second brace stands on the leaf here, its two arms enclosing the two altitude lines `63 4` and `63 3` and opening to the right onto the word *bonæ*, which is printed **once** and serves both lines.

[351] These are the edition's two footnotes, numbered `1` and `2` on this page and set below the column rule across the measure. The guillemets are the edition's; the words they enclose are quoted Latin.

- *the tail of ♌ — 51° 0′*
- *Spica ♍ — 25° 9¾′*

But these observations must be taken again, as must the preceding ones as well, which were taken with the Greatest Quadrant.

After the sights of the Greater had been adjusted.

- *the head of Andromeda — by the smaller 60° 54′; by the greater 60° 53½′*
- the bright star of the square of Cetus, deneb kaitos — by the smaller **13° 51½′**; by the greater **13° 51¼′**
- the preceding of the two next the tail of Cetus, number 16 — **21° 43½′**
- the next following, number 15 — **23° 46′** — very nearly — or **23° 45⅔′**
- the belly of Cetus — by the smaller **16° 0′**; by the greater **15° 58′**
- the bright star in the head of ♈ — by the smaller **55° 32′**; by the greater **55° 31½′**
- the lower star in the neck of Cetus — by the smaller **29° 13½′**; by the greater **29° 11½′**
- *the middle star of the jaw of Cetus — 35° 33′; 35° 31½′*
- *the first star of the jaw — by the smaller 36° 33′; by the greater 36° 30′*[352]

Then, the sights of the Greater Quadrant having been adjusted a little better still, these same were observed the same night.

- *the breast of ♉ — greater quadrant 45° 19½′; smaller quadrant 45° 21′*
- *the eye of ♉ — 49° 42′; 49° 41½′*
- *the left foot of Orion — 25° 22′; 25° 22′*
- *the left shoulder — 40° 1½′; 40° 1′*
- *the first star of the Belt — 33° 26′; 33° 25½′*
- *the second — 32° 34′;…*
- *the third star of the Belt — 31° 52½′; 31° 53′*
- *the right foot of Orion — 24° 14′; 24° 14′*
- *the right shoulder — 41° 21½′; 41° 21′*
- *the heel of the upper left foot of ♊ — 56° 44⅔′; 56° 43′*
- *the southern head of ♊ — 63° 3′; 63° 3′*
- *the bright star of Hydra — 27° 13¾′; 27° 13½′*
- *cor ♌ — 48° 4′; 48° 3′*
- *the bright star of the neck — 56° 1½′; 56° 0′*
- *the hip of ♌ — 56° 54¼′; 56° 54½′*

[352] In this run the tag *fere* ("very nearly") stands alone on its own line, right-set, below the altitude of star number 15, and the alternative value on the line beneath it is introduced by *aut* with no star named — the leaf prints only aut **23 45⅔**. The second reading of the middle star of the jaw of Cetus likewise stands on a line of its own with **no label at all**, the bare figures **35 31½** right-set below 35 33. The leaf spells the lead-in *Poſt rectificata pinnacidia* ***Majoris***. with a j, where the right-hand column of the same side sets *Maioris Quadrantis* with an i. The same star's Arabic name is set *deneb caitos* on the preceding side and *deneb kaitos* here.

• *the tail of ♌ — 51° 0½; 51° 0½*[353]

And these later observations are certain enough and agree among themselves; you may use them without error.

The same morning Spica crossed the meridian, its altitude by the smaller quadrant 25.10, and by the greater 25.10½. But because the iron had frozen, the alidade could not be moved about that place accurately enough, so that Spica was seen a little brighter in the lower part of the sight than in the upper; its altitude must for that reason be a little less, and another observation, taken more reliably with the same greater instrument, bore this out.[354]

Before Spica crossed the meridian, however, two stars of ♍ were observed with the smaller quadrant, in this manner:

• *the second star of the wing of ♍ —...; 35° 46′*
• *the third and brighter star of the wing —...; 34° 59′*
• *Arcturus — 55° 30½; 55° 30′, or 30½*[355]

DIE 28 DECEMBRIS.

• the tail of Cetus — greater quadrant **13° 53′**; smaller **13° 52′**
• the preceding star at the tail of Cetus —...; **21° 43′**[356]
• the lower star of the former horn of ♈ — **51° 18′**; **51° 20′**
• the upper horn of the same — **52° 49′**; **52° 53′**
• the hinder horn of the same — **55° 32⅓′**; **55° 32½′**
• the middle star of the jaw of Cetus —...; **32° 38′**
• the bright star of the jaw of Cetus — **36° 31′**; **36° 32′**
• the bright star of the Pleiades —...; **57° 7′**
• at another time — **57° 6½′**
• the breast of ♉ — **45° 21½′**; **45° 21⅓′**
• the lowest and bright star of the intersection of ♉¹ — **41° 37′**
• the eye of ♉ — **49° 41½′**; **49° 42′**
• the third star in the hide of ♉ which Orion holds —...; **40° 18′**
• the second in the hide — **38° 58½′**

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[353] This run is set under the head *Qu. mai. · Qu. min.*, the first figure group of each line standing under the greater quadrant and the second under the smaller. On the line for the second star of the Belt the smaller-quadrant group is **three spaced dots**; the greater-quadrant value is printed in full beside it. The abbreviated description *Calx ſuper. ſin. ped.* ☌ and *Caput mer.* ☌ are the leaf's own contractions.

[354] The two altitudes in this paragraph are printed `25.10` and **25.10½**, each with a point set between the figures; the leaf does not show what the point separates. The leaf sets *poßis* and *eße* with the German ß sort for the double s.

[355] This run is set under the head *Per mai. · Per min.* In the first two entries the greater-quadrant group is **three spaced dots**; the smaller-quadrant value is printed in full beside each. The alternative *vel 30½* stands alone on a right-set line below the Arcturus entry, in the smaller-quadrant column.

[356] This run is set under the head *Per mai. quadr. · per min.* Its second entry's description overruns onto a right-set second line (*Præcedens ad / caudam Ceti*), and its greater-quadrant group is **three spaced dots**.

- the first in the hide — **35° 48′**
- the first star in Eridanus, at the foot of Orion —...; **28° 26′** — very nearly
- the left foot of Orion — **25° 23½′**; **25° 22½′**
- the left shoulder of Orion —...; **40° 1′**
- the first star of the Belt —...; **33° 25′**
- the second of the Belt — **32° 33½′**; **32° 37½′**
- the last of the Belt — **31° 52¼′**; **31° 54′**
- the right shoulder of Orion — **41° 20½′**; **41° 20′**

The difference of transit between the outermost star of the foot and the heel of ♊, on the clock: $7^m\ 52^s$.

- the outermost star of the foot of ♊ — **56° 37¾′**; **56° 39′**
- the heel of the foot of ♊ — **56° 44′**; **56° 44′**
- the upper head of ♊ —...; **66° 49′**
- the leading star in Canis Minor — **42° 9½′**;...
- the lower head of ♊ — **63° 4′**; **63° 3½′**
- the northern Ass of ♋ —...; **57° 0½′**
- the bright star of Hydra —...; **27° 13′**
- the southern star of the head of ♌ —...; **59° 46′**
- the third star of the neck of ♌ —...; **52° 55½′**
- cor ♌ — **48° 4⅔′**; **48° 4′**
- the middle star of the neck of ♌ —...; **56° 1′**
- the hip of ♌ —...; **56° 55′**
- Arcturus —...; **55° 30½′**

DIE 29 DECEMBRIS.

By the smaller.

- the breast of ♉ — **45° 20½′**
- the first star of Eridanus at the left foot of Orion — **28° 25½′**
- the left foot of Orion — **25° 22¾′**
- the left shoulder of Orion — **48° 1⅓′**
- the heel of the foot of ♊ — **56° 44′**
- the right foot of ♊, northern — **50° 47½′**
- the brighter of the feet of ♊, southern — **47° 24′**
- the belly of ♊ — **51° 20′**
- the northern head of ♊ — **66° 49′**
- the southern head of ♊ — **63° 3½′**
- $12^h\ 14^m\ 45^s$ by the smaller / $12^h\ 13^m\ 25^s$ by the greater — the right wing of the Swan had, on the northern meridian, an altitude by the greater of **10° 10′** —...
- the bright star of Hydra, by the smaller — **27° 14′**
- cor ♌ — **48° 5′**

• the tail of ♏ — **51° 0⅔′**[357]

Lesser clock · greater · meridian altitude by the smaller quadrant

• $4^h\ 32^m\ 48^s$ / $4^h\ 29^m\ 0^s$ — the uppermost star of the seat of Caßiop. — **26° 56′**
• Shedir [recte: *Schedir* — Corrigenda, p. 429] Caßiopeæ — **20° 15′**
• $5^h\ 5^m\ 25^s$ / $5^h\ 0^m\ 15^s$ — the middle star of the wing of ♍ — **34° 59½′**
• $5^h\ 18^m\ 35^s$ / $5^h\ 13^m\ 45^s$ — the thigh of Caßiopeæ — **24° 1½′**
• $5^h\ 50^m\ 45^s$ / $5^h\ 44^m\ 40^s$ — Spica ♍ — **25° 10′**
• $5^h\ 58^m\ 50^s$ / $5^h\ 52^m\ 20^s$ — the pole star — **53° 1′**
• $6^h\ 14^m\ 10^s$ / $6^h\ 7^m\ 5^s$ — the foot of Caßiopeæ — **27° 30′**
• the knee of Arcturus — **54° 40½′**
• Arcturus — **55° 30′**
• $8^h\ 34^m\ 0^s$ / $8^h\ 23^m\ 0^s$ — ☉ was rising[358]

On the next following midday both clocks were running fast, the Maximum by $4^m\ 20^s$, the Medium by $22^m\ 30^s$.

DIE 30 DECEMBRIS.

By the greater quadrant.

• *$4^h\ 56^m$ — the pole star at its greatest altitude — **58° 51⅚′***
• *$7^h\ 28^m$ about — the bright and leading one of the two forward stars of the Lesser Bear — **41° 46¼′***
• *$7^h\ 58^m$ — the other star in the Lesser Bear — **39° 14½′***

By the smaller quadrant.

• the first star of Eridanus at the feet of Orion — **28° 25½′**
• the star following it, at the foot of Orion — **26° 47′**
• the hip of the Hare — **19° 4′**
• the outermost star of the foot of ♊ — **56° 39½′**
• the heel of the foot of ♊ — **56° 44′**
• the southern head of ♊ — **63° 3½′**
• cor ♏ — **48° 4′**

[1] Inserted afterwards; I do not know with which quadrant it was observed.

Greater clock

• $4^h\ 3^m\ 4^s$ — the tail of ♏ on the meridian; altitude as above
• $4^h\ 53^m\ 0^s$ — the pole star on the meridian — **52° 58′ 10″**
• $4^h\ 55^m\ 45^s$ — the middle and bright star of the wing of ♍ — **34° 59′**
• $5^h\ 38^m\ 0^s$ — Spica ♍ — **25° 10′**

[357] A brace stands on the leaf at this entry, its two arms enclosing the two clock lines `12 14 45 minus` and `12 13 25 maius` and opening to the right onto the sentence, which is printed **once** and runs across the two lines and on for two more (*Dextra ala Cygni ha- / buit in ſeptentrional / meridiano altitudinem / per maiorem 10 10*).

[358] Three of its ten entry lines carry no clock figures at all (*Shedir Caßiopeæ*, *Genu Arcturi*, *Arcturus*), and the last carries clock figures but no altitude.

- the star at the knee, or in the calf, of Arcturus — **54° 40′** — moderately good, but to be taken again
- Arcturus — **55° 30⅔′**

On the following midday the greater clock was running fast by at least 20ˢ, a third of one minute.

OBSERUATIONES FIXARUM PER SEXTANTEM ET RADIUM PRO DISTANTIJS HABENDIS.[1]

Observations of the fixed stars with the Sextant and the Radius, for obtaining distances.

DIE 7 IANUARIJ.

In the evening Petrus observed these distances with the Radius.

- *the eye of ♉ and Capra — **30° 10′***
- *the eye of ♉ and the bright star of the shoulder of Orion — **21° 10′***
- *the shoulders of Orion — **7° 28′***
- *the outermost star of the right wing of the Swan, and Scheat — **24° 25′***
- *Scheat and the middle star of the right wing of the Swan — **30° 6′12***
- *the tail of the Swan and the middle star of the right wing — **11° 24′***
- *the middle star of the wing, and Lyra — **26° 16′***
- *Lyra and the tail of the Swan — **23° 46′13***
- *the outermost star of the right wing of the Swan, and the mouth of Pegasus — **21° 37′***
- *the outermost star of the right wing of the Swan, and Aquila — **28° 30′***
- *Aquila and Lyra — **34° 28′***
- *the outermost star of the wing of the Swan, and Lyra — **32° 53′***
- *the mouth of Pegasus and Scheat — **25° 44′***
- *the mouth of Pegasus and the middle star of the right wing of the Swan — **27° 29′***
- *the outermost and the middle star of the right wing of the Swan — **6° 48′***

All these observations were repeated three times with the radius, which goes wrong at the greater distances.

DIE 16 APRILIS.

- with the sights of the Sextant, the distance of the heads of ♊ was taken — **4° 24′**
- with the Sextant, without the sights — **4° 27′**
- the same distance by the Radius — **4° 24⅓′**
- a second time by the Radius — **4° 24′**
- by the radius, between the most southerly of the three in the right hand of Andromeda and the right knee of Pegasus — **16° 57′**
- between Scheat and the same star in the hand of Andromeda, by the Radius — **16° 49′**

Because of the brightness of ☾ and the dense exhalations, the star in the hand of Andromeda was seen only dimly.

DIE 24 APRILIS.

- with the Sextant, without the sights, between the tail and the breast of the Swan — **6° 10′**
- with the sights of the Sextant — **6° 5′**
- by the Radius — **6° 4′**

DIE 29 APRILIS.

With the sights of the Sextant.

- between the tail and the hip of ♌ — **10° 14′**
- without the sights — **10° 25′**
- but by the Radius — **10° 13′**
- between the neck and the tail of ♌, with the sights of the Sextant — **21° 58′**
- without the sights, between the same — **22° 23′**
- but by the Radius, between the same — **21° 56′**
- between the most southerly of the three in the hand of Andromeda and the right knee of Pegasus, by the radius, at most — **17° 3′**

[1] Instituted by Petro Jacobi Flemløse.
[2] (5) is written beside it.
[3] 45 is written above it.[359]

At the same time I also got 17° 0′ now and then, and that two or three times; several times also a little below it, and sometimes a very little above 17° 0′ — but on this day only. Moreover, on earlier days the distance between the same stars was taken at about 17° 0′ a number of times.

DIE 2 MAIJ.

- With the sights of the Sextant, between the neck and the tail of ♌ — **21° 59′**
- without the sights — **22° 24′**
- by the Radius, between the same — **21° 56½′**
- On the same day I took with the Radius the distance between the most southerly of the three in the right hand of Andromeda and the right knee of Pegasus — **16° 57½′**

DIE 9 MAIJ.

- With the sights of the Sextant, between the tail and the hip of ♌ — **10° 13′**

[359] These are the edition's three footnotes, numbered 1, 2 and 3 and set below the column rule under the left-hand column. Footnote 1's name is printed in the ablative, *A Petro Jacobi Flemløse*. Footnotes 2 and 3 each report a figure written in the manuscript beside or above the printed one — (5) against the printed 30 6, and 45 against the printed 23 46.

- without the sights, however — **10° 24′**
- by the radius, between the same — **10° 14′**

DIE 15 OCTOBRIS.

These distances were taken with the astronomical Radius.

- Between the bright star of the Vulture and the left hand of Antinous — **13° 38½′**
- Between the Vulture and the upper horn of ♉ — **10° 56′**
- Between the Vulture and the left shoulder of ♒ — **14° 32½′**

DIE 16 OCTOBRIS.

- *Between both the upper stars of Pegasus — **16° 22′***

And that with the Sextant, where no account of parallax arises, since both stars appeared in the parallel of the instrument's centre.

- Between the shoulders of Hercules — **10° 17′**

With the Radius

- Between the Vulture and the mouth of Pegasus — **27° 50′**
- Between the mouth of Pegasus and the bright star of the neck — **13° 57′**
- Between the mouth of Pegasus and the first star of the wing — **20° 16′**
- Between the mouth of Pegasus and Scheat — **25° 46′**
- Between the bright star of the neck and the first star of the wing — **7° 5′**, very nearly
- Aquila and the lower horn of ♉ are distant — **24° 34′**

The four preceding observations were made through mist.

- Aquila and the mouth of Pegasus — very nearly **27° 50′**
- Aquila and the left hand of Antinous — **10° 49¼′**
- Aquila and the lower horn of ♉ — **24° 34′**
- The hand of Antinous and the lower horn of ♉ — **13° 56½′**
- Aquila and the left shoulder of ♒ — **28° 30′**
- Both shoulders of ♒ — **9° 55′**

The left shoulder could not be seen well enough.

- The mouth of Pegasus and the bright star of the neck — **14° 0′**
- The mouth of Pegasus and Scheat — very nearly **25° 47′**
- The bright star of the neck and the first star of the wing — **7° 4½′**
- The mouth of Pegasus and the first star of the wing — **20° 12′**
- The bright star of the neck and Scheat — **17° 50½′**

DIE 30 OCTOBRIS.

They are distant, by the Radius:

- The bright star of the Vulture and the head of Ophiuchus — **33° 28′**
- The bright star of the Vulture and the head of Hercules — **38° 39′**

These observations were made with the outermost sights of the Radius, in a great storm.

- The tail of the Vulture and the mouth of Pegasus — **41° 59′**

- The mouth of Pegasus and the left hand of Antinous — **25° 23′**
- The mouth of Pegasus and its right knee — **24° 26′**
- The bright star of the neck of Pegasus and the right knee — **19° 4′**
- The bright star of the neck of Pegasus and Scheat — **17° 42′**
- Afterwards I took — **17° 40′**
- The mouth of Pegasus and its head — **7° 15′**
- Afterwards — **7° 16′**
- — **7° 15′**

DIE 2 NOUEMBRIS.

By the Armillae, set right by means of the Vulture: the mouth of Pegasus at 25° 55′ of ♒, latitude 21° 58′. We also observed several times the same evening, with the Radius, that the mouth of Pegasus and the bright star of the Vulture stood 27° 55′ apart, which agrees. For the complement of the Vulture's latitude is 60° 41′, and the complement of the latitude of the mouth of Pegasus 68° 2′, while the difference of the two longitudes [recte: *longitudinis vtriusque* for *longitudinem vtrarumque* — Corrigenda, p. 429] *is 30° 0′ — these being presupposed to stand so from the observations and from the givens.*

The distance will therefore come out 27° 56′, which agrees well enough with what precedes.

On the same day I found the middle and brighter star of the neck of Pegasus, by the Armillae, at 10° 22′ of ♓; on the other side, 10° 0′; latitude 17° 30′. And so, if something like the mean is taken, the true longitude of this star would stand at 10° 10′ of ♓. Between the mouth of Pegasus and the bright star of the neck I found, that evening, 14° 8′. Afterwards I observed the first star of the wing, the one called Marcab, in longitude about 17° 25′, its own latitude being 19° 20′.

DIE 4 NOUEMBRIS.

- The Vulture and Lyra — **34° 6′**
- Lyra and the tail of the Swan — **23° 24′**
- The tail of the Swan and the breast of the same — **6° 0′**

DIE 7 NOUEMBRIS.

Distances with the Radius.

- The Vulture and the tail of the Swan — **37° 56′**
- The same distance, found a second time — **37° 55′**
- The head of Hercules and of Ophiuchus — **5° 9′**; this must be taken again under a clearer sky
- Lyra and the tail of the Swan — **23° 20′**
- a second time — **23° 21′**
- The right wing of the Swan and its beak — **17° 15′**, very nearly
- The left wing and the beak — **16° 56′**
- The right and the left wing — **16° 6′**, very nearly
- The right wing and the breast of the Swan — **8° 15′**

- The breast and the tail of the Swan — **6° 4′**, very nearly
- The left wing and the breast of the Swan — **7° 51′**

These observations were made in air darkened with cloud, and in bright moonlight.

DIE 12 NOUEMBRIS.

Distances with the Radius

- The Vulture and the bright star which stands a little above the tail of the same — **12° 5′**, very nearly
- Between the tail of the Swan and Lyra — **23° 23′**
- Between the tail of the Swan and the first star of the right wing — **9° 49′**, twice
- Between the tail of the Swan and the left wing — **11° 20′**
- another reading — **11° 18′**
- Between the right wing and the breast of the Swan — **8° 20′**
- Between Aquila and the right shoulder of ♒ — **35° 6′**
- another reading — **35° 4′**
- Between the mouth of Pegasus and the bright star of the neck — **14° 7′**
- Between the mouth of Pegasus and the first star of the wing — **20° 9′**
- From the mouth of Pegasus to the outermost star of the wing — **37° 8′**
- From the outermost star of the wing of Pegasus to the brighter horn of ♈ — **24° 50′**
- From the middle horn of ♈ to the eye of ♉ — **38° 36′**
- another reading — **38° 34′**
- From the eye of ♉ to the lower head of ♊ — **45° 6′**
- another reading — **44° 58′**
- From Canis Minor to the eye of ♉ — **46° 18′**

DIE 17 NOUEMBRIS.

With the Radius.

- Between the bright star of the Crown and the bright star of the Vulture — **63° 40′**
- Between the heads of Hercules and Ophiuchus — **5° 8½′**

DIE 18 NOUEMBRIS.

With the Radius.

- Between the heads of Hercules and Ophiuchus — **5° 9′**
- Between the hand of Antinous and the left shoulder of ♒ — **20° 47′**
- Between the bright star of the Crown and the bright star of the Vulture — **63° 40′**
- Between Lyra and the tail of the Swan — **23° 21′**

DIE 24 NOUEMBRIS.

They were distant, by the Radius:

- The bright star of the Crown and Spica ♍ — **49° 40′**
- Spica ♍ and cor ♌ — **55° 54′**
- Cor ♌ and the lower head of ♊ — **36° 24′**

DIE 25 NOUEMBRIS.

With the Radius.

- Cor ♌ and Canis Minor — **41° 44′**
- Canis Minor and the lower head of ♊ — **22° 38′**
- Cor ♌ and the tail of ♌ — **8° 16′**

DIE 26 NOUEMBRIS.

With the Radius.

- The hand of Antinous and the mouth of Pegasus — **25° 11′**
- The bright star of the Vulture and the head of Ophiuchus — **33° 26′**
- Between the lower horn of ♑ and the left hand of Antinous — **14°..′**[360]
- Aquila and the lower horn of ♑ — **24° 30′**
- The bright star of the Vulture and the head of Hercules — **38° 24′**
- From the right knee to Scheat — **4° 51′**
- Between the Vulture and the outermost star of the wing of the Swan — **28° 40′**
- Between the Vulture and the middle star of the wing of the Swan — **27° 45′**
- Aquila and the left shoulder of ♒ — **28° 52′**
- Both shoulders of ♒ — **9° 55′**, very nearly

They are distant, by the Radius, the sky being moderately clear:

- The most southerly star in the right hand of Andromeda and the right knee of Pegasus — **16° 55′**
- The same star in the hand of Andromeda and the star at the tip of the right foot of Pegasus — **19° 58′**

These could not be seen clearly.

- Scheat and the star just named in the hand of Andromeda — **16° 35½′**
- The eye of ♉ and Propus — **21° 38′**

I could not see Propus exactly enough.

- The eye of ♉ and the star at the tip of the left foot, the northern one, of ♊ — **24° 7′**
- The eye of ♉ and the star at the heel of the left foot, the northern one, of ♊ — **25° 55′**
- Propus and the star just named in the left foot of ♊ — **4° 27′**

Propus could not be seen well enough.

- The star at the tip of the left foot and the heel of that same foot, the northern one, of ♊ — **1° 51′**

[360] the edition prints the degrees, then two spaced dots in place of the minutes, then a footnote reference. Dreyer's footnote, set in roman small type at the foot of this column, reads: Minuta ſunt lineis craßis deleta. — "The minutes are struck out with thick lines."

- The same distance afterwards, **1° 50′**; another reading, **1° 46′**
- The southern head of ♊ and the star at the heel of the left foot, the northern one, of ♊ — **19° 22½′**
- The southern head of ♊ and the star at the tip of the left foot, the northern one, of ♊ — **21° 6′**
- The southern head of ♊ and Propus — **23° 8′**

Here too Propus could not be seen clearly enough.

DIE 28 NOUEMBRIS.

By the Radius.

- The left hand of Antinous and the lower horn of ♑ — **14° 1½′**
- Aquila and the lower horn of ♑ — **24° 34′**
- The hand of Antinous and the mouth of Pegasus — **25° 5′**
- The hand of Antinous and the left shoulder of ♒ — **20° 24′**
- The shoulders of ♒ — **9° 55′**
- The mouth of Pegasus and the bright star of the neck — **13° 59′**
- The outermost star of the wing of Pegasus and the upper horn of ♈ — **24° 40′**
- The first star of the wing of Pegasus and the outermost of the same — **16° 23′**
- Scheat and the right knee of Pegasus — **4° 52½′**

DIE 30 NOUEMBRIS.

By the Radius.

- The head of Ophiuchus and the bright star of the Crown — **31° 46′**
- Between the right wing of the Swan and the breast — **8° 14′**
- The hand of Antinous and the bright star of the Vulture — **10° 48′**
- Between the left wing of the Swan and the breast — **7° 49½′**
- The bright star of the Vulture and the tail of the same — **4° 12′**
- The hand of Antinous and the mouth of Pegasus — **25° 5′**
- Aquila and the left shoulder of ♒ — **28° 54′**
- Between the shoulders of ♒ — **9° 54′**

With the iron Sextant.

- The eye of ♉ and the star at the tip of the left foot, the northern one, of ♊ — **24° 34′**, the parallax not subtracted.

It was not clear enough.

DIE 1 DECEMBRIS.

- The tail and the breast of the Swan — **6° 2′**
- The middle star of the left wing and the breast — **7° 46′**
- The right wing and the breast — **8° 15′**
- The hand of Antinous and the bright star of the Vulture — **10° 48½′**
- The shoulders of ♒ — **9° 55′**

DIE 16 DECEMBRIS.

I myself observed carefully with the Radius that the tip of the foot and the heel are **1° 46′** *apart — a good observation.*

With the new Sextant, which admits no parallax.

- *Between Lyra and the bright star of the Vulture —* **34° 11′***; but on repeating the observation I found* **34° 10′***, and that is better*
- *Between the Vulture and the mouth of Pegasus —* **28° 2′**
- *On the following evening the same distance —* **28° 2′**
- *A second time again that same evening —* **28° 2′**

Nor was it possible to find it smaller; but once, by chance through carelessness, I found it 2 minutes greater. Put your trust rather in the earlier repeated readings.

- *Between the Vulture and the first star of the wing —* **47° 42′**
- *But observing a second time we found —* **47° 39′**
- *But observing a third time —* **47° 45′**
- *Repeating the same distance a third time —* **47° 45′***, as I myself also observed. But repeating the observation a fourth time we found an intermediate value, namely* **47° 42′***; and you may rather rely on this.*
- *Between the mouth of Pegasus and the first star of the wing —* **20° 22′***, twice*
- *Between the first and the last star of the wing —* **16° 34′***;* **16° 30′** *twice;* **16° 31′**
- *The mouth of Pegasus and the outermost star of the wing —* **36° 37′***;* **36° 40′***, twice*

With the sextant verified in another way, we observed again.

- *Between the Vulture and the mouth of Pegasus —* **28° 2′**
- *Between the Vulture and the first star of the neck —* **47° 45′***, twice; repeating a third time —* **47° 46′**
- *Between the Vulture and Lyra —* **34° 12′***; but the Vulture's star was near setting*
- *Between the first star of the wing and the brighter and more forward star in the lower jaw of the Whale —* **59° 25′**
- *Between the eye of* ♉ *and the uppermost star in the northern foot of* ♊ *—* **25° 56′***, twice*
- *Between the lower star of* ♊ *and the said foot —* **19° 27′***, twice; another reading —* **19° 29′**
- Between the outermost star of the wing of Pegasus and the first star of the jaw of the Whale — **42° 58½′**, twice
- repeating, twice more — **43° 0′**
- afterwards — **43° 2′**
- Between the right shoulder of Orion and the bright star in the lower jaw of the Whale — **43° 7′**, twice
- The eye of ♉ and the first star of ♈ — **38° 37′**; **38° 39′** twice, a good reading
- You may use **38° 38′** without appreciable error

Distances of the stars observed with the new Sextant on 23 December and the days following.

DIE 23 DECEMBRIS.

- The first star of the jaw of the Whale and the outermost star of the wing — **43° 0′**
- The eye of ♉ and the first star of ♈ — **38° 38′**
- The eye of ♉ and the bright star in the other horn — **35° 33′**
- repeated — **35° 32½′**
- The first star of the jaw of the Whale and the eye of ♉ — **26° 5′**
- The jaw of the Whale and the right shoulder of Orion — **43° 6′**
- The eye of ♉ and the uppermost and brighter star in the foot of ♊ — **25° 55½′**, a good reading
- *Between the eye of ♉ and the southern star of ♊ — **45° 7′**, a good reading; on repeating the observation I found **45° 6′***
- Between the heel of the upper star of ♊ and cor ♌ — **54° 29′**
- — **54° 33′**
- Between cor ♌ and the tail of ♌ — **24° 42½′**
- The same was afterwards found — **24° 40′**; this one is more reliable than the first. A third time — **24° 41′**
- Between cor ♌ and Spica ♍ — **54° 2½′**; **54° 3′**
- Between the tail of ♌ and Spica — once, **35° 0′**

DIE 24 DECEMBRIS.

- Between the bright star in the head of ♈ and the eye of ♉ — **35° 29′**
- The same a second time — **35° 30′**
- The eye of ♉ and the uppermost of the feet of ♊ — **25° 54′**
- — **25° 58′**; another reading, **25° 56′**
- The lower star of ♊ and the uppermost star of the foot — twice, exactly **19° 29′**
- The uppermost star of the foot of ♊ and cor ♌ — **54° 35′**; **54° 34′**
- The southern head of ♊ and cor ♌ — **36° 57′**
- Between cor ♌ and Spica ♍ — **54° 2½′**
- Between the bright star of the Hydra and Spica — **58° 29½′**; **58° 29′**
- Between the tail of ♌ and Spica — twice, **35° 2′**

DIE 25 DECEMBRIS.

- *Between the first star of the wing and the bright star in the head, or in the other horn, of ♈ — with the new Sextant, twice, **43° 37½′***
- *The outermost star of the wing and that same bright star of ♈ — twice, **28° 4′***

These two observations were sufficiently certain, because of the stillness of the air.

DIE 28 DECEMBRIS.

- *Between the bright star of the Vulture and the left shoulder of ♒ — **29° 0′**; **29° 0⅜′***

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- *The bright star of the Vulture and the right shoulder of ♒ — 34° 53½′, twice*
- *Between the tail of the Swan and the Vulture — 38° 0′*
- *Between the tail of the Dolphin and the mouth of Pegasus — 17° 28½′*

This small star in the Dolphin could not, however, be seen accurately enough.

- *Between the bright star which is the second in the head of the more southerly ♓ and the mouth of Pegasus — 23° 55′, twice*
- *Between the mouth of Pegasus and the bright star of the neck — 14° 3½′*
- *Between the mouth of Pegasus and Scheat of Pegasus — 26° 0′*

This one is only middling, and should be repeated.

- The first star of the wing and the bright star in the knee — 15° 50′
- Between the pole star and the eleventh star of Cassiopeia, the one in the seat — 26° 27′, twice
- *The bright star of the shoulder of Orion and the bright star of the Hydra — 55° 18½′, a good reading*
- *On repeating it again, with the stars nearly in the same line — 55° 19′*

Observations of the distances of certain stars, made with the new Biform Sextant, gathered into one place, combined, compared and weighed, which elsewhere are contained scattered and only in part through the book.

- *Between Lyra and the bright star of Aquila — 34° 10′, or 11′*
- *Between the mouth of Pegasus and the Vulture — 28° 2′*
- *Between the mouth of Pegasus and the first star of the wing — 20° 22′*
- *Between the first and the last star of the wing — 16° 31′*
- *The mouth of Pegasus and the outermost star of the wing — 36° 40′*
- *The Vulture and the first star of the neck — 47° 45′*
- *The first star of the wing and the bright star of the head of ♈ — 43° 37½′*
- *The outermost star of the wing and that same star of ♈ — 28° 4′*
- *The first star of the wing and the lower jaw of the Whale — 59° 25′*
- *The eye of ♉ and the bright star of the head of ♈ — 35° 32′*
- *The eye of ♉ and the first star of ♈ — 38° 38′*
- *The outermost star of the wing and the bright star of the head of the Whale — 43° 0′*
- *That same bright star of the Whale and the bright star of the shoulder of Orion — 43° 7′*
- Between Aldebora and the uppermost star of the foot of ♊ — 25° 56′
- Between the lower star of ♊ and the heel of the foot — 19° 28′
- Aldebora and the jaw, I, of the Whale — 26° 5′[362]
- Aldebora and the southern star of ♊ — 45° 7′
- The heel of ♊ and cor ♌ — 54° 35½′
- Between cor ♌ and the tail of ♌ — 24° 41′

[361] This side opens with no rubric of any kind: the first composed line is already a value line, and no date heading stands above it.

[362] the leaf prints *mandib. I Ceti*. What the letter abbreviates is not written out anywhere on the leaf.

- Between cor ♌ and Spica — **54° 2½′**
- The tail of ♌ and Spica — **35° 2′**
- Cor ♌ and the uppermost star of the foot of ♊, the heel — **54° 34′**
- The southern head of ♊ and cor ♌ — **36° 57′**
- The bright star of the Hydra and Spica ♍ — **58° 29′**

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OBSERUATIONES ANNI 1582.

OBSERUATIONES SOLIS.

DIE 10 JANUARIJ.

- Meridian altitude of ☉ — **13° 59′ 30″**

DIE 12 JANUARIJ.

- Meridian altitude — **14° 25′ 0″**

DIE 13 JANUARIJ.

- **8^{h} 13^{m}** by the greater clock; **8^{h} 25^{m}** by the lesser: ☉ was rising

DIE 14 JANUARIJ.

Meridian altitude **14° 54′** — whether this is to be trusted I do not know, since the sky was not clear enough.

DIE 17 JANUARIJ.

- Meridian altitude — **15° 28½′**

DIE 20 JANUARIJ.

- By the lesser Quadrant — **16° 26′**
- But by the greater Sextant — **16° 27½′**[364]

DIE 22 JANUARIJ.

- ***7^{h} 30^{m}*** ☉ *began to rise*
- ***7^{h} 32^{m}*** *half risen*
- ***7^{h} 34^{m}*** *wholly risen*

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[363] **Braces on this side: THREE settings; on the facing side, none.** (1) Under `DIE 13 JANUARIJ.`, a right brace gathers *8.13 per maius* and *8.25 per minus*, with the remark ☉ *oriebatur* printed **once**, to the right of the brace. (2) Under `DIE 14 FEBRUARIJ.`, a right brace gathers *H. 5. 2′ 0″ iuxta horol. max.* and *4 58 30 — — minus*, with ☉ *occidit* printed **once**, the ☉ standing on the upper line and *occidit* on the lower. (3) Under `DIE 22 FEBRUARIJ,`, a right brace gathers *5.27 ſecundum maius* and *5.51 — minus*, with ☉ *occidit* printed **once**. In brace 2 and brace 3 the em-dashes are repetition marks standing for the words above them (*iuxta horol.* and *ſecundum* respectively).

[364] the leaf writes this instrument as the bare initial `Q.` throughout — *per min. Q.*, *Q. min.*, *per Q. minor.* — and nowhere expands it on this leaf.

- *7^h 49^m it ought to have risen*

Meridian altitude by the lesser Quadrant **17° 0′ 0″**, a good reading; by the Trigonic Sextant **17° 0′ 30″** — *but the Trigonic Sextant was not adjusted accurately enough, because the Sun was outrunning the work, so to speak.*

- *4^h 18^m by the greater clock ⊙ set.*
- *4^h 12^m it ought, however, to have set.*

At the following midday the greater clock was running fast by **6½**^{m}, the lesser clock fast by **9½.**

DIE 23 JANUARIJ.

- *7^h 40^m 20^s ⊙ began to rise by the greater clock.*
- *7^h 48^m 10^s it ceased rising.*
- *7^h 48^m it ought, however, to have risen.*
- *Meridian altitude by the lesser Quadrant — 17° 17′*
- *by the Trigonic Sextant — 17° 17¾′*

It was, moreover, entirely clear, and the observation was made with the greatest care.

- **4**^{h} **18**^{m} ⊙ set by the greater clock
- **4**^{h} **17**^{m} by the lesser
- **4**^{h} **12**^{m} it ought to have set.

DIE 7 FEBRUARIJ.

The meridian altitude of ⊙, carefully observed with the Trigonic Sextant — 22° 7′ exactly.

DIE 14 FEBRUARIJ.

- Meridian altitude of ⊙ by the Trigonic Sextant — **24° 37′**
- by the lesser Quadrant — **24° 36′**
- **5**^{h} **2**^{m} **0**^{s} by the greatest clock; **4**^{h} **58**^{m} **30**^{s} by the lesser: ⊙ set
- It ought to have set at **5**^{h} **4**^{m}.

DIE 15 FEBRUARIJ.

- Meridian altitude of ⊙ by the lesser Quadrant — **24° 59⅔′**
- by the Trigonic Sextant — **24° 59½′**

DIE 16 FEBRUARIJ.

- *Meridian altitude of ⊙ by the lesser Quadrant — 25° 22′*
- *or rather — 25° 21¾′*

By the same reckoning, with the Trigonic Sextant, we found the altitude a little less than 25° 22′, so that here too it comes out 25° 21¾′.

DIE 17 FEBRUARIJ.

- *Meridian altitude of ⊙, both by the Trigonic Sextant and by the lesser Quadrant — 25° 45′*

DIE 22 FEBRUARIJ

- Meridian altitude of ⊙ by the lesser Quadrant — **27° 39′**
- **5^{h} 27^{m}** by the greater, **5^{h} 51^{m}** by the lesser: ⊙ set
- It ought to have set at **5^{h} 22^{m}**.

DIE 23 FEBRUARIJ.

- Meridian altitude of ⊙ by the lesser Quadrant — **28° 0¼′**, but it is uncertain whether it is good, on account of the dense mists.
- At **5^{h} 26⅔^{m}** the centre of ⊙ was on the horizon.
- At **5^{h} 33^{m}** it set wholly, by the greater clock.

DIE 24 FEBRUARIJ.

Meridian altitude of ⊙ by the Trigonic Sextant — **28° 24′**, ἐν πλάτει [Greek: *en platei*, "in breadth"], on account of a defect in the sights.

DIE 25 FEBRUARIJ.

- *Meridian altitude of ⊙ by the lesser Quadrant — 28° 48′*
- *by the Trigonic Sextant — 28° 48′*

DIE 26 FEBRUARIJ.

- *Meridian altitude of ⊙ by the Trigon — 29° 11½′*
- *by the lesser Quadrant — 29° 10′*

This second reading was the better one, since something was still wanting in the Trigon and in its alhidade — a defect put right the following day.

DIE 27 FEBRUARIJ.

Meridian altitude of ⊙ — 29° 33′ 30″ — both by the lesser Quadrant and by the Trigonic Sextant.

⊙ stood in azimuth from the meridian toward the west.

- **2^{h} 29^{m} 25^{s}** — azimuth **41° 0′** — altitude **22° 16½′**, a good reading
- **2^{h} 31^{m} 43^{s} — 41° 30′ — 22° 4′**
- **2^{h} 35^{m} 26^{s} — 42° 30′ — 21° 4′**, a good reading
- **2^{h} 37^{m} 28^{s} — 43° 0′ — 21° 30½′**, a good reading
- **2^{h} 53^{m} 57^{s} — 47° 0′ — 19° 55′**
- **2^{h} 56^{m} 7^{s} — 47° 30′ — 19° 40′**
- **2^{h} 58^{m} 9^{s} — 48° 0′ — 19° 29′**
- **3^{h} 58^{m} 41^{s} — 62° 0′ — 12° 34½′**
- **4^{h} 3^{m} 4^{s} — 63° 0′ — 12° 1½′**
- **4^{h} 21^{m} 19^{s} — 67° 0′ — 9° 44½′**

- **4^h 26^m 0^s — 68° 0′ — 9° 5½′**

DIE 28 FEBRUARIJ.

Meridian altitude of ⊙ by both instruments — **29° 57′ 30″**.

- **2^h 17^m 34^s** — azimuth **38° 8′** — altitude **23° 40½′**
- **2^h 23^m 12^s — 39° 30′ — 23° 12½′**
- **3^h 6^m 14^s — 50° 0′ — 19° 1½′**
- **3^h 10^m 15^s — 51° 0′ — 18° 34½′**

From these the times can [recte: *poßunt* for *poßint* — Corrigenda, p. 429] be verified again.

DIE 1 MARTIJ.

- *Meridian altitude of ⊙ by the Trigonic Sextant* — ***30° 21½′***

It was entirely clear, and the observation a careful one. But by the lesser Quadrant the altitude was ***30° 20′ 15″***

All the azimuths of ⊙ that follow are reckoned from the meridian toward the west.

- **2^h 28^m 48^s** — azimuth **41° 0′** — altitude **23° 2⅔′**
- **2^h 32^m 45^s — 42° 0′ — 22° 40½′**
- **3^h 9^m 54^s — 51° 0′ — 18° 56½′** — less clear
- **3^h 14^m 5^s — 52° 0′ — 18° 34½′**
- **3^h 18^m 23^s — 53° 0′ — 18° 0′**
- here ⊙ was clear enough
- **3^h 20^m 34^s — 53° 30′ — 17° 46½′** — less clear

— nor are these certain enough. From this you can verify the times.

- **3^h 44^m 25^s — 59° 0′ — 15° 1′**
- **3^h 46^m 40^s — 59° 30′ — 14° 44′**
- **3^h 50^m 57^s — 60° 30′ — 14° 15½′**
- and here too ⊙ was clear enough

From this you can verify the times again.

At the following midday the clock strayed imperceptibly; it was not, however, clear enough, and ⊙ was sighted through the chinks.

DIE 2 MARTIJ.

The Sun on the meridian had the altitude ***30° 43′****, but it was not clear enough on account of clouds. By the Trigonic Sextant the altitude was* ***30° 44′****.*

DIE 5 MARTIJ.

- Altitude of ⊙ on the meridian by the lesser Quadrant — **31° 53½′**
- by the greater Quadrant — **31° 53½′**
- *by the Geometric Square [per □ Geo.]* ***62240****, answering to* ***31° 53′ 55″***

Remember, however, that all these observations were made in haste, because of the adjustment of the Greatest Quadrant, which could not be completed so quickly as the time of midday came on.

To verify the time of ☿'s transit across the meridian, these azimuths of ☉ were set down, as follows.

- **2^h 30^m 25^s** — azimuth **42° 0′** — altitude **24° 23⅓′**
- **2^h 34^m 22^s — 43° 0′ — 24° 0¾′**
- **2^h 36^m 12^s — 43° 30′ — 23° 49⅓′**

After ☿'s transit we observed these azimuths of ☉.

- **2^h 56^m 39^s** — azimuth **48° 30′** — altitude **21° 47′**
- **2^h 58^m 44^s — 49° 0′ — 21° 27′**
- **3^h 2^m 47^s — 50° 0′ — 21° 10½′**
- **3^h 4^m 51^s — 50° 30′ — 20° 55′**
- **3^h 6^m 56^s — 51° 0′ — 20° 44′**
- **3^h 11^m 14^s — 52° 0′ — 20° 17′**
- **3^h 13^m 19^s — 52° 30′ — 20° 1½′**
- **3^h 15^m 27^s — 53° 0′ — 19° 49′**
- **5^h 51^m** — the middle of ☉ was setting.

DIE 7 MARTIJ.

- Altitude of ☉ on the meridian by the greater Quadrant — **32° 41¼′**
- by the lesser Quadrant — **32° 41½′**
- (The fecund number [Numerus fæcundus] **64180** gives **32° 41½′**)

And you can trust this observation safely enough, and found yourself on it with confidence, because both instruments had been well adjusted, in their sights [pinnacidia] and in other respects —

The greater clock was running slow by **0^m 12^s**, and the lesser was also running slow by **0^m 30^s**.

- **2^h 29^m 1^s** — azimuth of ☉ **42° 0′** — altitude **25° 6½′**
- **2^h 33^m 10^s — 43° 0′ — 24° 52½′**
- **2^h 35^m 0^s — 43½° — 24° 43′**
- not good enough
- **3^h 3^m 44^s — 50½° — 20° 17′**

☉ was sighted [recte: *Viſo* for *Viſio* — Corrigenda, p. 429] through the slits of the sights, for it was not altogether clear.

At the very next midday the greater clock was running fast by only **18^s**.

DIE 9 MARTIJ.

- **2^h 30^m 21^s** — azimuth of ☉ **42° 30′** — altitude **25° 58′**
- **2^h 32^m 28^s — 43° 0′ — 25° 45′**
- **2^h 34^m 16^s — 43° 30′ — 25° 32′**
- not certain enough
- **2^h 36^m 23^s — 44° 0′ — 25° 23′**

After ☿'s transit across the meridian:

- **2^h 58^m 39^s — 49° 30′ — 23° 6′**
- **3^h 0^m 28^s — 50° 0′ — 22° 54′**
- **3^h 4^m 28^s — 51° 0′ — 22° 29′**

- **3^h 8^m 55^s — 52° 0′ — 22° 0′**
- **3^h 12^m 56^s — 53° 0′ — 21° 36½′**
- this one too was thoroughly good.

The last three [recte: *duo* ("two") for *tria* — Corrigenda, p. 429] are the more reliable, even though all of them are [recte: *ſunt* for *ſint* — Corrigenda, p. 429] moderately good.

At **6^h 2^m** ☉ was seen to set; it ought, however, to have set at **5^h 56^m**. At the very next midday the greater clock was running fast by **10^m 35^s**, the Sun shining very dimly through clouds.

DIE 15 MARTIJ.

☉ in azimuth from the meridian toward the west

- **2^h 19^m 50^s** — azimuth **41° 0′** — altitude **29° 1′**
- **2^h 23^m 35^s — 42° 0′ — 28° 37′**
- **2^h 27^m 25^s — 43° 0′ — 28° 15′**
- **2^h 58^m 30^s — 51° 0′ — 25° 6′**
- **3^h 2^m 40^s — 52° 0′ — 24° 40′**
- **3^h 6^m 55^s — 53° 0′ — 24° 11′**

By these azimuths of ☉, taken before and after ☿'s transit, you can verify the time of ☿'s transit.

DIE 16 MARTIJ.

- Meridian altitude by the greater Quadrant — **36° 15′**
- by the lesser Quadrant — **36° 14½′**
- by the Trigonic Sextant — **36° 14⅓′**

Azimuths of ☉ taken before ☿'s transit across the meridian.

- **2^h 31^m 33^s** — azimuth **45° 0′** — altitude **27° 59′**
- **2^h 33^m 31^s — 45° 30′ — 27° 45′**
- **2^h 35^m 20^s — 46° 0′ — 27° 36′**

After ☿'s transit we took none, because of the scattered clouds that were drawn across the Sun.

DIE 18 MARTIJ.

- Meridian altitude of ☉ by the greater Quadrant — **37° 3′**
- by the lesser Quadrant — **37° 2′**
- by the Trigonic Sextant — **37° 2⅓′**

DIE 20 MARTIJ.

- Altitude of ☉ by the greater Quadrant — **37° 48¾′**
- by the lesser Quadrant — **37° 48′**
- by the Trigonic Sextant — **37° 48½′**
- **2^h 22^m 30^s** — azimuth of ☉ **42° 0′** — altitude **30° 45′**
- **2^h 26^m 23^s — 43° 0′ — 30° 23½′**
- **2^h 30^m 9^s — 44° 0′ — 30° 2′**

- **2^h 57^m 11^s — 51° 0′ — 27° 18′**
- **3^h 1^m 20^s — 52° 0′ — 26° 52′**
- **3^h 5^m 29^s — 53° 0′ — 26° 23′**
- **3^h 9^m 33^s — 54° 0′ — 25° 52½′**

DIE 21 MARTIJ.

⊙ was rising, by the greatest clock, at **5^h 43^m**. At the following midday, that of the 21st, the greater clock was running fast by **13^m 10^s**.

- Meridian altitude of ⊙ by the greater Quadrant — **38° 12⅔′**
- by the lesser Quadrant — **38° 9½′**
- by the Trigonic Sextant — **38° 12⅔′**

Certain white clouds were drawn across the Sun, so that at the time of midday it could not be seen clearly enough.

DIE 24 MARTIJ.

- Meridian altitude of ⊙ by the greater Quadrant — **39° 22′**
- by the lesser Quadrant — **39° 22′** very nearly
- by the Trigonic Sextant — **39° 21¾′**

⊙, however, was dimmed by certain small white clouds.

- **2^h 18^m 11^s** — azimuth of ⊙ **42° 0′** — altitude **32° 27′**
- **2^h 25^m 40^s — 44° 0′ — 31° 43½′**

DIE 28 MARTIJ.

Meridian altitude of ⊙ by the Greatest Quadrant — **40° 52′ 15″**
___[365]

- by the lesser Quadrant — **40° 51′ 0″**

[365] **The printed setting of the remarks inside the azimuth runs, and what it settles.** Three settings occur. **(i) A one-word verdict set at the extreme right of a value line —** *bona* three times in the 27 February run, and *fere* once, on the second side, at 24 March. These attach to the value on their own line; the two are same-setting controls for each other. **(ii) A verdict set flush right on a line of its own between two value lines —** *non satis bona* and *non satis certa*, both on the second side, set identically, each standing after the third entry of a group. **The setting alone does not decide whether such a verdict covers the single entry above it or the group of three above it**, and nothing on the leaf settles it: no brace is printed anywhere. The same holds for *Hæc etiam admodum bona fuit.*, set flush right across two lines at the foot of the 9 March post-transit run. **(iii) A remark distributed word by word down the gap between the time and the azimuth**, running across the lines of the entries it covers — *minus clara* twice and *hic fuit ⊙ satis serenus* once in the 1 March run on the first side, and *Et hic fuit ⊙ satis serenus* in the continuation of that run in the second column, where the three fragments fall one to each of three complete entry lines. In that last instance the setting DOES decide the attachment: the remark covers the three entries whose lines carry its three fragments. Round brackets do occur, once: the parenthesis enclosing *Numerus fœcundus 64180 facit 32 41½* on the first side, which is part of the observer's own text.

- by the Trigonic Sextant — **40° 52′ 20″**[366]
- **2h 12m 45s** — azimuth of ⊙ **41° 0′** — altitude **34° 26′**
- **2h 16m 25s — 42° 0′ — 34° 5′**
- **2h 46m 24s — 50° 0′ — 31° 2½′**
- **2h 50m 23s — 51° 0′ — 30° 26′**
- **2h 54m 14s — 52° 0′ — 30° 7′**

DIE 29 MARTIJ.

- Altitude of ⊙ on the meridian, by the Greatest Quadrant — **41° 15′ 0″**
- by the least Quadrant — **41° 13′ 30″**
- by the Trigonic Sextant — **41° 14′ 30″**[367]

DIE 30 MARTIJ.

⊙ was rising, by the greater Clock, at **5h 17m 30s**.

- Altitude of ⊙ on the meridian, by the Greatest Quadrant — **41° 36′ 30″**
- by the lesser Quadrant — **41° 36′ 30″**
- by the Trigonic Sextant — **41° 37′ 0″**

But these observations are not much to be trusted, for ⊙ was shining through rather thin clouds, and it was not clear enough.

DIE 1 APRILIS.

- Altitude of ⊙ on the meridian, by the Greatest Quadrant — **42° 21′ 30″**
- by the lesser Quadrant — **42° 19′ 0″**
- by the Trigonic Sextant — **42° 22′ 0″**

DIE 3 APRILIS.

- Altitude of ⊙ on the meridian, by the Greatest Quadrant — **43° 5′ 0″**
- by the lesser Quadrant — **43° 4′ 30″**
- by the Trigonic Sextant — **43° 5′ 0″**
- **2h 2m 35s** — azimuth of ⊙ **39° 30′** — altitude **37° 16′**
- **2h 4m 20s — 40° 0′ — 37° 4′**
- **2h 7m 50s — 41° 0′ — 36° 46′**
- **2h 40m 15s — 50° 0′ — 33° 36′**
- **2h 44m 0s — 51° 0′ — 33° 10′**
- **2h 47m 55s — 52° 0′ — 32° 43½′**
- these are not so good

DIE 7 APRILIS.

- Altitude of ⊙ on the meridian, by the Greatest Quadrant — **44° 31¼′**

[366] in the timed run that follows, and in the two like runs below it, the hour figure stands on the first line only and is carried down the run; it is written out on every line here, and on the two lines where the page itself repeats it the figure is the page's own.

[367] the second line is printed *per Q. minim.*, where the neighbouring entries of these days print *per Q. min.*

- by the lesser Quadrant — **44° 30⅓′**
- **1h 59m 58s** — azimuth of ⊙ **39° 0′** — altitude **38° 59′**
- **2h 3m 42s — 40° 0′ — 38° 39′**
- not certain enough
- **2h 7m 4s — 41° 0′ — 38° 19′**
- **2h 39m 0s — 50° 0′ — 35° 7′**
- **2h 42m 49s — 51° 0′ — 34° 43′**
- **2h 46m 40s — 52° 0′ — 34° 19′**

DIE 9 APRIL.

At **7h 9m** ⊙ was seen to set.

Altitudines meridianæ.

- Die 10. By the greater Quadrant — **45° 33′ 0″**
- by the lesser Quadrant — **45° 33′ 0″**
- by the Trigonic Sextant — **45° 33′ 15″**
- Die 11. By the greater Quadrant — **45° 52′ 50″**
- by the lesser Quadrant — **45° 52′ 45″**
- by the Trigonic Sextant — **45° 53′ 30″**
- Die 12. By the Greatest Quadrant — **46° 13′ 50″**
- by the lesser Quadrant — **46° 13′ 0″**
- by the Trigonic Sextant — **46° 15′ 0″**

At **7h 19m** ⊙ was seen to set.

- Die 13. By the Greatest Quadrant — **46° 33′ 20″**
- by the lesser Quadrant — **46° 32′ 30″**
- by the Trigonic Sextant — **46° 35′ 0″**
- Die 14. By the Greatest Quadrant — **46° 54′**
- by the lesser Quadrant — **46° 54′**
- by the Trigonic Sextant — **46° 54′**
- Die 15. By the Greatest Quadrant — **47° 14′ 0″**
- by the lesser Quadrant — **47° 15′ 0″**
- by the Trigonic Sextant — **47° 15′ 0″**
- Die 16. By the Greatest Quadrant — **47° 32′ 40″**
- by the lesser Quadrant — **47° 30′ 30″**
- by the Trigonic Sextant — **47° 35′ 0″**
- Die 17. By the Greatest Quadrant — **47° 53′ 0″**
- by the lesser Quadrant — **47° 52′ 30″**
- Die 18. By the Greatest Quadrant — **48° 10′ 40″**
- by the lesser Quadrant — **48° 11′ 10″**

⊙ was seen to set at **7h 32m**.

- Die 21. By the Greatest Quadrant — **49° 7′ 30″**
- by the lesser Quadrant — **49° 7′ 40″**
- Die 24. By the Greatest Quadrant — **50° 1′ 0″**
- by the lesser Quadrant — **50° 0′ 0″**

- Die 27. By the greater Quadrant — **50° 52′ 0″**
- by the lesser Quadrant — **50° 52′ 0″**
- Die 28. By the greater Quadrant — **51° 7′ 30″**
- by the lesser Quadrant — **51° 8′ 0″**
- Die 29. By the greater Quadrant — **51° 23′ 0″**
- by the lesser Quadrant — **51° 23′ 0″**
- Die 30. By the greater Quadrant — **51° 38′ 45″**
- by the lesser Quadrant — **51° 38′ 40″**

MAIJ.

- Die 8. By the lesser Quadrant — **53° 56′ 30″**
- Die 9. By the lesser Quadrant — **53° 49′ 0″**
- Die 22. By the Greatest Quadrant — **56° 8′ 15″**
- Die 24. By the greater Quadrant — **56° 24′ 0″**
- Die 28. By the lesser Quadrant — **56° 51′ 0″**

JUNIJ.

- Die 4. By the lesser Quadrant — **57° 24′ 30″**
- Die 7. By the lesser Quadrant — **57° 31′ 0″**
- Die 8. By the lesser Quadrant — **57° 32′ 15″**
- Die 10. By the lesser Quadrant — **57° 34′**
- By the greatest mural Quadrant — **57° 34′ 50″**
- Die 11. By the mural Quadrant, rect. — **57° 35′ 40″**
- By the lesser Quadrant — **57° 34′ 45″**
- Die 12. By the lesser Quadrant — **57° 34′ 30″**
- by the greater Quadrant — **57° 34′ 45″**
- by the mural Quadrant — **57° 35′ 35″**
- Die 14. By the mural Quadrant — **57° 34′ 50″**
- by the greater Quadrant — **57° 33′ 30″**
- by the lesser Quadrant — **57° 33′ 0″**
- Die 15. By the mural Quadrant — **57° 33′ 35″**
- by the greater Quadrant — **57° 32′ 50″**
- by the lesser Quadrant — **57° 32′ 40″**
- Die 17. By the greater Quadrant — **57° 29′ 0″**
- by the lesser Quadrant — **57° 27′ 40″**
- by the mural Quadrant — **57° 30′ 30″**[368]

DIE 20 JUNIJ, MANE.

Diagram. An open circle drawn in outline, standing in the column beside the entry for **5^h 11^m 20^s**. Inside the rim, at the foot of the circle and a little to the right of its lowest point, a narrow shaded lune is drawn and filled with close hatching. No lettering stands on or within the figure.

[368] the abbreviation *rect.* in the entry for Die 11 stands unexpanded on the leaf; the sorts printed admit both *rectum* and *rectificatum*.

- $5^h\ 11^m\ 20^s$, azimuth of ⊙ from the north toward the east **66° 34′**, altitude **12° 22⅔′**

Diagram. A second open circle of the same size, standing beside the entry for $5^h\ 17^m$. Inside the rim at the foot of the circle a shaded, hatched lune is drawn, shorter and shallower than the one in the first figure. No lettering stands on or within the figure.

- $5^h\ 17^m$

Diagram. A third open circle of the same size, standing beside the entry for $5^h\ 27^m\ 17^s$. Its outline carries no shading, hatching or break at any point of the rim, and no lettering stands on or within it.

- $5^h\ 27^m\ 17^s$
- azimuth of ⊙ **69° 39′**, altitude **14° 30′**

At the next following noon the clock was running fast by $3^m\ 40^s$.

DIE 22 JUNIJ.

- Altitude of ⊙ on the meridian, by the mural Quadrant — **57° 13′ 40″**
- by the greater Quadrant — **57° 12′ 30″**
- by the lesser Quadrant — **57° 13′ 0″**

ALTITUDINES MERIDIANÆ.

JULIJ.

- Die 2. By the mural Quadrant — **56° 11′ 0″**
- by the lesser Quadrant — **56° 10′ 20″**
- by the greater Quadrant — **56° 10′ 0″**
- Die 6. By the Greatest Quadrant — **55° 33′ 15″**
- by the lesser Quadrant — **55° 33′ 30″**
- Die 7. By the lesser Quadrant — **55° 23′ 30″**
- Die 13. By the lesser Quadrant — **54° 17′**
- Die 25. By the mural Quadrant — **51° 29′ 30″**
- Die 28. By the mural Quadrant — **50° 41′ 10″**
- by the lesser Quadrant — **50° 40′ 0″**

AUGUSTI.

- Die 9. By the mural Quadrant — **47° 3′ 10″**
- by the lesser Quadrant — **47° 1′**
- very nearly
- Die 15. By the mural Quadrant — **45° 1′ 0″**
- by the lesser Quadrant — **44° 59′ 30″**

Not certain enough, on account of the weather.

- Die 20. By the mural Quadrant — **43° 15′ 0″**
- by the lesser Quadrant — **43° 13′ 45″**
- Die 23. By the lesser Quadrant — **42° 7′ 0″**

ἐν πλάτει [Greek: *en platei*, "in breadth"], on account of thin clouds.

- Die 28. By the lesser Quadrant — **40° 19′ 0″**
- Die 29. By the mural Quadrant — **39° 56½′**
- By the lesser Quadrant — **39° 54′**

ἐν πλάτει, on account of thin clouds.

SEPTEMBRIS.

- Die 5. By the mural Quadrant — **37° 15′ 25″**
- by the lesser Quadrant — **37° 14′ 0″**
- Die 8. By the mural Quadrant — **36° 6′ 0″**
- by the lesser Quadrant — **36° 6′ 0″**
- Die 14. By the mural Quadrant — **33° 44′ 5″**
- Die 21. By the mural Quadrant — **30° 59′**
- by the lesser Quadrant — **30° 59′**

OCTOBRIS.

- Die 7. By the lesser Quadrant — **24° 55′ 0″**
- Die 18. By the mural Quadrant — **21° 1′ 20″**
- by the lesser Quadrant — **21° 1′ 0″**
- very nearly
- Die 21. By the lesser Quadrant — **20° 1′ 30″**
- by the mural Quadrant — **20° 2′ 0″**
- Die 24. By the mural Quadrant — **19° 4′ 0″**
- by the greatest Quadrant — **19° 4′ 0″**
- by the lesser Quadrant — **19° 3′ 30″**
- Die 25. By the greatest Quadrant — **18° 45′ 30″**
- by the lesser Quadrant — **18° 44′ 0″**
- Die 27. By the mural Quadrant — **18° 8′ 20″**
- by the greatest Quadrant — **18° 7′ 50″**
- by the lesser Quadrant — **18° 8′ 0″**
- by the Trigonic Sextant — **18° 7′ 20″**

___[369]

NOUEMBRIS

- Die 2. By the mural Quadrant — `16 25 0`
- by the Greatest Quadrant — `16 24 45`
- by the lesser Quadrant — `16 24 30`
- Die 3. By the mural Quadrant — `16 9`
- by the Greatest Quadrant — `16 8`
- by the lesser Quadrant — `16 9`
- by the Trigonic Sextant — **16 8½**
- Die 6. By the Greatest Quadrant — `15 20`

[369] the observation figures on this side are printed as bare spaced groups, with no marks of arc on any of them. The leaf does print such marks in the first row of the table below, in its parallax cell, and in the footnote.

- by the lesser Quadrant — **15 22½**
- nearly, not good enough
- by the Trigonic Sextant — 15 22
- Die 11. By the lesser Quadrant — 14 13
- ἐν πλάτει
- Die 12. By the mural Quadrant — 13 58

It is not certain enough, on account of scattered clouds coming between.

- Die 21. By the mural Quadrant — 12 18
- by the Greatest Quadrant — **12 18½**
- by the lesser Quadrant — 12 18
- by the Trigonic Sextant — **12 17¾**
- Die 22. By the mural Quadrant — 12 8 48
- by the Greatest Quadrant — **12 8½**
- by the Trigonic Sextant — 12 8

It was not, however, exact enough, because the observation was made less punctually.

- Die 23. By the mural Quadrant — 12 0
- by the Greatest Quadrant — 12 1
- by the lesser Quadrant — 11 58
- by the Trigonic Sextant — 12 0
- Die 27. By the mural Quadrant — **11 29½**
- by the Greatest Quadrant — 11 30
- by the lesser Quadrant — **11 29½**
- by the Trigonic Sextant — **11 29½**

DECEMBRIS

- Die 3. By the mural Quadrant — **10 57½**
- by the lesser Quadrant — **10 57½**
- by the Trigonic Sextant — **10 57½**

Note. The meridian altitudes of the Sun taken this year by the Mural Quadrant are a little higher than they ought to be — by about half a minute — because that quadrant had not yet been trued in its own level against the Wall as exactly as was needed, nor verified and tested by other instruments as it was in the following year. Nor did it face the meridian, above and below and through all its parts, as exactly as in the following year. For afterwards we rectified it afresh, and, having verified it exactly in its own level and in its position on the meridian line, we fixed it immovably to the Wall. The following year's observations of the Sun made by the Mural are therefore more exact, and give its altitude to a nicety.

The observations made this year by the Greatest Quadrant, on the other hand, are not to be relied on, because the arc of the circle that forms the quadrant had not been

trued to flatness and to an even thickness as exactly as was required; and this was precisely restored to it, and completely rectified, in the year 84.[370]

LOCA SOLIS[1].[371]

Day	Alt. ☉ observed	Parall.	True Alt.	Decl. ☉	Long. ☉	Our Ephemerides give
23 Jan.	17° 17′				13° 27′ 56″ ♒	
7 Feb.	22 7	2′ 45′	22 9 45	11 57 15	28 38 ♒	28 35 ♒
14 —	24 37			9 27 20	5 37 ♓	5 36 ♓
	24 36			9 28 20	5 34 ♓	
15 —	24 59 45	2 40	25 2 25	9 4 35	6 38 ♓	6 36 ♓
	24 59 30		25 2 10	9 4 50		

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[373]

___[374]

Day	Alt. ☉ observed	Parall.	True Alt.	Decl. ☉	Long. ☉	Our Ephemerides give
16 Feb.	25 21 45	2 40	25 24 25	8 42 35	7 38 ♓	7 36 ♓
17 —	25 45	2 40	25 47 40	8 19 20	8 40 ♓	
22 —	27 39				13 40 23 ♓	13 36 28 ♓
23 —	28 0 15				14 35 35 ♓	14 36 7 ♓
25 —	28 48 15	2 0	28 50 15	5 16 45	16 37 ♓	16 36 ♓
26 —	29 11 30	2 30	29 14 0	4 53	17 38 ♓	17 35½ ♓[1]
	29 10		29 12 30	4 54 30	17 35 ♓	
27 —	29 33 30	2 30	29 36 0	4 31 0	18 35 ♓	18 35 ♓
28 —	29 57 30	2 30	30 0 0	4 7 0	19 36 ♓	[2]
1 Mart.	30 21 30	2 30	30 24 0	3 43 0	20 37 ♓	
	30 20 15		30 22 45	4 44 15	20 34 ♓	
2 —	30 43	2 30	30 45 30	3 21 30	21 32 ♓	
	30 44		30 46 30	3 20 30	21 34 ♓	21 34 ♓
5 —	31 53 30	2 30	31 56 0	2 11 0	24 30½ ♓	

[370] the leaf writes only *per Muralem* at the two places that read above "by the Mural Quadrant" and "by the Mural"; the noun is carried by *quadrans ille*, "that quadrant", in the clause that follows the first of them.

[371] the printed head row reads, cell by cell: *Die · Alt. ☉ obſerv. · Parall. · Vera Alt. · Decl. ☉ · Long. ☉ · Ephemerides noſtræ dant*.

[372] the two unlabelled rows are second readings belonging to the day named on the row above; the leaf leaves their day cell blank. Marks of arc stand on the first row only (degree and minute on the observed altitude, degree, minute and second on the longitude) and on the parallax of 7 February; every other figure group in the table is bare. In the parallax cell of 7 February **both** figures carry a single raised mark, the second where a double mark would be expected.

[373] Dreyer's footnote, keyed to the rubric above and set in roman small type below the table: In ſequentibus ſupputationibus altitudo æquatoris ſemper = 34° 7′ poſita eſt. — "In the following computations the altitude of the equator is throughout taken as 34° 7′."

[374] As on the previous page, no figure group in the table carries a mark of arc.

Day	Alt. ☉ observed	Parall.	True Alt.	Decl. ☉	Long. ☉	Our Ephemerides give
	31 53 55		31 56 25	2 10 5	24 31½ ♓	24 32⅔ ♓
7 —	32 41 15	2 30	32 43 45	1 23 15	26 31 ♓	
	32 41 30		32 44 0	1 23	26 31⅓ ♓	26 31½ ♓
16 —	36 14 30	2 24	36 16 54	2 9 54	5 26 50 ♈	
	36 14 20		36 16 44	2 9 44	5 26 25 ♈	5 24 48 ♈
20 —	37 48	2 20	37 50 20	3 43 20	9 23 20 ♈	9 20 58 ♈
28 —	40 51 0				17 14 0 ♈	17 11 2 ♈
	40 52 20				17 17 26 ♈	
29 —	41 15 0	2 14	41 17 14	7 10 14	18 16 47 ♈	18 9 42 ♈
	41 13 30		41 15 44	7 8 44	18 12 52 ♈	
30 —	41 36 30	2 12	41 38 42	7 31 42	19 13 16 ♈	
	41 37 0		41 39 12	7 32 12	19 14 36 ♈	19 8 20 ♈
1 Apr.	42 19 0	2 12	42 21 12	8 14 12	21. 6 0 ♈	21 5 58
	42 22 0		42 24 12	8 17 12	21 14 0 ♈	
3 —	43 5	2 10	43 7 10	9 0 10	23 9 19 ♈	23 2 56 ♈
	43 4½		43 6 40	8 59 40	23 8 2 ♈	
7 —	44 31¼	2 6	44 33 21	10 26 21	27 5 5 ♈	26 56 31 ♈
	44 30⅓		44 32 26	10 25 26	27 2 33 ♈	
10 —	45 33 0	2 4	45 35 4	11 28 4	29 58 26 ♈	29 51 23 ♈
	45 33 15		45 35 19	11 28 19	29 59 9 ♈	
11 —	45 52 50	2 4	45 54 54	11 47 54	0 55 3 ♉	0 49 37 ♉
	45 53 30		45 55 34	11 48 34	0 56 57 ♉	
12 —	46 13 0	2 4	46 15 4	12 8 4	1 53 9 ♉	1 47 49 ♉
	46 15 0		46 17 4	12 10 4	1 58 57 ♉	
13 —	46 32 30	2 2	46 34 32	12 27 32	2 49 43 ♉	2 45 59 ♉
	46 35 0		46 37 2	12 30 2	2 57 0 ♉	
14 —	46 54	2 2	46 56 2	12 49 2	3 52 48 ♉	3 44 7 ♉
15 —	47 14	1 59	47 15 59	13 8 59	4 52 3 ♉	4 42 13 ♉
	47 15		47 16 59	13 9 59	4 55 0 ♉	

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[375] As on the previous page, a row whose day cell is blank is a second reading for the day named above it. The days are printed as a bare figure followed by a dash, the month being named only at 16 Feb., 1 Mart. and 1 Apr. Several cells carry fewer figures than their neighbours in the same column — `25 45`, `27 39`, `30 43`, `30 44`, `37 48`, `43 5`, `46 54`, `47 14`, `47 15` in the observed-altitude column, and `4 53` and `1 23` in the declination column. In the longitude cell for 1 April a printed point stands between the first and second figure groups (`21. 6 0`). The ephemeris value opposite 1 April, `21 5 58`, is the one cell in that column that carries no sign of the zodiac after it. The declination `4 44 15` on the second reading of 1 March breaks the run of its column, whose neighbours above and below it read `3 43 0` and `3 21 30`.

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Day	Observed alt. ☉	Parall.	True alt.	Decl. ☉	Long. ☉	Our Ephemerides give
16 Apr.	47 30 30	1 59	47 32 29	13 25 29	5 41 27♉	5 40 17♉
	47 35 0		47 36 59	13 29 59	5 55 0♉	
17 —	47 53 0	1 59	47 54 59	13 47 59	6 49 35♉	6 38 20♉
	47 52 30		47 54 29	13 47 29	6 48 3♉	
18 —	48 10 40	1 59	48 12 39	14 5 39	7 43 42♉	7 36 22♉
	48 11 0		48 12 59	14 5 59	7 44 45♉	
21 —	**49 7½**	1 57	49 9 27	15 2 27	10 42 3♉	10 30 23♉
	49 7⅔		49 9 37	15 2 37	10 42 35♉	
24 —	50 1	1 54	50 2 54	15 55 54	13 36 40♉	13 24 8♉
	50 0		50 1 54	15 54 54	13 33 20♉	
27 —	50 52	1 52	50 53 52	16 46 52	16 30 42♉	16 17 35♉
28 —	51 7 30	1 52	51 9 22	17 2 22	17 25 49♉	17 15 18♉
	51 8 0		51 9 52	17 2 52	17 27 0♉	
29 —	51 23 0	1 52	51 24 52	17 17 52	18 20 46♉	18 13 4♉
30 —	51 38 45	1 50	51 40 35	17 33 35	19 18 0♉	19 10 46♉
8 Maij	53 36 30	1 45	53 38 15	19 31 15	27 6 21♉	26 51 46♉
9 —	53 49 0	1 45	53 50 45	19 43 45	28 1 30♉	27 49 19♉
13 Julij	54 17 0				29 49 42♋	29 51 0♋
25 —	51 29 30	1 52	51 31 22	17 24 22	11 15 39♌	11 20 20♌
28 —	50 41 10	1 52	50 43 2	16 36 2	14 7 0♌	14 13 5♌
	50 40 0		50 41 52	16 34 52	14 11 0♌	
9 Aug.	47 3 10	2 2	47 5 12	12 58 12	25 40 3♌	25 46 1♌
	47 1 0		47 3 2	12 56 2	25 46 30♌	
15 —	45 1 0	2 6	45 3 6	10 56 6	1 31 51♍	1 33 56♍

376 Dreyer's two footnotes, set in roman small type below the table. [1] (keyed to the ephemeris place for 26 February): Adſcriptum eſt: »Sed non erat ſatis correctum inſtrumentum. Vide locum ☉ infra repetitum«. — "There is written beside it: 'But the instrument was not sufficiently corrected. See the place of the Sun repeated below.'" [2] (standing at the right-hand edge of the last column on the line of the entry for 28 February, where that column is empty; its sort is set low, on the line, and not raised as the first marker is): Adſcriptum eſt: »Vide infra hunc ☉[lis] locum ex debita æquatoris eleuatione«. — "There is written beside it: 'See below this place of the Sun as derived from the due elevation of the equator.'" Both notes report what stands written in the manuscript; neither is a conjecture on a printed figure, and nothing in them has been carried into the table.

377 the head row is printed, verbatim: Die | Alt. ☉ obſerv. | Parall. | Vera Alt. | Decl. ☉ | Long. ☉ | Ephemerides noſtræ dant. not one figure group on this side carries a mark of arc. Every group is printed bare, its parts separated by white space only.

Day	Observed alt. ☉	Parall.	True alt.	Decl. ☉	Long. ☉	Our Ephemerides give
	44 59 30		45 1 36	10 54 36	1 36 6♍	
20 —	43 15 0	2 10	43 17 10	9 10 10	6 23 38♍	6 24 33♍
	43 13 45		43 15 55	9 8 55	6 27 3♍	
28 —	40 19 0	2 16	40 21 16	6 14 16	14 9 18♍	14 11 7♍
5 Sept.	37 15 25	2 22	37 17 47	3 10 47	21 59 17♍	21 59 47♍
	37 14 0		37 16 22	3 9 22	22 2 55♍	
8 —	36 6 0	2 24	36 8 24	2 1 24	24 54 35♍	24 56 5♍
14 —	33 44 5	2 26	33 46 31	0 20 29	0 51 27♎	0 49 38♎
21 —	30 59 0	2 33	31 1 33	3 5 27	7 47 10♎	7 43 35♎
7 Oct.	24 55 0	2 42	24 57 42	9 9 18	23 34 0♎	23 36 33♎
18 —	21 1 20	2 46	21 4 6	13 2 54	4 33 54♏	4 36 44♏
21 —	20 1 30	2 47	20 4 17	14 2 43	7 34 42♏	7 37 34♏
27 —	18 8 20	2 49	18 11 9	15 55 51	13 36 30♏	13 39 52♏
	18 7 20		18 10 9	15 56 51	13 39 50♏	
2 Nov.	16 25 0	2 51	16 27 51	17 39 9	19 38 30♏	19 43 7♏
	16 24 30		16 27 21	17 39 39	19 40 23♏	
3 —	16 9 0	2 51	16 11 51	17 55 9	20 38 15♏	20 43 47♏
	16 8 0		16 10 51	17 56 9	20 42 0♏	
6 —	15 22 0	2 51	15 24 51	18 42 9	23 41 4♏	23 45 59♏

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[379]

For the altitude of the Equator[1]

	Die 21 Nouem.	Die 27 Nouemb.	Die 3 Decemb.
Observed altitude	**12° 18′ ″**	**11° 29′ 30″**	**10° 57′ 30″**
Parallax of altitude	2 54	2 54	2 54
True altitude ☉	12 20 54	11 32 24	11 0 24
Place ☉	8 59 46♐	15 6 19	21 13 27♐
Declination of the place ☉	21 48 31	22 37 3	23 9 34
Altitude of the Equator	34 9 25	34 9 27	34 9 58

[378] A blank cell above is blank on the leaf. The `Die` file gives the month by name at the first entry of each month and by an em-dash thereafter. Nine entries occupy two lines in the four inner files while the `Die` and `Ephemerides` files carry one line only, and the second line is set without a day. The `13 Julij` line carries figures in three files only, the `Parall.`, `True alt.` and **Decl.** ☉ cells standing empty.

[379] `50 1` and `50 0` (24 April), `50 52` (27 April) and the two fraction entries at 21 April print two members where their neighbours print three.

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For the place of the Sun in the Zodiac.[1]

	Die 26 Februarij	Die 28 Februarij
Meridian altitude ☉	29° 11′ 30″	29° 57′ 30″
Parallax ☉ to be added	2 37	2 36
Refraction to be subtracted	1 30	1 25
True meridian altitude ☉	29 12 37	29 58 41
Elevation of the Equator	34 5 30	34 5 30
True declination ☉	4 52 53	4 6 49
Place ☉ in the Zodiac	17 41 30♓	19 41 12♓
Place from his own tables	17 40 50	19 40 30

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If, then, the altitude is taken as **29° 11′**, the place of the Sun as fixed from the observation answers in every respect to the one that comes out of the modern Tables [Tabulis neotericis].

OBSERUATIONES LUNÆ.[384]

DIE 13 JANUARIJ.

- H. 3 **3′ 50″** minus
- 2 57 20 maius[385]

— the Moon's eastern limb was on the meridian, having an altitude, reckoned to the lower limb, of 50 32.

- 5 35 5 — the Moon, reckoned by its eastern limb, was distant from Spica ♍ **27 3½** by the Sext. biform. *It was then some 90 degrees from its rising.*
- maius tantum

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[380] The stub labels are printed, verbatim: **Altitudo obſeruata**, **Parallaxis altit.**, **Altit. ☉ vera**, **Locus ☉**, **Declinatio loci ☉**, **Altitudo æquatoris**. Marks of arc stand in the first row only, on all three files; every other row is bare.

[381] in the first cell of the first row the leaf prints **12° 18′** and then, after a space, a seconds mark with no figure before it.

[382] the **Locus ☉** cell of the middle file carries no sign glyph, while the cells to its left and right both do.

[383] The stub labels are printed, verbatim: **Altit. merid. ☉lis**, **Parallaxis ☉ addenda**, **Refractio ſubtrahenda**, **Altit. ☉ merid. vera**, **Eleuatio æquatoris**, **Declinatio vera ☉**, **Locus ☉ in Zodiaco**, **Locus ex propriis tabulis**. Marks of arc stand in the first row only; every other row is bare.

[384] the display rubric reads *OBSERUATIONES LUNÆ.* — "Observations of the Moon."

[385] those two lines are joined at their right by a single brace, whose point opens toward the sentence that follows; the sentence is set to the right of the brace and belongs to both lines together.

- 5 38 54 — the Moon was in azimuth **44ᴾ 22′** from the south toward the west, having an altitude of **24ᴾ 3′ 30″**, and that reckoned by the lower limb.
- maius tantum
- *8 55 5 minus*
- *8 42 35 maius*[386]

— *we observed the Sun and the Moon by the Armillae, and, the place of the Sun being put at* ***3ᴾ 10′*** ♒, *the Moon's eastern limb, the one nearest the Sun, appeared at* ***22ᴾ 32′*** ♍; *but the Moon was very close to setting, so this observation is not exact enough. At the following noon the clock maius was running fast by* ***5′ 48″****, and minus also fast, by* ***21′ 20″****; from this you can verify the times.*

Computation of the Moon's place.[2]

- Corrected time — H. 5 **33′ 6″**
- Declination of the Moon's centre — **6° 48′ 23″** Sept.
- Asc. R. of the Moon's centre — 83 25
- Lat. — 3 37 50 Sept.
- True place of the Moon — 21 15 12 ♍

DIE 25 FEBRUARIJ.[3]

H. 12 ***16½*** *by maius: the Moon's upper horn stood at an altitude of* ***42ᴾ 10′****, so far as the thinness of the Moon's light allowed it to be seen. Its azimuth, taken on the illuminated limb, was* ***39ᴾ 10′*** *from the south toward the east.*[387]

H. 12 ***21⅙*** *— by the same reckoning, Alt. 42 27, Azim. 38 0. But afterwards, because the tip of the Moon's upper horn was not showing up so well, we took the Moon's altitude by estimate to the middle of the illuminated horn, as though that line ran through the Moon's centre; the azimuths, however, were directed to the edge of the western limb as before. So the following stand thus.*

- *H.12* ***27½*** *of the centre of ☾ Alt. 42 47 Azim. 36 16*
- • 12 **32¼** 43 15 34 37*

You can compare these and check them against one another, for since the Moon was little lit she showed very faintly, especially with the Sun standing so high.

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[386]these two lines likewise carry a single brace at their right, opening toward the sentence that follows.

[387]Dreyer's three footnotes, set in roman small type below the composed matter. [1] (called twice, at the rubric *Pro altitudine æquatoris* and again at the rubric *Pro loco ☉lis in Zodiaco.*): E codice V. — "From codex V." [2] (called at *Supputatio loci Lunæ.*): E codice M. Aſc. R. a coluro ſolſtitiorum numerata eſt. — "From codex M. The right ascension is reckoned from the colure of the solstices." [3] (called at *DIE 25 FEBRUARIJ.*): Diſtantias lunæ a Venere die 24 Feb. obſervatas infra inter obſeruationes planetarum invenies. — "You will find the Moon's distances from Venus, observed on 24 February, below among the observations of the planets." All three are statements about the codices or a cross-reference; none is a conjecture on a printed figure, and nothing in them has been carried into the text above. *minus* and *maius* stand through this side as the designations of two clocks — the leaf itself names them so at *Horol. maius … minus etiam* — and the page nowhere spells out what the comparison is between. the leaf prints Sept. after the declination of the Moon's centre and after the latitude.

Then I observed the Moon carefully by the Armillae with respect to ☉, so that at exactly the first hour she was seen, on her western limb nearest the Sun, at **24ᵖ 40′** ♓[1], *the place of ☉ being put at* 16 36 ♓, *which is what it was at noon by our Ephemerides. But if, following the observation, it is taken to have been at* **37′**, *then at the first hour ☉ was at about* **16° 39′**, *and so the longitude of the Moon's limb was seen at about* **24° 43** ♓[1].

At the instant of that same time the altitude of the Moon's middle was 45 20, *and the azimuth of the western limb* 26 2, *this still being reckoned from the south toward the east. These observations were good enough, and from them, from the place of the Sun, you can verify the Moon's place; the observation of the Sun was taken to the Sun's own centre.*

H. 2 M. 16[2] *— the same limb of ☾ was on the meridian, and the middle of ☾ had an altitude of* 47 59, *very nearly* 48 G. *Then with the Trigonic Sextant I took the distance of the Sun's centre from the western limb of ☾ in this way.*

- *H.2 M.35 Distances of ☾ and ☉* 38 58
- • 37¼ 38 59*
- • 41½ 39 1*

To these times there answered, by the lesser Quadrant, the azimuths of ☾ and the altitudes —[388]

- Distan. · Azim. · Alt.
- *H. 2* 50 39 4 12 7 47 42
- • 57½ 39 7½ 14 52 47 24*
- or 8
- • 3 0 39 9 15 50 47 21*
- • 2½ · · · 16 36 47 14*
- • 4 39 11 17 10 47 10*
- • 5½ 39 12 · · · · · *
- • 15 39 15 20 35 46 46*
- • 20 39 18 22 41 46 33*
- • 30 39 22*
- • 33 39 24*
- • 35 39 25*

Note. The azimuths of ☾ are on her western limb. The altitudes are taken through the middle.

These observations are good enough.

H. 4 M. 2½ — the place of ☉ being put at 16 45 ♓, *the place of ☾, reckoned to the western limb, was by the Armillae at* **26 3½** ♓.[3] *Besides, at that time the azimuth*

[388] Its three roman column heads are printed Distan. | Azim. | Alt., each with a terminal point; no head stands over the time file at the left. The third line carries vel 8 alone; the 2½ line carries three spaced dots under Distan.; the 5½ line carries three spaced dots under both Azim. and Alt.; and the last three lines carry no Azim. and no Alt. figure at all, the roman Nota. sentence occupying that space instead. The files, left to right, are the time, then Distan., then Azim., then Alt.

of ☾ from the south toward the west, reckoned to the western limb, was 36 15, and the middle of ☾ had an altitude of 43 50.

H. 4 M. 19 — ☾ in the same way, Alt. 42 27, Azim. 41 20, and the same limb was seen by the Armillae at 26 14 ♓.[4]

H. 4 M. 26½ — Alt. of the centre of ☾ 41 47, Azim. 43 25, and the same limb of ☾ was seen at 26 12 ♓.[4]

You can therefore compare these observations with one another and choose the best, and above all trust the one made a little after the fourth hour.

I also observed in the meantime that, the hour being exactly the fifth, the western limb of ☾ stood off from the centre of the Sun, in partes, by exactly 40 M. 0. At that time the altitude of ☾, reckoned to the centre, was 38 54, and the azimuth of the western limb 51 50; from this you can restore the apparent place of ☾.

Afterwards, as the Sun sank toward setting, this distance varied and grew smaller because of the refracted rays of the Sun — as we said happens with Venus too — so that at last it barely showed 39 52.

Then the distance of ♀ and ☾ was observed with the Sext. Trig., taking it between the illuminated western limb of ☾ and ♀.[389]

- *H. 5 M. 38 6 25*
- - 42 6 23*
- - **43½ 6 22½***
- - 50 6 21*
- - **54½** 6 18*

Then we took the azimuths and altitudes of ☾ with the lesser Quadrant, at set times of the distance, in this way.

- *H. 6 2½ 6 15 ☾ Alt. 31 8 Az. 68 37*
- - **6½ 6 13½** 30 43 69 24*
- - **9½ 6 12¼ 30 18½** 70 15*
- - 33 6 58 [recte: 5 58 — Corrigenda, p. 429] 27 16 75 37*
- - 37 6 0 doubtful 26 40 76 35*
- - 41 5 55 26 21 77 9*
- - 54 5 52*

Note. These altitudes of ☾ were taken at the lower part of the bright limb, so the semidiameter of ☾ has to be added. The azimuths, however, were taken at the edge of the limb that was shining toward the west.

- *H. 7 M. 10 — between the brighter star in the lower horn of ♈ and the limb of ☾ nearest it*
- - 3 43*

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[389] Dreyer's apparatus, four notes set in roman below the composed matter. [1] (called twice, at **24ᵖ40′ ♓** and again at **24° 43 quaſi ♓**): Sic in codice. Sed debet eße ♈. — "So in the codex. But it ought to be ♈." [2] (called at the minute figure of *H. 2 M. 16*): Supra adſcriptum eſt a Tychone **15′ 55″**. — "Written above, by Tycho: **15′ 55″**." [3] (called at **26 3½ ♓**): Debet eße ♈. In margine adſcriptum eſt: »Vera longitudo 26.5«. — "It ought to be ♈. Written in the margin: 'True longitude 26.5'." [4] (called twice, at 26 14 ♓ and at 26 12 ♓): Debet eße ♈. — "It ought to be ♈."

• *H. 7 17 — the same as before, 3 43, better.*

At that time the azimuth of ☾ was 85 30 and the altitude 21 21½, this being taken as we said before in the case of the Moon: the altitude on the lower limb, the azimuth on the more westerly one.

Between ♀ and the western limb of ☾:

• *H. 7.21 5 42 Az. ☾ 86 1 Alt. 20 45*

• • 40 5 37*

In this last observation the western limb of ☾ was exactly at 90 Gr. from the meridian, and the altitude 18 10.

H. 7 36 — between the brighter star in the lower horn of ♈ and the limb of ☾ nearest it, 3ᵖ 43′. At that time the azimuth of ☾ was 88 58 and the altitude 18 56. The line of ☾ through both horns pointed toward this star, so that the Long. was the same and the Diff. lay in the Latit. only. And from this you can gather the apparent latitude of ☾, if you subtract this distance from the star's latitude, allowing all the same for the semidiameter of ☾, which has to be added.

To verify the star's place we took its distance from the eye of ♉ twice, 38 20; the declination will be given by the altitude observed in the preceding year, so it will have to be looked for among that year's observations; and from this, from the place of Aldebora, there will be given the right ascension of this star, and then its Long. and Latitudo.

Between the eye of ♉ and the lower illuminated limb of ☾ there was observed —

• *H. 7.48 37 24 Azim. ☾ 1 6 Alt. 17 25*

• • 54 37 17½ 2 33 16 30*

• • 58 37 12½ 3 20 16 6*

• • 8.13 37 8*

These azimuths are reckoned from the west toward the north. Then Gellius and Andreas observed, between the western limb of ☾ and the eye of ♉ —

• *H. 9 M. 12 36 23*

• • 18 36 19*

• • 29 36 2*

• • 33 36 0*

A little after, at H. 10 M. 10, ☾ was seen to set.

All these preceding distances were made with the Sext. Trig. carefully enough that an error of one minute can hardly lie hidden in them.

With the Radius these distances were taken the same evening.

• *H.5 M.41 between ♀ and the western limb of ☾ 6 19*

• • 49½ the same distance 6 17*

• • 56 6 8*

• • 6.14 5 53*

• • 20 5 52*

Then from the head of ♈ to the lower limb of ☾.

• *H. 6 M. 54 7 8*

• • 56 7 8*

• • 59 7 3*

- • 7 1 distance of ♀ and the western limb of ☾ 5 38*

Remember throughout that distances taken with the Radius are deceptive, and those taken with the Sextant sure. I used the greater clock throughout.

DIE 26 FEBRUARIJ.

H.1 M.26 — I observed with the Sext. that between the Sun and the limb of ☾ there was P.52 M.15. At that time the upper horn had

- • Alt. 48 16*
- *and the lit part toward the*
- • west, Azim. 38 17*
- *H. 1 33 the same distance **52 17½***
- *and taking it as before Alt. 48 38,*
- • Az. 36 17*

	Dift.	Alt.	Azim.
H. 1 43	52 21	49 16	33 3
1 45	**52 22½**	49 36	32 17
1 47	52 23	49 45	31 34
1 52	52 25	50 5	29 57

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And I made all these observations with the Trigonic Sextant, to the Sun and to ☾; and comparing them one by one I find that at H. 1 M. 40, when ☾ [recte: ☾ *fuit* for ☾ — Corrigenda, p. 429] *stood at exactly 90 Gr. and was free of the parallax of longitude, it was P. 52 M. 20 — a figure you can build on. At that time, the rest being compared, the altitude of the uppermost circumference of ☾ was 49 5, and the azimuth of the western limb 32 5.*

This is what I gathered from the preceding observations.

Observing by the Armillae at H. 1 M. 37, however, with the place of the Sun put at 17 40 ♓, that limb of ☾ was seen at 9 55 ♉. At that time the altitude of the upper limb of ☾ was 48 55, and the azimuth of the western limb very nearly 34 50. Then at H. 2 13 the same western limb of ☾ was seen at 10 10 ♉, its own azimuth standing at 22 23 and the altitude of the upper circumference at 51 25.

It is clear from this that in a space of 33 minutes of time ☾ advanced 15 min. in the sky, which does not stray far from the truth; still, more trust should be put in the distance from the Sun taken with the Sextant.

H. 3 13' 20" — the western limb of ☾ crossed the meridian, and the upper altitude of ☾ was 53 26. Then, straight away, with the Sextant.

Between the western limb of ☾ and ♀

- *H.3 13' 55" 6 50*

390 The head words are the leaf's own abbreviations; they stand for the distance, the altitude and the azimuth. The leftmost file, carrying the times, has NO printed head of its own; that file too carries a value on every line. Each figure group is a spaced pair set with no degree, minute or second mark anywhere.

- • 16 13 6 52 All between*
- • 17 45 6 53 the western limb*
- • 19 0 6 54 of ☾ and ♀.*
- • 20 50 6 54 Good enough.*
- • 22 30 6 55*
- • 26 0 6 58*

These distances are better than those taken with the Radius.

At this last time the azimuth of the lunar limb, reckoned from the south toward the west, was 4 50, and the altitude 53 18. The altitude, as before, was of the upper limb, that is of the tip of the horn, from which the semidiameter has to be subtracted.

Then after the setting of ☉ these observations were made.

- *H. 6 42 Between ♀ and the western limb of ☾ 8 18*
- • 46½ 8 16*
- • 50 8 15½*
- • 55 8 23*
- • 58 8 22½*[391]

Comparing them one by one, it appears that the more reliable were the second observation, made at H. 6 46½ at a distance of 8 16, and the one made at H. 6 58 at a distance of 8 22½ — for the difference is M. 6½, answering to an interval of time of M. 11½. That agrees well enough with the hourly motion of ☾ away from ♀, the other observations too, where they are bounded, conflicting only imperceptibly.

H. 7 M. 13 — between ♀ and the western limb of ☾, 8 31, good enough. At that time the azimuth of the western limb of ☾ was 74 30, and the lower limb had an altitude of 33 43.

Then I noticed that Aldebora, the upper horn of the Moon and the bright star of the head of ♈ stood exactly in one straight line; for when a rule was laid to both stars it seemed to touch the tip of the Moon's light precisely. That same horn stayed in that line for more than two hours, and so several times in the meantime we took the distance of that horn from the head of ♈ and from the eye of ♉ with the Sextant — as we did with all the rest — so that from the Moon's given apparent place the places of the stars might be restored.

H. 7 M. 20½ — between the upper cusp of the shining horn of ☾ and the eye of ♉, 23 12½; and at that same instant the azimuth of that cusp was 76 0, the altitude 35 14 [recte: 33 14 — Corrigenda, p. 429].

H. 7 M. 25½ — the same cusp from the head of ♈, 12 18; and the azimuth of the cusp of ☾ was 77 8, the altitude 32 35.

H.7 M.44 — the same cusp of ☾ and the head of ♈, 12 32; and the azimuth of that same cusp was 82 6, the altitude 30 7.

[391] The phrase is printed occid limb. — occid with no point, limb. with one — where the same word carries a point everywhere else on this side.

H. 7 M. 46 — Aldeboran and the distance of that same cusp, 22 58½. And the azimuth of that same cusp was 81 50, the altitude 29 46.[392]

There seems to be some fault in one of these two azimuths, which the calculation will show clearly enough — and which of them is the more to be trusted.

H. 8 M. 28 — the upper cusp of ☾ crossed 90 from the meridian, having at that same place an altitude of 24 20.

But remember that this is not really the altitude of the upper limb itself, because the Moon nodded a great deal westward [recte: *verſus occaſum & ſept.*, "toward the west and north", for *verſus occaſum* — Corrigenda, p. 429] *through her upper cusp, in about this way.*

Diagram. A small figure standing in the upper half of the left block, set to the right of the text, with the text lines running up to its left edge. It shows a circle; a straight line drawn right across it from lower left to upper right and running well beyond it at both ends; a horizontal line entering from the left, passing above the circle's centre and stopping at the circle's right side; and a vertical line running from above the circle down through it and out below. Along the inside of the circle's lower-right arc a narrow lune is drawn and filled with close hatching, its inner edge meeting the oblique line near the circle's top. **The figure carries no lettering of any kind — zero labels, zero numerals** — and no caption is printed. Nothing is identified and no quantity is claimed for it.

And the same had to be allowed for in the other observations too, in observing this cusp of the Moon. Around these times the Moon pointed a line, running through both her horns, toward the knee of Cassiopeia, and from this the inclination of her cusp will be able to be known in full — just as

Diagram. A second figure, lower in the left block and running across its full width, cutting the text: a facsimile of a freehand sketch, drawn and lettered by hand rather than set in type. A long straight line runs from the upper right down to the lower left; a second long straight line crosses it, running from the upper left down to the lower right. Star marks and handwritten words stand along them. Reading round the figure: at the left, a handwritten word and, below it, a star mark; at the top centre, a small cluster of star marks with a handwritten word to their right; at the centre right, a small disc, shaded, with a crescent drawn on its lower left; to the right of that disc a handwritten word followed by a two-stroke glyph of the form the printed text of this side sets for ♈, with a star mark below them; and at the lower right a star mark with the glyph ♀ below it. **Lettering: three handwritten words and two glyphs.**

- Left, above a star mark: `Aldeb.`

[392] a short horizontal rule is printed here, set flush with the left edge of the right block and running about a quarter of its measure, standing between the line above and the two lines below. It is not a footnote rule in the sense the rest of this volume uses, since the matter beneath it is set in the same italic and at the same size as the text above it, and the sentence it opens is not complete on this side but runs on. The alternatives left open are a division mark printed by the editor, and a reproduction of a line drawn in the manuscript.

- Top centre, beside a cluster of star marks: pleiades [?]
- Centre right, above a star mark: cap followed by a two-stroke glyph matching the printed ♈. No name is supplied for the glyph.
- Lower right, below a star mark: the glyph ♀. No name is supplied for it.

a line drawn through the upper horn passed through Aldebora and the head of ♈ *together, as we said, so that these three lay in one line. In the same way a line drawn from the star* ♀ *through the lower horn of* ☾ *fell on the middle of the Pleiades — at this time particularly on the brighter of them, but a little later on the very middle of the group, so far as eye and rule allowed one to see.*

Then we observed that cusp from Aldebora and from the Head of ♈.

- *H. 8 M. 37 Between the upper cusp of* ☾ *and Cap.* ♈ ***12 56½***
- 8 41 Between the same cusp and Aldebor. 22 33
- 8 **47½** The same cusp and Cap. ♈ 13 2
- Azim. of the same cusp 86 51
- Alt. 21 37
- 8 51 The same cusp and Aldeb. 22 28
- And lastly, of that cusp: Azim. 85 5
- Alt. 21 11
- Note: these azimuths are reckoned from the north toward the west.
- H.8 **57½** The same cusp from Cap. ♈ 13 6
- Of the same: Azim. 84 0
- Alt. 20 25
- 8 59 The same cusp from Aldeb. 22 23
- 9 **7½** The same cusp and cap. ♈ 13 12
- 9 **10½** The same cusp from Aldeb. 22 16
- 9 15 The same cusp from cap. ♈ 13 14
- 9 **17½** The same from Aldeb. 22 14
- We did not take the azimuths here.[393]

These last observations, from H. 8 M. 57½ up to H. 9 M. 17½, of the cusp of ☾ *from Aldeb. and cap.* ♈*, are moderately good; but because these stars were then leaning toward the west, and there were also some thin clouds there, an error of 2' or 3' could easily creep in. So more trust should be put in those we took above, and above all in those we obtained from H. 8 M. 37 in H. 8 M. 37 into Hour 8 M. 51.*[394]

Nota. All the distances made this evening and on the preceding ones, to ♀*, to* ☾ *and to the stars, are by the Trigonic Sextant, so that you may trust them well enough; but with the Radius too, on this same evening, the distance of* ♀ *and the western limb of* ☾ *was taken —*

- *H.7* ***35½*** ***8 46½***
- • 7 41 the same distance 8 48*

[393] The leaf's own abbreviations for the two stars are inconsistent within this one run — Aldebor., Aldeb., Cap. ♈ with a capital and cap. ♈ with a small letter. Nota: here takes a COLON; the other Nota on this same side takes a full stop.

[394] The leaf sets ab H. 8 M. 37 in H. 8 M. 37 in Horam 8 M. 51, with the group H. 8 M. 37 in standing twice in succession on one line.

• • 7 48 and the same repeated 8 48½*

But the Radius is not much to be trusted in these distances.

At the next following noon the greater Clock was running at least 0 M 48" fast.

DIE 27 FEBRUARIJ.

On this day ☾ passes through 90 Gr., free of the parallax of longitude, at H. 3 M. 9½ p. m.

Then we observed ☾ against the Sun with the Armillae, and

H. 3 M. 11½ — the western limb of ☾ was seen at 25 5 ♉, the place of ☉ being put at 18 43 ♓. But afterwards I corrected the circle of longitude, setting it at 25 10 ♉ and ♏. And

H. 3 22' 47" — the Sun remaining in the same place, the same limb of ☾ was seen at 25 10 ♉; and this observation is certain enough.

H. 4 9' 20" — ☾ was on the meridian, having Alt. 56 57. *In ☾ the western limb was what was observed for the azimuth from the south, the upper horn for the altitude.*

H. 5 5½ — ♀ stood from the limb of ☾ nearest to her 21 0. ☾ was then in Azim. from the south toward the west 22 57, Alt. of the lower limb 55 3½.

Nota, that in these observations the western limb of ☾ is taken for the distance and for the azimuths, and the lower limb for the altitude.

• ♀ et ☾ Azim. ☾ Alt.
• H. 5 M. 10 21 2½ 24 30 54 53
• 12 21 2 melior hæc priori
• 54½ 21 17½
• 56 21 18 40 47 51 32
• 6 0 21 19 41 52 51 18
• 6 7 21 20 43 55 50 43
• 10 21 20 45 9 50 20
• 8 12½ 22 13½ 77 52 35 58
• 25 22 19½ 80 30 34 7[395]

The upper horn of ☾ lay as it were on a straight line — except that it was slightly lower — drawn from ♀ to the northern horn of ♉, the one shared with the foot of Erichthonius.

H. 9 12 18 — ☾ was at 90 Gr. from the south and had Alt., reckoned by the lower limb, 28° 0½′. As regards the azimuth, understand the western limb, as

[395] A head row IS printed — three roman groups, ♀ et ☾, Azim. ☾ and Alt., standing over the distance file, the azimuth file and the altitude file; the leftmost file, which carries the times, has no printed head of its own. But a value does not stand on every line: the second line carries the words *melior hæc priori* where the azimuth would stand and has no altitude at all, and the third line carries a time and a distance only. In this head row Alt. carries NO ☾ after it, where the answering head row in the other block does carry one. Every figure group in the run is bare — no degree, minute or second mark stands anywhere in it. *melior hæc priori* means "this one better than the previous".

in the earlier entries. The greater clock at the following noon was running slow by M. 2 42".

DIE 28 FEBRUARIJ.

☾ crossed 90 Gr. at H. 4 37', and the place of ☉ then, from the meridian observation, is at 19 47 ♓; parallax of longitude subtracted 2', so that the true longitude of ☉ is 19 45.

H. 3 M. 59. The place of ☉ being put at 19 45 ♓, the western limb of ☾ was seen at 9 26 ♊, and ☾ was at least 38' before the 90th degree itself.

H. 4 M. 8 — in the same way ☾ was seen through the armillae at 9 30 ♊. It should be noted, however, that the Sun's rays were not strong enough this day, because from the meridian onward he was moving all the while among rather thin clouds.

H. 4 M. 36 — ☾ was at 90 Gr. from the ascendant; at the same time the western limb of ☾ was in Azim. from the south toward the east 14 11, and the upper cusp had an Altitude of **58 15½**.

H. 4 42' 45" — again the same western limb of ☾ was in Azim. 11 0, Alt. of the upper cusp 58 30.

H.5 9' 0" — the western limb of ☾ was on the meridian, the upper cusp having Alt. **58 52½**.

H. 5 51 — ♀ stood from the limb of ☾ nearest to her **34 15¼**; Azim. of the western limb of ☾ 17 40, Alt. of the lower horn 57 30.

- ♀ et ☾ Azim. ☾ Alt. ☾
- H. 5 M. 57 **34 17½** 19 56 57 16
- 6 1 34 19 21 30 57 6
- 3 **34 19½**
- 8 **34 23½** 24 35 **56 40½**
- 10 **34 23¼** 25 27 **56 31½**
- 18 34 25
- 9 8 35 36 77 50 37 46
- 12 35 35 78 37 37 20
- 16 **35 36½** 79 20 37 0
- 18 35 36 79 43 fere **36 44½**[396]

♀ was drawing near the clouds about the horizon, and ☾ too was being veiled by rather thin clouds; so these distances appear less exact, and less consistent with one another.

H. 10 5' 12" — the more westerly limb of ☾ crossed 90 Gr. from the south, and the lower cusp had Alt. **30 5½**.

[396] The head row is printed — ♀ et ☾, Azim. ☾, Alt. ☾ — and the time file again has no head of its own. Two lines, the third and the sixth, carry a time and a distance only and stand empty under the azimuth and altitude heads. THE REFERENT OF fere IS NOT DETERMINED BY THE SETTING: it stands between the azimuth group 79 43 and the altitude group **36 44½**, closer to the azimuth but inside the white that separates the two files — the alternatives are that it qualifies the azimuth to its left or the altitude to its right. Every figure group in the run is bare.

The greater Clock, which I used in these observations, was running slow by at least 50" *on the following day.*

DIE 3 MARTIJ.

H.8 M.37 — ☾ was at 90 Gr from the ascending degree, and at the same time had an altitude, reckoned by the lower horn, of **53°51′**, standing in Azimuth 17 18 from the south toward the west, reckoned by the western limb.

At the next following noon the Greatest Clock was running slow by M. 2 40".

DIE 5 MARTIJ.

- H. 10 25 — the heel of the foot of ♊ from the limb of ☾ nearest to it **46 37⅔**
- 29 — the heel of the foot of ♊ from the same limb 46 40
- Azim. of ☾ from the south toward the west 20 50
- Altit. of the upper limb 45 53
- H. 10 50 — cor ♌ from the western limb of ☾ 8 30
- Azim. of ☾ 28 47, Alt. 44 4[397]

These following observations, all of them, of the Azim. and Alt. of ☾ were made by the shadow of ☾; the azimuths, however, are reckoned from the middle of the bright part of ☾, and the altitude from the centre.

	☾ et		Azim. ☾	Alt.
H.11 0	Calx pedis ♊	**46 51½**	30 20	43 40
5	Cor ♌	8 25	31 45	43 20
8	Calx pedis ♊	**46 41½**	32 52	43 4
10½	Cor ♌	**8 16½**	33 59	42 48
16½	Calx ♊	46 35	35 3	42 30
18½	Cor ♌	8 19	36 7	42 12
23	Calx pedis ♊	46 54	37 19	41 50
26½	Ead. repet.	46 54	38 27	**41 33½**
29	Cor ♌	8 21	39 5	41 18
33	Calx pedis ♊	**47 1½**	40 20	41 0
37½	Cor ♌	8 14	41 32	40 37

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[397] Two further members carry no time at all, holding an azimuth or an altitude only. All figure groups in the run are bare. The leaf spells the star cor ♌ with a small c here and Cor ♌ with a capital in the run below.

[398] A head row is printed: ☾ et stands over the file of star-names, Azim. ☾ over the azimuths and Alt. over the altitudes. The time file at the left and the distance file between the names and the azimuths have NO printed head of their own. The star-names are the leaf's own words and abbreviations — Calx pedis ♊ against the shorter Calx ♊ on the fifth line, Cor ♌ with a capital, and Ead. repet. on the eighth. Every figure group in the table is bare: no degree, minute or second mark stands anywhere in it.

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About the times of these observations, cor ♌ and the tail of ♌ lay in one straight line with the lower limb of ☾, by the rule. If anywhere in the distances from ☾ a large error appears when the observations are compared, that is perhaps how it came about: distances of one sort and of another were taken by turns, on account of the repeated shifting of the instrument, through carelessness in the counting.

The greater clock at the following noon was seen to run slow by at least one minute, the Sun being watched through the slits of the sights; for it was not clear enough.

DIE 21 MARTIJ.

- Between the eastern limb of ☾ and ♃
- In the morning H. 4 M. 34 **13° 28½′** per Radium
- 43 13 34
- 49 **13 38½**
- 53 **13 41½**[400]

DIE 26 MARTIJ.

H.7 13"55" — Altit. of the upper horn of ☾ at **26° 30′**, when ☾, reckoned by its western limb, was at **90°**.

7 36 — Azim. of the western limb of ☾ from the north toward the west **85° 36′**, Alt. of the upper horn **23° 34′**.

DIE 28 MARTIJ.

H. 3 44' 28" — ☾ was at Gr. 90 from the ascendant, free of the parallax of Longitude.

H.3 44 10" — ☾ in Azimuth from the south toward the east 9 7, reckoned by the western limb. Alt. of the upper horn 58 52.

H.3 57 — the western limb of ☾ stood from ♀ **20 3½**; Azim. of the western limb of ☾ 3 41, Alt. 58 57, with respect to the upper cusp.

H. 4 0 — the western limb of ☾ from ♀, as before, **20 3½**; Azim. of the western limb 2 19, Alt. **58 57½** of the upper horn.

- H. 4 **3½** — the same distance **20° 4′**
- 4 6 10" 20 5[401]

and the western limb of ☾ was on the meridian, Alt. of the upper horn 58 59

[399] the seventh and eighth lines of the table print the SAME distance, 46 54, one under the other, the eighth being labelled *Ead. repet.* — "the same, repeated". Calx pedis ♊ is the heel of the foot of ♊, and Ead. repet. stands for *Eadem repetita.*

[400] The first value is printed **13° 28½′**, with a degree mark and a prime; the three below it are printed bare.

[401] The two members print the SAME quantity — the distance called *Eadem diſtantia* — one marked **20° 4′** with a degree mark and a prime, the other bare 20 5 a single line below.

H.4 9 — ♀ from the western limb of ☾ **20 5⅔**. Azim. of the western limb from the south toward the west 1 25, Alt. of the upper horn 58 58.

DIE 29 MARTIJ.

H. 5 3' 54" — the western limb of ☾ was on the meridian, and the Alt. of the upper horn was **58 18⅔**.

At the same time the distance of the western limb of ☾ from ♀ was taken, **33 41½**.

H. 5 7' 30" — the western limb of ☾ in Azim. 1 30 from the south toward the west, Alt. of the upper horn **58 18½**. At the same time the distance of the western limb of ☾ from ♀ **33 42½**.

H. 5 8' 8" — ☾ was at 90 Gr from the Ascendant.

H.5 11 30 — distance of the western limb of ☾ and ♀ 33 45; Azim. of ☾ toward the west **3° 24′**, Alt. **58 18⅓**.

H. 8 10 — ☾ appeared to be sensibly conjoined with the northern knee of Gemini. For a straight line drawn through both horns fell upon the star, and the distance of the northern horn of ☾ from the star appeared to be about one degree. With the Radius, however, **1° 28′**, and a little later **1° 24′**

H.10 5' 45" — the western limb of ☾ at 90 Gr. from the south, Alt. of the upper horn **29 12½**.

DIE 30 MARTIJ.

H. 5 56' 5" — the western limb of ☾ on the meridian, and the Alt. of the upper horn was 56 11

___[402]

- H. 6 24 — between ♀ and the western limb of ☾ 46 54
- **6 28 0″** — Azim. of the western limb of ☾ 12 30
- Alt. of the upper horn **55 10½**

At this time ☾ stood in the 90th degree from the Ascendant. At the same time, between ♀ and the western limb of ☾, 46 56.

Nota. About this time ☾ was near its greatest distance from the centre of the greater epicycle, and so it will show each of the two doubled prosthaphaereses [prostaphæresin] at its greatest.

- H. 6 30 — between ♀ and the western limb of ☾ **46 56½**
- **32½** — the same distance **46 57½**
- Azim. of the western limb 14 10, Alt. **55 27½**
- 34 — the same **46 58⅔**
- Azim. of the western limb 15 5 Alt. **55 26½**

[402] at H.3 44 10" on printed p. 144, right block, second entry under *DIE 28 MARTIJ*. The minute figure is read 44, the same minute as the entry above it, whose seconds figure is larger (44' 28"); so as read the second entry carries the earlier time of the two while standing later in the file. at *Eodem temporc capta eſt diſtantia*, printed p. 144, right block, under *DIE 29 MARTIJ*. The last sort of the second word is read as a c: the bowl is open at the right and no crossbar is visible. Both forms stand on this side.

DIE 31 MARTIJ.

H. 7 **46′ 44″** — ☾ in the 90th Gradu from the Ascendant, free of parallax of longitude.

H. 7 47 15 — the western limb of ☾ in Azim. from the south toward the west 22 30, Alt. of the upper horn 51 14.

This observation was made while thin clouds were passing. At the following noon the greater Clock was running slow by M. 5 S. 55.

DIE 1 APRILIS.

H. 7 **33′ 9″** — the western limb of ☾ was on the meridian, Alt. of the upper horn 48 47

H. 8 17 — between cor ♌ and the western limb of ☾ 12 18. The western limb was then in Azim. from the south toward the setting 15 13, Alt. of the upper horn 47 56.

DIE 2 APRILIS.

H. 10 **17′ 24″** — ☾ was in the 90th from the Ascendant, Gr.

H.8 17 2 — the western limb of ☾ crossed the meridian, Alt. of the upper horn **44 3½**

8 21 50 — Cor ♌ crossed the meridian. It was not possible to take the Alt. because of the brightness of ☾.

- 8 28 — Cor ♌ and the upper horn of ☾ stood apart, with the Radius **4° 3′**
- 8 34 — the same found 4 4
- 10 18 39 — Azim. of the western limb of ☾ from the south toward the setting **28° 23′**, Alt. of the upper horn 38 16

DIE 3 APRILIS.

H.8 **58′15″** — the western limb of ☾ was on the meridian, having an Altitude, reckoned by the upper circumference, of **39 3½**

DIE 5 APRILIS.

H.10 **18′45″** — the western limb of ☾ on the meridian, Alt. of the upper limb 28 40

DIE 6 APRILIS.

H.11 **0′21″** p. m. — the western limb of ☾ was on the meridian, Alt. of the upper limb 23 43

DIE 7 APRILIS, MANE.

H. 2 **0′ 20″** — ☾ was in the 90th from the East, gradu.

- 2 0 25 — Azim. of the western limb of ☾ 44 30
- Alt. of the upper limb 13 57
- 2 6 — distance of the western limb of ☾ from Spica ♍, with the Trigonic Sextant 5 28

• 2 7 — the same distance 5 28

DIE 24 OCTOBRIS.

H.4 M.25 — by the lesser Clock the more westerly limb of ☾ was in Azim. toward the rising 27 10, and Alt. of the upper horn 15 32. The Moon was then exactly in the 90th degree from the Horizon on the Ecliptic. It should be noted, though, that about this time ☾ is at its greatest departure [digreßione] from the centre of the greater epicycle, and so the prosthaphaeresis of each epicycle is at its greatest.

Then H.4 M.32, in the same way, Azim. 25 30, Alt. 15 56, these too of the upper horn and of the more westerly limb.

And H.4 M.36⅓, on the same reckoning, Azim. 24 30, Alt. 16 12½, everything being taken on ☾ as before.

H.4 M.38½ — Azim. 24 0, Alt. 16 9, everything as before.

H.4 M.42⅔ — Azim. 23 0, Alt. 16 33, everything as before. All these times by the lesser Quadrant.

From this you can work out the apparent declination and the apparent latitude of ☾ about this time, since she had almost no parallax in longitude.

H.4 M.58 — the star ♃ was in Azim. 22 0 and Alt. 13 55, but not very exactly, because of rather thin clouds coming between. From this you will be able to verify the times from what is given, by means of the following observations of the place of ♃, so that the moments of the earlier observations may be established — all of these likewise by the lesser Clock.

H.5 M.2¼ — the same star ♃ in Azim. 21 0, Alt. 14 8; and this observation was exact enough.

H.5 M.6½ — Azim. of ♃ 20 0, Alt. 14 21. From this, again, as from a surer observation, you can correct the time, once the place of ♃ has first been restored.

Then I observed the distance of ☾ from the star ♄, because that star was the first to meet the declination of the Ecliptic; and I found it to stand off, measured by the western limb, p. 23 31½. The Azim. of the western limb was 13 40, Alt. of the upper horn 18 27. On the lesser Clock it was then H. 5 M. 20¾. Correctius Hor. 5 M. 24.[403]

Then H.5 M.28⅙ the more westerly limb of ☾ was in Azim. Gr. 10 M. 40, Alt. of the upper horn 18 41. But the western limb stood off from ♄, measured with the Trigonic Sextant, 23 27.

H.5 M.33 — again in the same way, Azim. of ☾ 10 38, Alt. 18 44, distance 23ᵖ 26′. But this observation was not certain enough, because of clouds coming between.

H. 5 M. 42½ — once more, on the same reckoning, the Azim. of ☾ was 8 10, Alt. 19 2, and the distance of the more westerly limb from the star ♄ at the same instant 23 21; and this observation was certain enough in every respect.

H.5 M.44½ — again Azim. of ☾ 7 35, Alt. 19 6, everything taken as before as regards the limbs of ☾. The distance was in fact 23 16[1], but there is doubt about this observation.

[403] the closing words of the paragraph above, *Correctius Hor. 5 M. 24.* — "more correctly, Hor. 5 M. 24" — are set in ROMAN inside an italic run.

*H.5 M.51 — Azim. of ☾ 5 59, Alt. of the upper circumference 19 19; it stood off from ♄ P. **23 17½′**; and this observation is surer than the one before it.*

*H.5 M.**54½** — Azim. of ☾ 5 10, Alt. 19 20, distance from ♄ 23 18; but there was some error in the sight [pinnacidio].*

H. 5 M. 59 (H. 6 M. 2⅔ correctum) — *Azim. of ☾ 3 52, Alt. in fact 19 25. Distance from ♄ 23 11. And this one was certain enough.*

*H.6 M.**14½*** (H.6 M.18 S.20 corr.) — *exactly, the western limb of ☾ was on the meridian, and the upper horn then had an altitude of 19 28. At the same instant the distance of ☾ from the tip of the wing of Pegasi was p. **52 20½**.*[404]

*H. 6 M. **18⅔** — Azim. of the western limb of ☾ **1**ᵍ... **0**°[2], Alt. 19 27, the distance from the tip of the wing of Pegasj P. 52 M. 18. These two observations are good.*

*Then a little later, H. 6 M. **22⅔**, the same distance was found 52 19; but trust the preceding one rather.* Tempus correctum transitus H. 6 M. 30⅗.[405]

*H.6 M.**26 40″** — the star ♃ crossed the meridian, having an altitude of 16 19. From this too, from the given place of ♃, you can find the place of ☾, through the interval between the transits of ♃ and ☾, 12 M. **10″**.*

*H. 6 M. **32½** — the Azim. of ☾ was 4 23 toward the setting, Alt. 19 25; and the western limb of ☾ again stood off from ♄ 23 Gr. 0 M.*

*H. 6 M. 37 — Azim. of ☾ 5 30, Alt. 19 23, distance from ♄ **22 58½**. And this one too is good enough.*

Then H. 7 M. 12 — ♃ stood off from the upper limb of ☾, measured with the Radius, exactly 4 partibus. But this distance was for the most part a matter of latitude, since both horns fell as it were upon ♃.

*Then H. 7 M. 17 — it stood off from the lower horn of ☾ p. **3 24′**, so that the diameter of ☾ comes out 36.*

The lesser Clock was running slow at the following noon by M. 9 S. 10.

DIE 25 OCTOBRIS.

- Per minus Horolog. H. 4 M. 49
- Per maius 4 45

The Azim. of ☾, taken by the western limb, was 34 G. 30′ toward the rising. Alt. in fact 18 32.[406]

The western limb, the one nearest to Jupiter, stood off at the same instant from ♃ itself p. 11 M. 42.

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[404] two further ROMAN insertions inside the italic run, both given in roman here so that the fount survives.

[405] the closing words above, *Tempus correctum tranſitus H. 6 M. **30⅗**.* — "the corrected time of the transit, H. 6 M. 30⅗" — are ROMAN inside the italic run.

[406] the two displayed lines above and the sentence that follows them are a single printed structure, and they are ROMAN where the rubric above them and the paragraphs below them are italic. A BRACE is printed: one brace-sort spanning both lines, set to the right of the two clock readings, with *Fuit* standing to its right on the first line and *Azim.* on the second — so the two readings are braced together and the words *Fuit Azim.* ☾ … govern both.

☾ *was at about this time in the* 90*th degree of the Ecliptic from the rising, free of parallax of longitude, and not far removed from the greatest distance of the Epicy-*[407]

I observed the same again in this way[1].

- *Per minus Horol.* **H.4 M.54 40″**
- *Per maius* 4 50 20
- *Tempus correctum* 4 53 0

The Azim. of ☾ *was* 33 16*, Alt. of the upper limb* 18 55*. The distance of the same limb from Jupiter* **11 44½***.*

- **H.4 59⅚′** *per minus Horol.*
- **4 55 20″** *per maius*

The Azim. of the western limb **32 Gr. 2′***, Altit.* **19 G. 20′***, Dist. of the western limb from Jupiter* **11 46⅓***.*

- **H.5 4⅚** *per minus Horol.*
- 5 0 *per maius*

The Azim. of the western limb of ☾ **30 G. 52′** *toward the east. Altitude of the upper circumference* 19 48*. Distance of the western limb from* ♃ **11 48⅓***. All these observations good enough.*

- **H.6 M.14⅙** *per minus*
- **6 4⅙** *per maius horol.*

The Azim. of the western limb of ☾ *was* 14 20*, Alt. of the upper circumference* 23 25*; and the western limb stood off from the lower one in the horn of* ♑ *p.* 26 *M.* **43⅓***.*[408]

- **H.6 19⅔** *minus*
- **6 9⅙** *maius*

Azim. of ☾ 12 50*, Alt.* **23 40½***, Dist. from the lower horn of* ♑ **26ᵍ 44½′***.*

- **H.6 43⅚** *per minus*
- 6 32 0 *per maius*

The western limb of ☾ *stood off from the tip of the wing of Pegasus, with the Trigonic Sextant, as above, p.* **38 55½***. The Azim. of the western limb was* 6 40*, Alt. of the upper circumference* 24 18*.*

- **H.6 48⅔** *per minus*
- **6 36⅓** *per maius*
- **6 46⅓** *temp. corr.*

The tip of the tail of ♑ *crossed the meridian, having an altitude of* 16 13*.*

- **H.6 53⅔** *per minus*
- 6 41 0 *per maius*

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[407] DREYER'S APPARATUS ON THIS SIDE — two notes, set in roman below the left block, each opening with a small raised figure. [1] (called at the distance figure 23 16 in the left block, *Diſtantia vero erat 23 16*): Lineis inducta. — "Struck through with lines." [2] (called at 0° in the right block, in the group 1ᵍ... 0°): Sic in codice V. — "Thus in codex V."

[408] the words at the end of that sentence stand on the leaf as *diſtabat autem occid. limbus ab inferiori in cornu* ♑ *p.26 M.43⅓.* The phrase *ab inferiori in cornu* is set with no noun to govern *inferiori*, and the setting does not determine what it qualifies.

The distance of ☾, taken at the western limb, from the tip of the wing of Pegasus was observed again: **38 G. 48′**; *and the Azim. was* **4 G. 18′**, *Alt.* 24 29.

- **H.6 59⅙** *per minus*
- 6 46 *per maius*

The Azim. of ☾ being 3 0, *Alt.* 24 33, *the western limb of ☾ stood off from the tip of Pegasus p.* 38 *M.* **42½**.

- H.7 M.11 40 *per minus*
- 6 57 10 *per maius*

The western limb of ☾ crossed the meridian, and the upper circumference had Alt. 24 35; *and at the same instant the western limb stood off from the tip of the wing of Pegasus p.* 38 *M.* **39½**. *This observation was certain enough, and you can trust it. With the mural Quadrant the altitude of the centre of ☾ was then* 24 15, *but not accurate enough.*[409]

Once all these have been set within their limits and compared with one another, you can gather from them the place of the Moon to a fixed and given minute of the hour; and since at this time the Moon is not far from the greatest distance of the mean motion with respect to each epicycle, you can then look into the true magnitudes of the epicycles and the corrections of their prosthaphaereses [proſtaphæreſium].

Note. The observations made on ☾ the following evening are middling and good enough, although ☾ did not shine out freely but was seen through rather thin cloud; even so they agree well enough with one another.

DIE 26 OCTOBRIS.

H. 5 *M.* 22 *per maius* (5.33 Temp. corr.) — *between ♃ and the western limb of ☾, with Q.[2] Tichon.,* 25 38. *☾ was then near the* 90*th degree of the Ecliptic from the east.*

Then H.5 **M.26½** *by the greater clock the same distance was* 25 41. *The western limb of ☾ had Azim.* 37 40 *toward the east, Alt.* 23 25 *of the upper horn[3].*

*H.5 M.*32 *per Max., in the same way, the Azim. of ☾* 36 8, *Alt.* 24 0, *Dist. from ♃* 25 43.

H.5 **M.36½** *Azim.* 35 0 *Alt.* **24 22′**, *and then the distance of the same limb from ♃* 25 45. *From this you can verify the Moon near the* 90*th Degree by the place of ♃.*

H.6 12 (Hora correcta 6.25) — *the star ♃ crossed the meridian, or nearly so, having a greatest altitude of* 16 22 *both by Q. Mur. and by Q. Max., but by Q. Min.* **16 21½**. *From this the declination of ♃ is given; and from its distance from some fixed star taken yesterday (for this evening was not clear enough), account being taken of the proportion of the motion, the longitude and latitude of ♃ are obtained.*[410]

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[409] Each of the ten runs of clock readings above is joined by a brace to the prose sentence printed beside it.

[410] two ROMAN insertions stand inside the italic run of this side. (i) (5.33 Temp. corr.), and (ii) (Hora correcta 6.25). TWO COMPETING TIME CONVENTIONS STAND ON ONE LINE, twice on this side: H. 5 M. 22 beside (5.33 …), and H.6 12 beside (… 6.25). In each pair the first group uses the leaf's order-words and the second a printed POINT inside the figure group.

[1] Adſcriptum eſt alia manu: »NB. ☾ circa nonageſimum gradum iuxta ſupputationem Hora 4 M. 51«. — "Written in by another hand: »NB. ☾ about the ninetieth degree, by the reckoning, Hora 4 M. 51«."

[2] An »Sext.«? — "Perhaps »Sext.«?"

[3] Adſcriptum eſt alia manu: »Ex Azim. et Alt. Reſp. H.5 M.37⅔«. — "Written in by another hand: »From the Azim. and Alt. Resp. H.5 M.37⅔«."[411]

And from that the place of ☾ can be found. For verifying the time, though, you can use this given time of the transit ἐν πλάτει [Greek: *en platei*, "in breadth"], *although the sky was not clear enough then.*

H. 7 M. **41½** — the western limb of ☾ was on the meridian, having an Alt., as regards the upper horn,

- per Q. Mur. **30° 12½′**
- per Q. Max. **30 13½**
- per Q. Min. **30 13½**

You can therefore place greater trust in the two later ones. But ☾ was not seen clearly enough, because of an interval of cloud.

DIE 27 OCTOBRIS.

*H.6 M.**10½** by the greater Clock ☾ was at about the 90th degree, and the western limb had Azim. **43½** eastward. Alt. of the upper horn **27 G. 52′** by Q. Max. And the distance of the western limb of ☾ from ♃ **40 12¼**.*

*H.6 M.24 by the greater, in the same way, ☾ was Az. 40 0, Alt. 29 12, distance from ♃ **40 18⅔**.*

H. 8 **43⅔′** — the western limb of ☾ was on the meridian, having alt. of the upper horn 36 29.

DIE 12 NOUEMBRIS, MANE.

H.7 **29′30″** — Azim. of the more easterly limb of ☾ from the south toward the east 31 41

- Alt. of the lower horn 14 2
- Dist. of the eastern limb from ♀ 10 37
- 7 40 5 — Azim. of the eastern limb of ☾ 29 12
- Alt. of the lower horn 14 40
- Dist. of the eastern limb from ♀ 10 34
- 7 46 5 — Azim. of the eastern limb, as above 27 55
- Alt. of the lower horn 15 2
- Dist. of the eastern limb from ♀ 10 32

At the next following noon the greater Clock, which we used in these observations, was running 3 minutes slow, the transit of ☉ having been observed through the slits of the sights [pinnacidia].

[411] DREYER'S APPARATUS ON THIS SIDE — three notes, set in small roman across the full measure below the composed matter, each opening with a small raised figure answering a raised figure in the text: [1] called at *obſeruaui* in the left block's opening line, [2] called at Q in the right block's **per Q². Tichon.**, [3] called at *cornu* in the right block.

DIE 22 NOUEMBRIS.

The lower horn of ☾ stood off from ♄

- H.6 **53′30″** — gradibus **5½** with the Radius.
- 59 5 — distance of ☾ from ♄ **5°21′**
- The same distance, presently repeated, with the Radius 5 26
- H.7 **4′50″** — dist. of ♄ from the lower horn of the more easterly limb of ☾ 5 25

And this was the better observation of those remaining.

- H.6 **50′ 0″** — Dist. of the more westerly limb of ☾ from the Vulture 44 48
- 7 8 0 — Azim. of the western limb of ☾ from the south toward the west 22 50
- Altitudo 25 25
- Dist. of the western limb from the Vulture **44 50¼**
- 7 10 15 — Azim. of the western limb of ☾ 23 20
- Alt. 25 18
- Dist. of the western limb of ☾ 44 52

And ☾ was at this time at its greatest prosthaphaeresis, on the reckoning of each of its epicycles.[412]

DIE 23 NOUEMBRIS.

H. 3 M. 54 — ☾ was in the 90th degree.

	Azim. of the western limb of ☾ from the meridian toward the east	Alt. of the lower cusp	Dist. of ♃ and the western limb, with the Sext.
3ᴴ58′16″	43 0	25 6	
4 10 52	39 44	26 7	
4 15 48	38 27	26 37	
4 21 2	37 10	26 58	
4 30 40	33 34	27 43	31 14
4 36 45	33 0	28 12	**31 16½**
4 46 56	30 10	29 0	**31 19½**

DIE 24 NOUEMBRIS.

[412] THE TIME RUNS BACKWARD ACROSS THE HEAD OF THIS RUN: **H.7 4′50″** stands above **H.6 50′ 0″**.

	Azim. of the western limb of ☾	Alt. of the circumference	Dist. of ♃ from the western limb
4 53 20			45 17
5 6	41 50	31 55 inf.	45 22
5 10 12	40 0	32 49 ſup.	45 24
5 14 40	39 20	32 32 inf.	**45 26½**
5 18 42	38 10	32 50 inf.	**45 28¼**

But ☾ was not far from the greatest distance of each epicycle.

DIE 25 NOUEMBRIS.

	Azim. of the western limb of ☾, with the lesser Q.	Alt. of the lower limb	Dist. of the western limb from Aldeb., with the Sextant. △.
6ʰ13′10″	42 30	37 23	**47 32⅓**
6 21 16	40 0	38 10	**47 28⅓**
6 27 14	38 34	38 30	47 25
6 31 4	37 25	39 23	47 22
6 36 50	36 0	39 26	47 20
6 39 20	34 30	40 13	**47 17½**
6 44 0	33 50	40 10	**47 15½**

413

414

415

413 THE THREE HEAD ROWS DO NOT AGREE with one another: the altitude file is headed *Alt. infer. cuſpidis* in the first, *Alt. circumfer.* in the second, *Alt. infer. limbi* in the third; the distance file *Diſt. ♃ et occid. limbi per Sext.*, *Diſt. ♃ ab occ. limbo*, *Diſt. occ. limbi ab Aldeb. per Sextant. △*. In the third, the head's third line, *per minorem* Q., is set centred so that it stands beneath both the azimuth file and the altitude file; the setting does not determine which of the two it governs, or whether it governs both.

414 in the head row of the second table the final c of *occ.* carries a small mark below the line. The alternatives left open are a printed sort, a broken or fouled sort, and a speck on the leaf. The corresponding head of the third table carries no such mark.

415 A SHORT ENTRY stands in the second table, second line: the time group reads 5 6 where every other time group in the three tables carries three figures, the 6 standing in the file that elsewhere holds the minutes and the seconds file left empty.

DIE 27 NOUEMBRIS.

8^{H} **59′ 46** Azim. of the western limb of ☾ 26 40; and it was then about in the 90th degree from the Ascendant, toward the south. With the lesser Quadrant, Alt. of the lower circumference

51 44

Diſt. of the lower cusp of ☾ from Aldebora, or the eye of ♉, per Sext. △ **17 14½**

9 12 40 Azim. of the western limb of ☾ 21 50

- Alt. infer. circumf. per Q. min. 52 23
- Diſt. of the lower cusp of ☾ from Aldeb. 17 10
- 9 28 30 Azim. per Q. min. 16 10
- Alt. of the lower circumference 53 17
- Diſt. of the same per Sext. △ 17 6
- 9 31 24 Azim. per Q. min. 14 55
- Alt. infer. circumf. 53 20
- Diſt. of the same, ☾ and Aldeb. 17 4[416]

LOCA LUNÆ[1]

DIE 25 FEBRUARIJ.

Investigation of the place of ☾ from an observation taken from ☉, when it was near the ninetieth degree.

H. 1 M. 0 p. m. True place of ☉ **16° 43′ 29″** ♓. Alongside this corrected place of ☉$^{l_i^s}$, taken with the zodiacal Armillae, one minute being added for parallax, **25° 4′** ♈. Then

H. 2 M. 25, the distance of the centre of ☾ from ☉, the semidiameter being taken as **15**^{M}. The latitude of ☾^{ae} ἐν πλάτει [Greek: *en platei*, "in breadth"] **5° 10′**, from our tables; for it was in fact near the northern limit. From this its place is investigated by the science of triangles in the following way.

In the right-angled triangle BCD:

- DC 5.10
- BC 39.13
- BDC a right angle.

Therefore DB **38° 55′ 47″**. Place of ☉ ♓ **16° 47′ 23″**. Therefore the place of ☾^{ae} **25° 43⅙′** ♈ — that is, **40⅙** minutes more than before, over a time-span of H. 1 M. 35, which by the daily motion of ☾ would have been 58. But from this proportionate quickening of the course of ☾$^{r_i^s}$ only the refraction of ☉ and the παραλλαξις [Greek: *parallaxis*, "parallax"] of longitude of ☾^{ae} (for it was about **90°** at H. 0 M. 13 p. m.) could rightly be deducted.

[416] the leaf writes the instrument out in full once on this side — Per Q. Minorem, *the lesser Quadrant* — and abbreviates it per Q. min. at three further loci. The sort △ stands after Sext. at two loci; the printed setting does not determine a referent for it.

DIE 26 FEBRUARIJ.

Investigation of the apparent place of ☾ae from its distance from ☉, its true latitude being given as before.

H. 1 M. 40. Distance between the western limb and ☉em 52.20, ſemidiam. 15M. Latitude of ☾ 4° 47′ B.

- DC 4 47
- BC 52 35, the distance of the centre of ☾ae from ☉le.
- BDC right.
- BD 52 25 48, the arc of the difference of longitude.
- 17 45 0 ♓, the place of ☉lis.

Therefore the Longitude of ☾ae 10° 10′ 48″ ♉.

For extracting the parallaxes of ☾ae from observations near the meridian and the 90mum degree.

Diagram. An uncaptioned curvilinear figure standing at the left of the full-measure band, part-depth, with the composed lines running down its right. Two long curves spring from a single point at the top and bow apart as they descend to a flat base at the foot; a further curve crosses the interior from the left edge near the foot and rises to the right, meeting the right-hand curve above the base. Four letters are lettered on the block, all in italic:

- A (apex, at the top of the figure): A
- B (outer left, at the foot, where the left curve meets the base): B
- C (outer right, at the point where the crossing curve meets the right-hand curve): C
- D (outer right, at the foot, below C): D

[1] E Codice V. — "From codex V."[417]

DIE 28 FEBRUARIJ.

H. 5 M. 9⅙[418], the western limb of ☾ae was on the meridian. Altitude of the centre of ☾ 58 37½.

- Therefore the apparent declination 24° 32′
- True place of ☾ from the observation 10 20 ♊
- True latitude from our tables 3 3 0
- True declination 25 7 0
- Parallax of altitude 35 0

[417] DREYER'S APPARATUS ON THIS SIDE — ONE note, [1] E Codice V., set in small roman below the composed matter and opening with a small raised figure that answers the raised figure standing after LOCA LUNÆ. (i) The line H. 2 M. 25 diſtantia centri ☾ a ☉, aßumto ſemidiametro 15M. announces a distance and states NO FIGURE for it. (ii) The two stated times H. 1 M. 0 and H. 2 M. 25 are one hour twenty-five minutes apart, while the text names the interval H. 1 M. 35. (iii) 25° 4′ ♈ and 25° 43⅙′ ♈ differ by 39⅙, while the text says 40⅙. (iv) 16° 43′ 29″ and 16° 47′ 23″ are given as places of ☉ at those two times.

[418] the sixth rests on a comparison with body-size figures; no fraction-size 6 or 8 stands on the leaf.

H. 5 M. 51¼ Parallax of Altitude 35 45
For distinguishing the parallaxes in longitude at this time.
I. In the triangle ABD there are given:
- BA 34 5 30 — the complement of the elevation of the pole
- DA 65 25 0 — the complement of the observed declination
- DB 32 13 0 — the complement of the observed altitude
- Therefore BAD 10 17
- ABD 162 16

II. In the triangle ABC there are given:
- BA 34 5½
- CB 31 37¼, the complement of the true altitude
- ABC 162 16
- Therefore CA 64 50, the complement of the true declination
- and BAC 10 9 24, the true distance of ☾ from the meridian
- Parallaxis Decl. 35ᴹ
- Parall. Aſc. R. 7⅔
- Aſc. R. vera 68 35⅔
- Declin. vera 25 10
- Reſp. Vera Longit. 10 41 ♊
- Viſa Longit. 10 29
- Parallaxis longit. 12[419]

On 28 Feb.[1], H. 5 M. 51, the distance of the centre of ☾ from ♀ 34° 31′
- BA 65 25
- CA 73 48
- BC 34 31
- BAC 35 50½
- Declin. ♀ B ex obſerv. 16 12
- Aſcenſio recta ♀ 32 37½
- Declinatio ☾ 24 35
- Aſcenſio recta ☾ 68 28
- Longitudo 10 29 ♊
- Latitudo 2 30½ B[420]

[419] the two displayed groups above stand SIDE BY SIDE in the measure, the file opening BA 34 5½ at the left and the file opening Parallaxis Decl. at the right. No rule divides them. In the left file a brace-sort is set to the left of the last two lines, gathering CA and BAC to the word Ergo, which stands outside it. In section I above, three brace-sorts are printed: one gathering BA, DA, DB to the word complem.; a second opening from complem. onto the three phrases eleuat. poli, declinationis, altitudinis, line for line; a third gathering declinationis and altitudinis — and those two only — to obſeruatæ.

[420] those two files also stand SIDE BY SIDE, and here a PRINTED SHORT VERTICAL RULE divides them, four lines deep, beginning level with BA 65 25 and stopping level with BAC 35 50½. It is a rule inside the block and is recorded here rather than set as a horizontal division. The right file runs two lines deeper than the rule and two lines deeper than the left file; over those last two lines nothing stands at the left of it.

And this place of ☾ agrees tolerably with the transit across the meridian, taking account of the motion of ☾ae; but the parallax of longitude must be added, for the delay of ☾ near the ninetieth degree was H. 4 M. 37.

DIE 3 MARTIJ, P. M.[2]

The Moon, observed near the ninetieth degree from the Ascendant, in altitude and in azimuth.

H. 8 M. 37 S. 57 Altitude of the centre of ☾ae **54° 8′**

Azimuth observed from the meridian toward the west, and that at the western limb, **17° 18′**.

For the correction of the Azimuth, the semid. of ☾ near the horizon.

- BA and CA 35 52, the complement of the altitude of ☾
- BC 0 16, the semidiameter of ☾ae.
- Therefore FG **27M**, the semidiameter of ☾ at the horizon
- Accordingly the true Azimuth of the Centre **16° 51′**.

Diagram. An uncaptioned curvilinear figure standing at the left of the measure beside the lines of the first numbered section, part-depth. A narrow lens-shaped figure: two curves spring from a single point at the left and run to the right and downward, one arching high and the other low, closing together at a point at the lower right. Four letters are lettered on the block, all in italic:

- A (outer left, at the point where the two curves spring): A
- B (above the upper curve, toward its highest part): B
- C (below and right, against the inner of the two curves near its lower end): C
- D (at the lower right, below the point where the curves close): D

Diagram. An uncaptioned curvilinear figure standing at the left of the measure beside the lines of the block that opens Die 28 Feb., part-depth. A tall figure with a rounded apex, its two sides curving down and outward to a flat base; a single arc crosses the interior from the left side to the right, well below the apex, dividing the figure into an upper part and a lower band. Three letters are lettered on the block, all in italic:

- A (above the apex): A
- B (outer left, at the left end of the crossing arc): B
- C (outer right, at the right end of the crossing arc): C[421]

Diagram. An uncaptioned figure standing at the left of the measure beside the lines under the second rubric, part-depth. A tall narrow sliver: two nearly vertical lines, the left one bowing slightly, running from a point at the top down to a short flat base; a small disc, drawn with stippling inside it, straddles the left line about a third of the way down. Five letters are lettered on the block, all in italic:

- A (above the point at the top): A
- C (immediately left of the small disc): C
- B (immediately right of the small disc): B

[421] on this block only three letters are lettered.

- F (outer left, at the left end of the base): F
- G (outer right, at the right end of the base): G

[1] Poſtea (poſt diem 30 Martii) ſcripta. — "Written afterwards (after the 30th day of March)."

[2] Adſcriptum eſt: Equatio temporis 2 M. 46 S. — "Written in: Equation of time 2 M. 46 S."[422]

For the declination of ☾ae.

- **34° 5′ 30″** complement of the elevation of the pole.
- 35 52 0 compl. of the altitude of ☾
- 163 9 0 compl. of the Azim. to **180°**.
- Therefore 69 5 45 compl. of the declination.
- 10 29 0 distance of ☾ from the M. C.
- Right ascension of ☉li **353° 35′ 23″**
- Therefore the right ascension of ☾ 112 35 45
- Therefore the Longitude 21 3 24 ♋, Latitude **0° 58′ 37″** M.
- From the Prut. Tables, long. 21 52 9 ♋
- Difference **48′ 45″**[423]

For the παραλλαξι [Greek: *parallaxi*, "parallax"] of ☾ near the ninetieth.

- Motion of ☊ of the Dragon **15° 46′** ♍
- Argument of latitude of ☾ **6s 5 18**
- Latitude from prop. tab. 29 1 M.
- Latitude from Ptolemy's Tab. 27 41
- Observed latitude 0 58 37 M.
- παραλλαξις [Greek: *parallaxis*, "parallax"] of ☾ in the circle of altitude, according to our latitude 29 36[424]

DIE 5 MARTIJ.

Investigation of the apparent motions of ☾ae when it was near the ninetieth degree, from observation.

- H. 11.0 Distance of the western limb of ☾ae from the heel of the foot of ♊ **46° 51½′**
- 11.5 Distance of the western limb from the heart of ♌ 8 25
- Declination B. of the centre of ☾ 12 50, from the altit. and azim.

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[422] DREYER'S APPARATUS ON THIS SIDE — TWO notes, set in small roman below the composed matter, each opening with a small raised figure: [1] called at Die 28 Feb. in the middle of the band, [2] called at the second rubric, after P. M.; (i) Viſa Longit. **10 29** carries no sign glyph where Reſp. Vera Longit. **10 41** ♊ above it and Longitudo 10 29 ♊ below it both do. (ii) BA and CA are braced to ONE value, 35 52. THE YEAR STANDS NOWHERE IN THE COMPOSED TEXT of either side of this opening. It stands only in the running heads, which are not composed text. The month is first stated on the facing side, in the rubric DIE 27 NOUEMBRIS.

[423] a printed short horizontal rule stands under the figures 21 52 9 ♋ and above the line Differentia **48′ 45″**. The leaf writes complementum out in full on the first line of this file and abbreviates it compl. on the next four.

[424] The leaf does not write prop. in Latitudo ex prop. tab. out anywhere on this side.

- Declination B. of the heel of ♊ 22 38
- Declination B. of the heart of ♌ 13 58
- Right ascension of the heel of the foot of ♊ 89 26
- Right ascension of the heart of ♌ 146 29
- BA 67 22
- CA 77 10
- BC 47 7
- BAC 48 36 32
- DA 76 2
- CA 77 10
- DC 8 10
- BAC 8 19[425]
- Therefore the right ascension of the centre of ☾ from the heel of the foot of ♊ **138° 2½′**
- from the heart of ♌ 138 10

Therefore at H. 11 M. 3, when ☾ was near the ninetieth degree, its right ascension as limited was **138° 6′**, the corresponding Longitude **16° 38′** ♌

- Latitude **3 13⅖** M.
- From the corrected motions of the tables, the place of ☾ 17 32 43

Diagram. An uncaptioned curvilinear figure standing at the left of the measure, part-depth, beside the two side-by-side files and the lines that follow them. Two long curves spring from a single point at the top and bow apart as they descend to a flat, slightly curved base; a third curve runs from the apex down to the base inside the figure, to the left of centre; and a single arc crosses the figure from the left side, low down, to the right side, rising toward the right. Four letters are lettered on the block:

- A (apex, above the point where the curves spring): A
- B (outer right, at the right-hand end of the crossing arc): B
- D (outer left, at the left-hand end of the crossing arc): D
- C (inside, just below the point where the inner curve meets the crossing arc): C[426]

DIE 30 MARTIJ.

Since ☾ was not far from the greatest remoteness of the centre of the I epicycle, its apparent place is investigated from an observation from ♀ near the ninetieth degree, in this way.

H. 6 M. 28 Distance between the western limb of ☾ and ♀ **46° 56′**; subtract **1′** for the parall. of ♀

- BA **64° 52′**
- CA 68 10

[425] the two four-line files above stand SIDE BY SIDE in the measure, beside the figure, the file opening BA 67 22 at the left and the file opening DA 76 2 at the right, divided by white alone; no rule stands between them.

[426] C and D are cut in a sloped, script-like form and A and B in upright capitals.

- Right ascension of ♀ 56 11[1]
- Declination B. of ♀ 25 10, subtr. 1′ for the parall. of ♀[427]

[1] In margine adſcriptum eſt: reſpectu motus diurni ♀, qui fuit 31 M. — "Written in the margin: in respect of the diurnal motion of ♀, which was 31 M."[428]

- BC 47 12
- BAC 51 38½
- Declination of the centre of ☾ B. 21 50
- Diameter 30
- Right ascension of the centre of ☾ 107 54½

From the tables, according to the proper correction of the ☾rium motions and the application of our simple ☉lis, the corresponding Long. is 16° 26⅔′ ♋.[429]

DIE 26 OCTOBRIS.

☾ in 90 g. H. 5 M. 24.

- H. 5 M. 33 Distance of the centre of ☾ae from ♃ 25° 53′.
- Right ascension of ♃ 316 19
- Angle of the difference of ascension 22 48½
- Therefore the right ascension of ☾ae 339 7½
- Declination of ☾ 4° 36½′ M.
- Declination of ♃ 17 43½

The corresponding Longitude of ☾ is 9° 0′ 0″ ♓. Add 5′ for the latitude; therefore the true Longitude of ☾ is 9° 5 ♓.[430]

OBSERUATIONES RELIQUORUM QUINQUE PLANETARUM.

DIE 12 JANUARIJ.

- H. 5 17 16 per mai., 23 57 per mi. — ♀ was in Azim. from the meridian toward the west 40 0
- having an altitude of 19 59½

A good observation, which you can trust.

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[427] The words pro parall. ♀ closing the line H. 6 M. 28 … are set alone at the right on a line of their own below it. The two two-line files at the foot stand SIDE BY SIDE, BA/CA at the left and Aſcenſio recta/Declinatio B. at the right, divided by white alone.

[428] DREYER'S APPARATUS ON THIS SIDE — ONE note, [1] In margine adſcriptum eſt: …, set in small roman below the composed matter and opening with a small raised figure that answers the raised figure standing after 56 11. (i) Latitudo ex prop. tab. 29 1 M. sets 29 in the minutes position and 1 in the seconds position of its file, with no degree member. (ii) The line Latitudo 3 13⅖ M. sets its M. apparently smaller than the other two M.s on the side.

[429] the left file here continues the file BA 64° 52′ / CA 68 10 of the facing side, and the right file continues the file Aſcenſio recta ♀ … / Declinatio B. ♀ …. ☉lis noſtri ſimplicis leaves its governing noun understood.

[430] the two Declinatio lines stand at the right of the first two lines of the four-line file, divided from it by white alone. The final group 9° 5 carries a degree mark and NO minute mark. The line Adde pro latitudine 5′, closes with a comma and the next line opens Ergo.

• *5 38 13 mai., 44 47 mi. — ♀ was again in Azim. 45 0, having Alt. 18 1*
• *5 46 40 mai., 53 30 min. — ♀ was in Azim. 47 0, having Alt. 17 12½*

You can trust these three altitudes of ♀, which I took, for verifying its place; for correcting the time, however, I observed again the transit across the meridian of the middle star in the lower jaw of Cetus

• *H. 6 12 5 min., 6 4 50 mai. — Altit. 35 31.*[431]

DIE 13 JANUARIJ, VESPERI.

Hor. min.	Hor. mai.	Azim. ♀ verſ. occ.	Alt. ♀
4 22 47	4 28 55	27 0	24 27½
33 33	40 30	30 0	23 41⅔
41 15	48 30	32 0	23 8½
48 30	56 13	34 0	22 32⅓
5 15 29	5 24 35	41 0	20 11½

At the next following noon the greater clock was running fast by **22′ 15″**, and the lesser slow by **25′ 0″**.[432]

DIE 22 JANUARIJ.

• H. 5 28 33 mai., 28 38 min. — ♀ in Azim. toward the west 45 0; it had Alt. **23 39⅔**
• 36 40 mai., 36 30 min. — ♀ in Azim. 47 0; it had Alt. **22 46⅔**
• 7 36 mai. Dist. of ♀ and the upper one in the tail of Cetus 9 41
• 7 40 ♀ and the same one of Cetus were 9 42 apart, very nearly

Moreover, ♀ was very nearly in a straight line with the tail of the southern ♓ and that same tail of Cetus, leaving the tail of ♓ toward the preceding signs and the tail of Cetus toward the following.

• H. 7 45 ♀ and the tail of the southern ♓ were 6 36 apart, with the Radius

[431] In this column each clock pair is gathered by a printed brace to the words at its right: H. 5 17 16 per mai. / 23 57 per mi. to ♀ fuit in Azim. a / meridie verſ. occ., with the value 40 0 set alone at the right on the line below; 5 38 13 mai. / 44 47 mi. — a brace three lines deep — to fuit ♀ denuo / in Azim. 45 0 / habens Alt. 18 1; 5 46 40 mai. / 53 30 min. to fuit in Azim. ♀ 47 0 / habens Alt. 17 12½; and H. 6 12 5 min. / 6 4 50 mai. to Altit. 35 31. In the last pair the lesser clock stands ABOVE the greater, the reverse of the three pairs before it.

[432] THE TABLE ABOVE IS SET ON THE LEAF WITH A PRINTED HEAD ROW of four cells — Hor. min., Hor. mai., Azim. ♀ over verſ. occ. in two lines, and Alt. ♀ — in a smaller roman than the body, and a value stands on every one of its five lines. Its first file sets the hour only on the first and last lines; the three lines between print minutes and seconds alone. A small dot stands in the white between the second and third files on the last row, attached to no figure group. In the closing sentence the primes do duty for TIME — **22′ 15″** and **25′ 0″** are rates of the clocks.

DIE 23 JANUARIJ.

- H. 5 0 10 mai., 4 59 33 min. — ♀ was in Azim. from the mer. toward the west 38°, Alt. 26 44
- 5 7 47 mai., 5 7 6 min. — ♀ in Azim. 40; it had Alt. 26 4

DIE 14 FEBRUARIJ.

- H. 7 23 maius, 18½ minus — ♀ was distant from the tail of the northern ♓, with the Radius, 3 39
- 29 maius, 25 minus — the same distance, repeated, 3 40[433]
- 8 19 maius, 14 minus — the same, again, repeated 3 41

Moreover, ♀ was in a straight line with a certain star which follows next in the line of that same fish, and with this one in the tail of ♓.

At the next following noon the greater clock was running slow by 29 M., and the lesser slow by M. 24 S. 27.[434]

DIE 15 FEBRUARIJ.

- H. 6 43 maius, 42½ minus — ♀ was distant from the tip of the tail of ♓, with the Radius, 3 56
- 51 maius, 50 minus — ♀ was distant from the same, with the Radius, 3 59
- 7 43 maius, 42 minus — the same distance, repeated, 4 0

9 0 by the greater: ♀ and the eye of ♉ were distant, with the Sext. △, observed twice, 41 35

[433] in this column, too, each clock pair is gathered by a printed brace to the words at its right: H. 5 28 33 mai. / 28 38 min. — a brace three lines deep — to ♀ in Azim. / verſus occ. 45 0 / habuit Alt. 23 39⅔; 36 40 mai. / 36 30 min. to ♀ in Azim. 47 0 / habuit Alt. 22 46⅔; H. 5 0 10 mai. / 4 59 33 min. to Fuit ♀ in Azim. a mer. / verſ. occ. 38°, / Alt. 26 44; 5 7 47 mai. / 5 7 6 min. to ♀ in Azim. 40 / habuit Alt. 26 4; H. 7 23 maius / 18½minus to Diſtabat ♀ a cauda ♓ / Borei per Radium 3 39; 29 maius / 25 minus to Diſtantia eadem / repetita 3 40. The lines 7 36 mai. Diſt. ♀ et ſuperior. / in cauda Ceti 9 41 and 7 40 diſtabat ♀ et eadem Ceti 9 42 / fere are not braced; fere stands alone, set to the right, on a line of its own. THE YEAR STANDS NOWHERE IN THE COMPOSED TEXT of either side of this opening; it stands only in the running heads, which are not composed text. The month is first stated on p. 193, in the rubric DIE 5 MARTIJ.

[434] 8 19 maius / 14 minus is gathered by a printed brace to Eadem adhuc / repetita 3 41. The italic sentence reads Fuit autem ♀ in linea recta cum quadam ſtella, quæ ſequitur proxime in lino eiuſdem piſcis, & hac in cauda ♓.; the leaf does not name either star. In the roman sentence the order-word stands AFTER the figure in 29 M. and BEFORE it in M. 24 S. 27.

From this, and from the distance of ♀ from the star in the tail of the northern ♓, 4 g. 0′, its place can be given.[435]

DIE 17 FEBRUARIJ.

Horologium maius	minus	♀ Azim. verſ. occaſ.	♀ Alt.
H.6 28 50	6 23 30	66	28 31½
37 0	31 40	68	27 37
45 50	40 30	70	26 29

Distance of ♀ with the Radius

- 7 49 · 7 43 — from the extreme one, which is in the southern line of ♓ — 5 4, very nearly
- 8 5 · 7 58 — 5 4¼
- 8 57 · 8 49 — ♀ and the head of ♈ 10 20
- 9 8 · 9 0 — 10 18
- 9 29 · 9 20½ — 10 16¼

With the Trigonic Sextant

- 8 27 · 8 20 — ♀ from the eye of ♉ 39 42
- 8 43 · 8 36 — 39 35
- 8 50 · 8 43 — 39 35
- 9 0 · 8 52 — 39 34[436]

DIE 22 FEBRUARIJ.

Horol. maius	♀ Azim. verſ. occ.	Alt. ♀
5 35 50	54	37 6
43 16	56	36 13½

[435] each of the three roman pairs is gathered by a printed brace to the words at its right — H. 6 43 maius / 42½minus to Diſtabat ♀ ab extrema / cauda ♓ per Radium, with the value 3 56 set alone at the right on the line below; 51 maius / 50 minus to Diſtabat ♀ ab eadem / per Radium 3 59; 7 43 maius / 42 minus to Eadem diſt. / repetita 4 0. The italic line 9 0 per maius, ♀ & oculus ♉ di- / ſtabant per Sext. △ bis obſeruatum closes with its value 41 35, set in italic alone at the right on a third line, and CARRIES NO TERMINAL POINT. The triangle after Sext. is a printed glyph. The second italic sentence reads Hinc et ex diſtantia ♀ a ſtella in cauda ♓ / Borej 4 g. 0′ poteſt dari ip- / ſius locus.; its figure group carries the order-word g. after 4 and a prime after 0. Whether the star of this sentence is the star of the three roman entries above (ab extrema cauda ♓) the leaf does not say.

[436] THE TABLE ABOVE IS SET WITH A PRINTED HEAD ROW in a smaller roman than the body, in two tiers: Horologium stands over two cells, maius and minus; ♀ Azim. stands over verſ. occaſ.; and ♀ Alt. stands alone. In the first of those runs the words ab extre. / quæ eſt / in lino ♓ / Auſtr. are set down four lines, interleaved with the two rows 7 49 7 43 and 8 5 7 58, and gathered by a printed brace to the values at the right; a second, smaller printed brace gathers 5 4 and fere, set on the line below it.

Horol. maius	♀ Azim. verſ. occ.	Alt. ♀
51 4	58	35 29⅔
6 2 45	61	33 56¾

• 54½ ♀ distance from the head of ♈, with the Radius, 7 46[437]

At the same time the heel of the foot of ♊ was on the merid.

• 7 7½ ♀ and the head of ♈, with the Radius, 7 44
• 14 — 7 42
• 18 — 7 42
• 23 — 7 43

The following observations are better than the earlier ones, for the sky was then somewhat clearer than at the start.

With the Trigonic Sextant.

• 6 54½ Dist. of ♀ from Aldebora toward the preceding signs 34 45¼
• 7 1⅓ — 34 45¼
• 15 — 34 45
• 42 — 34 44

Here it was not clear enough.

• 7 43 ♀ and the head of ♈, with the Radius, 7 42
• 51 - - the eye of ♉ 34 42½
• 53 - - the head of ♈, with the Radius, 7 41½
• 58 — 7 40
• 8 3 - - the eye of ♉ 34 42½

At the same time ♀ appeared in a straight line with the head of ♈ and the knee of Cassiopeia; the head of ♈, however, stood above that straight line by the amount of one and a half diameters of its own body.

• 8 12 12 ♀ in 90° from the mer., had Alt. 16 49
• 27 ♀ and the head of ♈, with the Radius, 7 40
• 31 50 ♀ in Azim. from the north toward the west 86, Alt. 14 1⅔
• 37⅓ ♀ and the eye of ♉ 34 41
• 40½ ♀ and the head of ♈, with the Rad., 7 41

Afterwards, at H. 8.50 by the lesser clock, ♀, the head of ♈ and the knee of Cassiopeia were seen in one plane; but the head of ♈ did not appear clearly enough because of a thin cloud.

[437] THE TABLE ABOVE IS SET WITH A PRINTED HEAD ROW of three cells in a smaller roman, Horol. maius, ♀ Azim. verſ. occ. and Alt. ♀, and a value stands on each of its four lines. The head of this table sets Alt. BEFORE the planet glyph and the head under DIE 17 FEBRUARIJ. sets it AFTER.

At the next following noon the greater Clock was running fast by M. 5 S. 20. The lesser, however, by 3 hours 18 M.[438]

DIE 23 FEBRUARIJ.

- H. 5 17 25 Maius. The Architect observed ♀ in Azim. from the mer. toward the west 49 13, Alt. **39 32½**
- 5 35 15 ♀ in Azim. 54, Alt. 37 34
- 42 50 — 56 — 36 44[439]
- 5 50 25 — 58 — 35 50
- 6 1 55 — 61 — 34 27
- 43 Distance of ♀ from the head of ♈, with the Radius, 7 31
- 55 — 7 30
- **59½** — 7 30
- 7 6 ♀ from the first of ♈ 6 0
- 12 — 5 54
- 17 — 5 53

With the Trigonic Sext.

- 6 57 ♀ and the eye of ♉ 33 48
- 7 11 15 — 33 47
- 45 ♀ and the first of ♈, with the Rad., **5 54½**
- 56 10 ♀ in Azim. from the mer. toward the west 87, Alt. **19 16½**
- 8 4 ♀ from the first of ♈ 5 52
- 7 ♀ from the eye of ♉, with the Sext. Tr., **33 44⅓**
- 11 30 ♀ in 90 Gr. from the mer., Alt. 17 8
- 17 ♀ and the eye of ♉, with the Sext. Tr., **33 43½**
- 31 19 ♀ in Azim. from the north toward the west 86, Alt. **14 23½**
- 39 ♀ and the first of ♈, with the Rad., 5 52

♀, moreover, was distant from that star toward the south.

- 8 49 ♀ and the eye of ♉, with the Sext. Trig., **33 41¾**
- 51 ♀ and the head of ♈ 7 26
- 54 — 7 27
- 9 0 ♀ and the eye of ♉ **33 41⅔**

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[438] 18 and 23 are gathered by a printed brace, pointing right. The pairs of hyphen-like marks after 51, 53 and 8 3 are printed; they are not points. The circle raised after 90 in in **90°** a mer. is set smaller than the figures and open; whether it is a degree mark or a raised letter o is NOT decided. Which body the reflexive ſuj corporis refers to the leaf does not settle. 8.50 carries a printed point inside the figure group. In the last sentence the lesser clock's quantity stands in the ablative 3 horis 18 M. with no verb of its own.

[439] Obſeruauit Architectus — the word Architectus is printed with a capital and without a name. Maius. is printed with a capital and a point after the time. In the line 5 35 15 ♀ in Azim.54, Alt. 37 34 the figure 54 is set close up to Azim. and followed by a comma. The last line, 42 50 56 36 44, carries three figure groups in the positions of the time, azimuth and altitude of the line above and no words; it CARRIES NO TERMINAL POINT and is the right column's last composed line. THE YEAR STANDS NOWHERE IN THE COMPOSED TEXT of this side; it stands only in the running head.

- 6 ♀ and the head of ♈ 7 25
- 12 with the Sext. Tr. 7 32
- 16 with the Rad. **7 24½**
- 35 — — 7 24
- 43 with the Sext. Tr. 7 32

The earlier observation of ♀ from the head of ♈ is more exact than this one.

- 9 46 ♀ and the head of ♈, with the Rad., 7 23
- 51 ♀ and the eye of ♉, with the Sext. Tr., 33 35
- 58 — **33 34¾**
- 10 4 — **33 31¼**
- 8 ♀ and the head of ♈, with the Rad., **7 20½**
- 13 — 7 23
- **14½** ♀ and Aldebora, with the Sext. Tr., **33 24¾**
- 21 — **33 21½**
- 10 23 ♀ set.

[At the next following noon] the greater Clock was running fast by M. 7. The lesser M. 3 slow.[440]

DIE 24 FEBRUARIJ.

- H. 5 M. 9 30 maius, 6 0 minus — ♀ was in Azim. 48 from the merid. toward the west
- 10 0 maius, 6 30 minus — Distance of ♀ from the limb of ☉ nearest to it, with the Sext., 45 45
- 5 17 A ♀ in ☉ 45 37
- 24 — 45 31
- 26 — 45 29

I believe, however, that the first observation was the truer, because the Sun was then a little higher, not so close to the Horizon that it could shine by a refracted ray.

With the Trigonic Sextant.

- H.5 44 ♀ was distant from the western limb of ☾ 20 8
- 48 — 20 8
- 51 — **20 7½**
- **58½** — 20 2
- **6 1½** — 20 1
- 4 — **20 0½**
- 10 ♀ and the eye of ♉ **32 52½**
- 18 uncertain 32 51
- 26 — **32 52½**

[440] The leaf names no star beyond prima ♈. The pair of long dashes on the row 35 is printed. in 90 Gr. a mer. carries no mark. THE SQUARE BRACKETS round Proxime ſequenti meridie are PRINTED ON THE LEAF. They are the first printed square brackets met after a nil recorded on the ten preceding pairs of sides; nothing on this side says what they mark — an editorial supply by the edition, or a bracket standing in the codex are the alternatives — and no apparatus note answers them.

- 32 — 32 52
- 39 ♀ and the head of ♈ 7 26
- 45 — 7 27
- 52 — **7 27½**
- 8 28 ♀ and the eye of ♉ **32 43½**

*H. 8 M.30, the illuminated limb of ☾ and ♀ **18 7½***
☾ was then very close to setting, for it set at H.8.35.
With the Trigonic Sextant.

- *H. 8 40 ♀ and the head of ♈ 7 27*
- *46 ♀ and the first of ♈ 6 40; again 6 38, twice*
- 9 8 ♀ and the eye of ♉ **32 42½**
- 16 — **32 42¼**
- 26 — **32 41½**
- 31 — **32 41½**
- 38 — **32 41⅛**
- 46 — 32 38, a little less
- 50 — 32 38, a little more
- 59 — 32 35, but both imperceptible
- 10 6 — 32 33
- 10 9 — **32 30⅔**
- 15 — **32 27¾**[441]
- 10 17 **32 24½**
- 20 **32 24½**
- 10 22 ♀ set entirely.

On the same day in the evening we observed ♀ against the stars of ♈ with the Radius.

- H. **6 25′** ♀ and the head of ♈ 7 24
- 30 7 23
- 39 **7 21½**
- 43 **7 20¼**
- 53 7 22
- 57 7 20

Not good, for it was made in the evening twilight.

- **7 4′ 10″** ♀ in Azim. from the mer. toward the west 77 0, Alt. 26 11
- 8 32 ♀ and the first star of ♈ 6 34
- 42 6 34

[441]the two clock pairs at the head of this column are gathered by printed braces to the words at their right — H. 5 M. 9 30 maius / 6 0 minus to ♀ fuit in Azim. 48 / a merid. verſus / occaſ.; 10 0 maius / 6 30 minus to Diſtantia ♀ a lim- / bo ☉ ſibi prox. / per Sext. 45 45. In the line 5 17 A ♀ in ☉ 45 37 the sort before ♀ is a capital A, with crossbar and serifs. The hour 10 is printed on both of the successive rows 10 6 and 10 9. THE YEAR STANDS NOWHERE IN THE COMPOSED TEXT of either side; it stands only in the running heads. (i) The time 6 57 stands after 7 17 and before 7 11 15: the clock file runs backward at that row.

- 49 6 35
- 9 3 6 35
- 5 ♀ and the head of ♈ 7 16
- 40 7 17
- 53 7 17

At the next following noon the greatest Clock was running slow by M. 6 S. 30, the lesser also slow by 10 M. 0 S.[442]

DIE 25 FEBRUARIJ.

I observed the distance between the centre of ☉ and ♀ several times, and found it three times from Hour ***4¾*** *to Hour 4 M. 53 to be P. 46 M. 10. But a little later as ☉ came nearer to the vapours of the Horizon, and on that account shone by a refracted ray, I saw this distance diminish successively in this manner.*

Distances of ☉ from ♀ about the Horizon

- *H. 5 17 45 58*
- *28 45 53*
- *31 45 50*
- *34 45 47*

About the setting of ☉

And these later distances were made by a refracted ray, on that account they are also less certain, so one should rather trust the earlier which was ***46⅙****, that one is better than yesterday's[1].*

We also observed ♀ from the eye of ♉ on the same evening in this manner.

- *H. 6 20 ♀ and the eye of ♉* ***31 57½***
- ***26½*** *31 57*

Venus moreover was in this last observation in Azim. from the south toward the setting 68 30 (29), having Alt. P. 31 M. 39.

About this time ♀ ☾ and the head of ♈ appeared to form an isosceles triangle of two equal sides, so that the side from the head of ♈ to ♀ was equal to that which [was drawn] *from the same head to the lower limb of ☾.*

- *H. 7 2 ♀ and the eye of ♉ 31 55*

♀ was then at Alt. 26 40, Azim. toward the setting 76 46

H. 7 30 Between ♀ and the brighter one in the lower horn of ♈ P. 7 M. ***31½***

Note. At H. ***8 4½*** *the star ♀ passed through 90 G. from the meridian, having alt. P. 18 M. 13. From this you can investigate its declination. And at the same time its distance from the eye of ♉ was observed part. 31 M. 52, and a little later, at H. 8 M. 10 found in the same way P. 31 M. 52.*

But between ♀ and the head of ♈, with which star it was as it were in one Long., the distance was P. 7 M. 28. And we always found the same by repeating three times, and from this too the latitude of ♀ can be examined.

[442] the sentence Non bona, facta eſt enim in crepuſculo veſpertino. is set in a smaller roman in five short lines at the right of the rows H. 6 25′ to 53, within the column.

Moreover ♀ and the head of ♈ were as it were in one straight line with the one that is the outermost at the apex of the Deltoton, except that Venus had passed beyond this line toward the east by the amount of its diameter or 10 M. at most, about hour 8½.

H. 8 52 Between ♀ and the western limb of ☾ with the Sext. Trig. 4 47½

- *8 58½ The same 4 50*
- *9 4 The same 4 45*

good

Gellius and Andreas observed these. Finally we again took the dist. of ♀ from the eye of ♉.

- *H. 9 41 31 46*
- *54 31 43*

But ♀ was approaching its setting, so the following observations were made by a refracted ray, and therefore they become successively smaller than they should be.

- *H. 9 58 Between ♀ and the eye of ♉ 31 40¼*
- *10 5 31 38½*
- *10 31 36⅛*

[1] Diſtantiæ ♀ a ☾ hoc die obſeruatæ ſupra inter obſervationes lunæ reperiuntur. — "The distances of ♀ from ☾ observed on this day are found above among the observations of the Moon."[443]

- *15 31 34¾*
- *18 31 31¼*
- *24 ♀ itself was seen to set.*

And all these preceding distances were made with the Trigonic Sextant carefully enough, that an error of one minute could hardly lie hidden in them.

But meanwhile Andreas and Gellius also observed some distances on the same evening with the Radius in this manner.

- *H. 7.10 ♀ and the head of ♈ 7 20*
- *13 7 19*
- *35 7 19*

Remember moreover everywhere that distances with the Radius are deceptive, with the Sextant certain. Moreover I used the greater Clock everywhere.

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[443] The four rows are gathered by ONE printed brace, at the right of the value file, to the words Circa ☉ / occaſum, which carry no terminal point. The sentence opening Circa hoc tempus sets videbantur ♀ ☾ et caput ♈ with NO comma between ♀ and ☾. ad infer. limb. ☾ [ducebatur].: THE SQUARE BRACKETS ROUND ducebatur ARE PRINTED ON THE LEAF, in italic; nothing on this side says what they mark — an editorial supply by the edition and a bracket standing in the codex are the alternatives — no apparatus line answers them. THE PARENTHESES ROUND 29 in 68 30 (29) ARE PRINTED ON THE LEAF; the leaf does not say what the parenthesised figure is. H. 8 52 Inter ♀ et ☾ limbum occid. / per Sext. Trig. 4 47½ and the two rows 8 58½ Eadem 4 50 and 9 4 Eadem 4 45 are gathered by ONE printed brace, at the right of the value file, to the single word bonæ, which carries no terminal point. THE LINE BELOW THE COLUMNS. One line in a smaller roman, opening with a small raised 1 that answers the raised 1 after heſterna in the left column: Diſtantiæ ♀ a ☾ hoc die obſeruatæ ſupra inter obſervationes lunæ reperiuntur.

DIE 26 FEBRUARIJ.

Note. We saw the star of Venus quite plainly a little after the second hour, before it had yet reached the meridian, so that at H. 2 M. 31 its distance from the western limb of ☾ nearest to it could be taken P. 6 M. 37, and that with the Radius as far as faith can be placed in it, but afterwards we took it more carefully with the Sextant.

And when the Hour was 2 M. 50 the same star of Venus was on the meridian, and had an altitude with the lesser Q. 49 25. But this observation both as to time and as to Alt. was ἐν πλάτει *[Greek: en platei, "in breadth" — that is, only roughly], for the following are more certain[1].*

- *H. 3 33′ 54″ between ⊙ and ♀ 46 10½*
- *Repeating 46 10 as yesterday evening*
- *3 43 5 Azim. ♀ 19 34, Alt. 48 6*

And hence from the place of the moon[2] found earlier by means of the Sun you can investigate the place of ♀ and by the place of the Sun also examine the same place of ♀, and afterwards from the following distances of the stars from ♀ correct the places of the stars themselves, or conversely examine Venus from these.

- *H. 7.4½ Dist. ♀ from Aldebora 30 59*
- *And at the same instant ♀ was in Az. west 76 37*
- *Alt. 27 25*
- *H. 7.7½ Dist. ♀ from Aldebora 30 59 as before*
- *And at the same time too ♀ was in Az. 77 13*
- *Alt. 27 5*
- *H. 7.53 between ♀ and the head of ♈ 7 36½*
- *Azim. ♀ 87 28, Alt. 20 30*
- *H. 8.0 between ♀ and the head of ♈ 7.36 exactly*

At H. 8 M. 7 exactly ♀ was in 90 G. from the meridian having Alt. 18 46 good. It was distant moreover with the Sext. at the same instant from the eye of ♉ P. 30 57½.

- *H. 8.11 The same distance of ♀ and Aldeb. 30 58*
- *21 The same distance 30 57*

It is clear therefore that that distance which was made at H. 8 M. 7 and this last one at H. 8 M. 21 at a difference of ½ minute, with an interval of 14′ of time hold together well enough, it also agrees well enough with the earlier one.

Note. The greater Clock was going faster on the following noon by at least 0 Min. 48 S.

DIE 27 FEBRUARIJ.

At noon itself ♀ was visible so much that at H. 12 M. 37 my Architectus observed with the Radius its distance from the limb of ☾ nearest to it P. 19 M. 27.

- H. 2 M. 47 31″ ♀ was on the meridian having Alt. 49 54
- 2 47 50 correctly

At H. 3 40′ with the Armillae with the place of ⊙ set as before in 18 43 ♓ the star ♀ was seen to be in G. 4 M. 36 ♉, but perhaps ἐν πλάτει, *because we observed only once taking* the half of each which the circle gave.

[1] Poſtea adſcriptum eſt: »♀ *tranſiuit per merid.*

- *Die 28 2 H. 47 M. 50 Alt. 50 17*
- *Die 27 2 47½ 49 54*
- *Die 26 2 50 0* ἐν πλάτει *49 25*

23 29

Nota: Obſeruationes diej 27 & 28 ſunt meliores ſatisque bonæ«.

— "Afterwards there was added: »☿ passed the merid. Day 28 2 H. 47 M. 50 Alt. 50 17 Day 27 2 47½ 49 54 Day 26 2 50 0 in breadth 49 25. Note: The observations of day 27 & 28 are better and good enough«."

[2] Cfr. obſeruationes lunæ eiusdem diei. — "Compare the observations of the moon of the same day."[444]

- H. 4 1 Dist. of the centre of the ☉ & ☿ 46 9 quite good
- 4 46 10 Alt. ☉ 10°
- 8 46 10
- 17 46 10

	☿ from the limb of the ☾ nearest to it [☿ a limbo ☾ ſibi prox.]	Az. of ☿ from the mer. towards the west [Az. ☿ a mer. verſ. occ.]	Alt.
5 15	21 3	50 20	40 56
19	21 4½	51 28	40 54½
24	21 6	52 28	40 10
29	21 9	53 50	39 33
35	21 11½	55 29	38 55

[444] ab Aldeboram is set with the accusative after ab at both loci; Aldeb. is the leaf's abbreviation two entries below. 7.36 præciſe sets a point inside a distance. THE THREE LINES H.2 M.47 31″ ☿ fuit in meridiano / habens Alt. 49 54 / 2 47 50 correcte ARE SET IN ROMAN within the italic column and are gathered at their LEFT by ONE printed brace. The zodiac sign after 18 43 is printed as a)(-shaped glyph. THE LAST LINE AND A HALF CHANGE FOUNT: ſemel tantum obſeruauimus accipi- is italic and entes dimidium vtriusque quod dedit / circulus. is ROMAN; the change falls at the line turn INSIDE the divided word accipi-/entes. THE LINES BELOW THE COLUMNS. TWO entries, each opening with a small raised figure. ENTRY 1, answering the raised 1 after certiores: a roman lead, Poſtea adſcriptum eſt:, then a printed opening guillemet », then ITALIC — ☿ tranſiuit per merid., three rows of figures, and Nota: Obſeruationes diej 27 & 28 ſunt meliores ſatisque bonæ, closed by a printed closing guillemet « and a full stop. ENTRY 2, answering the raised 2 after loco: roman, Cfr. obſeruationes lunæ eiusdem diei. — a cross-reference, NEITHER a conjecture NOR a codex statement. WHERE A PRINTED FORM STANDS AGAINST A NOTE: the body's 26 February altitude 49 25 and the quoted row Die 26 … 49 25 state the same figures, and the body's 27 February H.2 M.47 31″ … Alt. 49 54 stands against the quoted row Die 27 2 47½ … 49 54; the entry does not correct the body. The dates of the three rows RUN BACKWARD, 28, 27, 26. At the right, set between the rows and not on any row's line, stand 23 (between the Die 28 and Die 27 rows) and 29 (between the Die 27 and Die 26 rows): A DIFFERENCE FILE, printed in the entry, not in the composed text.

	♀ from the limb of the ☾ nearest to it [♀ a limbo ☾ fibi prox.]	Az. of ♀ from the mer. towards the west [Az. ♀ a mer. verf. occ.]	Alt.
39	21 13	56 45	38 22
42	21 14	57 27	38 3

	♀ from the eye of ☿ [♀ ab oculo ☿]		
6 16½	**30 6½**		
23	30 6		
27	30 6	68 48	**32 25½**
31	**30 5½**	69 51	**31 50½**

- **41½** Dist. of ♀ from the head of ♈ [a ♈ capite] 7 50 quite
- Repeated 7 50 good
- 8 0 The same 7 50 ἐν πλάτει because of intervening clouds.
- 8 3 5 Dist. of ♀ from the eye of ☿ 30 0
- ♀ then passed through 90 G. and had Alt. 19 17
- 8 6 ♀ from the eye of ☿ 30 0

At the following noon the greater Clock was running slow by M. 2 S. 42.[445]

DIE 28 FEBRUARIJ.

H. 2 40 Dist. of ♀ from the centre of the ☉ 46 9. The distance was also seen at **10′**, but not with enough certainty because of the weak solar rays.

- H. 2 47 49 ♀ was on the meridian,
- Correctly **47′55″** Alt. 50 17

H. 3 25 With the place of the ☉ set at 19 45 ♓ the star ♀ was seen at 5 49 ☿, but since the ☉ at that time was only at **19ᵍ & 43′** ♓, the place of ♀ was at 5 47 ☿.

- ♀ and the eye of ☿ [♀ et ocul. ☿] Azim. of ♀ Alt.
- H. 6 30 **29 9½** approximately [fere]
- **33½** 29 13 70 30 32 1
- 37 29 10 or **9½** 71 20 31 30
- 41 29 8 72 21 **30 59½**
- These not good enough approximately [fere]
- 46 29 11 73 25 30 19

[445]THE LINE ♀ ab oculo ☿, in the same smaller roman, stands over the first value file only above the rows **6 16½** to 31; the second and third files are not re-headed there. The rows **6 16½** and 23 carry no figures in the second and third files. ſatis (after 7 50 in the row **41½**) and bonæ (after 7 50 in the row Repetita) are set right on successive lines with no brace. The Greek phrase in the row 8 0 means "in breadth", i.e. roughly. **8 3 5 Diſt. ♀ / ab oculo ☿ 30 0** overruns; how the three figures 8 3 5 divide the setting does not show.

- 49 29 10 74 20 29 49[446]

You can therefore set at H. 6⅜ the distance 29 10 without an error of a single minute, for thinner clouds passing across on every side produced this admittedly slight diversity in the distances.

- H. 8 30 ♀ from the eye of ♉ 29 4
- 34 29 5
- 36 29 5
- 39 29 5
- 42½ ♀ was distant from the head of ♈ 8 10[1]
- 47½ 8 15
- 51 8 14
- 55 8 14
- 57 8 14
- 9 4 ♀ from the eye of ♉ 29 3½
- 6 29 3½

Note. The greater Clock, which I used in these observations, was running slow on the following day by only 50 seconds, so ♀ crossed the meridian at H. 2 M. 47 S. 55.

Calculation of the apparent place of ♀ for the day 28 Feb. from the observations.

- H. 8 M. 39 between ♀ and Aldeb. 29° 5
- Declination B. of Venus 16 13
- Right Asc. of Aldeb. 63 0
- H. 8 M. 51 between the lucida of ♈ [lucid. ♈] and ♀ 8 14
- Right Asc. of the lucida of ♈ [luc. ♈] 25 57½
- Right Asc. of ♀ from Aldeb. 32 43⅝
- from the lucida of ♈ 32 40½
- Therefore the Right Asc. of ♀ determined [limitata] 32 42¼

DIE 1 MARTIJ.

- H. 2 48′ 4″ ♀ was on the meridian having Alt. exactly 50 40

Then with the Trigonic Sextant [per Sext. Trigonicum] we observed the dist. of ♀ & of the centre of the ☉ in this way.

- H. 2 25 46 8
- 32 46 7½
- 34 46 7½

[446]THE TWO LINES H.2 47 49 and Correcte 47′55″ are gathered at their RIGHT by ONE PRINTED BRACE, whose point faces the text beyond it; to the right of the brace the first line reads ♀ fuit in meridiano, and the second, set right, Alt. 50 17. The sign after 45 and after 43′ is printed as a)(-shaped glyph. ONE PRINTED BRACE, facing left toward the time file, stands before the first value file of the three rows 33½, 37 and 41; no word stands beside it. THE WORD fere IS SET TWICE, in the smaller roman of the head line, in the Alt. file: once on the line of the row H. 6 30, and once on the line Hæc non ſatis bonæ; the leaf does not say which figures either qualifies. Hæc non ſatis bonæ carries no verb and no terminal point. The row H. 6 30 carries no figures in the Azim. file, and none in the Alt. file apart from fere.

- 35 46 8
- 3 8 **46 7½** it was not clear enough.
- 29 With the sky moderately clear the same was found 46 8
- 40 46 8 each star was moderately visible.
- 42 46 8 also moderate

[1] Lineis inducta. — "Struck through with lines."[447]

- And shortly afterwards in the same
- 46 8 way

3 47 **46 7½**. You can therefore without perceptible error use as the distance of ♀ and the centre of the ☉ on this day 46 8

Afterwards as hour 5 was approaching the whole sky covered with clouds.

Note. From the transit of ♀ across the meridian on these three past days the following were found

- *Day 27 Feb. H. **2 47′ 50″** Alt. **49° 54′***
- *– 28 – 2 47 55 50 17*
- *Day 1 March 2 48 4 50 40*
- *or **40½***
- *at most*

These first two times were corrected by the following noon, but on 1 March no correction was made because of the darkness of the sky.

These observations are otherwise good, and you could use them with fair certainty. At the following noon the Clock strayed imperceptibly, yet it was not clear enough, and the ☉ was seen through small chinks.[448]

DIE 5 MARTIJ.

*H. **2¼** P. M. Between the Sun at its centre and the star ♀, which was then visible, the dist. was taken with the Sext. Trig. as P. 46 0 approximately*

- *The same repeated 45 59*
- *The same repeated 45 59*
- *good*

*The star ♀ crossed the merid. precisely at H. **2 47′ 0″**, having max. Alt. **52 16½***

- *by the Q. Max. 52 14*

But for the altitude the lesser Q. is rather to be trusted, since the greater was not yet corrected enough.

With the Armillae [*Per Armillas*]

H. 3.40 with the place of the ☉ set at 24 40 ♓ the longitude of ♀ was seen at 10 29 ♉, and shortly afterwards,

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[447] THE LINE BELOW THE LEFT COLUMN is set in a smaller ROMAN throughout, its call [1] included. It is the edition's own note, and the only one on this side: a statement about the manuscript at the call in the right column's row **42½**, where the printed figures 8 10 stand against it.

[448] Et paulo poſt eodem is set right on the first line; below it 46 8 stands in the value file and modo is set right on the same line. The second row sets a HYPHEN before and after 28 in the place of Die and Feb..

H3.48 with the place of the ☉ remaining as before we found the star ☿ in the same place.

- H. **4 13′** Dist. of the centre of the ☉ and ☿ 45 57
- 24 **45 58½**
- 36 45 55
- twice [bis]

Afterwards around hour 4 and a half we observed the same distance three or four times 45 55[449]

- H. 4 47 45 54
- 50 **45 53½**
- 52 45 53
- Altitude of the ☉ about 8 G.

Note. This variation in the distance of ☿ from the Sun taken last and differing from the earlier one no doubt came about for this reason, that the ☉ sinking towards the Horizon appeared refracted per radium, as it appears that that distance was successively diminished, the lower the ☉ became. For the later ones were taken below the 12th degree of the Altitude of the ☉, where the Sun is subject to variation. Greater trust will therefore have to be given to the earlier ones in the distance of the ☉ and the star ☿ 45 59 and it is to be compared with the transit through the meridian.

- H. 5 23 Dist. of ☿ and the centre of the ☉ **45 50⅓**
- 25 **45 49½**
- 28 approximately **45 47½**
- 35 45 44
- 38 45 42
- 42 **45 38½**
- 43 45 37
- 45 **45 34½**
- 47 45 33
- 49 45 33
- 51 45 30
- and then the middle of the ☉ was setting.

From this it is clear how great a diversity of appearance the ☉ near the Horizon produces through refracted rays. For from hour **2½** until the setting ☿ the Sun because of the refraction of its rays anticipated the distance by ½ Grad. more than was right.

Then immediately after the setting of the ☉ we observed the distances of the star ☿ from certain fixed stars in this way.

[449]THE TWO LINES Eadem repetita 45 59 are gathered at their RIGHT by ONE PRINTED BRACE to the single word bonæ, set in italic, which carries no terminal point. The two lines are identical sort for sort. Per Armillas is set centred, in ITALIC, with NO terminal point. H. 3.40 and H.3.48 each set a PRINTED POINT between the hour and the minutes. The sign after 24 40 is printed as a)(-shaped glyph. bis is set right, alone, on the line below 36 45 55.

	♀ and [♀ et]		Azim. of ♀ from the mer. towards the west [Azim. ♀ a mer.verſ.occ.]	Alt.
6 54	eye of ♉ [ocul. ♉]	24 48	77 31	30 18
6 58	Heel of the foot of ♊ [Calx ped. ♊]	48 53	78 28	29 52
7 2	eye of ♉ [ocul. ♉]	24 48	79 24	29 6
7 7	heel of the foot of ♊ [calx ped. ♊]	48 52½	80 34	28 22½

- 12 **48 52½** as before [vt prius]
- 15 end [extrema] **47 1½**
- 41 of the foot of ♊ [pedis ♊] 47 1
- **43½ 47 0½**[450]
- **48½** 47 1
- 52 47 0 this good [hæc bona]
- **57½ 47 0¼**
- 8 3 heel of the foot [calx pedis] 48 50
- 9 ♊ 48 50
- good [bonæ]
- 16 tail of ♈ [cauda ♈] 7 16
- **20½ 7 15½** this more certain than the earlier.

From this the latitude of ♀ can be verified, for they had nearly the same longitude.

- H. 8 25 ♀ and Aldebora [♀ et Aldeboram] 24 45
- 8 **28½** The same repeated 24 45
- 9 0 55 ♀ in Azim. from the north [a Sept.] towards the west 77 0, and had Alt. 13 20
- 5 56 Azim. 76 0, Alt. 12 39
- 15 55 74 0, 11 16
- 10 14 ♀ from the eye of ♉ 24 40
- **32½** 24 35
- 38 24 33
- **42½** not certain enough **24 33½**

[450] In per radium videbatur refractum the words per radium may mean "through the ray" or "by the Radius", and the leaf does not decide which. The rows 47 and 49 both read 45 33. In ab hora / 2½ vſque in occaſum ♀ Sol ½ Grad. the planet sign stands between occaſum and Sol; the construction does not show whether it goes with occaſum (the setting of ♀) or with diſtantiam (the distance of ♀). THE ROWS 6 54 TO 43½: the head line stands above them in smaller roman — ♀ et over the descriptor, Azim. ♀ a on one line and mer.verſ.occ. set close on the line below over the third and fourth files, and Alt. on the lower line over the fifth; the first value file carries no head. The sign after ped. and pedis is printed as a II-shaped glyph. The rows 12 to 43½ carry no figures in the third, fourth and fifth files apart from vt prius, set in the fourth file's place in the row 12. extrema stands in the row 15 and pedis ♊ in the row 41, set right within the descriptor file.

- 45 24 32
- 50 ♀ was seen to set.

At the following noon the greater Clock was seen to run slow by at least one minute [vno ſcrupulo primo], the Sun being seen through the slits of the sights [per rimas pinnacidiorum], for it was not very clear.[451]

DIE 7 MARTIJ.

- Azim. of ♀ from the meridian towards the east [Azim. ♀ a mer. verſ. ortum] Alt. of ♀ [Alt. ♀]
- **1ᴴ53′ 45″** 21 0 51 40
- 58 12 19 0 51 51 moderately [mediocriter]
- 2 5 44 16 0 52 6 good [bona]
- 11 15 14 0 52 21
- 18 55 11 0 **52 36½** moderately good [medioc. bona]
- 30 Between ♀ and **45 49½**
- 40 the centre of the ⊙ **45 49½**
- both good [ambæ bonæ]
- 47 19 ♀ crossed the merid. having
- Alt. by the Q. minor. 53 0
- by the Q.maxim. 52 59.

The altitude **53° 0′** is rather to be trusted.

At **3ᴴ 3′** ♀ was distant from the centre of the ⊙ 52 57, but both the ⊙ and ♀ were seen through rather thin clouds. This observation is therefore not much to be trusted, but rather the earlier ones.

At the very next noon the greater Clock was running fast by only 18 seconds.[452]

DIE 8 MARTIJ.

At H. **2 46′ 47″** ♀ crossed the meridian, but it was not possible to take the altitude, because ♀ was covered by thin clouds.

H. **7 10½** ♀ from the eye of ♉ 22 23 with the Sext. Trig., Azim. of ♀ from the south [a meridie] towards the west 80 47, Alt. **29 41½**.

- 7 16 ♀ from the eye of ♉ 22 24
- 19 22 23
- 53 14 ♀ at 90 G. from the meridian having Alt. **23 41½** taken through clouds.

[451] hæc bona is set after 47 0 on its row; bonæ stands to the right of ONE PRINTED BRACE whose point faces it and which gathers the two rows 8 3 calx pedis 48 50 and 9 … 48 50. The words calx pedis stand on the row 8 3, and the sign ⋕, printed as a II-shaped glyph, stands below pedis on the row 9. The sign after cauda is printed as a V-shaped glyph with curled tips; it is the only instance of that glyph on this opening. The commas after 77 0, 76 0 and 74 0 are PRINTED.

[452] THE ROWS 30 AND 40: Inter ♀ et stands on the first and centrum ⊙ on the second, each before **45 49½**. ambæ / bonæ stand to the right of ONE PRINTED BRACE gathering the two rows. The two figure groups **45 49½** are identical sort for sort.

At the very next noon the greater Clock was running fast by **5′ 16″**.

DIE 9 MARTIJ.

- H. **2 47′15″** ♀ crossed the meridian having Alt. by the Q. minor. **53 43¼**
- by the Q. max. **53 41½**
- 3 26 ♀ was distant from the centre of the ☉ 45 39
- 32 the same taken twice **45 38½**
- **34½** the same repeated **45 38½**
- 39 the same found approximately [fere] 45 39
- 54 the same distance **45 38¾**
- 4 1 The same was found **45 38½**

And this observation was tested by us a third time before it was written down.

- H. 5 9 again ♀ was distant 45 35
- 49 from the centre of the ☉ 45 25
- 51 **45 22½**
- 53 **45 21½**
- 54 **45 19½**
- 55 **45 17½**
- 56 45 17
- 57 **45 14¾**
- 59 **45 14¾**
- 6 1 45 12

	Azim. of ♀ from the mer. towards the west [Azim. ♀ a mer. v. occ.]	Alt. of ♀ [Alt. ♀]
6 48 58	76 0	33 0
6 53 30	77 0	**32 22½**

	♀ from the eye of ☿ [♀ ab oculo ☿]		
7 5½	**21 38⅔**	79 44	30 45
11	**21 37½**	81 1	30 0
16	21 37	82 9	29 15
19	21 37		
31½	**21 36½**	85 30	**26 56½**

	♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]		
35	**45 17½**	86 30	26 24
39 56		87 9	**25 59½**
40	**45 17½**	87 38	25 38
47	**45 16⅔**		

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- ♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]
- 7 50 43 29 at the same time ♀ passed through 90 G. **23 59⅔**

Azim. from the north towards the west [Azim. a ſept. verſ. occ.]				
8 2½	43 27¼	87 50		**22 54½**
7	43 27	86 48		**21 55½**

- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- **12½ 45 15⅔** 85 43 21 10
- ♀ from the eye of ♉ [♀ ab oc. ♉]
- 8 18 21 36 84 30 **20 19½**
- 21 **21 34¾** 83 53 **19 50⅔**
- This more certain than the earlier [Hæc certior priori]
- 24 **21 34½**
- 9 19 10 72 58 **12 20½**

♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]			
23	45 13	72 2	**11 47⅓**
30	45 12	70 41	10 56
41	**45 10½**		

- ♀ from the eye of ♉ [♀ ab oculo ♉]
- 46 **21 31½**

These later ones are not certain enough because of the parallax of ♀ near the Horizon, nor was it clear enough.

At the very next noon the greater Clock was running fast by **10′ 35″**, with the ☉ shining very dimly through clouds.[454]

[453] The words **rurſus diſtabat** ♀ stand on the row H. 5 9 and a **centro** ☉ on the row 49, both set right before the figures. The rows 57 and 59 both read **45 14¾**. THE HEAD LINE above the rows 6 48 58 and 6 53 30 is set in two lines of smaller roman, **Azim.** ♀ / a mer. v. occ. over the third file and **Alt.** ♀ on the lower line over the fourth. THE LINES ♀ **ab oculo** ♉ and ♀ **a calce pedis** ♊, in the same smaller roman, stand above the rows **7 5½** to **31½** and 35 to 47 respectively, over the second file; the third and fourth files are not re-headed there. The sign after pedis is printed as a II-shaped glyph.

[454] The descriptor lines ♀ **ab extrema pedis** ♊, ♀ **a calce pedis** ♊ (twice), ♀ **ab oc.** ♉ and ♀ **ab oculo** ♉, the head line **Azim. a ſept. verſ. occ.** and the line **Hæc certior priori** are set in a SMALLER ROMAN than the rows; the sign after pedis is printed as a II-shaped glyph. **Azim. a ſept. verſ. occ.** stands above the rows **8 2½** and 7 over the third file only; **ſept.** is set lower-case. ONE PRINTED BRACE, {-shaped, its point facing LEFT toward the time file, stands between the time figure 21 and the second file, running from the line of the row 21 down to the line **Hæc certior priori**, which is set to its right. The leaf does not show which rows the brace gathers, and **Hæc certior priori** carries NO VERB and names no referent. The row 24 carries figures in the second file only; the row 9 19 10 carries none in the second file; the row 41 none in the third and fourth; the row 46 none in the third and fourth — all empty as printed.

DIE 14 MARTIJ.

At H. **7 46′ 10″** ☿ passed 90 Gr. from the south [a meridie] and had the altitude 26 6

- Dist. of ☿ from the lucida of the Pleiades [Dist. ☿ a luc. Pleiadum] Azim. of ☿ from the north towards the west [Azim. ☿ a Sept. vers. occ.] Alt. of ☿ [Alt. ☿]
- 8^{H} **2½′** 5 32 86 40 23 50
- the sky was not clear enough
- 12 5 37 84 51 22 32
- 18 **5 35⅔** 83 48 21 50
- 35 5 29 80 13 19 21
- 49 5 24 77 42 17 38
- 54 **5 26½** 76 46 17 1
- 9 4 5 30 74 50 15 41
- 9 5 25 74 2 15 6
- Dist. of ☿ from the eye of ♉. It was now at last clearer than at the time of the earlier observations.
- 9 17 **18 0½** 72 19 13 58
- **21½ 18 0½**
- 24 **18 0¼** 70 58 13 8

	Dist. of ☿ from the heel of the foot of ♊ [Dist. ☿ a calce pedis ♊]	
9 31	**41 1½**	69 41 **12 10½**
36	**41 1½**	68 40 11 34

At **11 14′ 30″** by the max. clock [per max. horol.] ☿ was close to the Horizon, being due to set after two minutes, but we could not see its setting because of vapours.[455]

At the very next noon the greater Clock was running slow by M. 1 S. 41.

DIE 15 MARTIJ.

- H. 2 34 ☿ was distant from the centre of the ☉ 44 51
- And shortly afterwards twice [bis] 44 51
- 3 5 ☿ was distant from the centre of the ☉ **44 50½**
- 3 10 **44 50½**
- 3 23 44 51
- Repeating shortly afterwards twice we found 44 51
- H. **2 45′ 10″** ☿ on the meridian having Alt.
- by the Q. maximum 55 42
- by the Q. minimum 55 42

[455] The row **21½** carries no figures in the third and fourth files; they are empty as printed. THE LINE Dist. ☿ a calce pedis ♊, in the smaller roman, stands above the rows 9 31 and 36 over the second file; the third and fourth files are not re-headed there. The rows 9 31 and 36 both read **41 1½** in the second file.

- 5 49 ♀ was distant from the centre of the ⊙ 44 41
- 54 44 38
- 59 44 35
- 6 7 44 30
- 9 44 29
- 13 44 26
- 15 when the lower limb of the ⊙ was grazing the Horizon 44 23
- H. **7 42′ 14″** ♀ was at 90 G. from the meridian having alt. 26 30

	♀ was distant from the lucida of the Pleiades [Diſtabat ♀ a lucida pleiadum]	Azim. of ♀ from the north towards the west [Azim. ♀ a Sept. verſ. occ.]	Alt. of ♀ [Alt. ♀]
8 18	4 42	82 43	21 36
23	**4 42½**		
26½	4 42		

- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- 37 **40 16½** 78 58 18 57
- from the end of the foot of ♊ [ab extrema pedis ♊]
- 42 **38 26¾** 78 2 **18 21½**
- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- 47 40 16 77 2 17 38

	♀ from the middle one of the Chair of Cassiopeia [♀ a media cathedræ Caßiopeæ]		
59	49 8	74 43	16 3
9 4	49 9	73 43	15 20

	♀ from the first of Cassiopeia [♀ a prima Caßiopeæ]		
8	49 56	72 52	**14 47½**
12	49 57	71 47	14 0

	♀ from the star in the Bend of Cassiopeia [♀ a ſtella in flexura Caßiopeæ]		
20	45 35	70 31	**13 10½**
25	45 34	69 33	12 24
29	45 34	68 32	11 55

- 33 **44 59½**
- 37 **44 59½**
- ♀ from Schedir of Cassiopeia [♀ a Schedir Caßiopeæ]

At the following noon the greater Clock was running slow by M. 1 S. 35.[456]

DIE 16 MARTIJ.

- H. 2 41′ 58″ ♀ crossed the meridian [tranſiuit meridianum]
- having Alt. by the greater Q. [per Q. maiorem] 56 1½
- by the lesser Q. [per Q. minorem] 56 0
- Dist. of ♀ from the heel of the foot of ♊ [Diſt. ♀ a calce pedis ♊]
- Azim. of ♀ from the north towards the west [Azim. ♀ a Sept. verſ. occ.]
- Alt. of ♀ [Alt. ♀]
- H.7 43 39 31½ 89 20 26 23½
- ♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]
- 50 37 43 88 0 25 41
- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- 57 39 31 87 5 24 30
- ♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]
- 8 1 37 41½ 85 37 23 58
- ♀ the middle one of the Chair of Cassiop. [♀ media cathed. Caßiop.]
- 7 49 12 84 25 23 3
- ♀ from the star in the Bend of Cassiop. [♀ a ſtella in flexura Caßiop.]
- 14 45 40 83 2 22 7
- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- 36 39 30 good [bona] 78 38 19 2½
- ♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]
- 39 37 40 good [bona] 77 50 18 22
- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- 45 39 29 76 34 18 9

	♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]		
50	37 39	75 45	17 1
9 10 41″		72 0	14 25
20 50		70 0	13 8

[456] Et paulo poſt stands in the descriptor place and bis is set right, apart, immediately before 44 51. Repetendo paulo poſt bis / inuenimus 44 51 sets its second line right; whether bis goes with Repetendo or with inuenimus the setting does not determine. H. 2 45′10″ ♀ in meridiano habens Alt. carries a printed prime and double mark; per Q. maximum and per Q. minimum abbreviate the instrument as Q. beside the words written out; the two groups 55 42 are identical sort for sort. THE DESCRIPTOR LINES ♀ a calce pedis ♊ (twice), ab extrema pedis ♊, ♀ a media cathedræ Caßiopeæ, ♀ a prima Caßiopeæ and ♀ a ſtella in flexura Caßiopeæ are set in the smaller roman; ab extrema pedis ♊ carries NO ♀, unlike every other descriptor line in this column. The rows 25 and 29 both read 45 34 in the second file. THE TWO ROWS 33 44 59½ and 37 44 59½ are gathered at their right by ONE PRINTED BRACE to ♀ a Schedir / Caßiopeæ, set in the size of the rows, its second word set right on the lower line; the two groups 44 59½ are identical sort for sort.

DIE 20 MARTIJ.

- H.2 45′25″ ♀ crossed the meridian [tranſiuit ♀ per meridianum]
- having Alt. by the greater Q. [per Q. maior.] 57 7
- by the lesser Q. [per Q. minor.] 57 7⅓

These distances were also taken:

- H.2 22 ♀ from the centre of ☉ 43 50
- 27 43 50
- 32 43 49 45″
- 3 28 43 49½
- 35 43 49½
- 38 43 49 0

At the time of these three observations it was not clear enough, for thin white clouds slightly obscured ☉. And the small clock [paruum horologium] that we used in these observations was running slower, relative to the greatest clock [ratione maximi horol.], by 14 M.

- H.5 7 again ♀ from the centre of ☉ 43 46½
- 57 43 40

Nor was it clear enough here [Neque hic erat ſatis ſerenum].

- ♀ in Azim. from the south towards the west [♀ in Azim. a mer. verſ. occ.]
- Alt. of ♀ [Alt. ♀]
- H.7 7′49″ 83 0 32 50

	Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉]
26	14 40
29	14 40

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- ♀ from the lower head of ♊ [♀ ab inferiori cap. ♊]
- from the north towards the west [a Sept. verſ. occ.]
- 55 53 55 86 30 25 50
- 8 4 53 55 approximately [fere] 84 33 24 30

	♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]		
11	36 32	83 15	23 34
20	36 32		

[457] The sign after pedis is printed as a II-shaped glyph. ♀ media cathed. Caßiop. carries NO PREPOSITION, unlike every other descriptor line on this side; media stands without a noun. ONE PRINTED BRACE, its point facing RIGHT, stands to the right of the three rows 3 28, 35 and 38; nothing is printed at its point. The sentence Tempore trium harum obſeruationum … follows the braced rows; the leaf does not say which three observations it means beyond that setting. The two groups 14 40 are identical.

- ♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]
- 32 34 43 78 55 20 39
- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- **37½ 36 31⅔** 77 48 19 50
- ♀ from the lower head of ♊ [♀ ab infer. cap. ♊]
- 46 **53 52⅔** 76 16 18 46

Around these times ♀ appeared to be in a straight line with the uppermost of the Pleiades [ſuprema Pleiadum] and the lower head of ♊, by the ruler [ſecundum regulam].

- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- Azim.
- Alt.
- 8 53 **36 30⅓** 74 46 17 46
- ♀ from the end of the foot of ♊ [♀ ab extrema pedis ♊]
- **57½ 34 42¼** 73 56 17 8
- ♀ from the heel of the foot of ♊ [♀ a calce pedis ♊]
- **9 2½ 36 30½** 73 0 16 30

	♀ from the southern head of ♊ [♀ a merid. cap. ♊]			
18½	53 52		69 43	14 18
27	53 51			

At the following noon the greater clock [Horologium majus] was running fast by M. 13 S. 10.

DIE 21 MARTIJ.

- H.8 32 ♀ from the lower head of ♊ [♀ a cap. inferiori ♊] **53 12½**

Now, however, ♀ appeared to be passing the Pleiades freely [libere], so that its lower limb grazed the uppermost of the Pleiades, and its place appeared to be between the uppermost ones in the square of the Pleiades [inter ſupremas in quadrato Pleiadum]. It was, however, nearer the rear one [poſteriori vicinior].

DIE 22 MARTIJ.

- H.8 **2′** ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] **52 29⅓**
- Azim. from the north towards the west [a ſept. verſus occ.] 85 3,
- Alt. 25 28

Now ♀ was on a straight line drawn from the lucida of the Pleiades through ♀ and falling on the upper and more northerly one in the head of Erichthonius [in ſuperiorem et borealiorem in capite Erichtonij].

- ♀ from the last of the Pleiades [poſtrema pleiad.], which follows the lucida, with the Rad. [per Rad.] 0 44
- H.8 **37′** ♀ from the northern horn of ♉ shared with the foot of Erichthonius [a boreali cornu ♉ communi cum pede Erichtonij] **21 54½**
- Azim. of ♀ 78 10 Alt. 20 45

- ♀ was distant from the lucida of the Pleiades with the Rad. [p. Rad.] 0 46[458]
- H.8 47′ ♀ from the southern head of ♊ [♀ ameridionali capite ♊] 52 27½
- Azim. 76 15 Alt. 19 20
- 58 ♀ from the northern horn of ♉ [♀ a boreali cornu ♉] 21 53½
- Azim. 74 0 Alt. 17 50
- 9 3 73 0 17 6
- 4 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] 52 27
- 9½ ♀ from the northern horn of ♉ 21 53
- 18 30″ Azim. of ♀ 70 0
- Alt. 15 5½
- 19 ♀ from the lower head of ♊ 52 27 approximately [fere]
- 25 ♀ from the northern horn of ♉ 21 52
- 37 ♀ and the lucida of the Pleiades with the Rad. [♀ & lucida Pleiad. p. Rad.] 0 49

DIE 23 MARTIJ.

- H.9 20′ 5″ ♀ in Azim. from the north towards the west [a Sept. verſus occaſ.] 71 0 Alt. 16 4
- 28 0 69 30 15 2
- 35 30 68 0 14 4
- 42 ♀ from the northern horn of ♉ 21 11
- 52 ♀ from the lower head of ♊ 51 44¼
- 10 0 ♀ from the lucida of the Pleiades with the Rad. [♀ a luc, pleiad. p. Rad.] 1 20 ἐν πλάτει [Greek: *en platei*, "in breadth"] because of clouds [propter nubes].

At the following noon the greater clock [Horologium maius] was running fast by 19 M. 55″, not having been corrected for three whole days.

DIE 24 MARTIJ.

- H.2 46 21 ♀ in Azim. from the south towards the west [a meridie verſus occaſ.] 1 40, Alt. 58 6
- 2 21 ♀ distant from the centre of ☉ [♀ a centro ☉ diſt.] 42 44½
- 32 approximately [fere] 42 44½
- 3 41 42 43⅔
- 46 42 43¼
- 51 approximately [fere] 42 44

[458] THE HEAD LINES above the row 55 are set in two lines of smaller roman: ♀ ab inferiori / cap. ♊ over the second file and a Sept. verſ. occ. over the third, on the lower line; NO Azim. is printed in that head, and the fourth file carries no head at that depth. The two groups 36 32 (rows 11 and 20) are identical. THE HEAD LINES above the row 8 53 are set in the smaller roman: ♀ a calce stands on the same line as the closing word regulam. of the sentence above, to its right, and pedis ♊, Azim. and Alt. stand on the line below, over the second, third and fourth files. Azim. a ſept. verſus occ. 85 3, sets ſept. in lower case and carries a PRINTED comma after 3.

- 57 **42 44¼**
- 4 10 **42 43½**

DIE 26 MARTIJ.

- H.5 16 p. m. ♀ was distant from the centre of ⊙ 42 0
- 19 ♀ from the centre of ⊙ 42 0

About this time ☾, with respect to the upper horn [reſpectu ſuperioris cornu], was inclining towards the Horizon away from the straight line drawn from the centre of ⊙ to Venus, and that by the amount of the diameter of its own body [corporis ſui].

- H.5 35 the distance of ♀ and the centre of ⊙ [diſt. ♀ & centri ⊙] was found again **41 56½**
- 38 ♀ and the centre of ⊙ 41 58[459]
- **6 58⅔** ♀ and the western limb of ☾ [♀ et occidentalis limb. ☾] **6 32½**
- **7 4¾** ♀ from ☾ in the same way [♀ eadem ratione a ☾] 6 29
- **8½ 6 26⅔**

Here the small clock was corrected by the large one [Hic correctum eſt Horol. paruum ſecundum magnum].

- 7 13 55 distance of ♀ from the western limb of ☾ [diſt. ♀ a ☾ limb. occid.] 6 25
- 28 44 ♀ at 90 G. from the south [a merid.]
- Alt. **30 2½**
- At the same instant, distance of ♀ from the western limb of ☾ [Eodem inſtanti diſt. ♀ a ☾ limb. occ.] **6 17½**
- 7 36 ♀ from the same limb of ☾ 6 15
- 7 47 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] **49 50½**
- Azim. of ♀ from the north towards the west [a ſept. verſ. occ.] 86 27,
- Alt. **27 33½**

Around these times ♀ was on the straight line drawn from the lucida of the Pleiades through the centre of ☾.

- 7 53 30 Azim. of ♀ 85 0 Alt. **26 39½**
- 57 ♀ from the lower ♊ head [♀ ab inferiori ♊ capite] 49 51 approximately [fere]
- Azim. of ♀ 84 19 Alt. **26 6½**
- 8 14 ♀ from the northern horn of ♉ **19 15¼**
- 17 ♀ from the lower head of ♊ 49 49

[459] H.8 **47′♀ameridionali capite♊52 27½** is set close, a meridionali running together as one word; the line carries a printed prime and NO seconds. The sign after capite and cap. is printed as a II-shaped glyph; the sign after cornu as a circle with two horns. Azim. 76 15 Alt. 19 20, Azim. 74 0 Alt. 17 50 and the row 9 3 73 0 17 6 carry no descriptor; the row 9 3 carries no Azim. or Alt., and its two groups stand under the figures of those words on the lines above. **10 0 ♀ a luc, pleiad. p. Rad. 1 20** sets a PRINTED comma after luc and pleiad. in lower case. **H.2 46 21 ♀ in Azim. a meridie verſus / occaſ. 1 40, Alt. 58 6** carries a PRINTED comma after 40.

- 21 ♀ from the northern horn of ♉ 19 16
- **24½** ♀ and the lucida of the Pleiades with the Rad. [♀ et lucida Pleiad. p. Rad.] 3 16
- 25 ♀ from the lower head of ♊ 49 50 approximately [fere]
- **31½ 49 49½**
- Azim. 77 28 Alt. 21 23
- **36½** ♀ from the northern horn [a bor. cornu] of ♉ approximately [fere] 19 16
- Azim. 76 32 Alt. 20 45
- 41 ♀ from the lower head of ♊ **49 48½**
- Azim. 75 44 Alt. 20 10
- **44½** from the northern horn of ♉ [a boreali cornu ♉] **19 15½**
- Azim. 75 0 Alt. 19 41
- 48 ♀ from the lower head of ♊ **49 48½** approximately [fere]
- Azim. 74 15 Alt. 19 7
- **9 5 34″** 71 0 **16 54½**

At the following noon the greater clock [Horol. maius] was running fast by 3 M. 20 S.

DIE 28 MARTIJ.

- H.**2 0′** ♀ was distant from the centre of ☉ [Diſtabat ♀ a centro ☉] 41 22
- 14 **41 20½**
- **36 46″** ♀ on the meridian had Alt. by the lesser Q. [per Q. minorem] **58 56½**[460]
- 2 51 ♀ was distant from the centre of ☉ [Diſtabat ♀ a centro ☉] **41 20¾**
- 3 2 **41 19½**
- 8 **41 19½**
- 12 **41 19½**
- 16 **41 19⅔**
- 18 41 19
- **7 24 49″** ♀ at 90 Gr. from the south [in 90 Gr. a meridie] had Altit. **30 35½**

Distance between ♀ & ☿ [Diſtantia inter ♀ & ☿]	Azim. of ☿ from the north towards the west [Azim. ☿ a Sept. verſ. occ.]	Alt. of ☿ [Alt. ☿]
7 40⅔ 23 0	74 46	8 21
42⅝ 23 0	74 13	8 4

And in these two preceding observations you can place trust to the minute [in minuto], because the star ☿ was higher [altior erat ☿ ſtella]. In the others, variation

[460] Azim. ♀ a ſept. verſ. occ. **86 27**, sets ſept. in lower case and carries a PRINTED comma after 27. **57** ♀ ab inferiori ♊ capite **49 51** sets the sign BEFORE capite, unlike every other such line on this side. THE ROW **44½** a boreali cornu ♉ **19 15½** CARRIES NO ♀, unlike every other descriptor on this side.

occurs because of the refracted ray, the more so as it comes nearer the Horizon [quo magis Horizonti appropinquat].

- The same dist. [Ead. diſt.] Azim. of ☿ [Azim. ☿] Alt. of ☿ [Alt. ☿]
- 7 45 or [vel]
- 7 44 55 22 59 73 55 7 49
- 48 5 **22 58½** 73 14 7 25
- 50 40 **22 57½** 72 45 **7 3½**
- **54⅚ 22 57⅓** 71 55 6 33
- 57 55 22 56 71 16 6 9

	Azim. of ♀ [Azim. ♀]	Alt. of ♀ [Alt. ♀]
8 1	**22 55¼**	
5	22 55	
5⅙	82 2	25 0
7	**22 54½**	
10	**22 54⅓**	
13	**22 53½**	
16	22 53	
19	22 52	

A straight line drawn from ☿ through Venus fell below the southern head of ♊ [infra meridionale caput ♊] by the amount of one degree [vnius gradus] — as much, that is, as the distance of the small star nearest to it [ſtellæ paruæ ipſi proximæ].

- H. **8 27′** Dist. of ♀ and the lower head of ♊ [Diſt. ♀ et infer. cap. ♊] **48 37⅔**
- 30 Distance of ♀ and ☿ [Diſtantia ♀ et ☿] **22 47½**
- 32 The same distance [Eadem diſtantia] **22 46½**

The straight line from ♀ to ☿, however, left the whole of the Pleiades perceptibly towards the south [relinquebat ſenſibiliter totas Pleiades verſus auſtrum].

- H. 8 36 Distance of ♀ and ☿ **22 44¾**
- 8 40 Azim. of ♀ 82 52 Alt. 25 32
- 43 ♀ from the eye of ♉ [♀ ab oculo ♉] **11 52½**
- 51 ☿ was seen to set [☿ viſus eſt occidere].
- 54 Dist. of ♀ from the lower head of ♊ [Diſt. ♀ ab infer. capite ♊] **48 37½**
- 9 1 ♀ from the eye of ♉ **11 52¼**[461]

[461] THE HEAD LINES above the rows **7 40⅔** and **42⅚** are set in two lines of smaller roman: Diſtantia / inter ♀ & ☿ over the second file, Azim. ☿ a / Sept. verſ. occ. over the third, and Alt. ☿ over the fourth, on the lower line. The two groups 23 0 are identical. THE LINE 7 45 vel and the line 7 44 55 below it are gathered by ONE PRINTED BRACE, its point facing RIGHT, standing between vel and the head Ead. diſt.; nothing is printed at its point. vel is roman, set close after 45. THE HEAD LINE Azim. ♀ / Alt. ♀ above the row 8 1 is set in the smaller roman over the third and fourth files only. The sign after cap., caput and capite is printed as a II-shaped glyph; the sign after oculo as a circle with two horns.

- 9 5 ♀ from the lower head of ♊ [♀ ab inferiori cap. ♊] 48 36
- 9 ♀ from the eye of ♉ **11 52¾**
- 12 ♀ from the lower head of ♊ [♀ ab infer. cap. ♊] **48 34½**
- 15 ♀ from the lower head of ♊ [♀ ab infer. cap. ♊] 48 35
- 26 ♀ from the eye of ♉ 11 52
- 31 11 52
- 36 ♀ from the more northern horn of ♉ [♀ a borealiori cornu ♉] **18 2⅔**
- 39 **18 2⅔**
- 42 ♀ from the lower head of ♊ [♀ ab infer. capite ♊] **48 33¼**
- 45 **48 33½**
- 50 **48 32⅔**

At the very next noon the greater clock [Horologium maius] was running fast by 3 M. 50 S.

DIE 29 MARTIJ.

- H. 1 38 Distance of ♀ and of the centre of ☉ [Diſtantia ♀ et centri ☉] **40 59½**
- 40 The same distance [Eadem diſtantia] **41 0½**
- ♀ had on the merid. an alt. of [♀ habuit in merid. alt.] 59 5
- moderately good because of clouds [mediocriter bona propter nubes].
- Azim. of ♀ from the south towards the west [♀ Azim. a mer. verſ. occaſ.] Alt. of ♀ [Alt. ♀]
- 2 44 17 4 0
- 51 4 6 0
- 3 2 36 12 0 **58 41½** moderately good [mediocr. bona]
- 7 22 40 ♀ at 90 G. from the south [in 90 G. a mer.] had Alt. 30 45
- ♀ and ☿ were distant [Diſtabant ♀ et ☿] Azim. of ☿ from the north towards the west [Azim. ☿ a ſept. verſ. occ.] Alt. of ☿ [Alt. ☿]
- 7 34 22 7 not precise enough [non ſatis exquiſita]
- 37 12 **22 5¼** 75 15 9 30

The following were precise enough [Sequentes hæ fuerunt ſatis exquiſitæ]

- 40 15 **22 5¼** 74 44 9 2
- 44 17 **22 5¼** 74 8 8 39
- **48½ 22 5¼** 73 14 8 1
- 50 19 22 5 approximately [fere] 72 45 7 44
- 53 55 **22 5¼** 72 0 7 16
- 55 0 **22 4½** 71 48 7 6
- 57 20 **22 3¼** 71 17 6 48

		Azim. of ♀ [Azim. ♀]	Alt. of ♀ [Alt. ♀]
8 2 36	22 4	82 0	25 10
6 30	22 3	81 0	24 35

- 15 ☿ from the eye of ♉ [☿ ab oculo ♉] 27 49

- 19 27 48
- 27 ♀ from the lower head of ♊ [♀ ab inferiori cap. ♊] 48 4
- 30 **48 4½**

*NB. The diurnal motion [Motus diurnus] of ☿ towards ♀ on this day is, according to the Alphonsines [iuxta Alphonſinos], 1 Gr. M. 3, and according to Copernicus [iuxta Copernicum] **47′**; but observation gave **55′**, which is exactly midway between the two [præciſe medium inter vtrumque].*[462]

- H.8 36 ♀ from the eye of ♉ [♀ ab oculo ♉][1] **11 42½**
- 43 Between ♀ and ☿ [Inter ♀ et ☿] 21 54

This one, however, seems unlike the earlier ones [prioribus dißimilis] because of the refraction of the rays of ☿.

- 8 48 30 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] **11 42¼**
- Azim. of ♀ 73 0 Alt. 18 54

At that time ♀ was on the same straight line drawn through each eye of ♉ [per vtrumque oculum ♉] and the outermost ones of the Hyades [extremas Hyadum].

- 8 53 55 Between ♀ and the eye of ♉ **11 42¼**
- Azim. of ♀ 72 0 Alt. 18 12
- 8 59 Between ♀ and the northern horn of ♉ [Inter ♀ et boreale cornu ♉] **17 30⅔**
- 9 5 **17 30⅔**
- 9 Between ♀ and the lower head of ♊ [Inter ♀ et inferius caput ♊] 48 3
- 13 48 3

For finding the place of ♀ [Pro loco ♀ri$ indagando] from the observations of the 29th day of March [ex obſeruationibus diej 29 Martij], around the greatest elongation [circa maximam digreßionem], from which the place of ☾ is afterwards tracked down on the following day [ex qua poſtea ☾ locus perveſtigatur die ſequenti][2].

- Hora 8 M. 56 distance between Aldeb. and ♀ [diſtantia inter Aldeb. et ♀] **11 42¼**
- Declination of ♀ [Declinatio ♀] 26 3 B, determined from the azimuths and altit. [limitata ex azimuthis et altit.]
- Declination of Aldeb. [Declinatio Aldeb.] **15 35⅔**
- Angle of the difference of ascension [Angulus differentiæ aſcenſionis] 7 22 6
- Right ascension of Aldeb. [Aſcenſio recta Aldeb.] 63 0 30
- Therefore the R. ascension of ♀ [Ergo Aſcenſio R. ♀] 55 38 24

[462] The two groups 11 52 (rows 26, 31) and the two groups **18 2⅔** (rows 36, 39) are identical. non ſatis exquiſita, in the size of the running text, stands on the row 7 34 in the place of the third and fourth files; the row carries no azimuth and no altitude. THE HEAD LINE Azim. ♀ / Alt. ♀ above the row 8 2 36 is set in the smaller roman over the third and fourth files. **15** ☿ ab oculo ♉ **27 49** carries the sign ☿, with horns, unlike the ♀ of every other descriptor in the column; its value stands in the position of the fourth file.

- N.B. that ♀ faced this one very obliquely [N.B. quod ♀ hanc oblique admodum reſpexit].
- H. 8 M. 59 Distance between the northern horn of ♉ and ♀ [Diſtantia inter boreale cornu ♉ et ♀] **17 30⅔**
- Declination of the northern horn of ♉ [Declinatio B. cornu ♉] 28 10
- Angle of the ascensional difference [Angulus differentiæ aſcenſionalis] 19 17 44
- Right ascension of the horn of ♉ [Aſcenſio recta cornu ♉] 74 58
- Therefore the right ascension of ♀ [Ergo Aſcenſio recta ♀] 55 40 16
- H. 9 M. 9 Between ♀ and the southern head of ♊ [Inter ♀ et meridionale caput ♊] 48 3
- Declination of the southern head of ♊ [Declinatio merid. cap. ♊] 28 58
- Angle of the difference of ascension [Angulus differentiæ aſcenſ.] **54 13⅙**
- Right ascension of the southern head of ♊ [Aſcenſio recta merid. cap. ♊] **109 54⅚**
- Therefore the right ascension of ♀ [Ergo Aſcenſio recta ♀] 55 41 40

With these three observations of ♀ determined for the full hour 9 [Limitatis tribus hiſce obſeruationibus in ♀ ad horam 9 completam] [and account having been taken both of refraction and of parallax][3] (which at such an altitude nearly cancel each other out [fere ſe mutuo elidunt]), the apparent right ascension [aſcenſio recta viſa] is set, without any perceptible error, at **55° 41′**, and the northern declination of ♀ [declinatio B. ♀] at **25° 3′**. To these there afterwards correspond Longitude **29° 9′ 17″** ♉, Latitude **5° 8′ 40″** B. The daily variation of the declination of ♀ [Variatio declinationis diurna ♀] is gathered to have been **8′**, so that on the following day, at H. 6 M. 28, its [declination] was **25 10⅙**. The diurnal motion in longitude [Motus diurnus longitudinis] was **31′** from observation. Therefore at the same time the longitude of ♀ was **29° 37′** ♉. There corresponds Asc. R. [Aſc. R.] **56° 11′**[4].[463]

DIE 30 MARTIJ.

- H.3 **50′** In the morning ♃ was seen to rise [Mane, viſus eſt ♃ oriri].
- 4 10 ♃ and the mouth of Pegasus [♃ et os pegaſi] **24 24⅔**
- 16 ♃ and Aquila [♃ et Aquila] 35 32
- 23 **35 32½**

[463] ♀ris sets the letters ris RAISED after the sign, the ending of the genitive. Declinatio Aldeb., Angulus differentiæ aſcenſionis, Aſcenſio recta Aldeb. and Ergo Aſcenſio R. ♀ are gathered by ONE PRINTED BRACE, its point facing RIGHT, and beside it stands, on four short lines, N.B. quod / ♀ hanc / oblique admo-/dum reſpexit.; hanc is feminine singular, with no referent named. The line at H. 9 M. 9 reads meridionale caput ♊ where the right column of band 2 reads inferius caput ♊ at the row 9. TWO PAIRS OF PRINTED SQUARE BRACKETS stand in the paragraph: round et habita ratione tam refractionis quam parallaxeos, followed by the raised call [3]; and round declinatio, with no call. The parentheses round quæ in tali altitudine fere ſe mutuo elidunt are PRINTED. **25 10⅙** carries NO marks, while every other angle in the paragraph carries degree and minute marks.

- 26 35 35
- 31 35 34
- 4 45 ♃ was in Azim. from the south towards the east [♃ fuit in Azim. a merid. verſus ort.] 49 0 having Alt. 5 50

At the very next noon the greater clock [Horologium maius] was running fast by M. 4 S. 25.

In the evening [Veſperi], at H.7 18′ 20″, ♀ was at 90 G. [♀ fuit in 90 G.] Alt. 30 59. I do not know whether this observation is to be trusted [cuj obſeruationi neſcio an ſit fidendum], because ♀ was seen through clouds that were somewhat dense [per nubes quodam modo denſas].[464]

[1] Cfr. annotationem de hac diſtantia in tabula Aſcenſionum Rectarum quarundam ſtellarum, in Appendice ad obſervationes huius anni, p. 230. — "Compare the annotation on this distance in the table of Right Ascensions of certain stars, in the Appendix to the observations of this year, p. 230."

[2] E codice V. — "From codex V."

[3] Linea inducta. — "Struck through with a line."

[4] Cfr. ſupra inter obſeruationes lunæ p. 151. — "Compare above, among the observations of the Moon, p. 151."[465]

DIE 1 APRILIS.

	Between ♀ & ☿ [Inter ♀ & ☿]	Azim. of ☿ from the north towards the west [Azim. ☿ a Sept. verſ. occ.]	Alt. of ☿ [Alt. ☿]
H. 7 46	19 43	72 50	9 42½
7 49	19 43	72 10	9 23
7 53	19 43	71 28	8 52

These three preceding observations are certain enough, and you may trust them [Hæ tres antecedentes obſeruationes ſunt ſatis certæ, quibus poßis fidere].

- 7 56 19 42
- 58½ 19 41½

Less certain than the earlier ones [prioribus minus certæ], because of the refraction of the rays about the approach to the horizon [Propter radiorum refractionem circa appropinquationem Horizontis] and because of intervening clouds [propter nubes interuenientes].

- H. 8 6′ Between ♀ and the lower head of ♊ [Inter ♀ et caput inferius ♊] 46 29½
- 8 The same [Eadem] 46 31

[464] NO a mer. STANDS AFTER in 90 G. on this line, unlike the lines in 90 Gr. a meridie and in 90 G. a mer. on the preceding side, and NO verb such as habuit stands before Alt..

[465] Note [3] stands against the printed words in square brackets; note [2] names a codex, and the leaf does not say how much of the text above it covers.

- 10 The same repeated [Eadem repetita] 46 31
- more certain [certi-/ores]

Note [Nota]. The daily motion of ☿ towards ♀ [Motus diurnus ☿ ad ♀] from the 29th day of March to the 1st of April [a die 29 Martij in 1 Aprilis], over the three days now elapsed [per hoc elapſum triduum], is according to the Alphonsines [iuxta Alphonſinos] P. 3 M. 8, and according to Copernicus [iuxta Copernicum] P. 2 M. 4. But the observation gave roughly [quaſi] G. 2 M. 22. The daily motion of Venus [Motus … diurnus Veneris], however, taking account of the distance to the head of the lower ♊ [habito reſpectu diſtantiæ ad caput inferioris ♊], was 1 G. 33 M. (for ♀ has nearly the same latitude as the said star [nam habet ♀ fere eandem cum dicta ſtella latitudinem]); and this agrees very closely with the Alphonsine daily motion of ♀ [quod cum Alphonſino motu diurno ♀ apprime quadrat], falling short of Copernicus's motion by 11 minutes [deficientibus a Copernici motu ſcrupulis 11].

Therefore, if you take the Alphonsine motion of ♀ [ſi motum ♀ accipias Alphonſinum], such as the observation also gave [qualem etiam dedit obſeruatio], then, taking account of the Copernican motion in ☿ [habita ratione motus in ☿ Coperniani], ☿ advanced towards ♀ in these three days [promotus eſt ☿ ad ♀ hoc triduo] by G. 2 M. 15, which falls not much short of the celestial observation [quod non multum deficit ab obſeruatione cæleſti].

At the very next noon the greater clock was moving slow by **M. 6′ 30″** [Horologium maius tardius mouebatur M. 6′ 30″], the passage of ☉ having been observed through the slits of the sights [☉ tranſitu per rimulas pinnacidiorum obſeruato].[466]

DIE 2 APRILIS.

- H. 7 45 Between ♀ and ☿ [Inter ♀ et ☿] **18 57½** *uncertain because of the daylight and the clouds [incerta propter diem et nubes].*
- 57 *19 2*
- *8 0 19 2*
- good [bonæ]
- *5 The same [Eadem]* ***19 1½***
- *7* ***19 1½***

Because of the horizontal approach [propter approp. Horizontalem], the two earlier ones are more certain [certiores ſunt duæ priores].[467]

- ***8 12½*** *Between ☿ and Aldebora [Inter ☿ et Aldeboram]* ***23 12½***
- *16 23 12*

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[466] 8 Eadem 46 31 and 10 Eadem repetita 46 31 are gathered at the right by ONE PRINTED BRACE, its point facing right, beside which stands certi- / ores, divided across the two lines. The parentheses round nam habet ♀ fere eandem cum dicta ſtella latitudinem are PRINTED.

[467] 57 19 2 and 8 0 19 2 are gathered at the right by ONE PRINTED BRACE, point facing right, beside which stands bonæ, set between the two lines. 5 Eadem 19 1½ and 7 19 1½ are gathered by a THIRD PRINTED BRACE, point facing right, beside which stand propter / approp.; the words go on at the head of the right column.

- *20 Between ☿ and the lower horn of ♉ [Inter ☿ et inferius cornu ♉] 37 9*
- *25 The same [Eadem] 37 7*
- *27 37 5*

This variation [Hæc varietas] arises chiefly from the approach to the horizon [accidit potißimum propter appropinquationem ad Horizontem]; hence the true distance at hour 8⅓ could be put at 37⅙ [vnde vera diſtantia ad horam 8⅓ poterit poni 37⅙], but you should rather trust the observation made at hour 8 at ♀ [ſed potius fidas obſeruationi hora 8 ad ♀ factæ].

- H. 8 33 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] **11 11½**
- 38 The same [Eadem] **11 11½**
- 44 Between ♀ and the lower head of ♊ [Inter ♀ et inferius caput ♊] 46 4*
- **46½** The same 46 3
- 50 46 4*
- *these two good [*bonæ hæ duæ]
- **54½** Between ♀ and the northern horn of ♉ [Inter ♀ et boreale cornu ♉] 15 32
- 57 The same 15 33
- 9 1 15 33
- 4 15 32
- 10 **15 32½**
- 16 Between ♀ and the lower head of ♊ [Inter ♀ et inferius caput ♊] **46 2½**
- 19 The same repeated [Eadem repetita] **46 2½**
- Azim. from the north towards the west [Azim. a Sept. verſ. occ.] Alt.
- 7 35[1] ♀ 85 0 **28 8½**
- **40½** 84 0 27 29
- 47 ☿ 72 34 10 10
- 53 72 15 9 49
- 8 **39 30″** ♀ 72 30 19 21
- 47 30 71 0 18 19
- 51 0 70 20 17 53
- 54 0 69 40 17 23
- 9 6 0 less good [minus bona] 68 0 15 56

DIE 3 APRILIS, MANE.

- H. 3 30 Jupiter was seen to rise [viſus eſt Juppiter oriri].
- 56 Between the mouth of Pegasus and ♃ [Inter os Pegaſi et ♃] **24 36½**

Less good, since the mouth of Pegasus did not appear clearly enough [minus bona cum os Pegaſi non ſatis appareret].[468]

[1] Quæ ſequuntur alia manu ſcripta ſunt. — "What follows is written in another hand."[469]

- 4 2 ♃ and the lucida of the Vulture [♃ et lucida Vulturis] 35 56
- 4 7 The same was found [Eadem inuenta eſt] 35 58½
- 12 The same was found 35 57½

These observations were not certain enough [Hæ obſeruationes non erant ſatis certæ], both because of the nearness of dawn [cum propter vicinitatem auroræ] and above all because the wind shook the instrument too much, so that it could not be held fixed [tum maxime quod ventus inſtrumentum nimium agitaret, vt fixum teneri non poßet].

At the very next noon of the 3rd day of April the greater clock was running slow by 5 M. 14 S. [Proxime ſequenti meridie diej 3 Aprilis Horologium maius tardius ibat 5 M. 14 S.]

- H. 1 36′ P. M. ♀ from the centre of ☉ [♀ a centro ☉] 38 38½
- 40 38 39
- 52 38 39
- 55 38 38¼
- 58 38 38
- 2 0 38 38
- 8 38 38½

You may, however, without perceptible error, use for this time the distance of ♀ and the centre of ☉ [Potes autem absque ſenſibili errore vti diſtantia ♀ et centri ☉ ad hoc tempus] 38 38½

- H. 2 26′ 0″ ♀ crossed the meridian [tranſiuit ♀ meridianum], having Alt. by the lesser Q. [habens Alt. per Q. minorem] 59 53
- by the greater Q. [per Q. maiorem] 59 49¼

But the lesser Quadrant is rather to be trusted, for ♀ could be observed better with it [Sed potius fidendum eſt minori Quadranti, nam per eum melius obſeruari ♀ potuit].

- H. 2 45 ♀ from the centre of ☉ 38 37½
- 51 38 37½
- 58 38 37

But this one is less certain than the earlier ones [ſed hæc eſt minus certa prioribus].

- 7 8 20 ♀ was at 90 G. from the mer., having [♀ fuit in 90 G. a mer. habens] Alt. 31 41½

[468] TWO PRINTED ASTERISKS stand after the values 46 4 at 44 and at 50, and a third opens the line *bonæ hæ duæ, set right below them; bonæ hæ duæ carries no verb. THE AZIMUTH RUN stands under a PRINTED HEAD of two heads, Azim. a over Sept. verſ. occ., and Alt., with no head over the time file or the file of planet signs; the signs ♀, ☿, ♀ stand at 7 35, 47 and 8 39 30″ only, and the other rows carry none.

[469] The leaf does not say how far Quæ ſequuntur reaches.

- 18 5 ♀ in Azim. 88 0 Alt. 30 22
- 22 46 87 0 29 42
- 37 ♀ and ☿ were distant [diſtabant ♀ et ☿] **18 20¼**

It must not have been good enough [Oportet non fuiße ſatis bonam].

- 40 Distance of ♀ and ☿ [Diſtantia ♀ et ☿] 18 25
- 47 **18 26½**
- **50½** 18 25
- 53 18 25
- 56 18 25
- 8 **1½** Between ☿ and the eye of ♉ [Inter ☿ et oculum ♉] 22 16
- 5 **22 16¼**
- 7 22 16
- 13 Between ♀ and ☿ [Inter ♀ et ☿] 18 25
- 17 18 24
- 23 18 24
- 34 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] 11 9
- 40 11 9

Note that the distance between ♀ and the eye of ♉ was taken in these days at least on account of the latitude [Nota quod diſtantia inter ♀ et oculum ♉ capta ſit ſaltem ratione latitudinis hiſce diebus], for they were at nearly the same longitude [nam erant fere in eadem longitudine].

- 8 53 Between ♀ and the southern head of ♊ [Inter ♀ et merid. caput ♊] **45 36⅔**
- 57 **45 36½**
- 9 2 **45 36½**
- 5 Between ♀ and the northern horn of ♉ [Inter ♀ et boreale cornu ♉] 15 4
- 9 15 4
- 12 15 4

These azimuths of ☿ and ♀ separately, without regard to the time at which they observed the distances [Azimuta hæc ☿ et ♀ ſeorſim, non conſiderato, quo obſeruarunt diſtantias tempore]. These azimuths are counted from the north towards the west [Hæc Azimuta numerantur a ſept. verſus occaſum].

- H. 7 49 ☿ in Azim. 72 0 Alt. 10 8
- 55 70 40 9 19
- 8 17 46 the heart of ♌ on the meridian had alt. [cor ♌ in mer. habuit alt.] 48 4

From this you can verify the times [hinc potes verificare tempora].

- 29 ♀ in Azim. 74 0 Alt. 20 37
- 34 73 0 19 54
- 39 72 0 19 12
- 50 70 0 17 50

At the very next noon the clock was running slow by M. 10 S. 0 [Proxime ſequenti meridie Horologium tardius ibat M. 10 S. 0], the passage of the Sun

having been observed through the slits of the sights [Solis tranſitu per rimulas pinnacidiorum obſeruato].

DIE 5 APRILIS.

- H. 8 23 Distance between ☿ & ☿ [Inter ☿ & ☿ diſtantia] **17 20½**
- 27 **17 20¼**
- 30 17 20
- 33 Between ☿ and the eye of ☉ [Inter ☿ et oculum ☉] 20 35
- 36 Between ☿ and ☿ [Inter ☿ et ☿] 17 18
- 41 Between ☿ and the lower head of ♊ [Inter ☿ et infer. caput ♊] **44 50½**
- 48 **44 49¾**
- 55 44 50
- **8 23′ 30″** Azim. of ☿ [Azim. ☿] 74 0 Alt. 20 53
- 29 0 from the north [a Sept.] 73 0 20 9
- 32 towards [verſ.] 72 20 19 38
- 39 the west [occ.] 71 0 **18 35½**
- 44 70 0 18 7

DIE 6 APRILIS.

- H. **7 0′ 11″** ☿ at 90 G. had Alt. [☿ in 90 G. habuit Alt.] 32 10[470]
- 7 25 Azim. of ☿ from [Azim. ☿ a] 85 0 Alt. 28 43
- the north towards [Sept. verſ.]
- 30 the west [occ.] 84 0 28 0
- 35 83 0 27 20

This one is better than the two above [hæc eſt melior ſuperioribus duabus].

- 40 82 0 26 38
- 59 Between ☿ and ☿ [Inter ☿ et ☿] **16 58½**
- 8 4 **16 57⅔**
- 7 16 58
- 10 **16 57¼**

*Note [Nota]. The daily motion of ☿ from the preceding day to this one [Motus diurnus ☿ a præcedenti die in hunc] is roughly **45′** [eſt quaſi 45′], whereas Copernicus's calculation gives **55′** [cum tamen Copernici calculus dat 55′] and the Alphonsine gives G. 1 M. 19 [Alphonſinus dat G.1 M.19]; it is therefore clear that it is approaching the Sun sooner [patet itaque quod Solem accedat prius].*

- H. 8 17 Between ☿ and the northern horn of ☉ [Inter ☿ et boreale cornu ☉] 30 51
- 21 30 50
- **24½** 30 51
- 27 30 50
- 31 Between ☿ and the eye of ☉ [Inter ☿ et oculum ☉] **19 53½**

[470] THE RUN **8 23′ 30″** Azim. ☿ **74 0** Alt. **20 53** … 44 70 0 18 7 sets the words Azim. ☿, a Sept., verſ., occ. one to a line down its first four lines and Alt. on the first line only; it has NO printed head row.

- 35 less certain [minus certa] **19 54½**
- 39 nearly [fere] 19 53
- 47 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] **11 1⅔**
- **50½** 11 0
- 53 11 2
- 57 **11 1¼**
- 9 0 **11 1⅔**
- 5 Between ♀ and the northern horn of ♉ [Inter ♀ et boreale cornu ♉] **13 56¼**
- 8 **13 56½**
- 13 **13 56¾**
- 17 Between ♀ and the southern head of ♊ [Inter ♀ et merid. caput ♊] **44 27¾**
- 24 **44 27½**
- 34 **44 27⅓**

Certain azimuths of ☿ and ♀, all of which are counted from the north towards the west [Azimuta quædam ☿ et ♀ quæ numerata ſunt omnia a ſept. verſus occaſum].

- H. 8 **14′45″** Azim. of ☿ [Azim. ☿] 66 0 Alt. 7 18
- 19 48 65 0 6 49
- 22 13 64 30 **6 31½**
- 24 52 64 0 6 11
- 27 18 63 30 5 56
- 29 43 63 0 5 38
- 32 8 62 30 5 19
- 42 Azim. of ♀ [Azim. ♀] 70 0 **18 13½**
- **47⅓** 69 0 17 31
- 9 24 62 0 **12 52½**
- 11 31 ♀ was seen to set [♀ viſa eſt occidere].[471]

DIE 7 APRILIS.

- H. 3 36 Morning [Mane.]. ♃ from the mouth of Pegasus [♃ ab ore Pegaſi] **24 10½**
- 40 24 10
- 45 24 5

These three are not certain enough [Hæ tres non ſunt ſatis certæ], because of the smallness of the mouth of Pegasus [propter exiguitatem oris Pegaſi], and because ♃ was very near the horizon [et quia ♃ admodum vicinus erat Horizonti].

- H. 3 50 The Vulture and ♃ [Vultur et ♃] **36 16⅓**
- 56 36 18
- 59 36 18

[471] THE FIRST RUN has NO printed head row; its descriptor Azim. ♀ a / Sept. verſ. / occ. is set across its first three lines, the middle line carrying no time and no value, and Alt. stands on the first line only.

- 4 2 36 18
- 13 Azim. of ♃ [Azim. ♃] 49 30, Alt. 5 55
- from the mer. [a mer.]
- 18 towards [verſ.] 48 30 6 25
- 23 the east [ortum] 47 30 6 53

At the very next noon the greater clock was found to have erred not at all [Proxime ſequenti meridie Horologium maius nihil omnino aberraße compertum eſt].

- H. **2 19′ 7″** P. M. ☿ crossed the meridian [☿ tranſiuit meridianum]; its Alt. by Q. Max. [Alt. eius p. Q. Max.] 60 15
- by Q. Min. [per Q. Min.] 60 16,
- good, or better than the earlier one [bona vel melior priori].

DIE 9 APRILIS.

- H. **6 50′ 56″** ☿ was at 90 G., having Alt. [☿ fuit in 90 G. habens Alt.] **32 21½**
- *H. 8 M. 34 Between* ☿ *&* ☿ *[Inter* ☿ *&* ☿*]* 16 G. 2 M.

The distance of ☿ and ☿ was very nearly 16 degrees [Fuit diſtantia ☿ et ☿ partium proxime 16]. For, because of the thinness of ☿ and the rather sparse clouds about the horizon, the observers could not make out whether it was a minute or so more or less [Non enim potuit propter tenuitatem ☿ et rariusculas nubes circa Horizontem ab obſeruantibus diſcerni, an minuto aliquo plus vel minus]. For it was observed sometimes as **15ᵍ 59′**, sometimes as **16ᵍ 0′**, sometimes as 16 2, as before [Obſeruabatur enim aliquando 15ᵍ 59′, aliquando 16ᵍ 0′, aliquando 16 2 vt prius].

- H. 8 50 Between ☿ and the eye of ♉ [Inter ☿ et oculum ♉] **10 59⅓**
- 53 10 59
- 59 Between ☿ and the northern horn of ♉ [Inter ☿ et boreale cornu ♉] 13 5
- 9 7 **13 5½**
- 12 Between ☿ and the lower head of ♊ [Inter ☿ et inferius caput ♊] **43 36½**
- 16 43 37
- nearly [fere]
- 20 43 37

Azim. of ☿, which are counted from the north towards the west [Azim. ☿ quæ numerantur a Sept. verſus occaſum].[472]

- H. 7 M. 56 Azim. of ☿ [Azim. ☿] 77 0 Alt. 23 20
- 8 1 76 0 22 38

[472] THE RUN 13 Azim. ♃ 49 30, Alt. 5 55 / a mer. / 18 verſ. 48 30 6 25 / 23 ortum 47 30 6 53 has NO printed head row; its descriptor is set one piece to a line down four lines, the line a mer. carrying no time and no value. A COMMA stands after the azimuth value 49 30 on the first line. A COMMA stands after 60 16. fere stands on its own line, right-set, between 16 43 37 and 20 43 37; the leaf does not settle which line it qualifies.

- 6 75 0 21 55
- 12 74 0 21 10
- 22 72 0 19 49
- 58 65 0 15 4
- 9 4 64 0 **14 23⅓**
- 14 62 0 13 8

DIE 10 APRILIS.

- H. **3 32′** Morning [Mane.]. Between ♃ and the mouth of Pegasus [Inter ♃ et os Pegaſi] 24 1
- 36 23 52
- 42 The Vulture and ♃ [Vultur & ♃] 36 36
- 46 36 37
- 49 36 36
- 51 36 38
- **53½ 36 37½**

At the very next noon the clock was running slow by M. 6 S. 43 [Proxime ſequenti meridie Horologium tardius ibat M. 6 S. 43].

On this day ☿ was also seen at about hour 9 in the evening [Videbatur etiam hoc die ☿ circiter horam 9 veſpertinam], but because of the clouds, and because it was very near the horizon, it could not be observed [ſed propter nubes et quod Horizonti admodum vicinus eßet, obſeruari non potuit].

At the very next noon the clock was running slow by **1′ 50″** [Proxime ſequenti meridie Horologium tardius ibat 1′ 50″].

DIE 11 APRILIS.

At H. **6 48′ 14″** ♀ was at 90 G., having Alt. 32 31 [H. 6 48′ 14″ ♀ fuit in 90 G. habens Alt. 32 31]: middling, because the solar rays were somewhat in the way [medioc. propter radios ſolares impedientes quodammodo].

- H. 8 12 Between ♀ and the lower head of ♊ [Inter ♀ et inferius caput ♊] **43 12⅔**
- **17½** 43 13
- 20 43 13
- 30 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] **10 57¼**
- 33 **10 58¼**
- 38 **10 58¼**
- 47 10 58

These distances were taken only on account of the latitude [Diſtantiæ hæ captæ ſunt tantum ratione latitudinis].

- H. 8 54 Between ♀ and the northern [Inter ♀ et boreale] 12 42
- 57 horn of ♉ [cornu ♉] 12 42

Azim. of ♀ counted from the north towards the west [Azim. ♀ numerata a ſept. verſus occaſum].

- H. 7 58 Azim. of ♀ [Azim. ♀] 76 0 Alt. **22 45½**

- 8 4 75 0 **22 3½**
- 9 74 0 21 20
- not good enough [non ſatis bona].
- 14 73 0 20 39[473]
- 8 25 71 0 19 15
- 35 69 0 17 51
- 9 2 64 0 14 31
- **6½** 63 0 13 53
- 12 62 0 13 11

At the very next noon the greater clock was running slow by 55 seconds [Proxime ſequenti meridie Horologium maius tardius ibat 55 ſcrupulis ſecundis].

DIE 12 APRILIS.

- H. 3 34 Distance of ☿ and the centre of ☉ [Diſtantia ☿ et centri ☉] **32 31½**
- 39 **32 31½**
- 43 32 31
- 47 **32 30¼**
- *4 0 32 33*
- *Repeated at once [Statim repetita]* ***32 32½***
- ***10 32 32¼***
- ***15 32 32¼***

You may, without perceptible error, use the distance 32 32 around the middle of this time [Poteris abſque ſenſibili errore vti diſtantia 32 32 circa medium huius temporis].

- H. 6 45 25 ☿ at 90 G. had Alt. [☿ in 90 G. habuit Alt.] 32 32

	☿ Az. from the north towards the west [☿ Az. a Sept. verſ. occ.]	Alt.
7 50 25	77 0	23 30
58 12	75 30	22 46
8 2 40	74 40	21 50
6 8	74 0	21 23
11 25	73 0	**20 41½**
16 45	72 0	**19 59½**
21 50	71 0	19 18
27 10	70 0	18 36
32 10	69 0	17 54
58 10	64 0	**14 32½**
9 8 45	62 0	13 18

[473] THIS IS THE SECOND noon clock sentence under the one rubric DIE 10 APRILIS., each opening **Proxime ſequenti meridie**; the first gives M. 6 S. 43 with order-words, the second **1′ 50″** with marks. **H. 8 54 Inter ☿ et boreale 12 42 / 57 cornu ☋ 12 42** sets its descriptor ACROSS TWO TIMED LINES, each carrying its own value. **non ſatis bona.** stands on its own line, right-set, between 9 74 0 21 20 and 14 73 0 20 39; the leaf does not settle which line it qualifies.

At H. 8 50 the distance of ♀ and ☿ appeared as G. 15 M. roughly 36 [H. 8 50 visa est distantia ♀ et ☿ G. 15 M. quasi 36]. But because of the thinness, ☿ could not be observed very well [Sed ob tenuitatem non admodum bene obseruari ☿ potuit]; yet in such a way that an error beyond or short of 5 M. is not likely to have occurred [ita tamen, vt errorem vltra vel citra 5 M. non fuiße verisimile sit].

- H. 9 3 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] 10 58
- 7 10 58
- 10 Between ♀ and the southern head of ♊ [Inter ♀ et merid. caput ♊] **43 6⅓**
- 14 43 6
- 18 **43 6¼**
- 23 Between ♀ and the foot of Erichthonius [Inter ♀ et pedem Erichtonij] **12 32½**
- 25 **12 32½**

At the very next noon the greater clock was running slow by M. 2 S. 20 [Proxime sequenti meridie Horologium maius tardius ibat M. 2 S. 20].

DIE 13 APRILIS.

- H. **2 1′ 40″** ♀ was on the merid., having Alt. [♀ fuit in merid. habens Alt.]
- by Q. max. [per Q. max.] **60 30¼**
- by Q. minor. [per Q. minor.] **60 30¼**
- 3 21 ♀ from the centre of ☉ [♀ a centro ☉] 31 46
- 31 31 48
- nearly [fere]
- 36 31 43
- 42 **31 43¼**
- 48 **31 44½**
- 53 **31 44⅔**
- 55 31 44
- 57 31 43
- 4 4 31 43
- 5 31 43

Of these distances this one is the better, 31 43, around the middle time of these observations [Ex his distantijs melior hæc est 31 43 circa medium harum obseruationum tempus].

- H. 6 43 12 ♀ passed through 90 G., having Alt. [♀ transiuit per 90 G. habens Alt.] 32 30
- 7 47 55 Azim. of ♀ from [Azim. ♀ a] 77 0 Alt. 23 26
- 53 10 the north towards [Sept. vers.] 76 0 22 42
- 57 25 the west [occ.] 75 0 22 1
- 8 3 40 74 0 21 19
- 8 50 73 0 20 38

- 14 14 72 0 **19 55½**
- 8 43 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] **10 58⅔**
- 47 **10 57¼**
- 50 **10 57¼**

These distances at least are with regard to the latitude [Hæ diſtantiæ ſaltem ſunt quo ad latitudinem].

- 54 Between ♀ and the southern head of ♊ [Inter ♀ et merid. caput ♊] 42 58
- 58 42 59
- 9 0 42 59
- 3 42 59
- 8 Between ♀ and the foot of Erichthonius [Inter ♀ et pedem Erichtonij] **12 25⅔**
- 12 **12 27⅔**
- 15 **12 27⅔**
- 20 Between ♀ and the bright one in the shoulder [Inter ♀ et luc. in hum.] **20 44¾**
- 25 of Erichthonius **20 44¾**

At the very next noon the greater clock was running fast by only 18 seconds [Proxime ſequenti meridie Horologium maius 18 tantum ſcrupulis ſecundis celerius ibat].

DIE 14 APRILIS.

Note. The star ☿ could be seen neither this evening nor the preceding one; hence the reckoning of Alphonsus cannot be true, since according to their calculation it ought still to have been farther from ☉ [Nota. ☿ ſtella neque hoc veſperi neque præcedenti videri potuit, vnde Alphonſi ratio vera eße non poteſt, cum iuxta illorum calculum remotiorem a ☉ adhuc oportuit illum fuiße].[474]

- H. 8 33 Between ♀ and the eye of ♉ [Inter ♀ et oculum ♉] 10 53 good [bona]
- 36 10 55 good [bona]
- 38 10 55 good [bona]

These are with regard to the latitude [Hæ ſunt quoad latitudinem].

- 41 Between ♀ and the lower [Inter ♀ et inferius] 42 55
- 44 head of ♊ [caput ♊] 42 55
- 48 Between ♀ and the northern [Inter ♀ et boreale] 12 23
- 51 horn of ♉ [cornu ♉] **12 21½** these [hæ]

[474] **3 21** ♀ **a centro ☉ 31 46** opens a run of ten timed lines; the run has NO printed head row; fere stands on a line of its own, right-set, between 31 31 48 and 36 31 43; the leaf does not settle which line it qualifies. THE AZIMUTH RUN from 7 47 55 has NO printed head row: its descriptor **Azim. ♀ a / Sept. verſ. /** occ. is set one piece to a line down its first three TIMED lines, each of which also carries its values, and Alt. stands on the first line only. **20 Inter ♀ et luc. in hum. 20 44¾ / 25 Erichtonij 20 44¾** sets its descriptor ACROSS TWO TIMED LINES, each carrying its own value.

- 54 12 21
- 56 **12 21½** two [duæ]
- are better [meliores ſunt]
- 9 1 Between ♀ and the bright one [Inter ♀ et lucid.] 20 45
- 5 in the shoulder of Ericht. [in hum. Ericht.] 20 45

At the very next noon the greater clock was running slow by M. 4 S. 42 [Proxime ſequenti meridie Horologium maius tardius ibat M. 4 S. 42].

DIE 15 APRILIS.

- H. 8 32 Between ♀ and the lower head of ♊ [Inter ♀ et inferius caput ♊] **42 55½**

At that time the star in the head of ♊ did not show well enough [tunc temporis non ſatis apparuit ſtella in capite ♊].

- H. 8 37 The same was found [Eadem inuenta eſt] **42 52½**
- 45 The eye of ♉ and ♀ [Oculus ♉ et ♀] 10 54
- 50 **10 53½** *

*The slits of the sights were made a little wider here, because the eye of ♉ was obscured by the nearness of the solar rays [*Paulo latiores factæ hic ſunt pinnacidiorum rimulæ quia oculus ♉ vicinitate radiorum ſolarium offuſcatus eſt].

- H. 8 55 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] 42 52
- 57 42 52
- 9 3 Between ♀ and the foot of Erichthonius [Inter ♀ et pedem Erichtonij] 12 20
- 5 12 20

At the next noon the clock was running slow by M. 5 S. 0 [Sequenti meridie Horologium tardius ibat M. 5 S. 0].

DIE 16 APRILIS.

- H. 8 31 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] **42 53¼**
- 36 42 53
- 39 42 53
- 45 42 52
- 47 **42 52½**
- 50 42 53
- 55 ♀ from the foot of Erichthonius [♀ a pede Erichtonij] 12 20

• 59 **12 20¼** [recte: **12 20½** — Corrigenda, p. 429][475]

Afterwards, for the latitude of ☿ [Poſtea pro latitudine ☿]

• 9 10 ☿ from the bright one in the shoulder of Erichthonius[1] [☿ a lucida in hum. Erichtonij[1]] **20 46¼**
• 17 **20 46½**
• 9 21 **20 46½**
• 25 nearly [fere] 20 47

At the very next noon the clock [recte: *maius Horologium*, "the greater clock", for *Horologium* — Corrigenda, p. 429] was moving slow by **5′ 15″** [Proxime ſequenti meridie Horologium tardius mouebatur 5′ 15″].

Computation of the place of ☿ from the observations of 16 April, when it was stationary [Supputatio loci ☿ ex obſeruationibus diej 16 Aprilis, cum eßet ſtationaria].

At about H. 9, when ☿ had an altitude of 14 g. [H. 9 circiter cum ☿ haberet altitudinem 14 g.]

Distance of ☿ from [Diſtantia ☿ ab]

• the lower head of ♊ [inferiori capite ♊] **42° 53′**
• the northern horn of ♉ [Boreali cornu ♉] 12 20
• Capella **20 46½**

Places of the fixed stars [Loca Fixarum]	Longitude [Longitudo]	Latitude [Latitudo]
The lower head of ♊ [Inferius caput ♊]	**17 27⅓** ♋	6 38 B
The northern horn of ♉ [Boreale cornu ♉]	16 43 50 ♊	5 20 B
Capella	**16 0⅓** ♊	22 51 B

The working follows [Sequitur πράξις] [Greek: πράξις (praxis, "working", "procedure" — here the computation that follows)]

Diagram. A lettered figure set at the left of band 3, beside the three groups of labelled values and the paragraph that follows them. Two curved sides descend from a point at the top, one to the lower left and one to the lower right; a third, flatter curve closes the figure below. A straight line runs across the figure from the lower-left point to the lower-right point, a little above the closing

[475] **41** Inter ☿ et inferius **42 55 / 44** caput ♊ **42 55** and **48** Inter ☿ et boreale **12 23 / 51** cornu ♉ **12 21½** hæ each set a descriptor ACROSS TWO TIMED LINES, each line carrying its own value. THE WORDS hæ (after **12 21½** on line 51), duæ (after **12 21½** on line 56, set close) and meliores ſunt (on a line of its own, right-set, with no time and no value) stand right-set on three separate lines; read together they make hæ duæ meliores ſunt, "these two are better"; the leaf does not settle which two lines are meant. **9 1** Inter ☿ et lucid. **20 45** / 5 in hum. Ericht. 20 45 sets its descriptor across two timed lines, each carrying its own value. **45** Oculus ♉ et ☿ **10 54 / 50 10 53½** — A PRINTED BRACE stands to the right of the two values 10 54 and **10 53½**, joining them, and an ASTERISK stands beside the brace at its point. The paragraph *Paulo latiores factæ hic ſunt pinna-/cidiorum rimulæ quia oculus ♉ vici-/nitate radiorum ſolarium offuſcatus / eſt. opens with the matching ASTERISK and is set in the column, in the body size and the roman of the column.

curve; straight lines run from each of those two points up to a point inside the figure, forming a small triangle with the cross line as its base. Two further lines descend from the top point to the closing curve, one passing near the inner point and one crossing the cross line to its left. The lines are described as they appear on the scan; no angle or length is measured, and no quantity is attached to any line here. Labels, read off the figure only:

- A (top point): A
- E (inner point, at the apex of the small triangle): E, with the word Capella set beside it at the right
- D (on the cross line, left of centre): D, with a smaller cornu set close after it at a raised level, followed by one small sort, ♉
- C (lower-right point): C, with Cap. and a sort, ♊, set above and beside it
- B (lower-left point): B, with ♀ set below it
- CA **83° 22′**
- EA 67 9
- EAC 31 27
- EC 34 22
- EC **34° 22′**
- BC 42 53
- EB **20 46½**
- ECB **31 0⅓**
- CA **83° 22′**
- CE 34 22
- AE 67 9
- ACE 58 0

The sum of the angles ACE and ECB, which is the angle ACB, comes to **89 0⅓** [Aggregatum angulorum ACE et ECB quod eſt angulus ACB conflatur 89 0⅓]. Therefore, given in the triangle [recte: *trigono* for *trigone* — Corrigenda, p. 429] ACB: CA 83 22, CB 42 53, ACB **89 0⅓**, the side AB is given as 84 49, the complement of the latitude of ♀; and the angle BAC as 43 6 0, the difference of longitude of ♀ from the inf. head of ♊; and the angle BAD as 12 23 0, the difference of longitude from the horn of ♉ [Datis itaque in trigone ACB, CA 83 22, CB 42 53, ACB 89 0⅓, datur latus AB 84 49, complementum latitudinis ♀, et angulus BAC 43 6 0, differentia longitudinis ♀ ab inf. cap. ♊, et angulus BAD 12 23 0, differentia longitudinis a cornu ♉].

Therefore you may set down, without fail, the apparent [Infallibiliter itaque ponas viſam]

- Longit. **4° 21′ 0″** ♊
- Latitud. 5 11 0 B

Parall. and refr.: in long. **3′ 15″**, in lat. **4′ 25″**, add [Parall. et refr. in long. 3′ 15″, in lat. 4′ 25″, add.].[476]

[476] THE BRACED BLOCK: the words Diſtantia ♀ ab stand at the left, level with the middle line; ONE PRINTED BRACE, opening to the right, joins the three lines inferiori capite ♊ **42° 53′**, Boreali cornu ♉ **12 20**, Capella **20 46½**.

DIE 17 APRILIS.

- H. 8 54 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] 42 56
- 58 **42 57½**
- 59 42 57
- 9 1 **42 55½**
- 4 **42 55½**
- 7 42 56
- 12 ♀ from the northern horn of ♉ [♀ a boreali cornu ♉] **12 23¼**
- 24 12 23

At the very next noon the greater clock was moving slow by **3′ 20″** [Proxime ſequenti meridie Horologium maius 3′ 20″ tardius mouebatur].

DIE 18 APRLIS.

- 8 56 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] **43 1¼**
- 59 **43 1⅔**
- 9 2 43 2
- 5 43 2
- nearly [fere]
- 11 ♀ from the bright one in the shoulder of Ericht. [♀ a luc. in hum. Ericht.] **20 56¼**
- 16 20 55
- 19 20 55[477]

DIE 21 APRILIS.

- 8 40 ♀ from the lower head of ♊ [♀ ab inferiori capite ♊] **43 32½**
- 8 43 **43 32½**
- 8 55 ♀ from the brighter one of the shoulder of Ericht. [♀ a lucidiore hum. Ericht.] **21 23⅓**
- 9 0 The same [Eadem] 21 25
- 4 21 24
- 6 21 24
- 10 ♀ from the northern horn of ♉ [♀ a boreali cornu ♉] 13 4
- 14 **13 2¼**
- 16 13 1
- 19 13 0

These later ones are less certain, because ♀ was shining through a refracted ray; for it was near the horizon [Hæ poſteriores minus certæ ſunt, propterea quod ♀ luceret per radium refractum, erat enim vicina Horizonti].

At the very next noon the clock was moving fast by 2 M. **43″**, the Sun's passage through the slits of the sights having been observed [Proxime ſequenti

[477] THE RUBRIC OF THE SECOND DAY IS SET DIE 18 APRLIS. — six letters after the day figure, with no I between R and L on the scan — and closes with a point. fere stands on a line of its own, right-set, between 5 43 2 and **11 ♀** a luc. …; the leaf does not settle which line it qualifies.

meridie Horologium 2 M. 43″ celerius mouebatur, ſolis tranſitu per rimulas pinnacidiorum obſeruato].

[1] The codex has **10°**, but it should have been **20°** [Codex habet 10°, ſed debebat eße 20°].[478]

DIE 23 APRILIS.

- H. 8 44 Distance of ♀ from the lower [Diſtantia ♀ ab inferiori] 44 4
- 47 head of ♊ [capite ♊] **44 5⅔**
- 52 **44 3½**
- 55 44 5
- 57 44 5
- 9 3 ♀ from the shoulder of Ericht. [♀ ab humero Ericht.] 21 51
- 7 **21 51¼**

At the very next noon the greater clock was moving fast by 4 M. 29 S. [Proxime ſequenti meridie maius Horologium 4 M. 29 S. celerius mouebatur].

DIE 21 AUGUSTI.

With the Trigonic Sextant and the greater clock [Per Sextantem Trigon. et Horologium maius].

- **9ᴴ53′30″** Dist. of ♄ from the left shoulder of ♒ [Diſt. ♄ a ſiniſtro hum. ♒] 22 27
- 10 2 25 the same dist. was found [eadem diſt. inuenta eſt] 22 29
- 9 37 22 29
- 18 10 Azim. of ♄ 26 0 from the south towards the east, having Alt. [Azim. ♄ 26 0 a meridie verſus ortum, habens Alt.] 20 17
- 32 5 Dist. of ♄ from the right shoulder of ♒ [Diſt. ♄ ab hum. dextro ♒] 16 3 30[479]
- 10 38 30 The same distance [Eadem diſtantia] 16 5
- 43 45 The same, repeated [Eadem repetita] 16 5
- 49 36 Azim. of ♄ 18 0, Alt. [Azim. ♄ 18 0, Alt.] 21 53
- 4 40 ♄ and the mouth of Pegasus, dist. [♄ et os Pegaſi diſt.] 26 35
- 14 5 26 35
- 19 35 Azim. of ♄ 10 0, Alt. [Azim. ♄ 10 0, Alt.] **22 56¼**
- 57 30 ♄ was on the merid., Alt. [♄ fuit in merid., Alt.] 23 23

Here the clock was moving **3⅔** M. slower than it should [Horol. hic 3⅔ M. tardius iuſto mouebatur].

At the very next noon ☉ did not appear, but on the second day, namely 23 August, the clock was found to be in no error at all [Proxime ſequenti meridie

[478] WHERE THE PRINTED FORM STANDS AGAINST THE NOTE: at the call, the composed text prints 20 in the degrees place of **20 46¼**, where the note says the codex has 10.

[479] H. 8 44 Diſtantia ♀ ab inferiori 44 4 / 47 capite ♊ 44 5⅔ sets its descriptor ACROSS TWO TIMED LINES, each with its own value.

☉ non apparebat, ſed ſecundo die, nempe 23 Auguſti horologium compertum eſt nihil aberrare].

DIE 23 AUGUSTI.

With the Trig. Sext. and the greatest clock [Per Sext. Trig. et Horolog. max.].

- **9ᴴ31′21″** Azim. of ♄ from the south towards the east [Azim. ♄ a mer. verſ. ort.] 37 0
- Altitude [Altitudo] 16 57
- 47 ♄ from the lower horn of ♑, nearly [♄ ab inferiori cornu ♑, fere] 39 37
- 57 ♄ from the same horn of ♑ [♄ ab eodem cornu ♑] **39 36½**
- **10 5½** ♄ from the left shoulder of ♒ [♄ a ſiniſtro humero ♒] **22 20½**
- 15 22 20

Inquiry into the apparent motions of ♄ from the observations of this year, when it was acronychal, around the ☍ of the mean ☉ [Inquiſitio apparentium motuum ♄ ex obſeruationibus huius anni cum acronychius eßet circa ☍ medij ☉$^{l_i s}$].

MENSIS AUGUSTI DIE 21.

♄ was distant, in the order of the signs [Diſtabat ♄ in conſequentia],

- Hora 10 18 — from the left shoulder of ♒ [a ſiniſtro humero ♒] **22° 28½′** Decl. of ♄ [Decl. ♄]
- 10 40 — from the right shoulder of ♒ [a dextro humero ♒] **16 4½** M. **10° 42½′**
- 11 10 — from the mouth of Pegasus [ab ore Pegaſi] 26 35

	Right ascension [Aſcenſio Recta]	Declination [Declinatio]
Of the left shoulder of ♒ [Humeri ſiniſtri ♒]	**317° 21½**	7 18 40 M
right [dextri]	326 4 50	2 17 30 M
Of the mouth of Pegasus [Oris Pegaſi]	320 55 45	8 1 30 B

Diagram. A lettered figure set at the left of band 3, beside the three groups of labelled values, the paragraph NB. … and the lines that follow it. Several curved lines rise from a point at the foot of the figure; the leftmost runs up to a point at the upper left, and others rise to a point on the left side and to a point inside the figure, the curves crossing one another in their upper part. On the right, a curve rises from the foot point to a point at the right and continues above it to the top of the figure, where a flatter curve crosses to the left side. From the right-hand point three curved lines run leftward: one to the upper-left point, one to the inner point, one, nearly straight, to the point on the left side. The lines are described as they appear on the scan; nothing is measured on the figure and no quantity is attached to any line here. Labels, read off the figure only:

- E (upper left, at the top of the leftmost curve): E
- D (inside the figure, upper left of centre): D
- B (on the left side): B
- C (at the right, where the three leftward curves meet): C, with the sign ♄ set above and to its right
- A (at the foot, where the rising curves meet): A
- BA **82° 41′ 20″**
- CA 79 17 30
- BC 22 28 30
- BAC 22 30 10
- 317 21 30
- 339 51 40
- DA **87° 42½**
- CA 79 17 30
- DC **16 4½**
- DAC 13 48 0
- 326 4 50
- 339 52 50
- CA **79 17½**
- EA **98 1½**
- EC 26 35
- EAC 18 57 5
- 320 55 45
- 339 52 50

NB. If **29′** is taken in the distance from the left shoulder of ♒, as they are found in certain observations, it agrees more closely [recte: *accedat*, "it comes closer", for *concordat* — Corrigenda, p. 429] [NB. Si aßumatur 29′ in diſtantia a ſiniſtro humero ♒ prout in quibuſdam obſeruationibus habentur propius concordat].

Therefore on 21 August, H. 11 M. 0 [Ergo die 21 Auguſti H. 11 M. 0]:

- Right ascension of ♄ [Aſcenſio recta ♄] **339° 52⅚′**
- Declination M. [Declinatio M.] **10 42½**
- Corresp. longitude [Reſp. Longitudo] 7 24 0 ♓.
- Latitude [Latitudo] 2 2 0M.[480]

[480] ☉lis sets a RAISED ending lis after the sun sign (a raised ending, not an order position); huius anni names no year. THE BRACED BLOCK: the times Hora 10 18, 10 40, 11 10 stand one to a line at the left, closed on their right by ONE PRINTED BRACE; Diſtabat ♄ / in conſe- / quentia stands one piece to a line in the middle, divided conſe-/quentia, and is closed on its right by ONE PRINTED BRACE opening toward the three distance lines; the leaf ALIGNS each time with one distance line, but the braces join all three. Decl. ♄ stands at the right of the first distance line and M. **10° 42½′** at the right of the second. In each, a SHORT PRINTED HORIZONTAL RULE stands between the fifth line (the unlabelled 317 21 30, 326 4 50, 320 55 45) and the sixth (339 51 40, 339 52 50, 339 52 50); the fifth and sixth lines carry no label.

Let 22 28 20 be taken in the distance from the left shoulder of ♒, so that everything agrees: at the completed 11th hour the right ascension of ♄ collected from this will be ***339 51½****. This, compared with the one from the other two, gives a difference of* ***1′ 20″****; half of it, added, gives the limited right ascension of ♄,* ***339 52⅙****, to which corresponds the longitude* ***7ᵖ23′12″****. But the ☍ with the simple of the Sun was on day 19 H. 8½; so 2 days H.* ***2½*** *are lacking, to which in the diurnal motion of ♄ correspond* ***10⅗*** *minutes; if these are added to this place of ♄, they give its true position at the ☍ with the simple ☉ in 7 33 48 ♓. [Accipiantur in diſtantia ab humero ſiniſtro ♒ 22 28 20, vt concordent omnia, ad horam 11 completam erit Aſc. recta ♄ hinc collecta 339 51½. Hæc collata cum ea a duabus reliquis dat differentiam 1′ 20″, cuius dimidium additum dat limitatam ♄ Aſc. rectam 339 52⅙, quibus reſpondet longitudo 7ᵖ23′12″. At ☍ cum Solis ſimplici erat die 19 H. 8½, deſiderantur itaque dies 2 H. 2½, quibus in motu diurno ♄ reſpondent minuta 10⅗, quæ ſi addentur ad hunc locum ♄ præbent verum eius ſitum ad ☍ cum ſimplici ☉ in 7 33 48 ♓.]*

DIE 23 AUGUSTI.

H. 10 M. 5 Distance of ♄ from the left shoulder of ♒ [Diſtantia ♄ a ſiniſtro humero ♒] **22° 20′**

- BA 82 41 20
- CA 79 12 0
- BC 22 20
- Let **30″** be added here [Hic addantur 30″] BAC 22 21 0
- so that the place may be [vt locus ſit] 317 22 0
- more correct [correctior] Asc. recta [Aſc. recta] 339 43 0
- Declination of ♄ [Declinatio ♄] 10 46
- Therefore right asc. of ♄ [Ergo Aſc. R. ♄] 339 43
- Corresp. longitude [Reſp. Longitudo] **7 13¾ ♓**
- Latitude [Latitudo] **2 1⅗ M**

I also tried to fit, for this day, the distance of ♄ from the lower horn of ♍, but it agrees less well [Aptabam etiam ad hunc diem diſtantiam ♄ ab inferiori cornu ♍, ſed minus quadrat].

Therefore, the simple motion of ☉ having been taken from the modern tables for the time of the 21st day assumed, and the rest worked out by a proper reckoning of the calculation, the diurnal motion of ♄ being assumed at the same time as **5′2″**, as the Prutenic tables supplied it, the ☍ of ♄ in the mean of the ☉ was found on 19 August, Hora 8 M. 32, and that in **7° 34⅗′ ♓** [Excerpto igitur ex neotericis tabulis ſimplici motu ☉ ad tempus 21 diej ſuppoſitum et iuſta calculi ſubductione reliquis perſolutis, aßumpto ſimul motu diurno ♄ 5′2″ prout tabulæ Prutenicæ largiebantur, inuenta eſt ☍ ♄ in Medio ☉ˡⁱˢ Die 19 Auguſti Hora 8 M. 32, idque in 7° 34⅗′ ♓].

- The Alphonsine calculation [Calculus Alphonſinus] **8 26⅓ ♓**
- The Copernican [Coperniceus] **7 51⅓ ♓**

Note. I limited it roughly [recte: *hæc* ("these") for *fere* — Corrigenda, p. 429] *so that the place of ♄ would fall in* ***7 35¼*** *at the time of the ☍; to these the motion*

in its course adds **2′ 10″**, *so that the true place is nearly* [recte: *tunc* ("then") for *fere* — Corrigenda, p. 429] *in* 7 37 25 ♓*; for which I took* **7 37½**, *for* ♄ *was observed from one side only, and not the other way round.* [*Nota. Ego fere ita limitaui vt caderet locus* ♄ *in 7 35¼ tempore* ☍, *quibus motus in ſuo ductu addit 2′ 10″ vt ſit verus locus fere in 7 37 25* ♓, *pro quibus ego ſumpſi 7 37½, nam ab vna parte tantum obſeruabatur* ♄, *non autem vice verſa.*]

N. B. For its place I took ♓ 7 38, *limited, on account of refraction and other things.* [*N. B. Aßumpſi in loco eius* ♓ *7 38 limitate, propter refractionem et alia.*][481]

DIE 27 AUGUSTI.

With the Trig. Sext. and the greater clock [Per Sext. Trig. et Horologium maius].

- **9ᴴ59′ 35″** ☋ was on the meridian, having Alt. [☋ fuit in meridiano habens Alt.] 16 20

☋ *had already passed* ☍ ☉, *by about the space of a month.* [☋ *jam præterierat* ☍ ☉ *quaſi ſpatio menſtruo.*]

- 10 10 ☋ dist. from the lower horn of ♍ [☋ diſt. ab infer. cornu ♍] **16 36½**
- 27 The same distance [Eadem diſtantia] 16 37
- 52 ♄ from the left shoulder of ♒ [♄ a ſiniſtro humero ♒] **22 6½**
- 57 The same distance [Eadem diſtantia] 22 6
- 11 11 ♄ from the right shoulder of ♒ [♄ a dextro humero ♒] **15 47½**
- 15 The same distance [Eadem diſtantia] 15 49
- 19 15 48
- **32¼** had on the merid. Alt. [habuit in merid. Alt.] **23 14½**
- not good enough [non ſatis bona]

At the very next noon the greater clock, which we used in these observations, was going slow by **23′**. But this error of the clock applies to 4 days [Proxime ſequenti meridie Horologium maius, quo in his vſi ſumus obſeruationibus tardius ibat 23′. Sed iſte horologij error competit 4 diebus].[482]

DIE 1 SEPTEMBRIS.

- H. 9 M. 43 S. 7 ☋ was on the meridian, having Alt. by the lesser Q. [☋ fuit in meridiano habens Alt. per Q. minorem] 16 17

DIE 4 SEPTEMBRIS.

With the Trig. Sext. and the greatest clock [Per Sext. Trig. et Horolog. max.].

- H. 8 **46′** P. M. ☋ dist. from the lower horn of ♍, in the order of the signs [☋ diſt. ab inferiori cornu ♍ ſecundum ſeriem ſignorum] 15 59
- 9 0 The same distance was found [Eadem diſtantia inuenta eſt] **15 58½**

[481] THE RUBRIC DIE 23 AUGUSTI. is set in ROMAN capitals with a point; it is the second rubric of that date on this opening.

[482] non ſatis bona. stands on a line of its own, right-set, with no time and no value; bona is feminine singular and names no noun; the leaf does not settle which line it qualifies.

- 4 ♄ dist., in the order of the signs, from the left shoulder of ♒ [♄ diſt. ſecundum ſeriem ſignorum a ſiniſtro humero ♒] 21 33 20
- 9 15″ ♃ was in Azim. from the mer. towards the east 5ᵍ 0′, having Alt. [♃ fuit in Azim. a mer. verſus ortum 5ᵍ 0′, habens Alt.] 16 4

At the very next noon the greater clock was moving slow by M. 17 S. 30. [Proxime ſequenti meridie Horologium maius M. 17 S. 30 tardius mouebatur.]

DIE 24 OCTOBRIS.

At H. 6 M. 46⅙ the end one of the two in the tail of ♍ crossed the meridian, having an altitude of 16 14 [*H. 6 M. 46⅙ tranſiuit extrema duarum in cauda ♍ meridianum, habens altitudinem 16 14.*]. *For this star was at the same height above the horizon as the star ♃, so that they seemed to have almost the same altitude* [*Fuit enim hæc ſtella in æquidiſtantia horizontis cum ſtella ♃, ita vt eandem quaſj viderentur habere altitudinem.*].

We took the distance of ♃ from this very star at the end of the tail at H. 6 M. 50, precisely, as P. 4 M. 33½, with the Trigonic Sextant [*Diſtantiam vero ♃ ab hac ipſa ſtella in extremitate caudæ accepimus H. 6 M. 50 exquiſite P. 4 M. 33½ per Sextantem Trigonicum*]. *From this and from the altitude the place of ♃ can be verified again, and then, through it, the place of ☾* [*atque hinc et ex altitudine poterit rurſus verificari locus ♃ atque deinde per ipſum locus ☾.*].

At exactly hour 7, between the stars ♃ and ♄, with the Trig. Sext.: P. 20 46½ [*Hora exquiſite 7 inter ♃ et ♄ ſtellas per Sext. Trig. P. 20 46½*]. *From this the place of ♄ can be sought through the place of ♃, its declination being given from the meridian altitude* [*atque hinc poteſt inquiri locus ♄ per locum ♃, data ipſius declinatione ex altitudine meridiana.*].

To verify the place of ♄, its distance from the lucida of Cetus[1] was then observed at H. 10⅓: P. 28 M. 56½ [*Pro verificando loco ♄ obſeruabatur poſtea H. 10⅓ ipſius diſtantia a lucida Ceti[1] P. 28 M. 56½.*]. *At hour 10 M. 27½, moreover, ♄ was in Azim. 40 29, Alt. 14 33½, so that its declination can be obtained from this* [*Erat autem Hora 10 M. 27½ ♄ in Azim. 40 29, Alt. 14 33½, vt hinc ipſius declinatio dari poßit.*].

At H. 10 M. 35 ♄ was distant from the same 28 56½ [*H. 10 M. 35 diſtabat ♄ ab eadem 28 56½*].

At H. 10 M. 45⅔, moreover, ♄ was in Azim. 44 45, having an altitude of P. 12 50, and the place of ♄ very nearly given [recte: *hæc locum ♄ dabunt*, "these will give the place of ♄", for *fere locum ♄ datum* — Corrigenda, p. 429] [*H. 10 M. 45⅔ fuit autem ♄ in Azim. 44 45 habens Altitudinem P. 12 50, atque fere locum ♄ datum*]. *This place, compared and examined together with the earlier ones, will indicate the place of ☾ around the greatest digression of the epicycle* [recte: *Epicycli ♃*, "of the epicycle of ♃", for *Epicycli* — Corrigenda, p. 429] [*is vero ex prioribus collatis et examinatis locum ☾ circa maximam Epicycli digreßionem indicabit.*].

At the following noon the lesser clock was running slow by M. 0 S. 10[2] [*Horologium minus tardius ibat ſequenti meridie M. 0 S. 10.[2]*].

DIE 25 OCTOBRIS.

By the greater clock, at H. **5.46⅔**, ♃ *was distant from the lower horn of* ♍, *forwards,* 16 G. **13′** [*Per maius Horol. H. 5.46⅔ diſtabat* ♃ *ab inferiori cornu* ♍ *in conſequentia 16 G. 13′*].

- *By the same, H.* 5.55.20 16 11 [*Per idem H. 5.55.20 16 11*]
- *By the same,* **5 57⅓ 16 12¼** [*Per idem 5 57⅓ 16 12¼*]

You can therefore trust the distance 16 G. 12. [*potes itaque fidere diſtantiæ 16 G. 12.*]

- 6 28 40 *by the lesser* [*per minus*]
- 6 17 40 *by the greater* [*per maius*]

♃ *was on the meridian, having altitude* [♃ *fuit in meridiano habens altitudinem*]

- *by the lesser Q.* [*per Q. minor.*] 16 21
- *by the greatest Q.* [*per Q. max.*] 16 20
- *by the mural Q.* [*per Q. mural.*] **16 20½**
- 7 38 *by the lesser* [*per minus*]
- 7 22 *by the greater* [*per maius*]

♃ *was distant from the end one in the tail of Capricorn, with the Trig. Sext., p.* 4 *M.* 29. [*diſtabat* ♃ *ab extrema in cauda Capricorni per Sext. Trig. p. 4 M. 29.*]

With the Radius the same was observed as p. 4 *M.* 27. [*Per Radium eadem obſeruata eſt p. 4 M. 27.*]

- *H.* 7 *M.* 47 *by the lesser* [*per minus*]
- 7 30 *by the greater* [*per maius*]

♃ *was again distant from the same end one, p.* 4 *M.* 30. [*diſtabat* ♃ *rurſus ab eadem extrema p. 4 M. 30.*]

- **7 55⅙** *by the lesser* [*per min.*]
- **7 37⅓** *by the greater* [*per mai.*]

the star ♄ *crossed the meridian, having alt.* [*tranſiuit* ♄ *ſtella meridianum habens alt.*]

- *by the lesser Q.* [*per Q. minor.*] *p.* 22 *M.* 18,
- *by the greater Q.* [*per Q. maior.*] **22 16¼**

From this the declination is given, then the place of ♃, *and from that the time* [*Hinc datur declinatio et deinde locus* ♃ *et inde tempus.*].

At H. 5.44 the distance of ♃ from ♄ was 20 G. 41 M. [H.5.44 erat diſtantia ♃ a ♄ 20 G.41 M.] The observation was not certain enough, since it was made only for the sake of practice [Obſeruatio non fuit ſatis certa, quia exercitij tantum gratia fiebat.]. *Yet it agreed with the one made the day before* [*Sed tamen conuenit cum ea quæ die antecedente fiebat.*].[483]

[483] BRACES: four printed braces, each spanning two lines and standing between a pair of timed clock readings (per minus / per maius, or per min. / per mai.) and the words set to their right.

DIE 25 OCTOBRIS.

- H. 5 M. 47 distance of ♃ from the lower horn of ♍ [diſtantia ♃ ab inferiori cornu ♍] 16 12
- Declination of ♃ [Declinatio ♃] 17 45
- Declination of the lower horn of ♍ [Declinatio inf. cornu ♍] 15 59
- Angle of the difference of ascension [Angulus diff. Aſcenſ.] 16 50
- R. ascension of the lower horn of ♍ [Aſcenſio R. inf. cornu ♍] **299 23⅓**
- Therefore right ascension of ♃ [Ergo Aſcenſio Recta ♃] 316 13 20
- H. 7.38 Dist. of ♃ from the hinder tail of ♍ [Diſt. ♃ a poſt. cauda ♍] 4 29
- Declination of the tail of ♍ [Declinatio caudæ ♍] 17 52
- R. ascension of the tail of ♍ [Aſcenſio R. caudæ ♍] **321 0¾**
- Angle of the difference of ascension [Angulus diff. Aſcenſ.] 4 43 0
- Therefore right ascension of ♃ [Ergo Aſcenſio Recta ♃] **316 17¾**
- Put, for H. **6⅔**, R. Asc. of ♃ [Pone H. 6⅔ Aſc. R. ♃] **316 15½**[484]

DIE 27 OCTOBRIS.

By the greater [Per Maius]

- H. **6 37′ 10″** Distance of ♃ and ♄ [Diſtantia ♃ et ♄] **20 30¼**
- 6 46 20 The same distance [Eadem diſtantia] 20 31 very nearly [fere]

Moreover ♄ was distant from ♃ forwards [diſtabat autem ♄ a ♃ in conſequentia.].

- 7 38 10 ♄ was on the meridian, having Alt. by the lesser Q. [♄ fuit in meridiano habens Alt. per Q. Minor.] 22 16

DIE 1. NOUEMBRIS.

- H. 5 58 10 by the greater clock ♃ was on the merid., having Alt. by the greatest Q. [per maius Horol. ♃ fuit in merid. habens Alt. per Q. Max.] **16 32½**
- 6 14 20 the end star in the tail of ♍ crossed the meridian, having Alt. by the greatest Q. [ſtella extrema in cauda ♍ tranſiuit meridianum habens Alt. per Q. Max.] 16 10[485]

1 Added in another hand: num. XXII. [Adſcriptum eſt alia manu: num. XXII.]

2 Perhaps M. 9 S. 10. [Forſitan M. 9 S. 10.][486]

[484] This run is ROMAN, under a ROMAN rubric, the second rubric on this side dated 25 October; the first, DIE 25 OCTOBRIS. in the left column, is italic.

[485] DIE 1. NOUEMBRIS. sets a point after 1, which no other rubric on this side sets.

[486] The two notes are set in a smaller BOLD ROMAN below the left column. Note 1 is called at Ceti[1] (italic body, left column); note 2 at S. 10.[2] (italic body, left column), where the body prints M. 0 S. 10; note 2's M. 9 stands against the printed M. 0.

DIE 2 NOUEMBRIS.

- H. 5 54 55 ♃ was on the merid., having Alt. by the lesser Q. [♃ fuit in merid. habens Alt. per Q. minorem] 16 34
- 6 0 Dist. of ♃ from the end one in the tail of Capricorn was three degrees 48 minut. [Diſt. ♃ ab extrema in cauda Capricorni fuit trium graduum 48 minut.]
- 6 7 The same distance [Eadem diſtantia] 3 49
- **10 40″** the end one of the tail of ♑ was on the merid., having Alt. by the lesser Q. [fuit extrema caudæ ♑ in merid. habens Alt. per Q. min.] 16 10
- 30 [recte: 15 — Corrigenda, p. 429] dist. of ♃ from the same star [diſt. ♃ ab eadem ſtella] 3 47

This distance, however, could scarcely be observed accurately enough, because the stars were close together [quæ tamen diſtantia ſatis exquiſite obſeruari vix potuit propter vicinitatem ſtellarum.].

- 6 30 Dist. of ♄ from ♃ forwards [Diſt. ♄ a ♃ in conſequentia] 19 54
- 40 The same distance [Eadem diſtantia] **19 55½**
- 45 19 54
- 48 **19 54½**
- 7 0 ♄ from the end one in the wing of Pegasus [♄ ab extrema in ala Pegaſi] **32 22½**
- **14 10″** ♄ was on the merid., having Alt. by the lesser Q. [♄ fuit in merid. habens Alt. per Q. minorem] 22 17
- 8 0 ♄ from the end one of the wing of Pegasus [♄ ab extrema alæ Pegaſi] **32 21½**
- 19 Between ♃ and the bright one of the Vulture [Inter ♃ et lucidam Vulturis] 35 0

Repeating the same [recte: *Eandem* for *Eadem* — Corrigenda, p. 429] about the same time, we found **35 2½**, and again **35 2½** [Eadem repetendo circa idem tempus inuenimus 35 2½, denuo 35 2½].

- H. 8½ Between ♃ and the first of the wing of Pegasus [Inter ♃ et primam alæ Pegaſi] **38 34½**
- The same, repeated at once [Eadem mox repetita] **38 44¼** [recte: **38 34¼** — Corrigenda, p. 429]

At the very next noon the greater clock, which we used in these observations, was moving slower by M. 15 S. 40 [Proxime ſequenti meridie Horologium maius, quo in his obſeruationibus vſi ſumus, M. 15 S. 40 tardius mouebatur.].[487]

[487] **6 0** Diſt. ♃ ab extrema in cauda / `Capricorni fuit trium graduum` / `48 minut.` sets its value partly in WORDS — `trium graduum`, "three degrees", construed from the Latin — and `48` as a figure followed by the word `minut.`; it carries no value in the value file.

DIE 4 NOUEMBRIS.

- H. 8 M. 0 Dist. of ♃ from the end one in the tail of ♈ with the Radius [Diſt. ♃ ab extrema in cauda ♈ per Radium] 3 27
- H. 8 M. 8 The same distance [Eadem diſtantia] 3 26
- H. 8¼ 3 26
- H. 8½ 3 28

DIE 12 NOUEMBRIS, MANE.

- H. 6⅔ Dist. of ♂ from the heart of ♌ [Diſt. ♂ a corde ♌] 27 30
- 6⅚ The same distance [Eadem diſtantia] 27 28
- H. 7 M. 8 S. 40 Azim. of ♂ from the merid. towards the west 64 59, Alt. [Azim. ♂ a mer. verſus occaſ. 64 59, Alt.] 43 5
- Dist. of the heart of ♌ and Spica of ♍ [Diſt. cordis ♌ et ſpicæ ♍] 54 1⅔
- The corresponding declination by computation [Reſp. declinatio per ſupput.] 23 7
- 7 28 In the evening, Dist. of ♃ from the end one of the tail of ♈ with the Radius [Veſperi, Diſt. ♃ ab extrema caudæ ♈ per Radium] 2 36
- 36¼ The same dist. of these stars [Eadem diſt. harum ſtellarum]
- 51 The same distance also found [Eadem quoque diſtantia inuenta.]

Computation of the place of ♂ for the 12th day of Nov., morning [Calculus loci ♂tiſ ad diem 12 Nov. mane.].

- H. 6¾ Distance of ♂ from the heart of ♌ [Diſtantia ♂ a corde ♌] 27 29
- Declination of ♂ [Declinatio ♂] 23 7 B
- Declination of the heart of ♌ [Declinatio cordis ♌] 13 58½
- Angle of the difference of asc. [Angulus diff. Aſc.] 27 24¼
- Right ascens. of the heart of ♌ [Aſcenſ. recta cordis ♌] 146 30¼
- Right ascension of ♂ [Aſcenſio recta ♂] 119 6 0
- Corresponding longitude of ♂ [Reſp. Longitudo ♂] 26 35½ ♋
- Latitude [Latitudo] 2 15 0 B[488]

DIE 22 NOUEMBRIS.

- H. 6 M. 38 S. 10 Dist. of ♃ from the more easterly star in the tail of ♈ with the Radius [Diſt. ♃ ab orientaliori ſtella in cauda ♈ per Radium] 1 45
- 6 42 20 Dist. of the same stars [Diſt. earundem ſtellarum] 1 45
- 47½ The same magnitude of dist. also found [Eadem quoque diſt. magnitudo inuenta.]

[488] The right column's first line Reſp. declinatio per ſupput. 23 7 follows the left column's last line Diſt. cordis ♌ et ſpicæ ♍ 54 1⅔; which body the corresponding declination belongs to is NOT stated by the leaf. 36¼ Eadem diſt. harum ſtellarum and 51 Eadem quoque diſtantia / inuenta. set NO value; inuenta. stands alone right-set below. Veſperi stands under a rubric that sets MANE. Calculus loci ♂tis ad diem 12 Nov. mane. sets RAISED LETTERS tis after ♂ (the genitive ending, Martis) and is set close with little word space.

DIE 23 NOUEMBRIS.

- Merid. altitude of ♃ by the mural Q. [Altitudo ♃ merid. per Q. Muralem] 17 27
- H. **4 56′36″** ♄ was distant from ♃ [diſtabat ♄ a ♃] **17 39⅓**
- 5 2 17 38
- 5 7 **17 39⅓**
- 5 10 17 39

♃ was distant from the more westerly of the two small ones in the tail of ♍, with the Radius, **2° 1′** three times [♃ ab occidentaliori duarum paruarum in cauda ♍ diſtabat per Radium 2° 1′ ter].

- Between ♃ and the more easterly [Inter ♃ et orientaliorem] 1 34
- II 1 36
- III 1 37[489]

H. M. S.	Distance of ♂ from the star in the upper knee of ♊ [Diſtantia ♂ a ſtella in genu ſuper. ♊]	Azim. of ♂ from the north towards the east [Azim. ♂ a Sept. verſ. ort.]	Alt. of ♂ [Alt. ♂]
8 45	22 32⅓		
51 20	22 32	70 50	15 36
56 25	22 32	71 48	16 20

from the lucida at the foot of Erichthonius, which it shares with the horn of ♉ [a luc. pede Erichtonij quæ illi communis eſt cum cornu ♉]

- 9 2 20 **39 53½** 72 56 17 0
- 7 30 39 54 73 44 17 44
- 11 0 39 53 74 25 17 59
- 14 40 **39 53½** 75 20 18 50
- 21 10 **39 53½** 76 49 19 39
- 10 28 50 Mars was in 90 Gr. eastern, having Alt. by the lesser Q. [Mars fuit in 90 Gr. orientalis habens Alt. per Q. min.] **28 52½**

DIE 24 NOUEMBRIS, MANE.

H. M. S.	Dist. of ♂ from the star in the knee of bor. ♊ [Diſt. ♂ a ſtella in genu bor. ♊]	Azim. of ♂ from the mer. towards the east [Azim. ♂ a mer. verſ. ort.]	Alt. of ♂ [Alt. ♂]
2 57		9 40	57 26½
20			
3 3 10		7 8	57 35½
12 35		3 6	57 41½
14	22 32		

[489] II and III are ROMAN-NUMERAL sorts set at the left of 1 36 and 1 37; they differ from the digit 1 on the same lines (the digit carries a sloped flag, the numerals have serifs at both ends) and from the Gemini sign in the head row below (whose bars join across the top and foot).

- 20 8 ♂ had merid. Alt. [♂ habuit Alt. mer.] **57 45½**
- 38 22 32
- Azim. from the mer. towards the west [Azim. a mer. verſ. occ.]
- 40 48 8 0 57 30
- 49 **22 31½**
- 4 52 ♂ from the foot of Erichthonius [♂ a pede Erichtonij] 39 52

DIE 24 NOUEMBRIS, VESPERI.

- 5 24 ♃ was distant from the end one [♃ diſtabat ab extrema] 47 42
- 5 28 of the wing of Pegasus [alæ Pegaſi] **47 41⅔**
- 5 33 The same [Eadem] **47 41⅔**
- 6 45 35 Azim. of ♃ from the mer. towards the west [Azim. ♃ a mer. verſ. occaſ.] 30 0 Alt. 13 6
- 6 49 30 30 57 **12 49½**[490]

DIE 25 NOUEMBRIS, VESPERI.

H. M. S.	Dist. of ♂ with the Trig. Sext. from the star in the knee of ♊ [Diſt. ♂ per Sext. Trig. a ſtella in genu ♊]	Azim. of ♂ from the north towards the east, by the lesser Q. [Azim. ♂ a ſept. verſ. ort. Per Q. minorem]	Alt. of ♂ [Alt. ♂]
8 27 0	22 21⅔	64 45	11 50
33 0	22 19½	65 50	12 30
36 30	22 16⅔	66 40	13 8
41 22	22 17½	67 26	13 30

	from the foot of Erichthonius [a pede Erichtonij]		
48 12	39 43	68 55	14 34
52 44	39 43	69 50	15 10
57 16	39 42½	70 40	17 37
9 0 10	39 42⅔	71 18	18 0
5 56	39 42½	72 10	18 17
18 0	39 43	74 40	18 39
21 22	39 43	75 28	18 58
24 14	39 43	76 0	19 19
28 2	39 43	76 48	19 50

- 10 34 52 ♂ in 90 G. had Alt. [♂ in 90 G. habuit Alt.] 29 0

DIE 26 NOUEMBRIS, MANE.

[490] ♃ diſtabat ab extrema and alæ Pegaſi stand on two successive lines, each with its own time and value; no continuation sign is printed between them.

H. M. S.	Dist. of ♂ with the △ Sext. from the foot of Erichthonius [Diſt. ♂ per Sext. △ a pede Erichtonij]	Azim. of ♂ from the mer. towards the east, by the lesser Q. [Azim. ♂ a mer. verſ. ort. Per Q. minoren]	Alt. of ♂ [Alt. ♂]
3 11 10	39 42	7 30	57 40
3 26 0		0 0	57 51½

		towards the west [verſ. occaſ.]	
44 31	39 42	7 50	57 50
50 45	39 42	10 17	57 30
55 20	39 42	13 20	57 10

[491]

- from the heart of ♌ [a corde ♌]
- 7 48 5 27 39 33 6
- 54 30 27 40 and these two are the better [atque hæ duæ ſunt meliores]
- 59 50 27 40
- 8 18 25 90 0 29 7[492]

At the very next noon the greater clock, which we used in these observations, was moving a little more than 23 minutes fast; this error, however, is common to three days [recte: *tribus diebus præcedentibus*, "the three preceding days", for *tribus diebus* — Corrigenda, p. 429] [Proxime ſequenti meridie Horologium maius quo in his obſeruationibus vſi ſumus, paulo plus minutis 23 celerius mouebatur, qui error tamen tribus diebus eſt communis.].

DIE 27 NOUEMBRIS.

In the evening, H. M. S. [Veſpertino tempore H. M. S.]	Dist. of ♂ with the Sext. Tr. from the knee of the northern ♊ [Diſt. ♂ per Sext.Tr. a genu ♊ Borealis]	Azim. of ♂ from the north towards the east, by the lesser Q. [Azim. ♂ a Sept.verſ.ort. per Q. minorem]	Alt. of ♂ [Alt. ♂]
8 5 46	22 9½	65 0	12 6
11 40	22 9¼	66 18	12·50
14 52	22 9¼	67 0	13 25
19 0	22 9¼	67 50	13 56
21 20	22 9½	68 17	14 17
25 35	22 9¼	69 5	14 57

[491] The head prints minoren, with a final n, where the head of 25 November prints minorem.

[492] A printed BRACE joins the two 27 40 values and opens to the words atque hæ duæ / ſunt meliores, set on those two lines.

	from the foot of Erichthonius [a pede Erichtonij]		
29 30	39 28½	69 50	15 20
32 2	39 28½	70 20	15 40
37 12	39 28½	71 25	16 20
40 54	39 28½	72 6	16 49
44 25		73 0	17 25

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At the very next noon the greater clock, which we used in these observations, was moving fast by M. **6½**, the passage of ☉ having been observed in the rough through the slits [Proxime ſequenti meridie Horologium maius, quo in his obſeruationibus vſi ſumus M. 6½ celerius mouebatur, ☉ tranſitu emplati per rimulas obſeruato.].

DIE 3 DECEMBRIS, MANE.

H. M. S.	Dist. of ♂ with the △ Sext. from the heart of ☋ [Diſt. ♂ per Sext. △ a corde ☋]	Azim. of ♂ from the north towards the west, by the lesser Q. [Azim. ♂ a Sept. verſ. occ. per Q. minorem]	Alt. of ♂ [Alt. ♂]
6 56	28 47	88 0	28 26
7 0	28 45½	87 10	27 52
4 38	28 46½	86 10	27 4
8 14	28 47	85 25	26 43
10 56		84 50	26 20
14 50		84 4½	25 48
18 15		83 30	25 19

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At the very next noon the greater clock, which we used in these observations, was moving slow by **36′ 40″**; this motion applies to several days, and yet it cannot be proportional [Proxime ſequenti meridie Horologium maius, quo in his obſeruationibus vſi ſumus, 36′ 40″ tardius mouebatur, qui motus pluribus competit diebus, neque tamen eße poteſt proportionalis.].

SEQUENTES OBSERUATIONES HABITÆ SUNT EODEM DIE VESPERI.

The following observations were made on the same day in the evening.

[493] In the `11 40` row a point stands at mid-height between `12` and `50` of the altitude (**12·50**).

[494] `6 56` and `7 0` stand in the hour and minute places, and `4 38` onward in the minute and second places; the hour `7` stands only on the `7 0` row.

H. M. S.	Dist. of ♂ from the star in the knee of the northern ♊ [Diſt. ♂ a ſtella in genu Borealis ♊]	Azim. of ♂ from the north towards the east, by the leſſer Q. [Azim.♂ a Sept. verſ. ort. per Q. minor.]	Alt. of ♂ [Alt. ♂]
7 15 30	21 7½	62 45	10 36
21 38		64 50	11 27
26 12	21 7¼ [recte: 21 7½ — Corrigenda, p. 429]	65 30	12 7
30 20	21 7½	65 50	12 39
39 20	21 7½	66 42	13 7
42 42		67 20	14 14

	from the eye of ♉ [ab oculo ♉]		
46 30	52 0	67 50	15 10
49 50	52 0	68 40	15 20
58 40	52 0	70 30	16 23

	from the one already mentioned in the knee of ♊ [a ſupradicta in genu ♊]		
8 2 0	21 7½	71 10	16 48
5 15	21 7½	71 48	17 10
8 12	21 7½	72 20	17 35

	from the foot of Erichthonius [a pede Erichtonij]		
11 18	38 27½	73 0	17 59
20 40	38 27½	74 50	20 16
25 41	38 27½	75 48	20 48

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DIE 17 DECEMBRIS.

H. M. S.	Dist. of ♂ with the △ Sext. from the upper head of ♊ [Diſt. ♂ per Sext. △ a ſuper.capite ♊]	Azim. of ♂ from the north towards the east, by the leſſer Q. [Azim. ♂ a Sept. verſ. ort. per Q. minor.]	Alt. of ♂ [Alt. ♂]
6 46 20	9 6	71	18 30
6 55 50	9 7½	73 30	19 51
8 5 50		86 50	28 0
11 50		88 50	30 40
18 30		90 0	31 27

[495] The capital heading is set in two lines, divided HA-/BITÆ, and closes with a point; EODEM DIE gives no day figure.

H. M. S.	Dist. of ♂ with the △ Sext. from the upper head of ♊ [Diſt. ♂ per Sext. △ a ſuper.capite ♊]	Azim. of ♂ from the north towards the east, by the lesser Q. [Azim. ♂ a Sept. verſ. ort. per Q. minor.]	Alt. of ♂ [Alt. ♂]
		from the mer. towards the east [a mer. verſ. ortum]	
25 40		89 20	32·27
42 0		83 25	33 0
9 10 0	9 5	79 0	38 31
24 40	9 5	76 48	40 35
33 0		74 44	41 50
44 0	9 6	71 4	43 28
50 30	9 7	70 53	44 0
10 0		68 58	45 0

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DIE 26 DECEMBRIS.

- H. 7 M. 33.40 the distance of ♂ from the small star nearest to it in the shoulders of ♊ was found with the Radius [inuenta eſt diſtantia ♂ a parua ſtella ſibi proxima in humeris ♊ per Radium] **1° 7′**
- H.7 M. 37.10 Dist. of ♂ from the same small star [Diſt. ♂ ab eadem parua ſtella] 1 7
- 7 44 50 Distance of the same [Earundem diſtantia] 1 7
- 7 48 40 [recte: 7 48 0 — Corrigenda, p. 429] The same distance of the same [Earundem eadem diſt.] 1 7

and all these with the Radius [*atque omnes hæ per Radium.*]

This star, however, was lower than ♂ti *[recte:* ♂te *— Corrigenda, p. 429], towards the horizon as it were. With the Trigonic Sextant, however,* ♂ *was observed to be distant from the one that is more northerly in the head of* ♊ [*Erat autem hæc ſtella* ♂ti *inferior verſus horizontem quaſi. Per Sextantem vero Trigonicum obſeruabatur* ♂ *diſtare ab ea quæ eſt borealior in capite* ♊]

- *H. 7 M. 40 P.* ***6 48½′***
- *And a little later* [*Et paulo poſt*] ***6 49¾***
- *But at hour 7⅚* [*Hora vero 7⅚*] ***6 49½***

You can therefore, around that time, use the distance ***6 49½*** *without any perceptible error. Around these observations, moreover, the altitude of* ♂ *itself was about partium* 34*, and Mars was lower, towards the horizon. For at hour 7 M. 28 it was in* 90 *G., having Alt.* 32 20 [*Potes itaque circa id tempus abſque omni ſenſibili errore vti diſtantia 6 49½. Fuit autem circa has obſeruationes altitudo* ♂ *ipſius quaſi partium 34 et erat Mars inferior verſus horizontem. Nam hora 7 M. 28 fuit in 90 G. habens Alt. 32 20*]

[496] The azimuth of the 6 46 20 row is the single figure 71, with nothing in the minute place. In the 25 40 row a point stands at mid-height between 32 and 27 of the altitude (**32·27**).

- *H.7 33⅔ Azim. 89 14 Alt. 33 10*
- *41 88 50 34 8*
- *45 87 0 34 46*
- *50 86 33 35 24*
- *8 3 83 33 37 14*

But as regards the times, one should not rely on them so exactly, for the clock had not been corrected for some days [*Sed quo ad tempora non adeo exquiſite illis eſt inhærendum, nam Horologium aliquot diebus non erat correctum.*].

- H. 7.0 ♂ was distant from the lower head of ♊ with the Radius [diſtabat ♂ ab inferiori capite ♊ per Radium] 2 26
- H. 7 M. 10½ the same, of ♂ and of the lower head of ♊, found again with the Radius [rurſus eadem ♂ et inferioris capitis ♊ reperta per Radium] 2 26

	Dist. of ♂ from the eye of ♉ with the △ Sext. [Diſt. ♂ ab oculo ♉ per Sext. △]	Azim. of ♂ [Azim. ♂]	Alt. of ♂ [Alt. ♂]
H. 8 23′ 0″	44 41½	77 50	40 4
28 30	44 40½	76 30	40 50
41 0	44 40	74 2	42 30
44 28	44 41	72 40	43 0

You will therefore be able, without any perceptible error, to use for hour 8½ the distance of ♂ from Aldebaran, P. 44 M. 41, exactly; and from this, out of the given place of Aldebaran and the declination of ♂ from the azimuths and altitudes noted above, its longitude and latitude, which are to be sought, will be given. Or else, from the distance given above from the northern head of ♊, P.6 M.49½, its latitude will be given. For it was nearly at the same longitude as this star. And so the place of ♂ at this time can be verified in both ways, since it is [*Poteris itaque abſque omni ſenſibili errore vti ad horam 8½ diſtantia ♂ ab Aldebora P. 44 M. 41 exquiſite, atque hinc dabitur ex dato loco Aldeboræ et declinatione ♂ ab azimuthis atque altitudinibus ſuperius annotatis, petenda ipſius longitudo et latitudo. Vel etiam ex diſtantia ſuperius data a capite boreali ♊ P.6 M.49½ dabitur latitudo eius. Siquidem erat fere in eadem cum hac ſtella longitudine. Atque ſic vtroque modo poterit verificari locus ♂ ad hoc tempus, cum ſit*][497]

in, as it were, opposition to the Sun. In the apogee of its epicycle, which on this very day falls according to the Alphonsines, but on the 30th, four days later, according to Copernicus. [*in Solis quaſi oppoſito. In Auge ſui Epicicli quod hoc ipſo die ſit apud Alphonſinos, die vero 30 poſt quatriduum apud Copernicum.*]

- H. 9 44′ the left foot of Orion [Orionis] was on the meridian, having Alt. 25° 23′ [ſiniſter pes Orionis fuit in meridiano habens Alt.]
- 10 22 50 the right shoulder was on the merid., having Alt. 41 20 [dexter humerus fuit in merid. habens Alt.]

[497] 33.40, 37.10 and 7.0 set a printed point inside the time figures.

From this you can correct the preceding times. We corrected the clock, however, by the transit of the latter, advancing the index by M. 4, since the right ascension of the shoulder was taken as **83° 15′**. [Hinc potes corrigere præcedentia tempora, emendauimus autem horologium ad tranſitum poſterioris, promouendo indicem M.4, cum aßumpta fuerit Aſcenſio Recta humeri 83° 15′.]

DIE 27 DECEMBRIS, MANE.

- H. **0 12′ 10″** ♂ was on the merid., having Alt. by the lesser Q. 60 29 [♂ fuit in merid. habens Alt. per Q. minorem]

The observation, however, was not certain enough, because of intervening clouds. [Non erat tamen ſatis certa obſeruatio propter interuenientes nubes.]

- H. **6 39′ 0″** Azim. of ♂ from the north towards the west 68 50 [Azim. ♂ a ſept. verſ. occ.]
- Alt. 17 40 by the lesser Q. [Alt. 17 40 per Q. minorem.]
- 6 43 30 dist. of ♂ and the upper head of ♊ with the △ Sext. 6 43 [diſt. ♂ & ſuperius caput ♊ per Sext. △]
- 6 51 0 the same distance, nearly **6 43¼** [diſtantia eadem fere]
- 7 0 8 Azim. of ♂ 64 50 Alt. 14 59 [Azim. ♂ … Alt.]
- 7 7 30 63 20 14 0
- Dist. of ♂ from the heart of ♌ with the △ Sext. **36 42¼** [Diſt. ♂ a corde ♌ per Sext. △]
- 7 15 10 Azim. of ♂ 61 44 Alt. 13 4 [Azim. ♂ … Alt.]
- Dist. of the same with the △ Sext. 36 43 [Diſt. earundem per Sext. △]
- 7 21 49 36 43
- 6 27 0 Dist. of ♂ from the small star nearest to it in the shoulders of ♊, with the Radius **1° 6′** [Diſt. ♂ a parua ſtella ſibi proxima in humeris ♊ per Radium]
- 6 32 0 The same dist. with the Radius 1 7 [Eadem diſt. per Radium]
- 6 50 0 1 6
- 6 58 0 1 7

♂*, however, was more northerly than this star.* It was not clear enough, however, for that very small star to be observed exactly. [*Erat autem* ♂ *hac ſtella ſeptentrionalior.* Non erat tamen ſatis ſerenum, vt exquiſite minutißima illa ſtella obſeruari poßet.]

- H. **6 15′40″** Dist. of ♂ with the Radius 2 26 [Diſt. ♂ per Radium]
- 40 0 from the lower head of ♊ 2 25 [ab inferiori capite ♊]
- 7 1 10 2 25
- 7 38 2 25
- 16 40 2 26
- 21 10 2 26
- 7 24 0 nearly 2 27 [fere]
- 27 0 2 26
- 32 50 2 26

At the very next noon the clock was running slow by **2′ 50″**, the transit of ☉ having been observed in breadth [Greek: ἐν πλάτει (en platei, "in breadth")] through the slits of the sights. [Proxime ſequenti meridie Horologium 2′50″ tardius mouebatur, ☉ tranſitu ἐν πλάτει per rimulas pinnacidiorum obſeruato.]

DIE 29 DECEMBRIS, P. M.

- H. 7 M. **47⅙** Azim. of ♂ from the mer. towards the east 85 0, Alt. 36 1 [Azim. ♂ a mer. verſ. ort. … Alt.]
- Distance of ♂ from the foot of Erichthonius [Erichtonij] **29 38½** [Diſtantia ♂ a pede Erichtonij]
- 7 40 Dist. of ♂ from the lower head of ♊ with the Radius 2 35 [Diſt. ♂ ab inferiori capite ♊ per Radium]
- 7 47 The same distance 2 36 [Eadem diſtantia]

♂ is to be observed in the evening from both feet of Erichthonius near the eastern horizon, but in the morning from the heart of ♌ and, in the neck of ♌, the lowest. For it is in a straight line with these. Let the same be done near the meridian. [*♂ obſeruandus veſperi ab vtroque pede Erichtonij iuxta horizontem orientalem, mane vero a corde ♌ et ceruice ♌ infima. Eſt enim cum his in linea recta. Idem fiat iuxta meridianum.*]

It can, however, be taken by intervals from the neighbouring ♊, with another instrument and with the Radius. [*Poterit tamen per interualla a vicinis ♊ capi per aliud inſtrumentum et per Radium.*]

Distance of ♂ from the lower foot of Erichthonius, shared with the horn of ♉. [Diſtantia ♂ ab inferiori pede Erichtonij communi cum cornu ♉.]

	Dist. with the △ Sext. [Diſt. per Sext. △]	Azim. of ♂ from the mer. towards the east, by the lesser Q. [Azim. ♂ a mer. verſ. ort. per Q. minorem]	Alt. of ♂ [Alt. ♂]
H. 11 6′	29 33½	25 31	58 50
11 13 40″	29 33	22 8	59 14
11 29 45		15 25	61 0

DIE 30 DECEMBRIS, MANE.

- H. **6 5′ 0″** Dist. of ♂ from the lower head of ♊ with the Radius **2° 38′** [Diſt. ♂ ab inferiori capite ♊ per Radium]
- 6 13 0 these stars had the same distance with the Radius 2 38 [habuerunt hæ ſtellæ eandem diſtantiam per Radium]

Frequent clouds, however, kept passing across during the observing. [Intercurrebant tamen inter obſeruandum frequentes nubes.]

- H. **7 6′ 0″** the dist. of ♂ from the upper head of ♊ was found with the Radius **6° 16′** [inuenta eſt diſt. ♂ a ſuperiori capite ♊ per Radium]
- 7 17 0 dist. of the same with the Rad. **6° 16′ 2″** [earundem diſt. per Rad.]

In neither observation, however, could the stars be seen clearly enough, because of the density of the surrounding clouds. [In neutra tamen obſeruatione ſatis clare propter circumſtantium nubium denſitatem conſpici ſtellæ potuerunt.]

DIE 30 DECEMBRIS, AD VESPEREM.

	Dist. of ♂ from the lower foot of Erichthonius [Diſt. ♂ ab inferiori pede Erichtonij.]	Azim. of ♂ from the mer. towards the east, by the lesser Q. [Azim. ♂ a mer. verſ. ort. per Q. minorem]	Alt. of ♂ [Alt. ♂]
H. 8 8 10[1]	29 13½	79 23	39 36
8 2′35″	29 13½	78 15	40 13
8 5 55	29 13½ from the upper foot of Ericht. [a ſuperiori pede Ericht.]	77 31	40 44
8 10 0	35 26	76 31	41 16
18 35	35 27½	74 20	42 25
25 45	35 27½	73 43	43 26
30 33		71½	44 0

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- 8 49 0 the eye of ♉ was on the meridian, having altitude 49 42 [oculus ♉ fuit in meridiano habens altitudinem]
- 9 7 10 the upper foot of Erichthonius [Erichtonij] was on the meridian, giving alt. 66 19 [ſuperior pes Erichtonij fuit in meridiano referens alt.]
- 9 26 50 the brighter foot of Erichthonius was on the merid., having alt. 62 16 [lucidior pes Erichtonij fuit in merid. habens alt.]

The observations made with the Radius follow. [Sequuntur obſeruationes factæ per Radium.]

- H. 8 M. 5½ Dist. of ♂ from the lower head of ♊ 2°41′ [Diſt. ♂ ab infer. cap. ♊]
- 8 31½ Dist. of ♂ from the upper head of ♊ 6 6 [Diſt. ♂ a ſuperiori cap. ♊]
- 36½ 6 7
- 59½ distance of the same 6 7 [earundem diſtantia]
- 9 19½ the distance of ♂ from the lower head of ♊ was found 2 43 [inuenta eſt diſtantia ♂ ab inferiori capite ♊]
- 24′ 0″ 2 42
- 25½ 2 42
- 30 0 the distance of ♂ from the small star nearest to it in the shoulders of ♊, which star was lower than ♂ itself towards the horizon, was found

[498] The 30 33 row prints nothing in the distance file, and in the azimuth file the single group 71½ with nothing in the minute place.

with the Radius **2° 1′** [inuenta eſt diſtantia ♂ a parua ſtella ſibi in humeris ♊ proxima, quæ ſtella erat inferior ipſo ♂ verſus horizontem, per Radium]

- 9 36 0 dist. of ♂ from the same 2 0 [diſt. ♂ ab eadem]
- 42 0 Dist. of the same with the Rad. 2 0 [Earund. diſt. per Rad.]
- 11 48 40 ♂ was crossing the meridian, having alt. 60 43 [transgrediebatur ♂ meridianum habens alt.]

The observation, however, was middling, because of scattered clouds that kept coming between. [Erat tamen obſeruatio mediocris propter raras nubes quæ interueniebant.]

Observations of the Fixed Stars [OBSERUATIONES STELLARUM FIXARUM.]

I. Altitudes and Azimuths [I. ALTITUDINES ET AZIMUTHA.]

DIE 10 JANUARIJ.

*Hour **4.7′** : the Pole Star [Stella polaris] on the meridian.* [*Hora 4.7′ Stella polaris in meridiano.*]

- H. **5 2′ 28″** by the Greater [per Maius] / 10 48 by the Lesser [per Minus] } The Pole Star had altit. 58 47 0, H. **5.6′**. [Stella polaris habuit altit. 58 47 0, H. 5.6′.]
- 5 17 25 Ma. / 26 5 Mi. } The alt. of the same was **58° 43′ 45″**, H. **5.21′** [Alt. eiusdem fuit 58° 43′ 45″, H. 5.21′]
- **29½** Ma. / **38½** Mi. } The alt. of the same **58 40′**, or at most **58 40′ 5″**, H. **5.33½**. [Alt. eiusdem 58 40′ vel ad ſummum 58 40′ 5″, H. 5.33½.]
- 30 20 / 39 25 } the bright one of the head of ♈ crossed the merid., having Alt. **55 31½**. From this you can verify the time. — H. 5.34. [tranſiuit lucida capitis ♈ merid. habens Alt. 55 31½. Hinc potes verificare tempus. — H. 5.34.]
- 5 38 0 Ma. / **47⅓** Mi. } Alt. of the Pole Star **58 38½**, or at least **25″**. H. 5.42. [Stellæ polaris Alt. 58 38½ vel ad minimum 25″. H. 5.42.]
- 6 37 36 Ma. / 48 24 Mi. } The leading one in the rear wheel of the Lesser Wagon [minoris plauſtri] had on the merid. Alt. 41 46 10. H. 6.43. [Prior in rota poſteriori minoris plauſtri habuit in merid. Alt. 41 46 10. H. 6.43.]
- H. 7 6 30 Ma. / 17 42 Mi. } The rear one in the wheel of the Lesser Wagon had on the merid. Alt. 39 14 0. H. 7.11. [Poſterior in rota plauſtri minoris habuit in merid. Alt. 39 14 0. H. 7.11.]

It was not clear enough at the time of this observation. *At the following noon the Greater Clock was going **18**ᴹ slow, the Lesser **24**ᴹ fast.* [Non fuit ſatis ſerenum tempore huius obſeruationis. *Sequenti meridie Horologium Maius 18ᴹ tardius, Minus 24ᴹ celerius ibat.*]

Let it be sought at what hour and minute 4 G. ♈ is on the meridian; and this, subtracted from the time of the transit or of the observation, gives the angle ACB. BD is the complement of the observed altitude. BC is given, 2.56.50. Let there be sought

I. the perpendicular AB by 27 IIII, and AC by 25; then, by 25, from BD and BA known, AD will be given. And when AD, found earlier, is added to CA, DC will be given, the complement of the altitude of the pole. [*Inquiratur qua hora et minuto 4 G.* ♈ *ſit in meridiano, et hæc ſubtracta a tempore tranſitus vel obſeruationis dat angulum ACB. BD eſt complementum altitudinis obſeruatæ. BC data 2.56.50. Inquiratur I. perpendicularis AB per 27 IIII et AC per 25, deinde per 25 ex BD et BA notis dabitur AD. Addito autem AD ad CA prius inuento dabitur DC, complementum altitudinis poli.*]

Diagram. A small lettered figure set at the right of the right-hand column of the lower band, beside the upper lines of the italic paragraph **Inquiratur qua hora** …. It shows a circle; two strokes meet at a point outside the circle at the upper right. One of them enters the circle at its upper left, passes a point on the circumference, and continues down through a point inside the circle to the circumference near the foot. The other meets the circumference at the right. Four letters stand on the figure; nothing else is lettered, and no value is printed on it.

- D (upper right, outside the circle, where the two strokes meet): D
- A (on the circumference, upper left, on the first stroke): A
- B (on the circumference, right, on the second stroke): B
- C (inside the circle, left of centre, on the first stroke): C

[1] So in codex V. [Sic in codice V.][499]

DIE 11 JANUARIJ.

- H. **6 6′30″** by the Lesser [per Minus] / `5 43 50` by the Greater [per Maius] } The Pole Star [Stella Polaris] had Alt. **58 37′** [habuit Alt.]
- `6 16 30` Mi. / `5 53 50` Ma. } Alt. of the Pole Star **58 34′35″** [Stellæ Polaris Alt.]
- `6 26 10` Mi. / `3 40` Ma. } `58 30`
- `6 48 10` Mi. / `24 55` Ma. } The bright one of the jaw of Cetus [Ceti] was on the mer., having Alt. **36 30⅓**; but as regards the Alt. it is not good enough. This observation was made with rather thin clouds passing across. [Lucida mandibulæ Ceti fuit in mer. habens Alt. 36 30⅓, ſed quantum ad Alt. non ſatis bona eſt. Hæc obſeruatio facta eſt in nubibus rariuſculis tranſeuntibus.]
- `7 0 30` Mi. / `6 37 13` Ma. } The leading wheel of the rear two was on the merid., having Alt. **41°46′10″**. [Prior rota ex poſterioribus duabus fuit in merid. habens Alt.]

Of the two small ones at the intersection of ♉, the leading and more southerly had Alt. **41 36½**, the following and more northerly of the same **42 18¼** [Paruarum duarum in interſectione ♉ prior et auſtralior habuit Alt. 41 36½, poſterior et borealior earundem 42 18¼]

[499] WHERE THE PRINTED FORM STANDS AGAINST THE NOTE: at the call, the composed text prints `8 10` in the minute and second places of the first row, and the note affirms that the codex has this; the next row prints **8 2′35″**.

- 7 28 55 Mi. / 6 15 Ma. } The rear wheel of the Bear [Vrſæ] crossed the merid., having alt. 39 13 35 [Poſterior rota Vrſæ tranſiuit merid. habens alt.]

The left foot of ♉ had merid. Alt. 38 54 [Siniſter pes ♉ habuit Alt. merid.]

- 7 56 45 Ma. / 8 19 40 Mi. } The eye of ♉ had on the merid. Alt. **49 42½** [Oculus ♉ habuit in merid. Alt.]

The star in the head of Draco [Draconis], above the ear, had merid. Alt. **18 35½** [Stella in capite Draconis ſupra aurem habuit Alt. merid.]

- 9 17 0 Ma. / 39 45 Mi. } The bright one of the Shoulder of Orion [Orionis] had mer. Alt. **41 21½** [Lucida Humeri Orionis habuit Alt. mer.]
- 9 34 45 Ma. / 58 23 Mi. } The outermost of the foot of ♊ crossed the meridian. [Extrema pedis ♊ tranſiuit meridianum.]
- 9 42 48 Ma. / 10 5 52 Mi. } The heel of the foot of ♊ crossed the meridian. [Calx pedis ♊ tranſiuit meridianum.]
- 4 1 20 Ma. / 11 30 Mi. } Lowest altit. of the Pole Star 52 56 45, or at most 56 50 [Stellæ Polaris Altit. minima 52 56 45 vel ad ſummum 56 50]

On the immediately following morning the rising Sun could not be seen; but when it had risen about 1 G. above the horizon, the greater clock showed H. **8 10′**, and the lesser H. **8 12′**. [Proximo ſequenti mane Sol oriens non potuit videri, ſed cum eßet ſupra horizontem eleuatus circiter 1 G., maius horologium monſtrabat H. 8 10′, minus vero H. 8 12′.]

DIE 12 JANUARIJ.

In the evening, when it was very clear. [*Veſperi cum admodum eßet ſerenum.*]

- H. 5 9 20 by the Greater [per Maius] / 15 23 by the Lesser [per Minus] } Alt. of the Pole Star **58 44¾** [Stellæ Polaris Alt.]
- *27 30 Mi. / 20 50 Ma. } Alt. of the Pole Star by the greater Q.* ***58 41½*** [*Stellæ polaris Alt. perQ.maiorem*]
- *31 35 Mi. / 25 15 Ma. } Alt. of the Pole Star 58 40 50* [*Stellæ Polaris Alt.*]
- *32 30 Mi. / 26 18 Ma. } The brighter horn in the head of ♈ was on the merid., having Alt.* ***55 30½*** [*Fuit cornu lucidius in capite ♈ in merid. habens Alt.*]
- *37 8 Mi. / 30 48 Ma. } Alt. of the Pole Star 58 39 10* [*Stellæ polaris Alt.*]
- *46 49 Mi. / 40 12 Ma. } 58 37 10*
- *52 0 Mi. / 45 20 Ma. } 58 35 50*
- *6 12 5 Mi. / 4 50 Ma. } The middle star in the lower jaw of Cetus, crossing the merid., had Alt. 35 31* [*Media ſtella in inferiori mandibula Ceti tranſiens per merid. habuit Alt.*]
- *13 20 Mi. / 6 5 Ma. } Alt. of the Pole Star* ***58 27½*** [*Stellæ polaris Alt.*]
- *30 20 Mi. / 23 20 Ma. } The brighter one in the lower jaw of Cetus was on the merid., Alt.* ***36 30½*** [*Lucidior in inferiori mandibula Ceti fuit in merid. Alt.*]

- *42 0 Mi. / 34 50 Ma. } The wheel crossing first, which is the upper and first of the back of the Lesser Bear [urſæ min.], had Alt. 41 46 10* [*Rota primum tranſiens, quæ eſt ſuperior et prima dorſi urſæ min. habuit Alt.*]
- 7 11 30 Mi. / 4 15 Ma. } The wheel that crosses the merid. second had on the merid Alt. 39 14 [Rota quæ ſecundo tranſit merid. habuit in merid Alt.]
- *8 1 33 Mi. / 7 54 45 Ma. } The eye of ♉ had Alt.* ***49 41½*** [*Oculus ♉ habuit Alt.*]
- *8 49 45 Ma. The first of the bright ones in the tail of Draco, of the 3rd magnitude, had Alt.* ***32 9⅔*** [*Prima lucidarum in cauda Draconis 3ᵃᵉ magnitud. habuit Alt.*]
- *9 32 5 Ma. / 37 20 Mi. } The first and outermost of the foot of ♊ had Alt.* ***56 38½*** [*Prima et extrema pedis ♊ habuit Alt.*]
- *40 0 Ma. / 45 10 Mi. } The other, which is the first of the upper foot of ♊, Alt. 56 44* [*Altera quæ prima eſt ſuperioris pedis ♊, Alt.*]
- IIII in the hide of ♌, from the head, had Alt. 40 15 [IIII in exuuio ♌ a capite habuit Alt.]
- III 38 56
- I 35 11
- In the ears, the northern of the leading ones of the quadrilateral of Lepus [Leporis] 21 43 [In auribus quadrilateri præcedentium borealis Leporis]
- The southern of the same **20 39⅔** [Eiusdem auſtralis]
- The heel of the foot of Orion [Orionis] **25 57½** [Calx pedis Orionis]
- The hip of Lepus 19 8 [Coxa Leporis]
- The eye of Draco [Draconis] **19 35½** [Oculus Draconis]
- The mouth of Draco 21 26 [Os Draconis]
- The tail of Lepus **20 54½** [Cauda Leporis]
- The bright one of the right wing of Cygnus [Cygni] **10 26½** [Lucida dextræ alæ Cygni]
- The last southern foot of ♋ 44 32 [Poſtremus pes auſtrinus ♋]
- The star below the head of Hydra [Hydræ], under the equator 31 31 [Stella infra caput Hydræ ſub æquatore]
- The tail of Cygnus **9 49¾** [Cauda Cygni]
- The bright one of Hydra **27 13⅔** [Lucida Hydræ]
- The more southerly in the head of ♌ 59 47 [Auſtralior in capite ♌]

DIE 13 JANUARIJ, MANE.

- H. 1 33 40 by the Lesser [Minus] / 28 5 by the Greater [Maius] } The Heart of ♌ had on the merid. Alt. 48 4 [Cor ♌ habuit in merid. Alt.]
- 2 44 49 Mi. / 39 5 Ma. } The middle one of the neck of ♌ had on the merid. Alt. 56 0 [Media ceruicis ♌ habuit in merid. Alt.]
- 3 16 28 Mi. / 10 16 Ma. } The tail of ♌ crossed the merid.; Alt. as above. [Cauda ♌ tranſiuit merid., Alt. vt ſupra.]

- 3 35 30 Mi. / 28 50 Ma. } The topmost of the Chair of Cassiopeia [Caßiopeæ] had on the merid. Alt. 22 47 20 [Suprema cathedræ Caßiopeæ habuit in merid. Alt.]

After the sights of the greatest Q. had been rectified. [*Poſt rectificata pinnacidia maximi Q.*]

- 4 8 35 Mi. / 0 37 Ma. } Lowest Alt. of the Pole Star [Stellæ Polaris] 52 58 15 [Stellæ Polaris Alt. minima]
- 22 9 Mi. / 13 53 Ma. } The star that is at the bend of Cassiopeia had on the merid. Alt. 24 23 50 [Stella quæ eſt ad flexuram Caßiopeæ habuit in merid. Alt.]
- 49 55 Mi. / 40 50 Ma. } The Knee of Cassiopeia had on the merid. Alt 24 0 0 [Genu Caßiopeæ habuit in merid. Alt]
- 55 20 Mi. / 45 30 Ma. } Spica ♍ had on the merid. alt. 25 10 [Spica ♍ habuit in merid. alt.]
- 5 16 35 Mi. / 6 55 Ma. } The foot of Cassiopeia had on the merid. Alt. 27 30 50 [Pes Caßiopeæ habuit in merid. Alt.]

The southern pan of Libra [libræ] 19 55 [Lanx libræ auſtralis]

- 7 5 0 Ma. / 16 5 Mi. } The rear one in the wheel of the Lesser Bear [Vrſæ min.], Alt. 70 0 45 [Poſterior in rota Vrſæ min. Alt.]

Both clocks went too far wrong, so that the times written down are not to be trusted. [*Horologium vtrumque nimis aberrauit, vt temporibus adſcriptis non ſit fidendum.*]

DIE 13 JANUARIJ, VESPERI.

- H. **5 5′37″** by the Lesser [Minus] / 14 9 by the Greater [Maius] } The Pole Star had Alt. **58 44⅔** [Stella Polaris habuit Alt.]
- 27 0 Mi. / 36 55 Ma. } 58 43
- 45 27 Mi. / 56 0 Ma. } 58 32
- 6 13 0 Mi. / 24 5 Ma. } The bright one of the jaw was on the merid., having Alt. **36 30½** [Lucida mandib. fuit in merid. habens Alt.]
- 6 53 58 Mi. / 7 5 22 Ma. } The rear wheel of the Lesser Bear had mer. Alt. **39 14½** [Poſterior rota Vrſæ min. habuit Alt. mer.]

At the immediately following noon the greater clock was going fast by **22′15″**, the lesser slow by **25′0″**. [Proxime ſequenti meridie maius horologium celerius ibat 22′15″, minus tardius 25′0″.]

DIE 14 JANUARIJ.

- 6 16 10 Ma. / 5 52 43 Mi. } Alt. of the Pole Star off the meridian 58 32 [Stellæ polaris Alt. extra meridianum]

DIE 17 JANUARIJ.

H. **5 54′** by the Greater [per Maius], the bright one of the jaw was on the merid., having altit. **36 30½** [Lucida mandibulæ fuit in merid. habens altit.]

- 6 33 12 Ma. / 29 44 Mi. } The rear wheel of the Lesser Bear had merid. Alt. 39 14 0 [Poſterior rota Vrſæ minoris habuit Alt. merid.]

- Alt. of the outermost of the foot of ♊ **56 38½** [Extremæ pedis ♊ Alt.]
- Alt. of the heel of the foot of ♊ **56 43½** [Calcis pedis ♊ Alt.]

The difference between the transits of the two, by the greater Clock, was 7 M. 37 S. [Differentia tranſitus vtriuſque per maius Horologium fuit 7 M. 37 S.]

The bright one of Hydra had on the merid. Alt. **27 13⅔** [Lucida hydræ habuit in merid. Alt.]

- 12 34 15 Mi. / 48 13 Ma. } The Heart of ♌ crossed the meridian [Cor ♌ tranſiuit meridianum]
- 43 45 Mi. / 58 5 Ma. } The neck of ♌ had on the merid. Alt. 56 0 30 [Ceruix ♌ habuit in merid. Alt.]
- The star of the fifth magnitude preceding the hip of ♌ had altit. 56 30 [Stella quintæ magnitudinis præcedens coxam ♌ habuit Altit.]
- The thigh of ♌ had on the mer. Alt. **51 47½** [Femur ♌ habuit in mer. Alt.]
- The hip of ♌ had on the mer. Alt. **56 53½** [Coxa ♌ habuit in mer. Alt.]
- The one that is between the knees of ♌ 42 44 2/[?] [Illa quæ eſt inter genua ♌]
- The one that is in the hinder dracibus [?] of ♌ had altit. **46 55⅔** [Illa quæ eſt in poſterioribus dracibus ♌ habuit Altit.]
- H. 2 22 8 Ma. / 3 48 Mi. } The tail of ♌ was on the merid., having Alt. **51 0⅓** [Cauda ♌ fuit in merid. habens Alt.]
- 40 10 Ma. / 20 35 Mi. } The topmost of the Seat of Cassiopeia had mer. Alt. 22 48 [Suprema ſellæ Caßiopeæ habuit Alt. mer.]
- 3 10 36 Ma., of the Pole Star [Stellæ Polaris]
- merid. Altitude **52 57½** [Altitudo merid.]
- 3 11 0 Ma., the middle one of the wing of ♍, merid. Alt. very nearly 34 59 [Media alæ ♍ / Alt. merid. fere]
- 21 30 Ma., the bright one of the bend of the seat of Cassiopeia [Caßiopeæ], at the thighs, had merid. Alt. **24 23½** [Lucida flexuræ ſellæ / Caßiopeæ ad femora habuit / in merid. Alt.]
- The bright one in the girdle of ♍, Alt. 47 21 [Lucida in cingulo ♍ Alt.]
- 3 46 49 Ma., the Knee of Cassiopeia, mer. Alt. **23 59½** [Genu Caßiop. / Alt. mer.]
- 51 0 Ma., of Spica ♍, mer. Alt. **25 10¼** [Spicæ ♍ / Alt. mer.]
- 4 10 40 Ma., the foot of Cassiopeia, Mer. **27 31¼** [Pes Caßiop. Mer.]

At the immediately following noon the greater clock was running **57′** slow. The lesser was standing still, its weight having run down. [Proxime ſequenti meridie maius horologium tardius ibat 57′. Minus ſtabat deſinente pondere ipſius.]

Taking account, then, of both transits, of the Tail and of Spica, you can from this check the clocks and know the intervals between the transits of the stars of Cassiopeia and Spica, and between the stars themselves. [*Habita itaque ratione vtriusque tranſitus*

Caudæ et Spicæ, potes hinc verificare horologia et ſcire interualla tranſitus ſtellarum Caßiopeæ ad Spicam et inuicem.]

DIE 19 JANUARIJ.

About the 6th hour of the evening we observed carefully that the brighter of the rear ones in the wheel of the Lesser Bear [Vrſæ minoris] had its least altitude on the meridian, by the Greatest Quadrant: [*Circa horam 6 veſpertinam obſeruauimus diligenter, quod lucidior poſteriorum in rota Vrſæ minoris habuit in meridiano altitudinem minimam per Maximum Quadrantem*]

- *H. 6 28 0 by the Greater [per Maius] / 17 30 by the Lesser [per Minus] }* ***41°46′50″***
- *6 35 the other in the wheel had Alt. 39 14 0, good.* [*altera in rota habuit / Alt. … bona.*]

We corrected the clocks at the transit of the eye of ♉ through the meridian, setting the pointers at the 23rd minute past H. 7. When, at its transit, [Correximus horologia ad tranſitum oculi ♉ per meridianum ponendo indices in 23 minuto vltra H. 7. Cum ad tranſitum eius monſtraret]

- the Greater showed H. 7. 17 [Maius H. 7. 17]
- the Lesser H. 7. 6 [Minus H. 7. 6]

The left foot of Orion [Orionis] had merid. Alt. 25 22, both by the triangular Sext. and by the lesser quadrant. [Siniſter pes Orionis habuit in merid. Alt. 25 22, tam per Sext. triangularem quam per quadrantem minorem.]

The left shoulder of Orion had Alt. [Humerus ſiniſter Orionis habuit Alt.]

- by the Sext. triangul. 40 0 [per Sext. triangul.]
- by the lesser Q. **40 0½** [per Q. min.]

The first of the belt, toward the west [Prima balthei verſus occaſum]

- by the Trigon. Sext. 33 25 [per Trigon. Sext.]
- by the lesser Q. **33 25⅓** [per Q. Minorem]

The second of the belt of Orion [Secunda baltej Orionis]

- by the Trig. Sext. **32 33½** [per Trig. Sext.]
- by the lesser Q. 32 33 [per Q. minorem]

The last of the belt of Orion [Poſtrema baltej Orion.]

- by the lesser Q. **31 53⅔** [per Q. min.]

The right foot of Orion [Dexter Pes Orion.]

- by the Trigon. Sext. 24 14 [per Trigon. Sext.]
- by the lesser Q. **24 15⅓** [per Q. minorem]
- *The outermost of the foot, by the lesser Q., 56 39 / the uppermost of the foot, which is in the heel, 56 44 }* [*Extrema pedis per Q. minor. / Suprema pedis quæ in calce*]

The difference of transit was ***7′ 55″****, moderately good enough. The dist. on the equator, however, G.* ***1 58′****, corresponds on the ecliptic to G.* ***1 48′****.* [*Differentia tranſitus fuit 7′ 55″ mediocriter ſatis bona. Diſt. autem in æquatore G. 1 58′, reſpondet in ecliptica G. 1 48′.*]

- The right foot of the more northern ♊ 54 30 [Dexter pes Borealioris ♊]

- The left foot of the more southern Ⅱ 50 46 [Siniſter pes Auſtralioris Ⅱ]
- A certain unformed star next to the lowest foot of Ⅱ 44 19 [Stella quædam informis iuxta / infimum pedem Ⅱ]
- The lowest, or right, southern foot of Ⅱ 47 23 [Infimus vel dexter pes / auſtral. Ⅱ]
- The southern Ass **53 43½** [Aſinus auſtralis]
- The heart of ♌, by the lesser Q., had Alt. 48 4 / the neck of ♌, by the lesser Q., had Alt. **51 0½** } [Cor ♌ per Q. min. habuit Alt. / Ceruix ♌ perQ.min.habuitAlt.]

Difference of transit by the greater Clock **10′ 36″**. [Differentia tranſitus per Maius Horol. 10′36″.]

DIE 20 JANUARIJ, MANE.

By the greater clock. [Per Horologium maius.]

- H. 2 30 25 after midnight, the tail of ♌ crossed the merid., having Alt. **51° 0′30″** [a media noc̃te, Cauda ♌ / tranſiuit merid. habens Alt.]
- **2 49½** the uppermost of the seat of Cassiopeia had Alt. 22 48 [ſuprema ſellæ Caßi-/opeæ habuit Alt.]
- 3 10 50 the lower in the seat of Cassiopeia, Alt. **26 34½** [inferior in ſella / Caßiopeæ, Alt.]
- 3 19 20 the Pole Star [Stella Polaris] was on the Merid., having Alt. **52 57½** [Stella Polaris fuit / in Merid. habens / Alt.]
- 3 33 0 the star in the bend of the seat of Cassiop. had Alt. 24 24 very nearly [Stella in flexura / ſellæ Caßiop. ha-/buit Alt. … fere]
- 4 4 20 Spica had on the meridian Alt. [Spica habuit in / meridiano Alt.]
- by the lesser Q. 25 10 [per Q. min.]
- by the Sext. Trig. **25 8½** [per Sext. Trig.]

Repeat this, for I do not know whether the instrument was hung quite correctly. [Hanc repete, neſcio enim an ſatis iuſte ſuſpenſum fuerit inſtrumentum.]

- 4 12 20 the foot of Cassiopeia had Alt. 27 31 [Pes Caßiopeæ ha-/buit Alt.]
- 5 30 51 the leading wheel in the Lesser Bear had merid. Alt. 68 24 [Rota prior in Vrſa / minore habuit Alt. / merid.]
- 6 7 0 the rear one had mer. Alt. 70 2 [Poſterior habuit / Alt. mer.]

*At the following noon the greater clock was running exactly **15′** slow, but the lesser went astray by more than a whole hour.* [*In meridie ſequente Horologium maius tardius ibat 15′ præciſe, ſed minus plus integra hora aberrauit.*]

DIE 20 JANUARIJ, VESPERI.

- The first in Eridanus [Eridano], at the feet of Orion [Orionis], Alt. 28 25 [Prima in Eridano ad pedes / Orionis Alt.]
- The star at the heel of the foot of Orion 26 45 [Stella ad calcem pedis Orionis]

- The southern horn of ♉ had Alt. 54 55 [Auſtrale cornu ♉ habuit Alt.]
- Propus had Merid. Alt. **57 28½** [Propus habuit Alt. Merid.]
- H. 8 51 35 Ma. / 47 40 Mi. } The outermost of the foot of ♉ crossed the Merid., having Alt. 56 39 [Extrema pedis ♉ tran-/ſiuit Merid. habens / Alt.]
- 59 39 Ma. / 55 45 Mi. } The heel of the foot was on the Meridian, having Alt. **56 44¼** [Calx pedis fuit in / Meridiano habens / Alt.]

Difference of transit by the Greater **8′ 4″** [Differentia tranſitus per Maius]

- by the Lesser 8 5 [per Minus]
- The star in the right hip of Canis Major [Can. Mai.], very nearly **5°48′** [Stella in coxa dextra Can. Mai. / fere]
- The star in the groin of the same, Alt. **8 24⅔** [Stella in inguine eiuſdem, Alt.]
- The star in the side, of the two, **10 54½** [Stella in latere duarum]
- In the rear dracibus [?] of Canis Major **5 25⅓** [In dracibus poſterioribus / Canis mai.]

At the immediately following noon the Sun could not be seen; but when it was in the seventh degree of azimuth from the south toward the west, the greater clock showed 12 M. after noon, and I advanced its pointer 16 M. The lesser, however, showed 9 M. after noon, and I advanced its pointer 19 M. [Proxime ſequenti meridie non potuit Sol videri, ſed cum eßet in ſeptimo gradu Azimuti a meridie verſus occaſum, maius Horologium monſtrabat 12 M. a meridie, et promoui eius indicem 16 M. Minus autem monſtrabat 9 M. a meridie, et promoui ipſius indicem 19 M.]

DIE 21 JANUARIJ.

H. 7 12 by the Greater [per Maius]. The eye of ♉ had Altitud. on the merid. [*Oculus ♉ habuit Altitud. in merid.*]

- *by the Trig. Sext.* ***49 41¾*** [*per Trig. Sext.*]
- *by the lesser Q. 49 42* [*perQ.minorem*]

The first of the belt of Orion had merid. Altit. [Prima baltej Orionis habut Altit. merid.]

- by the lesser Q. 33 25 [per Q. minorem]
- by the Sext. Trigon. **33 24½** [perSext.Trigon.]

The second of the belt, Alt. by the lesser Q. 32 32 [Secunda baltej Alt. per Q. min.]

- by the Sext. Trigon. 32 32 [perSext.Trigon.]

The third of the belt by the lesser Q. 31 54 [Tertia baltej per Q. minorem]

The right foot of Orion had Alt. [Pes dexter Orionis habuit Alt.]

- by the Sext. Trig. 24 14 [perSext.Trig.]
- by the lesser Q. 24 14 [perQ.minorem]
- *7 48 28 Ma. / 35 22 Mi. } The outermost of the foot of* ♊ *56 39* [*Extrema / pedis* ♊]
- *56 22 Ma. / 43 2 Mi. } The heel of the foot of* ♊ ***56 43½*** [*Calx pedis* ♊]

Difference of transit through the merid. by the Greater, 7′ 54″ in time, corresponds on the ecliptic to 1° 48′. [*Differentia tranſitus per merid. per Maiorem 7′ 54″ in tempore, reſpondet in ecliptica 1° 48′.*]

The southern head of ♊ *had Merid. Alt.* 63 4 [*Caput meridionale* ♊ *habuit / Alt. Merid.*]

- The following star of the two in the lead-out of the Neck of Hydra [Hydræ] had Altit. 38 9 [Stella ſequens duarum in educ͛tione / Colli Hydræ habuit Altit.]
- The bright one of Hydra, Alt. **27 13½** [Lucida Hydræ Alt.]
- The left knee of ♌ 45 51 very nearly [Genu ſiniſtrum ♌ … / fere]
- The more northern in the head of ♌ had Alt. **62 1½** [Borealior in capite ♌ habuit / Alt.]
- The more southern in the head of ♌ 59 46 [Auſtralior in capite ♌]
- H. 12 42 27 by the Greater, the heart of ♌ was on the meridian, having Alt. 48 4 [per Maius, Cor ♌ / fuit in meridiano habens Alt.]
- 12 53 16 by the greater, the neck of ♌ had Alt. on the meridian **56 0½** [per maius, Ceruix ♌ in me-/ridiano habuit Alt.]
- Of the two unformed ones above the back of ♌, the following had Alt. 61 3 [Duarum informium ſupra dorſum ♌ / ſequens habuit Alt.]
- The star next preceding the hip of ♌ **56 30¼** [Stella proxime præcedens / Coxam ♌]
- The hip of ♌ had merid. Alt. 56 54 [Coxa ♌ habuit in merid. Alt.]
- The rear star in the elbows of ♌, Alt. 35 37 [Stella in cubitis poſterior. ♌, / Alt.]
- H. 2.23 by the greater, the tail of ♌ was on the merid., having Alt. **51 0½** [per maius, Cauda ♌ fuit in me-/rid. habens Alt.]
- 3 13 50 Ma. / 2 52 20 Mi. } Alt. min. of the Pole Star [Stellæ Polaris], by the greater Q. **52 57¾**, by the Sext. Trig. 52 58 [Stellæ Polaris / Alt. min. / per maior. Q. / per Sext. Trig.]
- 3 57 36 Ma. / 3 35 5 Ma. } Spica ♍ had on the meridian Alt. [Spica ♍ habuit in / meridiano Alt.]
- by the lesser Q. 25 10 [per Q. min.]
- by the Sext. Trig. **25 9¼**, but not good enough. [per Sext. Trig. … / ſed non ſatis bona.]
- 4 18 40 Ma. The foot of Cassiopeia [Caßiopeæ] had Merid. Alt. **27 31⅔** [Pes Caßiopeæ habuit / in Merid. Alt.]
- *5 50 the lesser wheel crossed the meridian, having Alt.* 70 3 [*tranſiuit minor rota meridia-/num habens Alt.*]
- The upper one in the left hand of Ophiuchus [Ophiuchi], in Azim. from the merid. toward the east 22 0, Alt. 29 32 [Superior in manu ſiniſtra Ophiuchi in / Azim. a merid. verſus ortum … / Alt.]
- The same, in Azim. 14 0, Alt. 30 50 [Eadem in Azim. … Alt.]

At the immediately following noon the greater clock was running **11′ 40″** slow; the lesser was also running **40′ 33″** slow. [Proxime ſequenti meridie Maius horologium tardius ibat 11′ 40″, Minus etiam tardius ibat 40′ 33″.]

In the triangle CAB two sides are given, CA and AB. For CA is the complement of the altitude of the star, AB the complement of the altitude of the pole. The angle contained, CAB, is the complement of the azimuth EAD to ***180°****. Therefore the side CB, the complement of the declination of the star, is given by dogma VI, or by 27 and 25 Reg., by drawing the perpendicular FB.* [*In triangulo CAB dantur duo latera CA et AB. Nam CA eſt complementum altitudinis ſtellæ, AB complementum altitudinis poli. Angulus comprehenſus CAB eſt complementum EAD Azimuti ad 180°. Ergo datur per VI dogma latus CB, complementum declinationis ſtellæ, vel per 27 et 25 Reg., ducendo perpendicularem FB.*]

Diagram. A circle with a horizontal diameter. From a point on the top of the circumference a curved arc runs down through a point above the diameter and on through the diameter to the lower circumference. A second curved arc runs from that upper point on the first arc up to a point on the circumference to the right of the top. Outside the circle, above and between those two points on the circumference, a point stands joined to each of them by a dotted line; a third dotted line runs from the top point down toward the second arc. Six letters are printed on the figure:

- A (top of the circumference, where the first arc begins)
- B (on the circumference to the right of A, where the second arc ends)
- C (on the first arc, above the diameter, where the second arc begins)
- D (where the first arc crosses the diameter)
- E (at the left end of the diameter, outside the circle)
- F (outside the circle, above between A and B, at the meeting of the dotted lines from A and from B)

DIE 22 JANUARIJ.

- H. 5 53 0 Maius / 52 30 Minus } the leading one in the wheel had Alt. Merid. [Prior in rota habuit / Alt. Merid.]
- by the Sext. Trig. **41 42½** [per Sext. Trig.]
- by the greater Q. **41 42⅔** [per Q. maiorem]
- 6 23 35 Ma. / 22 10 Mi. } the rear one in the wheel had Alt. by the Sext. Trig. 39 14 [Poſterior in rota ha-/buit Alt. per Sext. / Trig.]
- by the greater Q. **39 14½** [per Q. maior.]

The eye of ♉ had on the merid. Altit. [Oculus ♉ habuit in merid. Altit.]

- by the Sext. Trig., very nearly 49 43 [per Sext. Trig., fere]
- by the lesser Q. 49 42 [per Q. minorem]

The left foot of Orion [Orionis], [Iniſter pes Orionis,]

- Alt. by the Sext. Trig. **25 22½** [Alt. per Sext. Trig.]
- by the lesser Q. 25 22 [per Q. minorem]

The first of the belt of Orion [Prima baltej Orionis]

- by the Sext. Trig. **33 24⅔** [per Sext. Trig.]

• by the lesser Q. 33 25 [per Q. minorem]

The second of the belt, by the Sext. Trig. **32 32½** [Secunda baltej per Sext. Trig.]

• by the lesser Q. 32 33 [per Q. minorem]

The third of the belt, by the lesser Q., very nearly 31 54 [Tertia baltej per Q. min. fere]

The right foot of Orion, [Dexter pes Orionis,]

• Alt. by the Sext. Tr. 24 15 [Alt. per Sext. Tr.]
• by the lesser Q. **24 15½** [per Q. minorem]

The right shoulder of Orion, Alt. [Dexter humerus Orionis, Alt.]

• by the Sext. Trig., very nearly 41 22 [per Sext. Trig. fere]
• by the lesser Q. **41 21⅔** [per Q. Minorem]
• H. 8 54 3 Maius, the outermost of the foot of ♊ had on the meridian Alt. 56 39 [Maius, extrema pedis ♊ / habuit in meridiano / Alt.]
• 9 2 5 Ma., the heel of the foot of ♊ crossed the merid. [Ma., Calx pedis ♊ tranſi-/uit merid.]

For finding the altitude of the pole. [Pro poli altitudine indaganda.]

The brighter wheel of the Lesser Bear [vrſæ minoris] has altit. [Lucidior rota vrſæ minoris habet altit.]

	By the Quad. ma. [Per Quad. ma.]	By the Sext. Trig. [Per Sext. Trig.]
Max.	**70° 3′ 15″**	**70° 3′ 15″**
Min.	41 42 40	41 42 30
Altitude of the Pole [Altitudo Poli]	55 52 58	55 52 52

*The altitude of the pole is therefore infallibly **55ᵍ 53′**. But later I found **55 54⅔**, better than the former.* [*Eſt itaque poli altitudo infallibiliter 55ᵍ 53′. Sed poſtea inveni 55 54⅔ melior priori.*]

DIE 23 JANUARIJ, MANE.

• H. 0 51 32 Ma. / 48 30 Mi. } the heart of ♌ was on the meridian, having Alt. 48 4 [Cor ♌ fuit in meridi-/ano habens Alt.]
• 1 1 40 Ma. / 0 58 40 Mi. } the neck of ♌ had on the merid. Alt. **56 0⅔** [Ceruix ♌ habuit in / merid. Alt.]
• Of the two unformed above the back of ♌, had Alt. 61 3 [Informium duarum ſupra dorſum ♌ / habuit Alt.]
• That which precedes the hip of ♌, in almost the same line, 56 29 [Quæ præcedit Coxam ♌ in / eadem fere linea]
• The thigh of ♌ had on the merid. Alt. 51 49 [Femur ♌ habuit in merid. Alt.]
• The hip of ♌ had Alt. **56 53⅔** [Coxa ♌ habuit Alt.]
• H. 2 32 45 Ma. / 30 10 Mi. } the tail of ♌ had on the merid. Alt. **51 0⅓** [Cauda ♌ habuit in / merid. Alt.]

- The second of the more southern wing of ♏, Alt. mer. **35 46⅓** [Secunda alæ auſtralioris ♏ / Alt. mer.]
- H. 3 19 48 Ma. / 17 30 Mi. } the breast of Cassiopeia [Caßiop.] had Alt. by the Sext. Trig. **20 10¾** [Peƈtus Caßiop. habuit / Alt. per Sext. Trig.]
- 3 19 55 Ma. / 17 38 Mi. } Alt. min. of the Pole Star [Stellæ polaris], by the greater Q. **52 57¾** [Stellæ polaris Alt. / min. per Q. maiorem]
- by the Sext. Trig. 52 57 35 [per Sext. Trig.]
- The middle one of the wing of ♏ had merid. Altitud. 35 0 [Media alæ ♏ habuit / Altitud. merid.]
- 4 0 25 Ma. / 3 57 48 Mi. } the Knee of Cassiopeia had Alt. on the meridian very nearly 24 0 [Genu Caßiopeæ ha-/buit Alt. in meridiano / fere]
- 4 5 20 Ma. / 2 50 Mi. } Spica had on the merid. Alt. by the Sext. Trig. 25 10 [Spica in merid. habuit / Alt. per Sext. Trig.]
- by the lesser Q. 25 10 [per Q. minor.]
- 4 26 23 Ma. / 23 53 Mi. } the foot of Cassiopeia [Caßiopeæ] had merid. Altit. very nearly 27 31 [Pes Caßiopeæ habuit / Altit.merid.fere]
- 5 57 5 Ma. / 54 15 Mi. } the first of the Wheel was on the meridian, having Alt. **70 3¼** [Prima Rotæ fuit in / meridiano habens / Alt.]
- The northern Claw had Alt. 26 19 [Chele borealis habuit Alt.]
- *The upper and brighter one in the hand of Ophiuchus [Ophiuchi], Azim. G.* ***12 0′****, G.****9 10′****; Alt.* ***30 58½****, 31 14* [*Superior et lucidior in manu Ophi-/uchi Azim. G. … G. … / Alt.*]

At the following noon the greater clock was running **6½** M. fast, the lesser **9½** M. fast. [Sequenti meridie maius horologium celerius ibat 6½ M., minus celerius 9½ M.]

DIE 23 JANUARIJ, VESPERI.

- *5 48 28 Ma. / 47 25 Mi. } the leading wheel crossed, having Alt.* [*Tranſiuit prior rota / habens Alt.*]
- *by the Trig. Sext. 41 46* [*per Trig. Sext.*]
- *by the greatest Q. 41 46* [*per Q. Max.*]
- *6 17 53 Ma. / 16 17 Mi. } the other wheel crossed, having Alt. by the Trig. Sext. 39 14* [*Tranſiuit altera rota / habens Alt. / perTrig.Sext.*]
- *by the greatest Q. 39 14* [*per Q. max.*]

The upper wheel on the leading axle of the Lesser Bear [Vrſæ minoris] had Alt. by the Sext. Trig. **44 55½** [Superior rota in priori Vrſæ minoris / axe habuit Alt. per Sext. Trig.]

- by the greatest Q. **44 55½** [per Q. max.]

DIE 5 FEBRUARIJ, MANE.

- H. 2 18 35 Maius / 12 25 Minus } the Pole Star [Stella polaris] has on the mer. alt. min. by the greatest Q. **52 57⅔** [Stella polaris habet / in mer. alt. min. / per Q. max.]
- by the lesser Q. **52 58½** [per Q. min.]

It was not clear enough. [Non fuit ſatis ſerenum.]

DIE 9 FEBRUARIJ.

The second in the Lesser Bear from the Pole Star had least Altit. [Secunda in Vrſa minore a Polari ſtella / habuit Altit. minimam.]

- by the greater Q. 48 27 25 [per mai. Q.]
- by the lesser Q. 48 30 very nearly [per min. Q. … fere]

The brighter one in the preceding side of the square of Draco [Draconis] had Alt. on the meridian [Lucidior in præcedenti latere quadra-/ti Draconis habuit in meridiano Alt.]

- by the greater Q. **32 51½** [per Q. mai.]
- by the lesser Q. 32 53 [per Q. min.]

The tail of Cygnus [Cygni], on the northern mer., had Alt. by the greatest Q. 9 48 [Cauda Cygni in mer. ſeptentr. habuit / Alt. per Q. max.]

- by the lesser Q. 9 50 [per Q. minor.]

The bright one of the arm of Cepheus [Cephej] [Lucida brachi Cephej]

- by the greatest Q. **26 46⅓** [per Max. Q.]
- by the lesser Q. **26 47½** [per minorem Q.]

The head of Cepheus, by the greater Q. 41 13 [Caput Cephej per Q. maior.]

- by the lesser Q. 41 14 [per Q. minor.]

The first in Cassiopeia [Prima in Caßiopea]

- by the greater Q. **22 47¼** [per maior. Q.]
- by the lesser Q. **22 46½** [perminoremQ.]
- by the Sext. Trig. 22 47 [per Sext. Trig.]
- H. 2 1 30 Ma. / 2 34 10 Mi. } Alt. min. of the Pole Star, by the lesser Q. 52 59 [Stellæ Polar. Alt. min. / per Q. Min.]
- by the Sext. Trig. **52 57½** [per Sext. Trig.]
- by the greater Q. **52 57½** [per Q. mai.]
- or at most ⅔ [aut ad ſummum]

At the immediately following noon the greater Clock was running 12 M. slow. The lesser was going far astray. [Proxime ſequenti meridie maius Horologium tardius ibat 12 M. Minus nimium aberrabat.]

DIE 14 FEBRUARIJ.

The second in the body of Draco had altitude by the greatest Q. 32 8 [Secunda in corpore Draconis habuit / altitudinem per Q. maximum]

- by the lesser Q. **32 10½** [per Q. minorem]
- H. 6 54 20 Ma. / 50 30 Mi. } the first in the tail of the Lesser Bear, or the second from the Pole Star, had Alt. by the greatest Q. **48° 27′ 15″**

[Prima in cauda vrſæ / minoris ſiue ſecunda a / Stella polari habuit Alt. / per Q. max.]

- by the lesser Q. **48 29½** [per Q. minorem]

At the immediately following noon the greater Clock was running M. 29 slow; the lesser was also slow, M. 24 S. 27. [Proxime ſequenti meridie maius Horologium tardius ibat M. 29, minus etiam tardius M. 24 S. 27.]

DIE 15 FEBRUARIJ.

The first in Cassiopeia, or the uppermost of the seat, on the meridian, by the greatest Q. **22 47½** [Prima in Caßiopea ſiue ſuprema ſellæ / in meridiano per Q. max.]

- by the lesser Q. **22 48½** [per Q. min.]

DIE 16 FEBRUARIJ, MANE.

H. **1 41′ 15″** by the Greater [per Maius]. The least Alt. of the Pole Star [Stellæ polaris Alt. minima]

- by the greatest Q. 52 57 35 [per Q. maximum]
- or at most **40″** [aut ad ſummum]
- by the lesser Q. 52 59 0 [per Q. minorem]
- by the Sext. Trig. 52 57 35 [per Sext. Trig.]

The Knee of Cassiopeia had meridian Alt. [Genu Caßiopeæ habuit Alt. meridia-/nam]

- by the greatest Q. 23 59 [per Q. max.]
- by the Sext. Trig. 23 59 [per Sext. Trig.]

The foot of Cassiopeia, by the greatest Q. 27 30 [Pes Caßiop. per Q. max.]

- by the lesser Q. 27 31 [per Q. minorem]

The brighter one in the preceding wheel of the Lesser Bear [Lucidior in præcedenti rota Vrſæ mi-/noris]

- by the greatest Q. **70 2⅓** [per Q. max.]
- by the lesser Q. **70 4½** [per Q. minorem]

The rear wheel of the Lesser Bear [Poſterior rota Vrſæ min.]

- by the greatest Q. 72 35 [per Q. max.]
- by the lesser Q. 72 38 [per Q. minorem]

Both Clocks were running slow at the immediately following noon, the greater M. 14 S. 15, the lesser M. 11 S. 30. [Proxime ſequenti meridie vtrumque Horologium tardius ibat, Maius M.14 S. 15, Minus M. 11 S. 30.]

DIE 17 FEBRUARIJ.

The right shoulder of Cepheus [Cephej] had Alt. **26 47⅓** [Dexter humerus Cephej habuit / Alt.]

The left knee of Cepheus had on the merid. Alt. by the greatest Q. **41 13¾** [Genu ſiniſtrum Cephej habuit / in merid. Alt. per Q. max.]

DIE 18 FEBRUARIJ, MANE.

- H. 1 7 30 Ma. / 0 55 50 Mi. } the first of Cassiopeia [Caßiop.] had merid. Alt. by the greatest Q. **22 47⅓** [Prima Caßiop. habuit / Alt. merid. / per Q. max.]
- by the Sext. Trig. 22 47 [per Sext. Trig.]
- 1 43 0 Ma. / 31 33 Mi. } the Pole Star [Stella polaris] had on the merid. Alt. by the Sext. Trig. **52 57½** [Stella polaris in / merid. habuit Alt. / per Sext. Trig.]
- by the greatest Q. 52 57 [per Q. max.]

The Knee of Cassiopeia, Alt. by the Sext. Tr. **23 58⅓** [Genu Caßiop., Alt. per Sext. Tr.]

- by the greater Q. **23 58½** [per Q. mai.]

The foot of Cassiopeia, mer. Alt. by the greatest Q. 27 30 [Pes Caßiop., Alt. mer. p. Q. max.]

The preceding wheel had Alt. 70 2 [Præcedens rota habuit Alt.]

The following wheel had Alt. **72 35½** [Sequens rota habuit Alt.]

- H. 4 31 5 Ma. / 21 10 Mi. } the bright one of the left shoulder of Ophiuchus [Ophiuchi] was in Azim. from the south toward the east 29 0, Alt. 41 17 [Lucida ſiniſtri humeri / Ophiuchi fuit in Azim. / a meridie verſus or-/tum …, Alt.]

Was again in Azim. 23 37, Alt. 42 24 [Fuit rurſus in Azim. …, Alt.]

The head of Hercules [Herculis], in Azim. from the mer. toward the east 24 14, had Alt. 47 4 [Caput Herculis in Azim. a mer. verſus / ortum … habuit Alt.]

The head of Ophiuchus, in Azim. toward the east 24 15, had Alt. **45 2½** [Caput Ophiuchi in Azim. verſus ortum / … habuit Alt.]

At the immediately following noon the greater clock was running **4½** M. fast, but the lesser 5 M. 20 S. slow. [Proxime ſequenti meridie maius ho-/rologium celerius ibat 4½ M., minus ve-/ro tardius 5 M. 20 S.]

The star next to the front and left shoulder of ♌ had merid. Alt. [Stella iuxta armum ♌ anteriorem & / ſiniſtrum habuit Alt. merid.]

- by the lesser Q. **45 33½** [per Q. minorem]

The left elbow of Cepheus had meridian Alt. by the greater Q. 29 56 35 [Siniſter cubitus Cephej habuit Alt. me-/ridianam per Q. maiorem]

The left knee of Cepheus [Genu Cephej ſiniſtrum]

- by the greater Q. 41 13 [per Q. mai.]

The tail of ♌ had merid. Alt. **51 0½** [Cauda ♌ habuit Alt. merid.]

The first of Cassiopeia [Prima Caßiopeæ]

- by the Sext. Trig. 22 47 [per Sext. Trig.]
- by the greater Q. **22 47½** [per Q. maiorem]

The first of the wing of ♍ [Prima alæ ♍]

- by the lesser Q. 35 47 [per Q. minorem]

The Pole Star, Alt. min. [Stella polaris Alt. min.]

- by the Sext. Trig. 52 57 [per Sext. Trig.]

• by the greater Q. **52 57½** [per Q. maiorem]

Spica ♍, merid. Alt. [Spica ♍ Alt. merid.]

• by the lesser Q. 25 10 [per Q. minor.]

• by the Sext. Trigon. (not good enough) 25 9 [perSext.Trigon.(non ſatis bona)]

The preceding wheel had Alt. [Præcedens rota habuit Alt.]

• by the greater Q. 70 2 [per Q. mai.]

The following wheel had Alt. [Sequens rota habuit Alt.]

• by the Quadrant, very nearly 72 36 [per Quadrantem fere]

DIE 22 FEBRUARIJ.

• H. **6 54½** by the Greater, the heel of the foot of ♊ was on the meridian. [H. … per Maius erat calx pedis ♊ / in meridiano.]

• 7 28 10 Ma., Canis Major [Canis maior] was on the merid., having Altit. very nearly 17 58 [Ma., Canis maior fuit in / merid. habens Altit. fere]

The uppermost of the Chair of Cassiopeia, Alt. [Suprema cathedræ Caßiop. Alt.]

• by the Sext. Trigon. **22 47½** [per Sext. Trigon.]

The second in the wing of ♍, immediately preceding the bright and middle one of the wing, had Alt. by the lesser Q. 35 47 [Secunda in ala ♍ proxime præcedens / lucidam et mediam alæ per Q. mino-/rem habuit Alt.]

Alt. min. of the Pole Star [Stellæ polaris Alt. min.]

• by the Sext. Tr. **52 57½** [per Sext. Tr.]

The middle and bright one of the wing of ♍ [Media et lucida alæ ♍]

• by the lesser Q. **34 59½** [per Q. min.]

• H. 2 5 41 Ma. / 3 31 20 Mi. } Spica ♍ had on the meridian alt. 25 10 [Spica ♍ in meridiano / habuit alt.]

At the immediately following noon the greater clock was running 5 M. 20 S. fast, but the lesser by 3 hours 18 M. [Proxime ſequenti meridie maius ho-/rologium celerius ibat 5 M. 20 S., mi-/nus vero 3 horis 18 M.]

DIE 23 FEBRUARIJ.

• H. 7 24 40 Canis Major was on the merid. and had Altitud. 17 57 [Canis maior fuit in merid. / habuitque Altitud.]

The first in the lead-out of the neck of Hydra [Hydræ] had on the merid. Altitud. 41 36 [Prima in eductione colli Hydræ ha-/buit in merid. Altitud.]

The bright one of Hydra had merid. Alt. 27 14 [Lucida Hydræ habuit / Alt. merid.]

The left and front knee of ♌ had Altit. **45 51½** [Genu ſiniſtrum & anterius ♌ habuit / Altit.]

The tail of ♌ had on the mer. Alt. 51 0 [Cauda ♌ habuit in mer. Alt.]

The middle and bright one of the wing of ♍ [Media & lucida alæ ♍]

• by the lesser Q. **34 58½** [per Q. min.]

• by the Sext. Trigon. **34 57½** [per Sext. Trigon.]

The bright one in the girdle of ♍ [Lucida in cingulo ♍]
- by the lesser Q. 39 47 [per Q. min.]
- by the Sext. Trigon. **39 47¼** [per Sext. Trigon.]

Merid. Alt. of Spica ♍ [Spicæ ♍ Alt. merid.]
- by the lesser Q., very nearly 25 10 [per Q. min. fere]
- by the Sext. Trigon. 25 10 [per Sext. Trigon.]

The northern of the three in the forehead of ♏, mer. Alt. 15 37 [Borealis trium in fronte ♏ / Alt. mer.]

The upper one in the hand of Ophiuchus [Ophiuchi] 31 36 [Superior in manu Ophiuchi]

The head of Ophiuchus, in Azim. from the mer. toward the east 19 7, Alt. 45 50 [Caput Ophiuchi in Azim. a mer. ver-/ſus ortum …, Alt.]

The right shoulder of Ophiuchus, in Azim. from the mer. toward the east 18 32, Alt. **37 49½** [Humerus dexter Ophiuchi in Azim. a / mer. verſus ortum …, Alt.]

[At the immediately following noon] the greater Clock was running M. 7 fast, the lesser 3 M. slow. [[Proxime ſequenti meridie] maius Ho-/rol. celerius ibat M. 7, minus tardius / 3 M.]

DIE 24 FEBRUARIJ.

- The heart of ♌ had merid. Alt. 48 3[1] [Cor ♌ habuit Alt. merid.]
- The neck of ♌ had merid. Altit 56 0[1], very nearly [Ceruix ♌ habuit Altit merid. … / fere]
- The tail of ♌ had mer. Alt. 50 59[1] [Cauda ♌ habuit Alt. mer.]
- The middle one of the wing of ♍, merid. Alt. 34 58[1] [Media alæ ♍, Alt. merid.]
- Mer. Alt. of Spica ♍ by the Q. **25 9½**[1] [Spicæ ♍ Alt. mer. per Q.]
- by the Sext. Trig. **25 9¾** [per Sext. Trig.]

The bright one of Hydra [Hydræ] had mer. Alt. **27 13½** [Lucida Hydræ habuit / Alt. mer.]
- The southern pan of ♎ 19 54 [Lanx ♎ meridionalis]
- The northern pan of ♎ **26 20½** [Lanx ♎ borealis]
- The southern claw of ♏ **9 22½** [Meridionalis chele ♏]
- The northern claw of ♏ **12 48½** [Borealis chele ♏]
- The upper one in the hand of Ophiuchus 31 34 [Superior in manu Ophiuchi]

The head of Ophiuchus, in Azim. from the south toward the east 19, Alt. 45 47 [Caput Ophiuchi in Azim. a meridie / verſus ortum …, Alt.]

The head of Ophiuchus, in Azim. 15 40. Alt. 46 11 [Caput Ophiuchi in Azim. … / Alt.]

DIE 25 FEBRUARIJ.

- *H.* **8 24′ 30″** *the southern head of* ♊ *was in Azim. from the merid. toward the west* 9 0, *and had Alt.* 62 50[1] [*Fuit meridionale caput* ♊ */ in Azim. a merid. verſus occaſum / … / habuitque Alt.*]
- *H.* **8 39′ 40″** *Aldebaran [Aldeboram] was in Azim.* 69 0 *toward the west, Alt.* 32 0 [*Fuit Aldeboram in Azim. / … verſus occaſum, Alt.*]
- *H.* **9 53′ 25″** *the bright one of Hydra crossed the merid., having Altitud.* 27 13 [*Lucida Hydræ tranſiuit / per merid. habens Altitud.*]

And from these you can find the true times and, taking account of the distance from the meridian, correct the preceding times. Moreover, I used the greater clock throughout. [*Atque ex his potes inquirere vera / tempora, et habito reſpectu diſtan-/tiæ a meridie corrigere antecedentia / tempora. Vſus autem ſum vbique ma-/iori horologio.*]

- *H.* 10 *M.* 43 *S.* 15 *by the greater clock, the middle one of the neck crossed the merid., having Alt.* 51 0[2] [*per maius horol. tran-/ſiuit media ceruicis merid. habens / Alt.*]

DIE 26 FEBRUARIJ, MANE[2].

- *The first in the wing of* ♍, *Alt.* 35 45 [*Prima in ala* ♍ *Alt.*]
- *Spica* ♍ 25 9 [*Spica* ♍]
- *The northern pan of* ♎ 26 20 [*Borealis lanx* ♎]
- *The southern claw of* ♏ 9 21 [*Meridionalis chele* ♏]
- *The northern claw of* ♏ 12 47 [*Borealis chele* ♏]
- *The hand of Ophiuchus* **31 33½** [*Manus Ophiuchi*]

The left shoulder of Ophiuchus, in Az. from the merid. toward the east 11 0, *Alt.* 43 48 [*Siniſter Humerus Ophiuchi in / Az. a merid. verſ. ort. …, Alt.*]

The head of Ophiuchus, in Az. 19 0, *Alt.* 45 50; 16 10, **46 5½** [*Caput Ophiuchi / in Az. …, Alt. … / …*]

The right shoulder of Ophiuchus, in Azim. 15 29, *Alt.* 38 32 [*Humerus dexter Ophiuchi in / Azim. …, Alt.*]

At the immediately following noon the greater clock was running 7 M. 45 S. slow. [Proxime ſequenti meridie maius ho-/rologium tardius ibat 7 M. 45 S.]

DIE 26 FEBRUARIJ, VESPERI.

For setting the clock right, the bright one of Hydra was on the meridian H. 9 *M.* 53 *S.* 40. *The heart of* ♌ *on the meridian H.* 10 *M.* 32 *S.* 25, *and the heart of* ♌ *had Alt.* **48 3½** [*Pro horologio reſtituendo fuit lucida / Hydræ in meridiano H.9 M.53 S.40. / Cor* ♌ *in meridiano H.10 M.32 S.25, / habuitque cor* ♌ *Alt.*]

At the following noon the greater clock was running at least 0 *M.* 48 *S. fast.* [*Sequenti meridie horologium ma-/ius ſaltem 0 M. 48 S. ibat celerius.*]

DIE 27 FEBRUARIJ.

H. **7 7′ 40″** Canis Major [Canis maior] was on the meridian. [H. 7 7′ 40″ Canis maior fuit in meri-/diano.]

The greater Clock was running M. 2 S. 42 slow at the following noon. [Horologium maius ſequenti meridie / tardius ibat M. 2 S. 42.]

DIE 28 FEBRUARIJ[2].

- The southern claw of ♏, Alt. **9 22½** [Merid. chele ♏, Alt.]
- The northern claw of ♏ 12 49 [Borealis chele ♏]
- The hand of Ophiuchus **31 34½** [Manus Ophiuchi]

The left shoulder of Ophiuchus, in Azim. 8 30, had Alt. 43 55 [Iniſter humerus Ophiuchi in Azim. / … habuit Alt.]

H. 7 57 11 the southern head of ♊ was on the merid. From this you can verify the times. [H.7 57 11 fuit caput meridionale ♊ in / merid. Hinc potes verificare tempora.]

The greater clock was running at least 50 seconds slow at the following noon. [*Maius horologium ſequenti meri-/die ſaltem 50 ſecundis tardius ibat.*]

DIE 1 MARTIJ, MANE[2].

When the head of Cygnus [Cygni] was at 90 G. from the south toward the east, had Alt. 33 49 [Quando Caput Cygni erat in 90 G. a / meridie verſus ortum habuit / Alt.]

1 To these altitudes 1′ is to be added. Cf. the note at the end of the day March 5. [His altitudinibus addendum eſt 1′. Cfr. annotationem ad finem diei 5 Martii.]

2 See the note at the end of the day March 5. To altitudes observed with the quadrant 1′ is to be added. [Vide annotationem ad finem diei 5 Martii. Altitudinibus per quadrantem obſervatis addendum eſt 1′.][500]

That unformed and unknown star, which makes a right angle with those mentioned above, exiſt. in Azim. from the mer. toward the east 61 0, had Altit. 32 30 [Stella illa informis et incognita, quæ / facit angulum rectum cum ſupra dic-/tis exiſt. in Azim. a mer. verſus ortum / …, habuit Altit.]

The head of Hercules [Herculis] in Azim. toward the east 31 0, Alt. 45 45 [Caput Herculis in Azim. verſus ortum / …, Alt.]

The left shoulder of Ophiuchus [Oph.], Az. 30 0, Alt. 35 25 [Humerus ſiniſter Oph. Az. …, / Alt.]

The middle of the right wing of Cygnus [cygni] at 90 G. toward the east, Alt. 45 25 [Media dextræ alæ cygni in / 90 G. verſus ortum, Alt.]

The breast of Cygnus at the same 90 G., Alt. 49 22 [Pectus Cygni in eodem 90 G., / Alt.]

The middle of the three outermost in the left wing of Cygnus, in Azim. from the north toward the east 84 22, Alt. 64 2 [Media trium extremarum in ſiniſtra / ala Cygni in Azim. a ſept. verſus or-/tum …, Alt.]

[500] PRINTED SQUARE BRACKETS enclose **Proxime ſequenti meridie** (left column, roman, line 8 of the column); no note answers them, and nothing on this side says what they mark. At every call of notes [1] and [2] the body prints the value uncorrected; the notes direct a correction of **1′** to be added.

But this observation was not very certain, because of the dawn. [Sed non erat admodum certa hæc / obſeruatio propter auroram.]

DIE 5 MARTIJ.

- H. **10 5′8″** the heart of ♌ was on the merid., having Alt. by the greater Q. **48 3½** [Cor ♌ fuit in merid. habens / Alt. per Q. maiorem]
- by the lesser Q. **48 2½** [per Q. minorem]

Spica ♍ had merid. Alt. [Spica ♍ habuit Alt. merid.]

- by the greater Q. 25 10 5 [per Q. maior.]
- by the lesser Q. 25 9 0 [per Q. min.]

Lyra had at 90 G. from the north toward the south Alt. **48 41½** [Lyra habuit in 90 G. a ſept. verſus me-/ridiem Alt.]

The head of Cygnus at 90 G. had Alt. **40 0½** [Caput Cygni in 90 G. habuit Alt.]

The right shoulder of Hercules in Azim. from the mer. toward the east 30 0, Alt. 53 51; 26 34, 54 34 [Dexter humerus Herculis in Azim. a / mer. verſus ortum …, Alt. … / …]

The northern pan of ♎ had Alt. [Lanx ♎ borealis habuit Alt.]

- by the greater Q. **26 20¾** [per Q. maiorem]

The left shoulder of Ophiuchus, Az. 26 48, Alt. 41 36; 23 52, **42 5⅔** [Siniſter hum. Oph. Az. …, Alt. … / …]

The head of Hercules in Az. 27 43, Alt. 46 26 [Caput Herculis in Az. …, Alt.]

The middle one between the claws of ♏, Alt. by the greater Q. **12 37½** [Media inter chelas ♏, / Alt. per Q. mai.]

The upper one in the left hand of Ophiuchus, Alt. by the greater Q. 31 35 [Superior in ſiniſtra manu Ophiuchi, / Alt. per Q. mai.]

The head of Hercules in Azim. 24 5, Alt. 47 3 [Caput Herculis in Azim. …, / Alt.]

The right shoulder of Hercules, Alt. by the greater Q. **56 33′25″** [Dexter hum. Herc., / Alt. per Q. mai.]

The middle of the right wing of Cygnus at 90 G. from the ascendant had Alt. 40 21 [Media dextræ alæ Cygni in 90 G. ab / aſcendente habuit Alt.]

The breast of Cygnus at 90 G. from the ascendant, Alt. **49 21¼** [Pectus cygni in 90 G. ab aſcendente, / Alt.]

The middle of the three outermost in the left wing of Cygnus, in Az. from the north toward the east 84 46, Alt. 65 7 [Media trium extremarum in ſiniſtra / ala Cygni in Az. a ſept. verſus ortum / …, Alt.]

The head of Ophiuchus in Azim. 9 42, Alt. 46 27 [Caput Ophiuchi in Azim. …, / Alt.]

These two last observations are not certain enough, because of the morning twilight. [Hæ duæ poſteriores obſeruationes / non ſunt ſatis certæ propter diluculum / matutinum.]

Up to this day 1 M.[1] is to be added. [Ad hunc usque diem addendum eſt / 1 M.[1].]

DIE 9 MARTIJ.

Canis Major [Canis maior] had merid. Alt. **17 55½** [Canis maior habuit Alt. merid.]

H. 7 24 27 the merid. Alt. of Canis Minor [Canis minoris] **40 20½** [Canis minoris / Alt. merid.]

- 9 53 43 the heart of ♌ was on the merid., having Alt. by the lesser Q. **48 3½** [Cor ♌ fuit in merid. habens / Alt. per Q. minorem]
- by the greater Q. **48 3½** [per Q. maiorem]

The head of Ophiuchus had at 90 G. Alt. **15 42½** [Caput Ophiuchi habuit in 90 G. / Alt.]

But it was not made certain enough, the air of the chasma being lit up and ☾ shining with full light. [Sed non ſatis certa facta eſt aere / chasmatis illuminato et lucente ☾ ple-/no lumine.]

Spica ♍ on the merid., Alt. [Spica ♍ in merid. Alt.]

- by the lesser Q. 25 10, very nearly [per Q. minor. … fere]
- by the greatest Q. 25 10 [per Q. max.]

Lyra at 90 G. had Alt. **48 39½** [Lyra in 90 G. habuit Alt.]

At the immediately following noon the greater clock was running **10′35″** fast, the Sun shining very dimly through clouds. [Proxime ſequenti meridie maius ho-/rologium celerius ibat …, ſole ad-/modum obſcure per nubes ſplendente.]

DIE 14 MARTIJ.

H. **11 14′ 30″** by the max. the heart of ♌ crossed the meridian, having Alt. **51 0½** [per max. Cor ♌ tranſiuit / meridianum habens Alt.]

The head of Ophiuchus at 90 G., Alt. 15 46 [Caput Ophiuchi in 90 G. Alt.]

H. **12 49′ 27″** Spica ♍ on the mer., Alt. 25 10 [Spica ♍ in mer., / Alt.]

Lyra had at 90 G. Altitude 48 39 [Lyra habuit in 90 G. Altitudinem]

The head of Cygnus had at 90 G. Alt. 40 1 [Caput Cygni habuit in 90 G. Alt.]

The breast of Cygnus had at 90 G. Alt. **49 24½** [Pectus Cygni habuit in 90 G. Alt.]

At the immediately following noon the greater Clock was running M. 1 S. 41 slow. [Proxime ſequenti meridie Horolo-/gium maius tardius ibat M. 1 S. 41.]

DIE 15 MARTIJ.

H. **9 38′ 30″** the neck of ♌ had on the mer. Alt. **56 0½** [Ceruix ♌ habuit in mer. / Alt.]

From this you can verify the preceding times[2]. [Hinc potes verificare præce-dentia / tempora[2].]

The head of Hercules had at 90 G. Alt. 18 14 [Caput Herculis in 90 G. habuit Alt.]

1 That is, to altitudes observed with the lesser Quadrant from February 24. [Id eſt, altitudinibus per Quadrantem minorem a die 24 Februarii obſervatis.]

2 Namely, the times of the observations of the planets made this evening. [Scilicet tempora obſervationum planetarum hoc vesperi inſtitutarum.][501]

The head of Ophiuchus [Ophiuchi] had at 90 G. Alt. **15 44½** [Caput Ophiuchi in 90 G. habuit / Alt.]

Spica ♍ had on the merid. Alt. 25 10 [Spica ♍ habuit in merid. Alt.]

Lyra at 90 G. had Alt. 48 42 [Lyra in 90 G. habuit Alt.]

At the following noon the greater Clock was running M. 1 S. 35 slow. [Sequenti meridie Horologium ma-/ius tardius ibat M. 1 S. 35.]

DIE 16 MARTIJ.

H. **9 34′10″** the neck of ♌ on the mer., Alt. 56 1 [Ceruix ♌ in mer., / Alt.]

DIE 20 MARTIJ, MANE.

The head of Cygnus [Cygni] at 90 G. from the north toward the east, Alt. **40 1⅛** [Caput Cygni in 90 G. a ſept. verſus or-/tum, Alt.]

The more southern of the pans of Libra [libræ] had on the merid. Alt. by the greater Q. 19 53 [Auſtralior lancium libræ habuit in me-/rid. Alt. per Q. mai.]

The bright one of Lyra at 90 G., Alt. 48 41 [Lucida Lyræ in 90 G. Alt.]

The more northern of the pans of ♎, merid. Alt. [Borealior lancium ♎ Alt. merid.]

• by the greater Q. 26 20 [per Q. maiorem]

The middle of the three in the forehead of ♏, had in the south Alt. by the greater Q. **12 48⅓** [Media trium in fronte ♏, in meridie / habuit Alt. per Q. maiorem]

The more northern claw of ♏, had Alt. [Borealior chele ♏, habuit Alt.]

• by the greater Q. **15 33¾** [per Q. mai.]

Of the upper one in the hand of Ophiuchus, Alt. by the greater Q. **31 33⅔** [Superioris in manu Ophiuchi / Alt. per Q. mai.]

The tail of Aquila [Aquilæ] in Azim. 53 0 from the south toward the east, Alt. 24 50 [Cauda Aquilæ in Azim. … a meri-/die verſus ortum, Alt.]

The right shoulder of Hercules [Herculis] in the south, Alt. by the greater Q. **56 32¼** [Humerus Herculis dexter in meridie, / Alt. per Q. mai.]

The breast of Cygnus had at 90 G. Alt. 49 24 [Pectus Cygni in 90 G. habuit Alt.]

The greater Clock was running slow over the space of two days by 10 minutes, 35 seconds. [Horologium maius tardius ibat per / ſpatium duorum dierum minutis 10, / 35 ſecundis.]

[501] Instructions to correct a value: none in the notes themselves; the instruction **addendum eſt 1 M.** stands in the composed text.

The hip of ♌ had on the meridian Alt. [Coxa ♌ habuit in meridiano Alt.]

• by the greater Q. 56 52 [per Q. mai.]

H. **10 58′50″** the tail of ♌ crossed the merid. by the greater Quad. [Cauda ♌ tranſiuit merid. / per Quad. maiorem.]

The head of Hercules had at 90 G. Alt. 18 9 [Caput Herculis in 90 G. habuit / Alt.]

The head of Ophiuchus had at 90 G. Alt. 15 42 [Caput Ophiuchi in 90 G. habuit / Alt.]

DIE 21 MARTIJ, MANE.

• H. **0 34′39″** the Alt. of Spica ♍ on the meridian by the greater Q. 25 10 [Spicæ ♍ in meridiano / Alt. per Q. maiorem]

• by the lesser Q. 25 10 [per Q. minorem]

The more southern of the pans of ♎ [Auſtralior lancium ♎]

• by the lesser Q. **19 53¼** [per Q. min.]

The head of Cygnus had at 90 G. Alt. 33 27 [Caput Cygni in 90 G. habuit Alt.]

The middle and bright one of the right wing of Cygnus at 90 G., Alt. 40 22 [Media et lucida dextræ alæ Cygni in / 90 G., Alt.]

The right shoulder of Hercules had Alt. [Humerus dexter Herculis habuit Alt.]

• by the greater Q. **56 33¼** [per Q. maiorem]

The breast of Cygnus had at 90 G. Alt. 49 23 [Pectus Cygni in 90 G. habuit Alt.]

The left shoulder of Ophiuchus [Humerus ſiniſter Ophiuchi]

• by the greater Q. **44 10¼** [per Q. maior.]

The middle of the outermost in the left wing of Cygnus, in Azim. from the north toward the west 86 0, had Alt. 66 27 [Media extremarum in ſiniſtra ala Cyg-/ni in Azim. a ſept. verſ. occaſ. … / habuit Alt.]

The right shoulder of Ophiuchus in Azim. from the merid. toward the west 8 15, Alt. 38 40 [Humerus dexter Ophiuchi in Azim. a / merid. verſ. occaſ. …, Alt.]

At the following noon the greater clock was running 13 M. 10 S. fast. [Sequenti meridie horologium maius / celerius ibat 13 M. 10 S.]

DIE 22 MARTIJ.

The head of Hercules at 90 G. from the north toward the east, Alt. 18 10 [Caput Herculis in 90 G. a ſept. verſus / ort., Alt.]

The head of Ophiuchus at the same 90 G. 15 41 [Caput Ophiuchi in eodem 90 G.]

Lyra at the same 90 G. 48 40 [Lyra in eodem 90 G.]

DIE 23 MARTIJ.

The left shoulder of Ophiuchus at 90 G., Alt. 12 19 [Humerus ſiniſter Oph. in 90 G., / Alt.]

The right shoulder of Hercules at 90 G. 27 30 [Humerus dexter Herc. in 90 G.]

The head of Hercules at 90 G., Alt. 18 11 [Caput Herculis in 90 G., Alt.]

The head of Ophiuchus at 90 G., Alt. 15 41 [Caput Ophiuchi in 90 G., Alt.]

DIE 26 MARTIJ.

The left shoulder of Ophiuchus 90 G. 12 18 [Humerus ſiniſter Ophiuchi 90 G.]

The right shoulder of Hercules at 90 G. 27 30 [Humerus dexter Herculis / in 90 G.]

- H. **10 33′ 31″** the tail of ♌ was on the merid., having Alt. by the lesser Q. 51 1 [Cauda ♌ fuit in merid. / habens Alt. per Q. minorem]
- by the greatest Q. 51 0 [per Q. max.]

The head of Hercules at 90 G. **18 11½** [Caput Herculis in 90 G.]

The head of Ophiuchus at 90 G. **15 41½** [Caput Ophiuchi in 90 G.]

The right shoulder of Ophiuchus in Azim. from the merid. toward the east 80 0, Alt. 12 44[1] [Humerus Ophiuchi dexter in Azim. a / merid. verſus ortum …, Alt.]

The unformed star making a right angle with the tail of the Vulture [Vulturis] and the mouth of Cygnus, in Azim. 80 0, Alt. 10 44 [Stella informis conſtituens angulum / rectum cum cauda Vulturis et ore / Cygni in Azim. …, Alt.]

The head of Cygnus at 90 G. orient., Alt. 33 27 [Caput Cygni in 90 G. orient. Alt.]

The upper one in the left hand of Ophiuchus had on the merid. Altit. **31 33½** [Superior in ſiniſtra manu Ophiuchi ha-/buit in merid. Altit.]

The right shoulder of Hercules on the merid. 56 33 [Dexter humerus Herculis / in merid.]

The breast of Cygnus at 90 G., Alt. 49 25 [Pectus Cygni in 90 G. Alt.]

1 Thus in the codex. But according to our computation it ought to be **12° 34′**. [Sic in codice. Sed ſecundum noſtram ſupputationem debet eße 12° 34′.][502]

The left shoulder of Ophiuchus [Oph.] on the merid., Alt. 44 11 [Humerus ſiniſter Oph. in merid. / Alt.]

The middle of the three outermost in the left wing of Cygnus [Cygni], in Azim. from the north toward the east 85 0, Alt. 65 48 [Media trium extremarum in ſiniſtra / ala Cygni in Azim. a ſept. verſus or-/tum … Alt.]

The head of Hercules [Herculis] on the merid., Alt. **49 1½** [Caput Herculis in merid. Alt.]

[502] The body prints 12 44, and the note states that by Dreyer's computation the value ought to be **12° 34′**.

This observation is not good enough because of the nearness of the dawn. [Hæc obſeruatio non ſatis bona prop-/ter vicinitatem auroræ.]

DIE 29 MARTIJ, MANE.

- H. **0 2′ 29″** Spica ♍ was on the merid., having Alt. by the lesser Q. 25 10 [Spica ♍ fuit in merid. ha-/bens Alt. per Q. minorem]
- by the greater Q. **25 10¼** [per Q. maiorem]

The more southern of the pans of ♎ [Auſtralior lancium ♎]

- by the greater Q. **19 53¼** [per Q. maior.]

The bright one of Lyra [Lyræ] at 90 G. had Alt. **48 41½** [Lyræ lucida in 90 G. habuit / Alt.]

Not good enough because of passing chasmata. [Non ſatis bona propter transeuntia / chasmata.]

The more northern of the pans of ♎ [Borealior lancium ♎]

- by the greater Q. 26 20 [per Q. maiorem]

The more northern claw of ♏, by the greater Q. **15 33½** [Borealior chele ♏, per Q. maior.]

The right shoulder of Hercules in the south [Humerus dexter Herculis in meridie]

- by the greater Q. **56 32½** [per Q. maiorem]

VESPERI.

The star in the belly of ♌ had mer. Alt. [Stella in ventre ♌ habuit Alt. mer.]

- by the greatest Q. **45 30½** [per Q. max.]

The star in the hind legs of ♌, Alt. **46 55½** [Stella in poſterioribus cruribus ♌, / Alt.]

H. 10 22 0 the tail of ♌ had on the mer. Alt. 51 1 [cauda ♌ habuit / in mer. Alt.]

DIE 30 MARTIJ, MANE.

Spica ♍ had mer. Alt. [Spica ♍ habuit Alt. mer.]

- by the greatest Q. **25 9¾** [p. Q. max.]
- by the lesser Q. 25 11 [per Q. minorem]

The more southern of the three in the train of ♍ had Alt. by the greater Q. **25 49½** [Auſtralior trium in ſyrmate ♍ habuit / Alt. per Q. maiorem]

The more northern of the same [Borealior earundem]

- by the greater Q. **33 47⅔** [per Q. maiorem]

The southern pan of ♎, mer. Alt. [Auſtralis lanx ♎ Alt. mer.]

- by the greater Q. 19 53 [p. Q. mai.]

The bright one of Lyra at 90 G. had Alt. **48 42½** [Lucida Lyræ in 90 G. habuit / Alt.]

Of the northern pan of ♎, Alt. [Borealis lancis ♎ Alt.]

- by the greatest Q. 26 20 [per Q. max.]

The one next following this in the claw of ♏ **25 21½** [Proxime ſequens hanc in / forcipe ♏]

The star in the second joint of the northern claw by the greatest Q. 20 48 [Stella in ſecunda iunctura Borealis for-/cipis per Q. maximum]

The more southern of the three bright ones in the forehead of ♏ [Auſtralior trium lucidarum in fronte ♏]

• by the greater Q. 9 21 [per Q. maiorem]

The middle one of the same [Media earundem]

• by the greater Q. **12 48⅔** [per Q. maiorem]

The more northern of the same [Borealior earundem]

• by the greater Q. **15 33½** [per Q. maior.]

The hand of Ophiuchus **31 33⅛** [Manus Ophiuchi]

The middle one of the right wing of Cygnus at 90 G. 40 29 [Media dextræ alæ cygni in 90 G.]

The right shoulder of Hercules on the mer. [Humerus dexter Herculis in mer.]

• by the greater Q. 56 33 [per Q. mai.]

The breast of Cygnus at 90 G. 49 26 [Pectus Cygni in 90 G.]

The left shoulder of Ophiuchus [Humerus ſiniſter Ophiuchi]

• by the greater Q. 44 11 [per Q. mai.]

The head of Hercules on the mer. [Caput Herculis in mer.]

• by the greater Q. 49 3 [per Q. maior.]

DIE 2 APRILIS.

H. 8 21 50 the heart of ♌ on the meridian. [H.8 21 50 cor ♌ in meridiano.]

DIE 3 APRILIS, MANE.

The left shoulder of Ophiuchus on the meridian had Alt. by the greater Q. **44 11⅜** [Humerus ſiniſter Ophiuchi in meridi-/ano habuit Alt. per Q. maiorem]

H. **3 30′** the head of Hercules had mer. Alt. by the greater Q. 49 2 [Caput Herculis habuit Alt. / mer. per Q. maiorem]

VESPERI.

8 17′46″ the heart of ♌ on the merid., Alt. 48 4 [Cor ♌ in merid., Alt.]

DIE 7 APRILIS, MANE.

The breast of Cygnus had at 90 G. Alt. 49 26 [Pectus Cygni habuit in 90 G. / Alt.]

The left shoulder of Ophiuchus had mer. Alt. **44 11½** [Humerus ſin. Ophi-uchi habuit / Alt. mer.]

DIE 13 APRILIS.

The merid. Alt. of the tail of ♌ [Alt. merid. caudæ ♌]

- by the greatest Q. 51 0 [per Q. max.]
- by the greater Q. **51 0½** [per Q. maiorem]

DIE 16 APRILIS.

The middle one of the wing of ♍ had mer. Alt. [Media alæ ♍ habuit Alt. mer.]

- by the greatest Q. **34 57¾** [per Q. max.]
- by the lesser Q. 34 58 [per Q. minorem]

The mer. Alt. of Spica ♍ by the greatest Q. **25 10¼** [Spicæ ♍ Alt. mer. per Q. max.]

- by the lesser Q., at most, 25 9 [per Q. minorem, ad ſummum]

DIE 5 OCTOBRIS.

The mouth of Pegasus [Pegaſi] had in the merid. Alt. [Os Pegaſi habuit in merid. Alt.]

- by the mural Q. **42 7½** [per Q. muralem]

The right shoulder of Aquarius [Aquarij], mer. Alt. 31 49 [Humerus dexter Aquarij, / Alt. mer.]

The head of Pegasus [Pegaſi], mer. Alt. 38 18 [Caput Pegaſi, Alt. mer.]

The bright one of the neck, mer. Alt. **42 49½** [Lucida colli, Alt. mer.]

The first in the Wing of Pegasus, mer. Alt. **47 8¾** [Prima in Ala Pegaſi, Alt. mer.]

Not certain enough because of scattered clouds. [Non ſatis certa propter raras nubes.]

DIE 4 NOUEMBRIS.

The bright one of Cetus [Ceti] (number 22) had merid. Alt. by the lesser Q. 13 53 [Lucida Ceti (numero 22) habuit Alt. / merid. per Q. minorem]

DIE 23 NOUEMBRIS.

H. **5 49′ 23″** the preceding one of the two small ones in the breast of Pegasus was on the merid., having Alt. by the lesser Q. 55 26 [præcedens duarum par-/uarum in pectore Pegaſi fuit in merid. / habens Alt. per Q. min.]

H. **5 52′20″** the following one of those two in the breast of Pegasus had merid. Alt. **56 30½** [Sequens duarum illarum / in pectore Pegaſi habuit / Alt. merid.]

DIE 24 NOUEMBRIS.

H. **5 50′ 5″** the preceding one of the two small ones in the breast of Pegasus was on the merid., giving Alt. 55 30 [fuit præcedens duarum / paruarum in pectore Pegaſi in merid. / referens Alt.]

5 53 27 the hinder of the two of the breast had merid. Alt. 56 30 [poſterior duarum pectoris / habuit Alt. merid.]

DIE 25 NOUEMBRIS.

H. 1 56 30 Canis Major [Canis maior] crossed the meridian, having Altit. 17 50 [tranſiuit Canis maior me-/ridianum habens Altit.]

II. Observations of the Distances of the Fixed Stars [II. OBSERUATIONES DISTANTIARUM AFFIXARUM.]

DIE 11 JANUARIJ.

The eye of ♉ *and the brighter one in the head of* ♈, *by the biform Sextant* 35 32 [*Oculus* ♉ *et lucidior in capite* ♈ *per / Sextantem biformem*]

The eye of ♉ *and the heel of the upper foot of* ♊ 25 54 [*Oculus* ♉ *et calx pedis ſuperioris* ♊]

DIE 12 JANUARIJ.

The distance of the two in the head, or lower jaw, of Cetus, with the Radius, twice 4 42 [*Diſtantia duarum in capite ſeu man-/dibula inferiori Ceti, per Radium bis*]

From this you can look into the longitude and latitude of the hinder one in the lower jaw, recently observed, so as to verify the time from it as well, since its altitude is given, and its distance from this one, which was known earlier by means of other stars. [*Hinc potes rimari longitudinem et / latitudinem poſterioris in inferiori / mandibula nuper obſeruatæ, pro ve-/rificando ab ipſa etiam tempore, cum / detur ipſius altitudo et diſtantia ab / hac, quæ per alias ſtellas prius erat / cognita.*]

With the biform Sextant. [*Per biformem Sextantem.*]

The distance of the eye of ♉ *and the firſt star of* ♈, *in a very clear sky,* **38 39½** *twice, good.* [*Diſtantia oculi* ♉ *et primæ ſtellæ* ♈, / *cælo ſereniſſimo … bis, bona.*]

Between the eye of ♉ *and the head of* ♈ 35 32 [*Inter oculum* ♉ *et caput* ♈]

Between the eye of ♉ *and super. of the foot of* ♊ **25 53½** *twice.* [*Inter oculum* ♉ *et ſuper. pedis* ♊ / *… bis.*]

DIE 13 JANUARIJ, MANE.

By the biform Sextant they were distant: [Per Sextantem biformem diſtabant.]

- Spica and the neck of ♌ **55 12′** [Spica et ceruix ♌]
- The tail of ♌ and Spica ♍ 35 2 [Cauda ♌ et Spica ♍]
- Spica ♍ and the heart of ♏ **45 52½** [Spica ♍ et cor ♏]
- Spica ♍ and the southern Claw 21 23 [Spica ♍ et Chele auſtral.]

The head of Ophiuchus [Ophiuchi] and the northern Claw **40 41½** [Caput Ophiuchi et Chele / boreal.]

This is not good because of the nearness of the dawn. [Hæc non eſt bona propter vicinita-/tem Auroræ.]

DIE 17 JANUARIJ.

With the rectified Trigonic Sextant the following distances were taken. [Per Sextantem Trigonicum rectifi-/catum captæ ſunt diſtantiæ ſequentes.]

- The firſt of ♈ and the eye of ♉ **38 37½** [Prima ♈ et oculus ♉]

- The head of ♈ and the eye of ♉ 35 32 [Caput ♈ et oculus ♉]
- The bright one of the jaw of Cetus and the bright shoulder of Orion [Orionis] 43 8 [Lucida mandibulæ Ceti et lucidus hu-/merus Orionis]
- The same repeated **43 8½** [Eadem repetita]
- The same taken a third time 43 8 [Eadem capta tertio]
- *Otherwise, by the other 43 7* [*Alias per alterum*]
- *Between the eye of* ♉ *and the heel of the foot of* ♊ *25 54* [*Inter oculum* ♉ *et calcem / pedis* ♊]
- *But repeated again twice, most precisely (trust this one)* ***25 54½*** [*Sed denuo bis repetita exquiſitiſſime / (fide huic)*]
- *The lower head of* ♊ *and the heel of the foot* ***19 28½*** [*Inferius caput* ♊ *et calx. pedis*]
- *but on repeating again we found 19 28* [*ſed denuo repetendo inuenimus*]
- *Between the southern head of* ♊ *and the eye of* ♉ ***45 7⅓*** [*Inter meridionale caput* ♊ */ et oculum* ♉]
- *on repeating again, good enough 45 7* [*denuo repetendo, ſatis bona*]
- *Between the heart of* ♌ *and the heel of the foot* ***54 35½*** [*Inter cor* ♌ *et calcem pedis*]
- *on repeating again we found 54 36* [*denuo repetendo inuenimus*]
- *but on repeating again, exactly, trust this one* ***54 35½*** [*ſed denuo repetendo, exacte, / fide huic*]

Between the heart of ♌ and the southern head of ♊ 37 2 [Inter cor ♌ et meridionale / caput ♊]

Repetition of the same **37 1¼**, or ⅓ at most [Repetitio eiusdem … / aut ⅓ ad ſummum]

A third time 37 2 [Tertio]

A fourth time 37 1 [Quarto]

Between the heart and the tail of ♌ 24 40, nearly [Inter cor et caudam ♌ … / fere]

The same repeated **24 39½** [Eadem repetita]

Between Spica and the head of Ophiuchus [Ophiuchi] 36 14 [Inter Spicam et caput / Ophiuchi]

II 36 15 [II]

With the other sight placed in partibus 500 000. [*Poſito altero pinnacidio in partibus / 500 000.*]

DIE 19 JANUARIJ.

Between the first of ♈ and the eye of ♉, good 38 38 [Inter primam ♈ et oculum ♉, / bona]

Between the head of ♈ and the eye of ♉, good **35 32⅛** [Inter caput ♈ et oculum ♉, / bona]

Between the end of the foot of ♊ *and Aldeb., doubtful 24 4¹* [*Inter extremam pedis* ♊ *et / Aldeb., dubia*]

Between the heel and the eye of ♉ *25 53* [*Inter calcem et oculum* ♉]

25 54²
With the △ Sextant. [*Per △ Sextantem.*]
Between the heart of ♌ and the end of the toe of the foot of ♊ ***56 26½****, twice* [*Inter cor ♌ et extremam digiti / pedis ♊ … / bis*]
the heel of the foot of ♊ 54 35, twice [*calcem pedis ♊ … / bis*]
the southern ♊ 37 1 [*meridionalem ♊*]
the tail of ♌ ***24 39½*** [*caudam ♌*]
II ***24 39¾*** [*II*]

DIE 20 JANUARIJ, MANE.

Between the heart of ♌ and Spica ♍ 54 5 [Inter cor ♌ et Spicam ♍]
II **54 2½** [II]
Between the tail of ♌ and Spica **35 3½** [Inter caudam ♌ et Spicam]
II 35 2 [II]
III 35 3, nearly [III … / fere]

VESPERI.

Between the eye of ♉ and the end in the foot of ♊, with the Trig. Sext. 24 4 [*Inter oculum ♉ et extremam / in pede ♊ per Trig. Sext.*]
on repeating again it appeared 24 4 [*denuo repetendo viſa eſt*]
Between the eye of ♉ and the heel of the foot of ♊ 25 54 [Inter Oculum ♉ / et calcem pedis ♊]
the same repeated **25 54¼** [eadem repetita]
The end of the foot and the merid. head of ♊ **21 14¼** [Extrema pedis et / merid. caput ♊]
repeated 21 14 [repetita]
Between the heart of ♌ and the southern head of ♊ 37 1, nearly [Inter cor ♌ et meridionale / caput ♊ … / fere]
the same distance taken again 37 1 [eadem diſtantia iterum capta]

DIE 21 JANUARIJ.

Between the eye of ♉ and the end of the lower foot of ♊ 24 4 [*Inter oculum ♉ et extremam / pedis inferioris ♊*]
Between the eye of ♉ and the heel of the lower ♊ 25 55 [*Inter oculum ♉ et calcem / inferioris ♊*]
Between the southern head of ♊ and the heart of ♌ 37 1 [Inter meridionale caput ♊ / et cor ♌]
Between the neck of ♌ and the merid. head of ♊ 36 3 [Inter ceruicem ♌ et merid. / caput ♊]
the same a second time 36 3 [eadem ſecundo]
taken a third time 36 3 [tertio accepta]
Between the heart and the tail of ♌ 24 40, nearly [Inter cor et caudam ♌ … / fere]
Between Spica ♍ and the heart of ♌ **54 3½** [Inter Spicam ♍ et cor ♌]

the same repeated 54 2 [eadem repetita]

The former of these is not good because of an error of the sight. Again the same was found, 54 2. [Prior harum non eſt bona propter / pinnacidij errorem. Adhuc eadem in-/venta eſt]

Spica ♍ and the more northern one in the left hand of Ophiuchus **42 34½** [Spica ♍ et borealior in ſiniſtra manu / Ophiuchi]

The same repeated 42 34 [Eadem repetita]

Repeated a third time 42 33 [Tertio repetita]

Repeated a fourth time 42 33 [Quarto repetita]

good [bo-/næ]

*Between the more northern one in the hand of Ophiuchus and the Vulture [Vulturem], once **55 16½** [Inter borealiorem in manu Ophiuchi / et Vulturem, ſemel]*

Between Spica ♍ and the Vulture, with the other sight placed in 500000 [Inter Spicam ♍ et Vulturem poſito / altero pinnacidio in / 500000]

- *I 53 34 [I]*
- *II **53 34½** [II]*
- *good [bo-/næ]*
- *III 53 35 [III]*[503]

Diagram. A line figure at the foot of the right column, at the left of the column, with the narrowed block of small type beside it. From an UNLETTERED apex at the top, two straight lines run down to the left and right to the points E and B, and a vertical straight line runs from the apex down to F. An arc, convex downward, joins E, F and B. On the vertical line stand, from the top, A, C and D. From A straight lines run to E and to B. From C a horizontal straight line runs to the right to B; from D a horizontal straight line runs to the left to E. SIX letters stand on the figure; the apex carries no letter.

- A (on the vertical line, above C, where the lines to E and B meet it): A
- B (right end of the arc and of the right-hand side): B
- C (on the vertical line, at the left end of the horizontal line to B): C
- D (on the vertical line, at the right end of the horizontal line to E): D
- E (left end of the arc and of the left-hand side): E
- F (foot of the vertical line, on the arc): F

Examination of the distance between the Vulture and Spica, with the sight placed in 500000, the middle place.[3] [Examinatio diſtantiæ / inter Vulturem et Spi-/cam, poſito pinnacidio / in 500000, medio loco.]

The observation gave [Obſeruatio dedit]

- BE **53 34½**
- Therefore FB 30 0 [Ergo]
- FE will be **23 34½** [Erit]

[503]BRACES, p. 191: TWO printed braces, both in the right column. The first joins Tertio repetita 42 33 and Quarto repetita 42 33 (roman); the second joins I 53 34 and II **53 34½** (italic). To the right of each stands the word bo- / næ, divided over the two lines it joins.

Let us first seek the size of the angle FAB in this way. [Inquiramus primo quan-/titatem anguli FAB in / hunc modum.]

The sine of FB is CB, 5000000 [Sinus FB eſt CB, 5000000]

[1] Tycho added: *so on the following day.* [Tycho adſcripſit: *ſic die ſequente.*]

[2] Tycho added: *at least* **53½**. [Tycho adſcripſit: *ſaltem 53½.*]

[3] From codex V. [E codice V.][504]

The versed sine or sagitta CF is 1339746. This, taken from AF, which is 5000000, leaves the side AC, 3660254. Thus, by 9 of Reinhold, in the right-angled triangle CAB two sides about the right are given, CB 5000000, AC 3660254. Thus the angle CAB is given. There results 13662542, a number which in the fecund table gives the angle FAB **53ᵍ 47ᵐ 55ˢ**. [Sinus uerſus ſeu ſagitta CF eſt 1339746. Hæc ablata / ab AF quæ eſt 5000000 relinquit latus AC, 3660254. / Dantur itaque per 9 Reinholdi in triangulo Rectangulo / CAB duo latera circa rectum CB 5000000, AC 3660254. / Datur itaque angulus CAB. Prouenit 13662542, qui / numerus in tabula fæcunda dat angulum FAB 53ᵍ / 47ᵐ 55ˢ.]

In the same way, on the other side, the subtense of the arc EF is given, 39995, as ED, and its sagitta or versed sine DF is 8346. Therefore AD will be partium nearly 41634. Multiplying ED, then, by the whole, there results 3999500000; and dividing again by AD there result 96063, to which correspond in the fecund Canon Gradus 43 M. 51, representing the angle EAF. If this, then, is added to the angle FAB found earlier, the whole EAB results, **97° 39′**, the distance of Spica and the Vulture [Vulturis]. [Pari ratione in altera parte datur ſubtendens ar-/cum EF 39995 tanquam ED, et huius ſagitta ſeu / ſinus verſus DF eſt 8346. Quare AD erit partium fere / 41634. Multiplicando itaque ED per totum prouenit / 3999500000, et diuidendo rurſus per AD proueniunt / 96063, quibus reſpondent in Canone fæcundo Gradus / 43 M. 51, repræſentantes angulum EAF. Hic itaque / ſi addatur ad angulum FAB prius inuentum prouenit / totus EAB 97° 39′, diſtantia Spicæ et Vulturis.]

In the year 83 we observed the same distance directly with the instrument of 120 grad., and five times we found it **97ᵖ 40ᵐ**. *But each falls short by* **10′**. [*Anno 83 eandem diſtantiam immediate obſer-/uauimus per inſtrumentum 120 grad. et inuenimus / quinquies eam 97ᵖ 40ᵐ. Sed vtraque 10′ deficit.*]

DIE 22 JANUARIJ.

The eye of ♉ and the end of the foot of ♊ 24 4 [Oculus ♉ et extrema pedis ♊]

The same distance taken again **24 3½** [Eadem diſtantia denuo capta]

The eye of ♉ and the heel of the foot of ♊ **25 54½** [Oculus ♉ et calx pedis ♊]

The same distance repeated **25 54½** [Eadem diſtantia iterata]

The end of the foot of ♊ and the merid. head **21 12½** [Extrema pedis ♊ et / merid. caput]

[504] WHERE A PRINTED FORM STANDS AGAINST A NOTE: at [2], the line prints 25 54, and the note records the added words ſaltem 53½.

The same distance taken a second time **21 12½** [Eadem diſtantia ſecundo capta]

The heel of the foot and the merid. head of ♊ **19 28¼** [Calx pedis et merid. caput ♊]

The same again 19 28 [Eadem denuo]

Between the merid. head of ♊ and the heart of ♌ **37 0½**, twice [Inter merid. caput ♊ et cor ♌ … / bis]

DIE 23 JANUARIJ, MANE.

Between the heart of ♌ and Spica **54 2¼** [Inter cor ♌ et ſpicam]

repeated **54 2¼** [repetita]

good [bo-/næ]

Between Spica and the Vulture [vulturem], with the sight placed in the ſtat. place nearest the arc, **53 33½** [Inter Spicam et vulturem, poſito pin-/nacidio in loco ſtat. proximo / arcui]

The same repeated **53 33½** [Eadem repetita]

Afterwards we observed twice 53 34 [Poſtea bis obſeruauimus]

But it was day, so the earlier ones are more certain. [*Sed erat dies, vnde priores ſunt / certiores.*]

Between Spica and the upper one in the hand of Ophiuchus [Ophiuchi] **42 32¼** [Inter Spicam et ſuperiorem in manu / Ophiuchi]

Repeating the same again **42 32¼** [Denuo repetendo eandem]

good [bo-/næ]

Between the most northern of the three in the forehead of Scorpius [Scorpij] and Spica **39 26½** [Inter borealiſſimam trium in fronte / Scorpij et Spicam]

Between the upper and brighter one in the hand of Ophiuchus and the Vulture 55 17, good [*Inter ſuperiorem et lucidiorem in / manu Ophiuchi et Vulturem … / bona*]

DIE 9 FEBRUARIJ.

After the trigonic Sextant was precisely rectified. [Poſt exquiſite rectificatum trigoni-/cum Sextantem.]

Between the eye of ♉ and the heel of the foot of ♊ **25 53⅓** [Inter oculum ♉ et calcem / pedis ♊]

or at most **25 53½** [aut ad ſummum]

The observations immediately following were made in the brightness of the moon. [Obſeruationes proxime ſequentes in / ſplendore lunæ ſunt factæ.]

Between the eye of ♉ and the luc. hum. of Orion [Orionis] 21 23 [Inter Oculum ♉ et / luc. hum. Orionis]

Between the eye of ♉ and the end of the foot of ♊ **24 1⅓** [Inter oculum ♉ et / extremam pedis ♊]

Between the eye of ♉ and the luc. hum. of Orion 21 23 [Inter oculum ♉ et / luc. hum. Orionis]

Between the eye of ♉ and the southern head of ♊ **45 4¼** [Inter oculum ♉ et / auſtrale caput ♊]

Note. Between the eye of ♉ and the left shoulder of Orion we observed, I myself and others, with the lesser Sextant 21 45, and with the trigonic Sextant 21 23. The parallax is therefore 0 22, so that one ′ is to be subtracted for each °, so that from the parallax of the lesser Sextant the true distance may be established. But on the following evening we found 21 48 [*Nota. Inter oculum ♉ et ſiniſtrum / humerum Orionis obſeruauimus ipſe / et alij per Sextantem minorem … / et per Sextantem trigonicum … / Eſt itaque parallaxis … / adeo vt pro ſingulis gradibus ſingula / ſcrupula prima veniant ſubtrahenda, / vt ex parallaxi minoris Sextantis / conſtet vera diſtantia. Sed ſequenti / veſperi inuenimus*]

- *21 23*
- *0 25*

And between the heart and the tail of ♌ 25 8, otherwise 24 40 [*Et inter cor caudamque ♌ … / alias*]

- *0 28*[505]

DIE 14 FEBRUARIJ, VESPERI.

Twice we observed the distance between the lower one in the hand of Andromeda [Andromedæ] and the right knee of Pegasus [Pegaſi] 16 58 [*Bis obſeruauimus diſtantiam inter / inferiorem in manu Andromedæ et / genu dextrum Pegaſi*]

(But once 17 6) [(Semel vero 17 6)]

And between the Pole Star [Polarem] and the middle one of the Chair of Cassiopeia [Cathedræ Caßiopeæ], three times 26 25 [*Et inter Polarem atque mediam / Cathedræ Caßiopeæ ter*]

once **26 26½** [ſemel]

Therefore at most 26 26 [Igitur ad ſummum]

But the wind was blowing hard. [*Sed ventus admodum flabat.*]

DIE 15 FEBRUARIJ, VESPERI.

With the Trigonic Sextant. Between the more southern one in the hand of Andromeda and the knee of Pegasus [*Per Sextantem Trigonicum. Inter / auſtraliorem in manu Andromedæ / et genu Pegaſi*]

- *I* ***17 0½***
- *II* ***17 0½***
- *III 17 0*[506]

And these observations are better than those we took yesterday evening, for the wind was then blowing too hard and was hindering. [*Atque hæ obſeruationes ſunt*

[505] PRINTED RULES INSIDE THE RIGHT COLUMN: a short rule stands across the value file between 21 23 and 0 25, and a second between 24 40 and 0 28; each stands under the two figure groups above it and over the one below. They are rules of the page, not divisions of it. The words adeo vt pro ſingulis gradibus ſingula ſcrupula prima veniant ſubtrahenda are the observer's own instruction to subtract.

[506] BRACES: TWO, both in the left column, joining Inter cor ♌ et ſpicam **54 2¼** with repetita **54 2¼**, and Ophiuchi **42 32¼** with Denuo repetendo eandem **42 32¼**; to the right of each stands bo- / næ, divided over the two lines.

me-/liores ijs, quas heſterno veſperi ac-/cepimus, nam ventus tunc nimium / flabat et impediebat.]

Between the end of the wing and Scheat, once **20 37¼** [*Inter extremam alæ et Scheat, / ſemel*]

Between the head of ♈ *and Scheat* **41 16¾** [*Inter caput* ♈ *et Scheat*]

on repeating 41 16 [*reiterando*]

Between Scheat and the 11th of Cassiopeia [Caßiopeæ] 37 40 [*Inter Scheat et 11am Caßiopeæ*]

Between the head of ♈ *and the bright one in the bend of Cassiopeia* **39 10½** [*Inter caput* ♈ *et lucidam in / flexura Caßiopeæ*]

then, repeating twice, we found 39 10 [*deinde bis iterantes inuenimus*]

Between the eye of ♉ *and the knee of Cassiopeia* **55 22½** [*Inter oculum* ♉ *et genu / Caßiopeæ*]

between the same 55 23 [*inter eaſdem*]

Between the Pole Star [ſtellam polarem] and the XIth of Cassiop. **26 24½** [*Inter ſtellam polarem et XIam / Caßiop.*]

repeated again **26 24½** [*denuo repetita*]

Between the Vulture [Vulturem] and the hand of Ophiuchus [Ophiuchi], with the Sext. Trigon. 55 17 [*Inter Vulturem & manum / Ophiuchi per Sext. Trigon.*]

DIE 17 FEBRUARIJ.

Between the knee of Pegasus [Pegaſi] and the hand of Andromeda [Andromedæ], with the Sext. Trigon. 17 0 [Inter genu Pegaſi et manum Andro-/medæ per Sext. Trigon.]

on repeating we found 16 58 [iterando inuenimus]

again 16 58 [denuo]

Between the head of ♈ and Scheat 41 15 [Inter caput ♈ et Scheat]

The sextant was constantly driven by a strong wind. [Vento valido agebatur ſemper / ſextans.]

Between the head of ♈ and the eleventh of Cassiop. **42 27½** [Inter caput ♈ et vndecimam / Caßiop.]

Between the head of ♈ and the knee of Cassiopeia 37 25 [Inter caput ♈ et genu Caßiopeæ]

repeated again, was found **37 25¼** [denuo repetita inuenta eſt]

Between the eye of ♉ and the knee of Cassiopeia 55 22 [Inter oculum ♉ et genu / Caßiopeæ]

Between the Pole Star and XI of Cassiopeia 26 25 [Inter ſtellam polarem et XI / Caßiopeæ]

the same repeated **26 24½** [eadem repetita]

DIE 18 FEBRUARIJ.

Between the upper one in the hand of Ophiuchus and its head **25 46½** [Inter ſuperiorem in manu / Ophiuchi et caput eius]

repeating, we found **25 46¼** [iterantes inuenimus]

Between the left shoulder of Ophiuchus and the uppermost one in the left hand 16 57 [Inter humerum Ophiuchi ſiniſtrum et / ſupremam in manu ſiniſtra]

II 16 57 [II]

Between the Vulture and the head of Cygnus [Cygni], or the beak [Inter Vulturem et caput Cygni / ſeu roſtrum]

- I 19 40
- II **19 39⅔**

Between the Vulture and the tail of Cygnus **38 4½** [InterVulturemetcaudamCygni]

DIE 22 FEBRUARIJ.

The head of ♈ and the knee of Cassiopeia **37 27½** [Caput ♈ et genu Caßiopeæ]

The eye of ♉ and the knee of Cassiopeia 55 23 [Oculus ♉ et genu Caßiopeæ]

55 24

In this one the sky was darker than in the preceding one. [In hac obſcurius fuit cœlum / quam in ſuperiore.]

DIE 23 FEBRUARIJ.

With the trigonic Sextant. [Per Sextantem trigonicum.]

Between the head of Andromeda and the knee of Cassiopeia [Inter caput Andromedæ / et genu Caßiopeæ]

- nearly 33 42 [fere]
- II 33 41
- III 33 40

Repeat this one, for the instrument was wobbling a little. [Hancrepete, vacillabat enim parum / inſtrumentum.]

Between the head of ♈ and the knee of Cassiopeia [Inter caput ♈ et genu / Caßiopeæ]

- I 37 27
- II 37 27

Between the eye of ♉ and the knee of Cassiopeia [Inter oculum ♉ et genu / Caßıopeæ, fere]

- nearly 55 23
- II 55 23

The head of Ophiuchus and its hand [Caput Ophiuchi et manus eius]

- 25 45
- II **25 45⅔**
- III **25 45⅔**

Between Lyra [Lyram] and Aquila [Aquilam] [Inter Lyram et Aquilam]

- I 34 10
- II 34 8
- III **34 8⅓**
- IIII **34 8⅔**

Between the head of Cygnus and the Vulture **19° 40′**, twice. [Inter Caput Cygni et Vulturem / bis.]

DIE 24 FEBRUARIJ.

Between the head of ♈ and the knee of Cassiopeia **37 26½** [Intercaput♈et-genuCaßiopeæ]

Between the head of Andromeda and the knee of Pegasus [Inter caput Andromedæ et / genu Pegaſi]

- **18 29½**
- **18 27½**

Between the head of Andromeda and Scheat of Pegasus [Inter caput Andromedæ / et Scheat / Pegaſi]

- **14 10¼**
- 14 10

The head of Andromeda and the knee of Cassiopeia 33 40 [Caput Andromedæ et genu / Caßiopeæ]

The head of ♈ and the head of Andromeda, twice 27 5 [Caput ♈ et caput Andromedæ, / bis]

The eye of ♉ and the Knee of Cassiopeia 55 23 [Oculus ♉ et Genu Caßiopeæ]

Between the Vulture and the head of Cygnus, nearly 19 40 [Inter Vulturem et caput Cygni, / fere]

Between the Vulture and the middle one of the three in the left wing of Cygnus **43 3½** [Inter Vulturem et mediam tri-/um in ſiniſtra ala Cygni]

Between the Vulture and Lyra **34 9½** [Inter Vulturem et Lyram]

or at most **9′ 40″** [aut ad ſummum]

Between the Vulture and an unknown star which makes a right angle with the tail of the Vulture and the head of Cygnus **14 14½**, nearly [InterVulturem et ſtellam incognitam, / quæ facit angulum rectum cumcauda / Vulturis et capite Cygni … fere]

repeated 14 14 [repetita]

Between the Vulture [Vulturem] and the head of Hercules [Herculis] 38 32 [Inter Vulturem et caput / Herculis]

DIE 26 FEBRUARIJ, MANE.

These distances were obtained with the Trigonic Sext. [*Hæ diſtantiæ per Sext. Trigonicum / ſunt deprehenſæ.*]

Between Lyra [Lyram] and the hand of Ophiuchus [Ophiuchi] [*Inter Lyram et manum / Ophiuchi*]

- *I **53 42½***
- *II **53 42⅔***

The Vulture and the Breast of Cygnus [Cygni] 32 12, twice [*Vultur et Pectus Cygni … bis*]

The Vulture and the head of Hercules 38 31, *twice* [*Vultur et caput Herculis … bis*]

The Vulture and the left hum. of Hercules **48 43½**, *twice* [*Vultur et ſiniſter hum. / Herculis … bis*]

The Vulture and the tail of the Vulture **8 28½**, *twice* [*Vultur et cauda Vulturis … bis*]

The Vulture and that unknown star, forming a right angle with the tail of the Vulture and the head of Cygnus, 14 16, *repeating the same dist. three times. And it is better than yesterday's, because that star was seen better.* [*Vultur et ſtella illa incognita, conſti-/tuens angulum rectum cum cauda / Vulturis et capite Cygni … / ter repetendo eandem diſt. Eſtque / melior heſterna eo quod ſtella illa / melius videbatur.*]

The Vulture and the head of Ophiuchus 33 30, *twice* [*Vultur et caput Ophiuchi … bis*]

The Vulture and the right shoulder of Ophiuchus 25 28, *twice* [*Vultur et dexter humerus / Ophiuchi … bis*]

Then, with the dawn already coming on, the distance was taken between the star of the vulture and the hand of Antinous [Antinoi] [*Deinde ingruente iam Aurora capta / eſt diſtantia inter vulturis ſtellam et / manum Antinoi*]

- 10 53
- *II* **10 51¼**

so that the more probable distance is 10 52 [*vt ſit probabilior diſtantia*]

Then between the Vulture and the left shoulder of Ophiuchus [*Deinde inter Vulturem et / ſiniſtrum humerum / Ophiuchi*]

- 42 40
- *II* **42 38½**

so that the more probable distance is 42 39 [*vt ſit probabilior diſtantia*]

But these last two distances are less certain because of the nearness of the dawn. At about hour **7½** *we observed twice, between the brighter one in the lower horn of* ♈ *and the eye of* ♉, 38 21, *which differs by at least one ′ from the one taken yesterday evening.* [*Verum hæduæ poſtremæ diſtantiæ / ſunt minus certæ propter Auroræ / vicinitatem. Circiter horam 7½ inter / lucidiorem in inferiori cornu* ♈ *et / oculum* ♉ *obſeruauimus bis 38 21, / quod vno ſaltem ſcrupulo ab ea, quæ / heri veſperi capta eſt diſcrepat.*]

DIE 1 MARTIJ, MANE.

These distances were taken with the Trigon. Sext. [Hæ diſtantiæ per Trigon. Sext. cap-/tæ ſunt.]

From the Vulture to the middle one of the three outermost of the wing of Cygnus 43 4, twice [A Vulture in mediam extremarum / trium alæ Cygni … bis]

From the Vulture to that unknown star of which I spoke 14 16, twice [AVulture in ſtellam illam incognitam, / de qua dixi … bis]

From the Vulture to the head of Hercules 38 30, twice [AVulture in caput Herculis … bis]

Between the tail of Aquila [Aquilæ] and Aquila 8 28¼, once [Inter caudam Aquilæ / et Aquilam … / ſemel]

At another time the same distance was found 8 28½, which you can trust. [Alias eadem diſtantia inuenta eſt … / cui potes fidere.]

DIE 14 MARTIJ.

Between the head of Ophiuchus and the breast of Cygnus [Intercaput Ophiuchi et pectus / Cygni]

- I 45 52½
- II 45 53½
- III 45 53

Between the right shoulder of Ophiuchus and the head of Cygnus [Inter humerum dextrum / Ophiuchi et caput Cygni]

- I 34 37
- II 34 35½
- III 34 35½

Lyra and the breast of Cygnus [Lyra et pectus Cygni]

- I 20 17½
- II 20 15
- III 20 17¼

The head of Cygnus and its breast [Caput Cygni et pectus eius]

- I 16 13
- II 16 13

DIE 21 MARTIJ, MANE.

Between the right shoulder of Ophiuchus and the head of Cygnus [Inter dextrum humerum / Ophiuchi … / et caput Cygni]

- I 34 35
- II 34 35

The head of Cygnus and the breast of the same [CaputCygniet pectus eiuſdem]

- I 16 12¾
- II 16 12½

Lyra and the middle one of the three outermost in the left wing of Cygnus [Lyra et media trium extre-/marum in ſiniſtra ala Cygni]

- I 15 51⅓
- II 15 51

Lyra and the left shoulder of Hercules [Lyra et ſiniſter humerus / Herculis]

- I 32 5
- II 32 5

The mouth of Pegasus [Pegaſi] and the hand of Antinous [Os Pegaſi et manus Antinoi]

- I 25 27
- II **25 26½**

DIE 22 MARTIJ.

Between the lower head of ♊ and the northern horn of ♉ **30 32½** [Inter inferius caput ♊ & / boreale cornu ♉]

The same repeated 30 33 [Eadem repetita]

repeated again **30 32½** [denuo repetita]

DIE 23 APRILIS.

Between the southern head of ♊ and the heart of ♌ [Inter meridionale caput ♊ et / cor ♌]

- 37 0
- **37 0½**
- 37 1
- 37 0
- 37 0

Between the heart of ♌ and Spica ♍ **54 3⅓** [Inter cor ♌ et Spicam ♍]

the same **54 1⅔** [eadem]

54 2½

It was not serene enough where Spica was situated. [Non erat ſatis ſerenum vbi ſita erat / Spica.]

DIE 27 APRILIS.

Between the heart and Spica ♍ **54 2½** [Inter cor et Spicam ♍]

the same, nearly 54 2 [eadem fere]

the same **54 1½** [eadem]

the same, good 54 2 [eadem bona]

(You can therefore use with sufficient certainty the distance of the heart of ♌ and Spica [Spicæ] ♍, 54 2, and this agrees with the observation of the year 1583).[1] [*(Potes itaque ſatis certo vti diſtantia / cordis ♌ et Spicæ ♍ …, atque hoc / concordat cum obſeruatione anni / 1583).*[1]]

DIE 12 NOUEMBRIS.

Between the mouth of Pegasus [Pegaſi] and its head 7 22 [Inter os Pegaſi et caput eius]

Between the Vulture [Vulturem] and the preceding one of the two small ones in the breast of Pegasus, or in the triangle of Pegasus [Inter Vulturem et præcedentem dua-/rum paruarum in pectore Pegaſi, ſeu / in triangulo Pegaſi]

- I 44 30
- II 44 30
- III 44 30

DIE 22 NOUEMBRIS.

Between the mouth of Pegasus and the lower one of the breast, the distance found twice 20 0 [Inter os Pegaſi et inferiorem pectoris / diſtantia bis reperta]

Between the upper one of the breast and the mouth of Pegasus 21 21 [Inter ſuperiorem pectoris et / os Pegaſi]

The distance of the same, II 21 25 [Earundem diſtantia II]

III 21 21 [III]

DIE 23 NOUEMBRIS.

Between the Vulture and the preceding one of the two small ones in the breast of Pegasus 44 34 [Inter Vulturem et præcedentem dua-/rumparuarum inpectorePegaſi]

Not certain enough, because the nearness of ⊙ was diminishing the brightness of the stars. [Non ſatis certa, quia vicinitas ⊙ mi-/nuebat ſplendorem ſtellarum.]

Between the mouth of Pegasus and the head of Androm. 38 48 [Inter os Pegaſi et caput / Androm.]

the same 38 48 [eadem]

Between the head of Andromeda [Andromedæ] and the head of Pegasus 36 5, twice [Inter caput Andromedæ et / caput Pegaſi … / bis]

Between the mouth of Pegasus and the end of the wing **36 42½**, twice [Inter os Pegaſi et extremam alæ … / bis]

DIE 27 NOUEMBRIS.

The distance between both Shoulders of Orion [Orionis], with the Sext. Trigon. [Diſtantia inter vtrumque Humerum / Orionis per Sext. Trigon.]

- 7 37
- II 7 38
- III 7 37

DIE 30 NOUEMBRIS.

[recte: *DECEMBRIS* — Corrigenda, p. 429]

The distance of the super. foot of Erichthonius [Erichtonij] from the infer. head of II [Diſtantia ſuper. pedis Erichtonij ab / infer. capite II]

- 36 24
- II 36 24[507]

[507]Dreyer's footnote, set in a smaller type below the left column. [1] (called once, after the closing parenthesis and point of 1583).): Hæc verba in ſolo codice V. reperiuntur. — "These words are found only in codex V." The words it covers are not delimited by the call; the call stands at the close of the printed parenthesis, and no further extent is asserted.

APPENDICES AD OBSERUATIONES ANNI 1582 PERTINENTES.[508]

I. DE OPPOSIT1ONE MARTIS MENSE DECEMBRI A. 1582.[509]

An investigation of the longitude and latitude of ♂ from its observed distances from certain fixed ones. [Inveſtigatio longitudinis et latitudinis ♂ ex obſeruatis diſtantijs eius a certis / fixis.]

Diagram. A figure of curved arcs at the left of the side, beside the side-text of 26 December. Two arcs descend from an apex at the top, one to the lower left and one to the lower right; a long, shallow arc runs across the foot of the figure from the lower-left end toward the lower-right corner; inside, straight or slightly curved lines join a point on the left arc to a point higher and to its right, and further lines run from those points toward the lower-right corner, with a near-vertical line dropping from the upper interior point to the arc at the foot. Six letters stand on it:

- P (apex, top): P
- B (upper interior, right of the left arc): B
- C (on the left arc, below B): C
- D (lower-left end of the arc at the foot): D
- E (right side, a little above the lower-right corner): E
- A (lower-right corner): A

Die 26 DECEMBRIS H. 8½ P. M.

- A. Aldebaran [Aldeboran], its longit. 3°56′ 4″♊ [A. Aldeboran longit. eius … ♊]
- latitude 5 30 25 A [latitudo … A]
- B. Bor. head of ♊, its longit. 14 25 13 ♋ [B. Bor. caput ♊ longit. eius … ♋]
- latitude 10 2 20 B [latitudo … B]
- C. Mars
- DE Arc of the Ecliptic [DE Arcus Eccliptícæ]
- P its Pole [P Polus eius]
- H. 8½ CA 44 41, CB 6 49. [H. … CA …, CB ….]

Triang. ABP

- Side PA 95 30 25 [Latus PA]
- Side PB 79 57 40 [Latus PB]
- Angle APB 40 29 9 [Angulus APB]
- Side BA 43 12 50 [Latus BA]
- Angle PBA 109 18 53 [Angulus PBA]

Triang. ABC. In this triangle, since the side BA is already known, while CA and CB are given by observation, the angle ABC is therefore also given, 98 57

[508] The display title reads "Appendices pertaining to the observations of the year 1582."

[509] The section heading reads "I. On the opposition of Mars in the month of December, A. 1582." In OPPOSIT1ONE the sort after the T stands on the leaf in the form of the figure 1 (a flagged head), unlike the capital I of I. and of MARTIS and DECEMBRI on the same line.

7; this, subtracted from 360 together with the angle PBA, leaves the angle PBC **151° 44′**. With this known, together with the enclosing sides, the complement of the latitude PC is given, **85 58⅔**, and accordingly the latitude itself of ♂, **4° 1′ 20″** B. [Triang. ABC. In hoc triangulo quia latus BA iam innotuit, CA vero et CB / dantur per obſeruationem, ergo datur et angulus ABC …, qui vna cum / angulo PBA ſublatus a … relinquit angulum PBC …. Quo noto vna cum / lateribus ambientibus datur complementum latitudinis PC … et perinde / latitudo ipſa ♂ … B.]

Then in the triangle APC, from the three known sides, the angle APC becomes known, **43° 42′ 37″**; this, added to the longitude of Aldebaran in **3° 56′ 4″** ♊, makes known the longitude of ♂ in **17° 38′ 41″** ♋. [Deinde in triangulo APC ex cognitis tribus lateribus innoteſcit angulus APC / …, qui additus ad longitudinem Aldeboræ in … ♊ notam facit / longitudinem ♂ in … ♋.]

A more exact examination of the latitude of ♂ for the day 26 Xbris. [Exactior examinatio latitudinis ♂ ad diem 26 Xbris.]

The distance of ♂ from the super. cap. of ♊ **6° 49½**, the difference of the longitudes **3° 13′**. [Diſtantia ♂ a ſuper. cap. ♊ …, differentia longitudinum ….]

- BA **79° 58′** the complement of the latitude [BA … complementum latitudinis]
- BC **6 49½** the distance [BC … diſtantia]
- BAC 3 13 the difference of the longitudes [BAC … differentia longitudinum]

Diagram. A second figure of curved arcs at the left of the side, beside the solution and the lines of 27 December. From an apex at the top one arc descends to the lower left and two arcs descend to the lower right, the outer one to the lower-right corner; a shallow arc runs across the foot from the lower-left corner to the lower-right corner; from the lower-left corner two further arcs run to points on the right, the upper to a point on the outer right arc and the lower to a point just inside it; a short line joins those two points, and a near-vertical line drops from the lower of them to the arc at the foot. Six letters stand on it:

- P (apex, top): P
- B (on the outer right arc): B
- C (inner point, below and left of B): C
- D (lower-right corner): D
- A (lower-left corner): A
- E (just below A): E

Diagram. A small, narrow figure at the right edge of the measure, beside the lines from Solutio … to In altero triangulo rectangulo BDA. A long, slightly curved line runs from a point at the top right down to a point at the lower left; a second line runs from the top point down to a point at the right a little above the foot; a short line joins that point to the lower-left point; a

DOTTED line runs from the right-hand point to a point on the long line. Four letters, set in italic, stand on it:

- A (top right): A
- D (on the long line, left, at the end of the dotted line): D
- B (right, lower): B
- C (lower left): C

Solution: in the triangle DBC there are given [Solutio, in triangulo DBC dantur]

- BC **6 49½** [BC]
- BD **3 10 3″** the perpendicular found earlier [BD … perpendiculum / prius inuentum]
- Therefore DC 6 2 56 [Ergo DC]

In the other, right-angled triangle BDA there are given BA 79 58, BD 3 10 3, the angle at D right. Therefore DA **79° 57′ 5″**, which, added to CD, gives **86° 0′ 0″**, the complement of the latitude. Therefore the latitude **4° 0′ 0″**. [In altero triangulo rectangulo BDA / dantur BA …, BD …, angulus ad D rectus. / Igitur DA …, quod additum ad CD dat / …,complementum latitudinis. Ergo latitudo / ….]

DIE 27 DECEMBRIS H. 7¼ A. M.

- CA 36 43 CB 6 43 [CA … CB …]
- A the heart of ♌, its longitude 24 1 45 ♌ [A cor ♌, longitudo eius … ♌]
- latitude 0 26 45 B [latitudo … B][510]
- B the northern head of ♊ [B Boreale caput ♊]
- C Mars
- DE Arc of the Ecliptic. P its Pole. [DE Arcus Eccliptícæ. P Polus eius.]
- Triang. PAB
- Side PA 89 33 15 [Latus PA]
- PB 79 57 40
- Angle APB 39 36 30 [Angulus APB]
- Side BA 40 32 20 [Latus BA]
- Angle ABP 101 14 5 [Angulus ABP]

Triangle ABC. In this triangle, since the three sides CA, AB and BC are given, the angle ABC is also given, **51° 57′ 7″**, added to the angle ABP, **101° 14′ 5″** it yields the whole angle PBC, **153° 11′ 12″**. [Triangulum ABC. In hoc triangulo quia dantur tria latera, CA, AB et BC, / datur quoque angulus ABC …, qui additus ad angulum ABP … / exhibet totum angulum PBC ….]

With the angle PBC known together with the enclosing sides, the complement of the latitude of ♂, PC, becomes known, **85° 58′ 0″** and accordingly the latitude itself of ♂, **4° 2′ 0″**. [Angulo PBC cum lateribus ambientibus cognito, innotescit complementum / latitudinis ♂ PC … et proinde latitudo ipsa ♂ ….]

[510] Dreyer's footnote, set in a smaller bold type under the second figure. 1 (called once, after the point of PERTINENTES. in the display title): E codice V. — "From codex V." How far down the side the note reaches is not stated by the call, and no extent is asserted.

The angle CPA, which represents the difference of longitude of ♂ and the heart of ♌, was found to be **36° 34′ 33″**, it is to be subtracted from the longitude of the heart of ♌, **24° 1′ 45″** ♌ and there remains the longitude of ♂ in **17° 27′ 12″** ♋. [Angulus vero CPA qui repreſentat differentiam longitudinis ♂ et cordis ♌ / inventus eſt …, ſubtrahendus a longitudine cordis ♌ … ♌ et / relinquitur longitudo ♂ in … ♋.]

DIE 30 DECEMBRIS. For obtaining the place of ♂ from these observations we investigated the right ascensions that follow. [Pro loco ♂ ex his obſeruationibus habendo inueſtigauimus has Aſcenſiones / Rectas quæ ſubſequuntur.]

- I. Between Aldebaran [Aldeboram] and the southern head of ♊ **45° 7′** [I. Inter Aldeboram et meridionale caput ♊]
- Declination of Aldebaran 15 35 [Declinatio Aldeboræ]
- Declination of the head of ♊ 28 57 [Declinatio capitis ♊]
- Right asc. of Aldebaran 63 0 [Aſc. R. Aldeboræ]
- Intercepted angle add. **46 55½** [Angulus interceptus add.]
- Right asc. of the lower head of ♊ **109 55½** [Aſc. R. inferioris capitis ♊]
- II. Between the southern head of ♊ and the heart of ♌ 37 1 [II. Inter meridionale caput ♊ et cor ♌]
- Declination of the heart of ♌ 13 57 [Declinatio cordis ♌]
- Right asc. of the heart of ♌ 146 31 [Aſc. R. cordis ♌]
- Intercepted angle subtr. 36 36 [Angulus interceptus ſubtr.]
- Right asc. of the southern head of ♊ 109 55 [Aſc. R. merid. cap. ♊]
- III. Between the upper foot of Erichthonius [Erichtonij] and the southern head of ♊ 36 24 [III. Inter ſuperiorem pedem Erichtonij / et mer. cap. ♊]
- Declination of the foot of Erichthonius 32 12 [Declinatio pedis Erichtonij]
- Right asc. of the head of ♊ 109 55 [Aſc. R. capitis ♊]
- Intercepted angle subtr. 42 23 [Angulus interceptus ſubtr.]
- Right asc. of the upper foot of Ericht. 67 32 [Aſc. R. ſuper. pedis Ericht.]

From the meridian altitude of ♂, moreover, its declination was found to be **26° 36′** Bor. And since at H.8⅙ its distance from the upper foot of Erichthonius was observed as **35° 26′** its right ascension comes out as **107° 56′**. By means of this and the declination, its longitude and latitude are given in this way: [Ex altitudine autem ♂ Meridiana inuenta eſt declinatio eius … Bor. / Cumque H.… obſeruata fuerit diſtantia eius a ſuperiore pede Erichtonij … / prodit Aſc. Recta eius …. Qua mediante et declinatione datur longitudo / et latitudo eius hoc modo:]

- Right asc. ♂ **107°56′** Declin. **26°36′**B. [Aſc. R. ♂ … Declin.…B.]
- Punct. culm. 16 32 ♋
- Its declin. 22 26 B [Declin. eius … B]
- Difference of decl. 4 10 [Differentia decl.]
- Angle inclinat. **82°58′** [Angulus inclinat.]

- Latit. ♂ Bor. 4 8 more correct **4 5¼** [Latit. ♂ Bor. … verior …]
- Differ. long. subtr. **0 31½** [Differ. long. ſubtr.]
- Longitude ♂ **16 0½** ♋ [Longitudo ♂ … ♋][511]

*Mars regressed from day 26 **8**ʰ p. m., to day 30 at the same hour, over four whole days, **1**ᵍ **40**ᵐ, according to Copernicus, however, it ought to have receded 1.44 and* [*Retroceßit Mars a die 26 8*ʰ *p. m. in diem 30 eandemque horam per qua- / tuor integros dies 1*ᵍ *40*ᵐ*, debuit autem iuxta Copernicum receßiße 1.44 et*]

according to the calculation of the Alphonsines, 1.35, so the reckoning of Copernicus exceeds, the Alphonsine falls short, and the observation is roughly intermediate; the observation itself is nearer to Copernicus by at least 1′. [*iuxta Alphonſinorum calculum 1.35, ſuperat itaque Copernici ratio et Al- / phonſina deficit et obſeruatio eſt quaſi intermedia; ipſa obſeruatio vno ſal- / tem ſcrupulo propior Copernico.*]

*From these preceding observations of ♂, especially those made on day 26 and 30 it is gathered that the ☌ of the Sun according to its mean motion with Mars, with respect to its true course, took place on Day 28 H. **11½** after midday, the sun holding in mean motion **16° 47′** ♍, and Mars in true motion 16 47 ♋. For:* [*Ex his antecedentibus obſeruationibus ♂, præſertim die 26 et 30 habitis / colligitur quod ☌ Solis ſecundum eius motum medium ad Martem quo ad / eius verum curſum fuerit facta Die 28 H. … poſt meridiem, ſole medio motu / … ♍, Marte vero motu … ♋ obtinente. Nam:*]

	Mean motion ☉ [Motus medius ☉]	True motion ♂ [Motus ♂ verus]
At day 26 compl. [Ad diem 26 compl.]	**14°50′ 0″** ♍	**17°37′** ♋
about midnight [circa med. noctem]	18 46 11 ♍	15 56 ♋
Difference [Differentia]	3 56	1 41

[512]

- 3 56
- 1 41
- sum 5 37 [ſumma]
- of the differences [differentiarum]
- 17 37
- 14 50
- Difference of the motions on day 26 2 47 [Differentia / motuum die 26][513]

[511] The eight lines above stand in two columns divided by a printed vertical rule: the first four in the left column, the last four in the right.

[512] The labels Ad diem 26 compl. and circa med. noctem are joined at their right by one printed brace. A short rule stands under each value file above the last row; Differentia stands only at the left, before 3 56, and 1 41 stands under the centre rule with no label.

[513] The seven lines above are the small-type block at the right edge of band 3, set in a smaller type than the text; a short rule stands under 1 41 and another under 14 50. ſumma 5 37 is printed on one line and differentiarum on the next, with no figure beside it.

5°37′ give **4ᵈ**, how many do **2°47′** give? The result is D. 1 M. 59, with this time added to the earlier one, the time of the ☍ becomes known, D. 28 H. **11½** p. m., with which the motions noted before agree. [5°37′ dant 4ᵈ, quot dant 2°47′. Prouenit / D. 1 M. 59, quo tempore addito priori, / innoteſcit tempus ☍ D. 28 H. … p. m., / cui congruunt motus prius annotati.]

And from this observation of ♂ *in* ☍ ☉*, compared with the two obtained before and with those made likewise by our predecessors, its motion is restored.* [*Atque ex hac obſeruatione* ♂ *in* ☍ ☉ *collata cum duabus prius habitis et / ſimiliter ab anteceſſoribus factis eius motus reſtituitur.*]

The place of ♂ computed more minutely and more exactly for Day 30 Dec. H. **8.3′** P. M., at the altitude of the equator **34° 5½′**. At H. 8.3 the distance of ♂ from the lower foot of Erichthonius [Erichtonij] was **29 13½**, and from the meridian altitude of ♂, at the altitude of the equator **34 5½**, the declination of ♂ is given, **26 37½**, while the declination of the lower foot of Erichthonius is 28 9 30, therefore by the IX Dogma the difference of the right ascension of ♂ and the foot of Erichthonius is given, **32°58′14″**, added to the right ascension of the foot of Erichthonius, **74°59′12″** it gives the right ascension of ♂, **107° 57′ 26″**. The longitude and latitude of ♂ are given thus (Declin. max. ☉ **23°31′**). [Locus ♂ ſcrupuloſius et exacte magis ſupputatus ad Diem 30 Dec. H. …′ / P. M. in altitudine æquatoris …. H. … diſtantia ♂ ab inferiore pede Erich- / tonij …, daturque ex altitudine meridiana ♂ in altitudine æquatoris …, / declinatio ♂ …, declinatio vero inferioris pedis Erichtonij eſt …, / itaque per IX Dogma datur differentia Aſcenſionis Rectæ ♂ et pedis Erich- / tonij …, quæ addita ad Aſc. Rectam pedis Erichtonij … notam / præbet Aſc. Rectam ♂ …. Longitudo vero et Latitudo ♂ ſic datur / (Declin. max. ☉ …).]

- Point culm. **16°33′15** ♋ [Punctum culm. … ♋]
- Its declination 22 29 10 B [Declin. eius … B]
- Declination ♂ 26 37 30 B [Declin. ♂ … B]
- Difference of declination 4 8 20 [Differ. declin.]
- Ang. inclin. to the mer. 82 56 0 [Ang. inclin. ad mer.]
- Latitude ♂ 4 6 27 B [Latitudo ♂ … B]
- Difference of longitude subtr. 0 30 30 [Diff. longit. ſubtr.]
- Longitude ♂ 16 2 45 ♋ [Longitudo ♂ … ♋][514]

Note. The right ascension of the foot of Erichthonius was found from its distance from the heart of ♌, which was observed as **67 20½**, presupposing the declination of Regulus [Reguli] 13 58 30, and the declination of the foot of Erichthonius 28 9 30 as the meridian altitudes of the stars gave them. But proceeding more minutely, since the distance of the heart of ♌ and the bright foot of Erichthonius should rather be observed as **67° 20′ 10″**, the difference of the right ascension of these stars will be 71 30 28, taken from the right ascension of the heart of ♌, 146 30 3, it gives the right ascension of the lower foot of Ericht. 74 59 35, with the difference of the right asc. of that star it

[514] The eight lines above stand in two columns divided by a printed vertical rule: the first four in the left column, the last four in the right.

and ♂, 32 58 14, added to it in turn, it makes known the right ascension of ♂, 107 57 49, so that accordingly the longitude of ♂ is **23″** greater, namely in **16° 3′ 8″** ♋. [Nota. Aſcenſio Recta pedis Erichtonij inuenta eſt ex diſtantia eius a corde ♌, / quæ obſeruata eſt …, præſuppoſita declinatione Reguli …, et decli- / natione pedis Erichtonij … prout dabant altitudines meridianæ ſtellarum. / Sed ſcrupuloſius procedendo cum diſtantia cordis ♌ et lucidi pedis Erichtonij / potius obſeruata ſit …, erit differentia Aſcenſionis Rectæ harum ſtella- / rum …, quæ ablata ab Aſcenſione Recta cordis ♌ …, exhibet / Aſcenſionem R. infer. pedis Ericht. …, cui rurſus addita differentia Aſc. / R. eius et ♂ …, notam facit Aſcenſionem Rectam ♂ …, vt per- / inde longitudo ♂ … maior ſit, nimirum in … ♋.]

Day 26 Decem. compl. [Die 26 Decem. compl.]	True motion ♂ [Motus verus ♂]	Mean motion ☉ [Motus medius ☉]
about midnight [circa mediam noctem]	**17°34′57″** ♋	**14°52′ 4** ♍
Day 30 completed [Die 30 completo]	15 59 21 ♋	18 48 37 ♍
	1 35 36	3 56 33

[515]

- 1 35 36 … 14 52 4
- Sum 3 56 33 … 17 34 57 [Summa]
- of the differences 5 32 9 gives 4 days; how much does 2 42 53 the difference of the place of ☉ and ♂ [differentiar. … dat dies 4, quantum … differentia loci ☉ et ♂][516]

on day 26 give? The result is **1°57′41″** that is, Days 1 H. **23.4′**, with which time agrees [die 26 Prouenit … h. e. Dies 1 H. …, cui tempori congruit]

- mean motion ☉ **16°48′ 2″** ♍ [Medius motus ☉ … ♍]
- true motion ♂ 16 47 53 ♋ [Verus motus ♂ … ♋]

But fixing this time more exactly to allow for the unequal motion of Mars, the true time of the ☍ will be Day 28 H. **11.1′** P. M., and at that time [Verum exactius limitando tempus hoc pro motu Martis inæquali erit verum / tempus ☍ Die 28 H. … P. M. fuitque tunc]

- the Sun in mean motion was in **16°47′34″** ♍ [Sol motu medio in … ♍]
- and Mars in true motion in 16 47 56 ♋.[1] [Mars vero motu vero in … ♋.[1]]

So ♂ was in ☍ to the mean place of the Sun on day 28 at hour 11 completed after midday, and ♂ was then in 16 48 ♋ in its true motion in longitude and ☉ in 16 48 ♍ in mean motion; and you can rely on this observation and computation with fair certainty in restoring the motion of Mars from its three acronychal observations. It is evident, moreover, that Mars in true motion went back ***1[9] 35½′*** *over four whole days.*

[515] A short rule stands under each value file above the last row; the last row carries no label.

[516] In the three lines above, Summa stands at the left of the second line and differentiar. at the left of the third; a short rule stands over 5 32 9 and another over 2 42 53, and the third line runs on in prose across the measure.

[*Fuit itaque ♂ in ☍ medij loci Solis die 28 hora 11 a meridie completa, / fuitque tunc ♂ in … ♋ vero ſuo motu in longitudine et ☉ in … ♍ me- / dio motu, atque huic obſeruationi ſupputationique potes ſatis certo te fun- / dare in reſtituendo motu Martis ex tribus Achronychijs eius obſeruationi- / bus. Patet inſuper quod Mars motu vero per integrum quatriduum retro- / ceßerit ….*]

For determining the parallaxes of ♂ in longitude and latitude at the time of the observations of 26 and 27 December. [Pro parallaxibus ♂ in longum et latum diſcernendis ad tempus obſeruati- / onum diej 26 et 27 Decembris.]

DIE 26 DECEMBRIS.

H. 8½ P. M. longitude of ♂ **17° 38′ 41″** ♋, latitude **4° 1⅓′** B, altitude **40° 0′**. First, however, its declination must be found from the given longitude and latitude of ♂, and then its right ascension, according to the figure drawn alongside. [H. … P. M. longitudo ♂ … ♋, latitudo … B, altitudo …. Inqui- / renda autem eſt ex data longitudine et latitudine ♂ primum declinatio eius, / deinde Aſcenſio Recta, idque iuxta adſcriptam figurationem.]

Diagram. A circle with several arcs drawn inside it, standing at the left of the side-text. One line runs from the top of the circle, at A, down to the left to C; an arc runs from B, right of A on the circumference, leftward toward C; an arc descends from the region of C past D to E; a nearly horizontal arc crosses the circle from its left edge through E and F to G at the right edge; another line crosses from H, at the upper left of the circumference, down through D and F to K at the lower right. Which arc passes through C and which through D is not asserted beyond this; the geometry is described only as far as the image shows it.

- A: top of the circumference
- B: upper right of the circumference
- C: inside, upper left, where arcs meet
- ♋: outside the circumference at the upper left, set rotated, above H
- H: outside the circumference at the upper left, set rotated
- D: inside, left, at a crossing
- E: inside, left, on the nearly horizontal arc
- F: inside, centre, below the crossing of the nearly horizontal arc and the descending arc
- a sign standing above F at that crossing: ♎, set rotated (~33°) along HFK
- G: outside the circumference at the right
- a sign above K, outside the circumference at the lower right, set rotated: ♍ (read on shape; for confirmation)
- K: outside the circumference at the lower right, set rotated
- Let EFG be a portion of the equator, A the pole, [Sit EFG portio Æqua- toris, A polus,]
- HFK a portion of the ecliptic, B the pole, C the place of ♂ [HFK portio Eccliptiçæ, B polus, C locus ♂]
- Triangle ABC [Triangulum ABC]

- side AB 23 31 [Latus AB]
- side BC 85 58⅔, compl. latitude ♂ [Latus BC … compl. latit. ♂]
- angle ABC 17 38 41, dist. from ♋ [Angulus ABC … diſt. a ♋]
- from this is given side AC 63 40, compl. declination ♂ [hinc datur latus AC … compl. decl. ♂]
- and angle BAC 160 15 52; when this is taken from [et angulus BAC … quo ablato a]
- 180 there remains [180 relinquitur]
- angle HAE 19 44 8, to be added to 90 [angulus HAE … addendus ad 90]
- so that the right ascension of ♂ is 109 44 8 [vt ſit Aſc. R. ♂ …][517]

Now that the right ascension of ♂ is known, the right ascension M. C. must be found as well; I found it thus from the known declination and altitude of ♂, according to the following figure. [Cognita iam Aſcenſione Recta ♂ habenda ſimul eſt Aſc. R. M. C., quam ex / cognita declinatione et altitudine ♂ iuxta ſequentem figurationem ſic inueni.]

[1] On a small leaf inserted later at this place in the codex, the annotation that follows is written in another hand: [In parvo folio poſtea hoc loco codicis inſerto annotatio quæ ſequitur alia manu conſcripta eſt:]

»For the time of the ☍ of the true place of ♂ and of the simple ☉, taking account of the refraction of the solar rays in the fixed stars from which ♂ was observed, which increases its longitude by 2 Minutes. [»Pro tempore ☍ veri loci ♂ et ſimplicis ☉, habita ratione refractionis radiorum ſolarium in ſtellis fixis / vnde ♂ obſeruabatur, quæ eius longitudinem 2 Minutis auget.]

December, about midnight [Decembris circa / mediam noctem]	True motion ♂ [Motus verus ♂]	Mean motion ☉ [Motus medius ☉]
Day 26 [Die 26]	17°36′57″ ♋	14°52′ 4″ ♑
Day 30 [Die 30]	16 1 21 ♋	18 48 37 ♑
	1 35 36	3 56 33

[518]

The sum of the differences of the motions, 5° 32′ 9″, gives 4 days; how much does 2° 44′ 53″, the difference of the place of ☉ and ♂ on day 26, give? The result is 1ᵈ 59′ 8″ 10‴, that is, Days 1 Hours 23 M. 39¼; with this time added to the earlier one, the time of the ☍ of the simple ☉ and the true place of ♂ becomes known: [Summa motuum different. … dat dies 4, quantum …, differentia loci ☉ et ♂ die 26. Proue- / nit …. H. e. Dies 1 Horæ 23 M. …, quo tempore adiecto priori innoteſcit Tempus ☍ ſimplicis / ☉ et veri loci ♂]

- December D. 28 H. 11 M. 39¼. [Decembris D. 28 H. 11 M. ….]

[517] The eleven lines above are the side-text standing to the right of the figure. Triangulum ABC is centred over the lines below it.

[518] A short rule stands under each value file above the last row; the last row carries no label.

The simple ☉ was then at **16° 49′ 31″** ♍, the true motion of ♂ at **16° 49′ 32** ♋«. [Fuit tunc ſimplex ☉ … ♍, verus motus ♂ … ♋«.]

- Let CROS be the horizon, G the pole, [Sit CROS Horizon, G polus]
- LNOP the equator, B the pole, [LNOP Æquator, B polus]
- K the place of Mars [K locus Martis]
- Triangle GBK [Triang. GBK]
- side GB **34 5½** [Latus GB]
- GK `50 0`
- BK `63 40`
- angle GBK `56 45`, ang. distance of ♂ from the meridian [Angulus GBK … ang. diſt. ♂ a meridie]
- right ascension ♂ `109 44` [Aſc. R. ♂]
- right ascension M. C. `52 59` [Aſc. R. M. C.]

In the following figure, therefore, the angle CDE is the difference of the right ascension of the M. C. and of the colure of the solstices near ♍. [In ſequenti ergo figuratione angulus CDE / eſt differentia Aſcenſionis Rectæ M. C. et / coluri ſolſtitiorum circa ♍.]

Diagram. A circle with arcs drawn inside it, standing at the right of the side-text and paragraph. A nearly horizontal arc crosses the circle from C at its left edge through R and O to S at its right edge; a line runs from L, at the upper left of the circumference, down to the right through M and N to O and on to P at the lower right; an arc runs from G, at the top, down through K to R; an arc runs from B, at the upper right, leftward through K to M. The geometry is described only as far as the image shows it.

- G: top of the circumference
- B: upper right of the circumference
- L: upper left of the circumference
- K: inside, upper centre, where two arcs cross
- M: inside, left
- N: inside, left of centre
- C: outside the circumference at the left
- O: inside, centre, on the nearly horizontal arc
- R: inside, below the nearly horizontal arc, left
- S: outside the circumference at the right
- P: outside the circumference at the lower right

Diagram. A larger circle with arcs drawn inside it, standing at the left of the side-text. A nearly horizontal arc crosses the circle from M at its left edge through H to G at its right edge; an arc runs from the region of D, at the upper left of the circumference, down through the interior to the lower circumference; an arc runs from O, at the left edge below M, round through the lower interior; an arc runs from E, at the top, down to the right past B and A toward H; a short line joins E and C; two close arcs run from C to the right, past B and K, toward F; a line descends from F toward H; an arc runs from R, near the lower left of the circumference, up to the right. Which arcs pass

exactly through which lettered points is not asserted beyond this; the geometry is described only as far as the image shows it.

- E: top of the circumference
- D: upper left of the circumference
- C: inside, upper left
- B: inside, upper right, in a close cluster with K and A
- K: inside, upper right, right of B
- A: inside, upper right, below B and K
- F: at the right of the circumference, upper
- M: outside the circumference at the left
- O: outside the circumference at the left, below M
- H: inside, right, below the nearly horizontal arc
- G: outside the circumference at the right
- R: at the lower left of the interior, near the circumference
- Triangle CDE [Triang. CDE]
- right ascension of the colure of the solstices `270 0` [Aſcens. R. coluri ſolſtit.]
- right ascension M. C. `52 59` [Aſcens. R. M. C.]
- angle CDE `142 59` [Angulus CDE]
- side DE **34 5½** [Latus DE]
- side DC `23 31` [Latus DC]
- From this is given side CE `54 30` [Hinc datur latus CE]
- Triangle CBE [Triang. CBE]
- side CE `54 30` [Latus CE]
- BE `50 0`
- CB **85 58⅔**
- therefore angle CBE **45 29½** [Ergo angulus CBE]
- which is equal to ABK. [qui æqualis eſt ABK.]

Triangle AKB [Triangulum AKB]

In this triangle, from the given altitude **40ᵖ0** and the distance of ♂ from the Earth, which is known, and which [recte: *quæ* for *qui* — Corrigenda, p. 429] according to Copernicus is on this day 721 semidiameters of the Earth, is given [In hoc triangulo ex data altitudine / … et diſtantia ♂ a terra nota, qui / iuxta Copernicum hoc die eſt 721 / ſemidiametrorum terræ, datur]

- side AB **0 3′ 39″**, parallax of altitude ♂ [Latus AB … parallaxis altit. ♂]
- angle ABK **45 29½** [Angulus ABK]
- side AK `0 2 36`, parallax of longitude ♂ [Latus AK … parallaxis long. ♂]
- side BK `0 2 34`, parallax of latitude ♂ [Latus BK … parallaxis latit. ♂][519]

[519] The lines under `Triang. CDE`, `Triang. CBE` and `Triangulum AKB` are side-text standing to the right of the larger figure; each sub-head is centred over its group; none carries a printed head row over its figures. In the `Triang. CBE` group `Latus` is printed once, on the `CE` line, and the `BE` and `CB` lines carry only the letters and figures. The four `Latus/Angulus` lines stand below, indented to about a third of the measure.

DIE 27 DECEMBRIS.

H. 7¼ A. M. Longitude of ♂ **17° 27′ 12″** ♋, Latitude **4° 2′ 0″**. Altitude **13° 0′**. Therefore, proceeding according to the first figure, the declination of ♂ is given as **26° 22⅓′** and the right ascension of ♂ as **109° 30⅓′**. [H. … A. M. Longitudo ♂ … ♋, Latitudo …. Altitudo …. Ergo / iuxta primam figurationem procedendo datur declinatio ♂ … et Aſcen- / ſio Recta ♂ ….]

Then, according to the second figure, the angle GBK is **106° 32′ 0″**; added to the right ascension of ♂, **109 30⅓**, it gives the right ascension of the M. C., **216° 2⅓′**. [Deinde iuxta ſecundam figurationem angulus GBK …, qui additus / ad Aſcenſionem Rectam ♂ … exhibet Aſcenſionem Rectam M. C. ….]

In the third figure, proceeding in the same way as before, there is [In tertia figuratione eodem modo quo prius procedendo, eſt]

- right ascension of the colure of the solstices near ♑ **270° 0′** [Aſcenſio Recta coluri ſolſtitiorum circa ♑]
- right ascension M. C. **216 2⅓** [Aſcenſio Recta M. C.]
- angle CDE **53 57⅔** [Angulus CDE]
- side DE **34 5½** [Latus DE]
- side DC 23 31 [Latus DC]
- From these data side CE was found, **27 0½**. [Ex quibus datis inuentum eſt latus CE]

In triangle BCE the angle CBE becomes known from the three known sides. [In triangulo BCE ex cognitis tribus lateribus innoteſcit angulus CBE.]

- For BE is 77 0 [Eſt enim BE]
- CB 85 58
- CE **27 0½**
- angle CBE **25 47⅗** [Angulus CBE]

Further, in triangle ABK, from the given altitude **13° 0′** and the distance of ♂ from the Earth, 721, there is given as before the parallax altit. ♂, side AB **0ᵖ 4′ 39″** [Porro in triangulo ABK ex data altitudine … et diſtantia ♂ a terra 721 / vt prius datur Parallaxis altit. ♂, latus AB …]

- angle ABK **25 47⅗** [Angulus ABK]
- parallax longit. ♂, side AK 0 2 1 [Parallaxis longit. ♂, latus AK]
- parallax latit. ♂, side BK 0 4 11. [Parallaxis latit. ♂, latus BK ….]

The parallaxes of ♂ were also found by another method for 17 January of the following year, 1583; you will find them in the book of observations for that year. [Sunt etiam alio modo parallaxes ♂ inuentæ ad 17 Januarij ſequentis Anni / 1583, quas in libro obſeruationum eius anni inuenies.]

FOR FINDING THE DISTANCE OF MARS FROM THE EARTH ACCORDING TO COPERNICUS FOR THE DAY 26 DECEMBER COMPLETED, SINCE WE USED IT IN INVESTIGATING THE PARALLAXES.[520]

- AD 10000
- DE 1460
- FB 500
- ES 6580, of which AD is 10000; in semidiam. of the Earth, ES 1142. [ES … qualium AD …, in ſemi- / diam. terræ ES ….]

In the year 1582, on the 26th day of December completed. [Anno 1582 Die 26 Decembris com- / pleto.]

- Mean motions [Medij motus]
- simple longit. ☌ **70 29⅓** GB [Simplex longit. ☌ … GB]
- apog. med. ☌ 120 24 A. [Apog. med. ☌ … A.]
- anomaly: commut: **186 8⅓** RTS [Anom: Commut: … RTS]
- anomaly: eccentric 310 5 ACB [Anom: Eccen. … ACB]
- simple, of the Sun **256 37⅔** [Simplex Solis]
- Triangle DCE [Triang. DCE]
- anomaly of the eccentric 310 5 [Anomalia Eccentri]
- angle CDE, equal to ADB, 49 55 [Angulus CDE æqual. ADB]
- side DE 1460 [Latus DE]
- side CE 1117 [Latus CE]
- angle CED 40 5 [Angulus CED]
- side CD 940, to be added to side DB 10000, gives side BC 10940 [Latus CD … ad- / dendum ad latus DB … pro- / uenit latus BC …]

In triangle CBE, since the two sides CB and CE about the right angle are known, there becomes known [In triangulo CBE, quia cognita ſunt / duo latera CB et CE circa Rectum, in- / notefcit]

- side BE 10997 [latus BE]
- and angle CBE **5° 49′ 47″** [et angulus CBE]

Since, moreover, angle DBF is by construction equal to angle ADB, namely part. **49° 55′**, if angle DBE, just found, is added to it, the whole angle EBF comes to [recte: *prouenit* for *peruenit* — Corrigenda, p. 429] **55° 45′**. [Cum autem Angulus DBF per con- / ſtructionem æqualis ſit angulo ADB / ſcilicet part. …, ſi addatur ej angu- / lus DBE modo inuentus, peruenit to- / tus angulus EBF ….]

- Triangle cBF [Triangulum cBF]
- side FB 500 [Latus FB]
- angle FBc **55° 45′** [Angulus FBc]
- side Fc 413 [Latus Fc]

[520] The heading is printed in roman capitals over three lines: PRO INVENIENDA MARTIS A TERRA DISTANTIA IUXTA COPERNICUM / AD DIEM 26 DECEMBRIS COMPLETUM, SIQUIDEM EA IN PARALLAXI- / BUS INDAGANDIS VSI SUMUS. — with a terminal point, IUXTA spelled with U and VSI with V in the same heading.

- angle BFc 34 15 [Angulus BFc]
- side cB 281, to be taken from BE 10997, leaves side cE 10716 [Latus cB … aufe- / rendum a BE … relin- / quitur latus cE …]

Therefore in triangle FcE, since the two sides Fc and cE about the right angle are given, there is given [Itaque in triangulo FcE, quia dan- / tur duo latera Fc et cE circa Rectum / angulum, datur]

Diagram. A large circle, with a smaller circle drawn inside it, and a vertical line from A at the top of the large circle running down through D and E to the foot of both circles. A small circle stands on the circumference of the large circle at the upper right, with B at a point on the large circumference inside it and F on its own circumference at the left. Several straight lines run from the lower left of the inner circle and from E up to the right toward the small circle, crossing the inner circle near X, P, S and T; one line runs from F down to the left. A short dotted line runs from F toward c, inside the small circle; a dotted line runs from p to S along the inner circle; two dotted lines join D to C and C to E. Two lines run from E down to the left, to R and V on the inner circle. The letters I, ♈ and G stand together outside the inner circle at the right, G on the large circumference. Which line passes exactly through which lettered point is not asserted beyond this; the geometry is described only as far as the image shows it.[521]

- A: above the top of the large circle, at the head of the vertical line
- F: at the left of the small circle, on its circumference
- B: on the large circumference inside the small circle, at its centre region
- c: small letter, inside the small circle, on a line below and left of B
- P: on the inner circle, upper right
- p: small letter, just below P
- S: on the inner circle, right of P, at a heavy point
- T: just below and right of S, on the inner circle
- X: inside the inner circle, below P, on a line
- D: on the vertical line, left, above E
- C: left of the vertical line, between D and E, at the corner of the two dotted lines
- E: on the vertical line, where the lines meet
- I: outside the inner circle at the right, left of the sign
- ♈: between I and G (read on shape; see the report)
- G: on the large circumference at the right
- R: on the inner circle, lower left
- V: on the inner circle, below R[522]
- side FE 10724 and [latus FE … et]
- angle FEB **2° 12′ 26″** [Angulus FEB]

[521] the Corrigenda (p. 429) direct that the points F and S of this figure should be joined by a straight line; the printed figure does not draw it.

[522] The Corrigenda (p. 429) state that in this drawing the points F and S should have been joined by a straight line.

This angle, added to the angle DBE found earlier, **5° 49′ 47″**, makes up the angle DXE, **8°2′13″**, which measures the equation of the eccentric of ♂, to be added to its equal longitude. [Hic angulus additus angulo DBE / prius inuento … conſtituit an- / gulum DXE…qui metitur Æqua- / tionem Eccentri ♂ addendam ad lon- / gitudinem eius æqualem.]

Equal to angle DXE is angle REV, which is to be subtracted from the mean motion of commutation so that there remains the arc VTS, which represents the equated anomaly of commutation of ♂. [Angulo DXE æqualis eſt Angulus REV, / ſubtrahendus a medio motu commu- / tationis, vt remaneat arcus VTS, qui / repreſentat Anomaliam Commutati- / onis ♂ coæquatam.]

- arc RVTS **186° 8′** [Arcus RVTS]
- angle REV `8 2` [Angulus REV]
- arc VTS `178 6` [Arcus VTS]
- arc VTSP `180` [Arcus VTSP]
- arc PS `1 54`, [Arcus PS]

which measures angle PES. [qui metitur angulum PES.]

- Triangle EpS [Triangulum EpS]
- side ES `6580` [Latus ES]
- angle pES **1° 54′** [Angulus pES]
- side Sp `218` [Latus Sp]
- angle pSE `88 6` [Angulus pSE]
- side pE `6576`, to be subtracted from FE `10724` so that there remains pF `4148` [Latus pE … ſub- / trahendum ab FE … vt re- / linquatur pF …]
- Triangle SFp [Triangulum SFp]

In triangle SFp, since the two sides Fp and pS about the right angle are known, there is given [In triangulo SFp cognitis duobus / lateribus Fp, pS circa angulum rec- / tum datur]

- angle pFS **3° 0½′** [Angulus pFS]

which measures the prosthaphaeresis of the parallax of the orb of Mars, to be added. Then [qui metitur proſtaphæreſin paralla- / xeos orbis Martis, addendam. Deinde]

Side SF is `4154` of such parts as AD is `10000`. [Latus SF … talium partium qua- / lium AD ….]

To side SF correspond `721` semidiameters of the Earth, the distance of ♂ sought. [Lateri SF reſpondent ſemidiametri / terræ …, diſtantia ♂ quæſita.]

A MORE EXACT AND TRUER INVESTIGATION OF THE RIGHT ASCENSION OF CERTAIN FIXED STARS, FROM THEIR OBSERVATIONS FROM VENUS, VENUS ITSELF HAVING BEEN OBSERVED BY DAY, BOTH AS REGARDS MERIDIAN ALTITUDES AND AS REGARDS DISTANCES FROM THE SUN. IN THE YEAR 1582.[523]

Distances of ♀ from the Earth on certain days, in semidiameters of the Earth. [Diſtantiæ ♀ a terra certis diebus in Semidiametris Terræ.]

	Copernican [Copernianæ.]	Ptolemaic [Ptolemaicæ.]
Day 25. Febr. [Die 25. Febr.]	822	429
Day 27. Febr. [Die 27. Febr.]	808	422
Day 9. Mart. [Die 9. Mart.]	722	382
Day 16. Mart. [Die 16. Mart.]	657	349
Day 28. Mart. [Die 28. Mart.]	554	292
Day 3. Apr. [Die 3. Apr.]	501	264
Day 13. Apr. [Die 13. Apr.]	426	223

[524]

FOR AN ELEVATION of the Equator of 34°5′30″. ON THE 25TH DAY OF FEBRUARY, H. 4 45′.[525]

- between ♀ and ☉ 46 10 [Inter ♀ & ☉]
- parallax of altitude ☉ **2′56″** [Parallaxis Alt. ☉]
- longitude 2 22 [Longit.]
- latit. 1 45 [Latit.]
- true longitude of ☉ **16 52 49** ♓ [Longitudo ☉ vera]
- parallax of longitude, ſt. 2 22 [Parall. Long. ſt.][526]
- apparent longitude of ☉ **16 50 27** ♓ [Longitudo ☉ viſa]
- apparent declination of ☉ 5 14 19 A. [Declinatio ☉ viſa … A.]
- apparent right ascension of ☉ 347 54 41 [Aſc. R. ☉ viſa][527]
- distance of ♀ from the Earth 822 [Diſtan. ♀ a terra]

[523]The heading is printed in roman capitals over seven lines: EXQUISITIOR ET VERIOR INQUISITIO ASCENSIONIS REC- / TÆ QUARUNDAM STELLARUM FIXARUM, EX OBSERUATIO- / NIBUS EARUM A VENERE, IPSA VENERE INTERDIU, / TUM QUO AD MERIDIANAS ALTITUDINES / TUM QUO AD DISTANTIAS A / SOLE OBSERVATA. / ANNO1582. — with a point after OBSERVATA and after ANNO1582; OBSERUATIO- is set with U and OBSERVATA with V in the same heading; QUO AD is set as two words; ANNO1582 is set with no space.

[524]The printed head reads Copernianæ, not Copernicanæ.

[525]The heading group is printed in three centred lines: AD ELEVATIONEM (capitals) / Æquatoris 34°5′30″. (upper and lower case, the marks set close) / DIE 25 FEBRUARIJ, H. 4 45′. (capitals, a prime after 45 only), each of the last two ending with a point.

[526]A short rule stands here under the value file of the line above, from about the middle of the column to its right edge.

[527]A rule the full width of the column stands here.

For investigating the apparent declination of ♀ according to the Copernican distance of Venus from the Earth. [Pro declinatione ♀ viſa / indaganda juxta Coper- / nianam Veneris a terra / diſtantiam.]

When the parallax was added to the apparent altitude of ♀ on 27 Febr., the true declination of ♀ was observed as **15 52¼**. And since the declination of ♀ varies by about one minute in each hour, for the 46 hours by which the observation made on the 25th preceded that of the 27th, I subtract `Minuta 46` from the declination of the 27th, so as to have the true declination of ♀ for the time of this observation, **15 6½**. [Addita parallaxi ad Altitudinem ♀ / viſam die 27 Febr. obſervata eſt decli- / natio ♀ vera …. Atque cum decli- / natio ♀ ſingulis fere horis ſingula mi- / nuta variet, pro horis 46 quibus obſer- / vatio die25 facta,illam diej 27præceßit, / ſubtraho a declinatione diej 27 Minuta / 46 vt habeatur declinatio ♀ vera ad / tempus hujus obſervationis, ….]

Moreover, I assumed it to be as if ♀ had been on the meridian on this day at hour **2°48′**; and from these assumptions I investigated the parallaxes of ♀ in this way. [Præſuppoſuj autem ac ſi ♀ hoc die, / hora … fuißet in Meridiano, ex qui- / bus præſuppoſitis hac ratione paral- / laxes ♀ indagavj.]

Diagram. A circle, set in the right column. Two long curved lines cross the circle from its left side to its right side in its lower half; they cross one another near the middle of the circle, one rising toward the right and the other running nearly level. From A, above the top of the circle, a line descends toward the lower left and ends at the upper of the two long lines. From B, at the top of the circle to the right of A, two curved lines descend toward the lower left, close together at first and then separating; one ends at the upper long line and the other at the lower. C stands at the left of the point where the line from A crosses a line from B; D stands at the right of a second crossing lower down. The four letters are cut in a cursive form. Which line passes exactly through which lettered point is not asserted beyond this; the geometry is described only as far as the image shows it.

- A: above the top of the circle, at the head of the line descending to the lower left
- B: at the top of the circle, right of A, where the two curved lines begin
- C: inside the circle, upper left, at a crossing of the line from A with a line from B
- D: inside the circle, below C, at a second crossing
- AB **34 5½**
- ABC `29 15`
- CD `0 3 2`
- AD **46 34¾**
- ABD `29 16 10`
- BC **74 53½**
- AC **46 31⅔**
- BAC `139 27`
- BD `74 56 20`

So that, namely, the differen- [Ut nimirum differen-]
the difference of BC from BD, that is, the parallax of declination, is **2′50″**. The difference of the angles at B, on the other hand, that is, the parallax of Aſc. R., is **1′10″**. [tia BC a BD, ſeu parallaxis declinati- / onis ſit …. Differentia vero Angu- / lorum ad B, ſeu parallaxis Aſc.R.….]

Therefore at hour **4¾** the apparent declination of ♀ will be **15°3′ 40″**, and that is when we derive the declination of ♀ from day 27 in the prescribed way. But since the meridian altitude of ♀ was also observed on 26 Febr., we shall rather use that one, as being nearer. And since the parallax of altitude is **2¾**, when it is added to the apparent altitude of ♀ the declination of ♀ is given as **15 23¼**. And since the declination changed by 29 minutes between day 26 and day 27, there correspond to the hours **22 5′** by which the observation of the 25th preceded the observation of the 26th 25 45, to be subtracted from the true declination that was given on the 26th with ♀ standing on the meridian, so that it is for 25 Feb., H. 4 45. [Erit itaque Hora … declinatio ♀ viſa / …, idque dum juxta præſcrip- / tum modum declinationem ♀ a die 27 / deducimus, verum cum Altitudo meri- / diana ♀ etiam die 26 Febr. obſervata / ſit, illam potius utpote propinquiorem / uſurpabimus. Cumque parall. Altitud. / ſit …, addita illa ad viſam Altitudinem / ♀, datur declinatio ♀, …. Et quo- / niam declinatio inter diem 26 & 27 mu- / tata eſt 29 ſcrupulis primis, congru- / ent horis …quibus obſervatio diej 25 / obſervationem diej 26 præceßit, … / ſubtrahenda a declinatione vera quæ / die 26 dabatur, ♀ exiſtente in meridi- / ano, ut ſit Die 25 Feb. H. ….]

- true declination of ♀, 14 57 30 [Declin. ♀ vera,]
- parallax of declination, ſub. 2 50 [Parall.decl.ſub.]
- apparent declination of ♀ 14 54 40 [Declin. ♀ viſa][528]

This also agrees better with the observation made on the same day in Azim. from the south 89 50 than the declination brought here from day 27; therefore in the following figure let there be [Quæ melius etiam congruit cum ob- / ſervatione facta eodem die in Azim. / a meridie … quam declinatio a 27 / die huc derivata, quare in ſequenti fi- / gura ſit]

Diagram. A curved triangle standing in the left column. From A at the apex two curved sides descend, one to the lower left and one to the lower right. The left side comes down to B; below B a short straight upright line runs down to D. The right side comes down to E; below E a short straight upright line runs down to C. Between the two sides two curved lines cross the figure: one runs from B to E, and one runs from D, rising and then falling, down to C; the two cross one another a little right of the middle of the figure. Five letters are cut in a decorative cursive; the D is cut in a form unlike the D of the circle figures on this opening. Which line passes exactly through which lettered point is not asserted beyond this.

- A: at the apex, above the meeting of the two sides

[528] A short rule stands over the value file between the second and third values above, from about three quarters of the column to its right edge.

- B: at the left, where the left side meets the upper crossing line
- D: at the lower left, at the foot of the short upright under B
- E: at the right, where the right side meets the upper crossing line
- C: at the lower right, at the foot of the short upright under E
- C the Sun [C Sol.]
- B ♀
- AC **95 14⅓**
- AB **75 5⅓**
- BC 46 10

From which the angle BAC comes out as **41°54′51″**; added to the apparent Aſc. R. of ☉, it gives [Unde prodit Angulus BAC …, / qui additus ad Aſc. R. ☉ viſam, exhibet]

- the apparent Aſc. R. of ☉, **29 49½** [Aſc. R. ☉ viſam,]
- to which is added the parallax of Aſc. R. 1 10 [cui add. parall. Aſc. R.]
- gives the same, true, 29 50 40 [præbet eandem veram][529]

And these are for H **4° 45′** P. M. [Atque hæc ad H … P. M.]

H. **7° 2′**. Between ♀ and Aldebaran [Aldeboram] 31 55. [H. …. Inter ♀ & Aldeboram ….]

Azim. ♀ Mer. 76 36. Altitude 26 41. From these data there are given, in the following figure, [Azim. ♀ Mer. …. Alt. …. Ex qui- / bus datis dantur in ſequentj figura- / tione,]

Diagram. A circle, set in the right column. A straight line runs across the circle a little below its middle, rising slightly from left to right. From A, just above the top of the circle, a straight line descends toward the lower left. From B, on the circle at the upper right, two curved lines descend toward the lower left, close together at first and then separating. E stands at the left of the point where the line from A meets the upper of the lines from B; a short straight stroke runs from that point down to the right to the lower line from B, where D stands at its right. C stands at the left of a point where the line from A crosses the lower line from B, further down. A long straight line enters the circle at the left, below E, and runs down to the right across the circle, crossing the line from A and the lines from B and passing below the middle of the circle to the lower right edge; a short stroke crosses it near its left end. The lines from A and from B end at or near the level of the line across the circle. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: just above the top of the circle, at the head of the line descending to the lower left
- B: on the circle at the upper right, where the two curved lines begin
- E: inside the circle, upper left of centre, at the meeting of the line from A with the upper line from B
- D: right of E and a little below it, at the lower end of the short stroke

[529] A short rule stands over the value file between the second and third lines above, from about the middle of the column to its right edge.

• C: below E, at the left of a crossing on the line from A

BC **75 10′40″**. ACB 34 20. Moreover, from the altitude and from the distance of ♀ from the Earth, which is 822, side EC is had as **3′45″**; when this is taken into angle ECD, side ED is produced, **2′6″**. Angle CED is the complement of the other, ECD, to 90, namely 55 40. From its being taken into side EC there comes out DC **3′5″**, which represents the parallax of declination of ♀. [BC … …. ACB …. Ac præterea / ex Altitudine & diſtantia ♀ a terra quæ / eſt … habetur latus EC …,quo duc- / to in Angulum ECD producitur latus / ED …. Angulus vero CED, eſt com- / plementum alterius ECD, ad … nimi- / rum …. Ex cujus ductu in latus EC / prodit DC …, quod repræſentat pa- / rall. declin. ♀.]

Since, moreover, the diurnal motion of ♀ on this day is **59′** in the Ephemerides, there correspond to H. 2 Min. 17, by which this observation follows that observation of the Sun and ♀, [Quia autem motus diurnus ♀ hoc die / eſt … in Ephemeridibus, H. … Min. …, / quibus hæc obſervatio ſequitur illam / Solis & ♀ obſervationem reſpondent]

• in the ecliptic 5 37 [in Ecliptica]
• in the Equator, 5 24. [in Æquatore, ….]

These, added to the true Aſc. R. of ♀ found before, make, at the time of this observation, the true Aſc. R. of ♀, [Quæ addita ad Aſc. R. ♀ veram, an- / te inventam, conſtituunt tempore hu- / jus obſervationis, Aſc. R. ♀ veram,]

• **29 56′ 4″**
• parallax of Aſc. R. 2 6 [Parall. Aſc. R.]
• apparent Aſc. R. of ♀ 29 53 58 [Aſc. R. ♀ viſa][530]

And from the diurnal variation of declination there correspond to the same interval of time **2′ 40″**. These, added to the true declination had earlier, **14 57½**, [Et de declinationis variatione diur- / na congruunt eidem temporis inter- / vallo …. Quæ addita ad prius ha- / bitam declinationem veram …]

give the true declination sought [exhibent declin. veram quæſitam]

• **15 0 10″**
• parallax of declination 3 5 [Parall. declin.]
• apparent declination of ♀ 14 57 5 [Declin. ♀ viſa][531]

And this procedure has been followed in all the rest from here on. Therefore I shall not write it out more often, but immediately after the diurnal motion I shall write down the true right ascension of ♀ and the true declination, from which their parallaxes will have to be removed. [Atque hic proceßus in reliquis om- / nibus deinceps obſervatus eſt, Quare / eam ſæpius non aſcribam ſed mox / poſt motum diurnum Aſc. Rectam ♀ / veram & Declin. Veram aſcribam, / a quibus ſuæ parallaxes auferendæ / erunt.]

[530] A short rule stands over the value file between the second and third lines above. The first value line carries no label; it stands under the sentence above it.

[531] A short rule stands over the value file between the second and third lines above. The first value line carries no label; it stands under the line above it.

From the foregoing data, moreover, the difference of right ascension between ♀ and Aldebaran [Aldeboræ] has been found, 33 6 45, to be added to the apparent right ascension of ♀, 29 53 58, so that there comes out the right ascension of Aldeb., 63 0 43, which was being sought. [Ex præmißis autem datis inventa eſt / differentia Aſc. rectæ ♀ & Aldeboræ / … addenda / ad Aſc. R. ♀ viſam … vt prodeat / Aſc. R. Aldeb. … quæ quæ- / rebatur.][532]

IN THE SAME WAY,[533]

H. 8 4. Between ♀ and Aldebaran 31 52. Azim. ♀ Mer. 89 50, altitude 18 13. From these, in the same way as before, there are given, according to the figure immediately preceding, BC 75 5′ 15″. ACB 35 27⅓, whose complement to 90 is CED 54 32 40. [H. …. Inter ♀ & Aldeboram …. / Azim. ♀ Mer. …, Alt. …. Unde / eodem modo quo prius dantur juxta / præcedentem proxime figurationem, / BC …. ACB … cujus com- / plementum ad … eſt, CED ….]

- parallax of altitude CE 0 4′ 0″ [Parall. Alt. CE]
- parallax of right ascension ED 0 2 18 [Parall. Aſc. R. ED]
- parallax of declination DC 0 3 15 [Parall. declin. DC]
- true right ascension of ♀ 29 58 33 [Aſc. R. ♀ vera]
- parallax of right ascension 2 18 [Parall. Aſc. R.]
- apparent right ascension of ♀ 29 56 15 [Aſc. R. ♀ viſa][534]
- true declination of ♀ 15 1 24 [Declin. ♀ vera]
- parallax of declination 3 14 [Parall. declin.]
- apparent declination of ♀ 14 58 10 [Declin. ♀ viſa][535]
- declination of Aldebaran 15 36 30 [Declin. Aldeboræ]
- and from this there results the difference of right ascension of ♀ and Aldeb. 33 3 45 [Provenitque hinc differentia Aſc. Rec- / tæ ♀ & Aldeb.]
- apparent right ascension of ♀ 29 56 15 [Aſc. R. ♀ viſa]
- right ascension of Aldebaran 63 0 0 [Aſc. R. Aldeboræ][536]

And in these the Copernican distance of ♀ from the Earth was presupposed. What follows is according to the Ptolemaic distance of ♀ from the Earth, which on this day is 429. [Atque in his præſuppoſita fuit Coper- / niana ♀ a terra diſtantia. Sequitur iux- / ta Ptolomaicam ♀ a terra diſtantiam / quæ hoc die eſt ….]

The same declination therefore remains, and the same right ascension of ☉, as there was before. [Manet ergo eadem declinatio eadem- / que Aſc. R. ☉ quæ prius fuit.]

For the declination of ♀ [Pro declin. ♀]

[532] A short rule stands under the figures 29 53 58, between the fourth and fifth lines of this paragraph.
[533] Printed as one centred line in roman capitals, PARI RATIONE,, ending with a comma.
[534] A short rule stands over the value file between the fifth and sixth lines above.
[535] A short rule stands over the value file between the second and third lines above.
[536] A short rule stands over the value file between the fourth and fifth lines above.

- On 26 Feb., H. 2 50, the apparent meridian altitude of ♀ was **49 26′ 0″** [Die 26 Feb. H. … fuit Altitudo ♀ me- / ridiana viſa]
- and the parallax of altitude 5 15 [Et parall. altitud.]
- therefore the true altitude 49 31 15 [Ideoque Alt. vera]
- and consequently the true declination 15 25 45 [Ac proinde decli. vera][537]

Since, moreover, this declination increases by 29 from day 26 to day 27, it is likely that it increased by the same amount from day 25 to day 26, so that accordingly, for the hours **22 5′**, **26′ 40″** come to be subtracted from the given declination. So let it be: on 25 Febr., hour 4 45, true declination of ♀ 14 59. [Cum autem declin. hæc, a die 26 in / diem 27 creſcat … veriſimile eſt eam / a die 25 in 26 tantundem creviße, ut / ideo, pro horis … a declinatione / data … ſubtrahenda veniant. Sit- / que Die 25 Febr. Hora …. Declin. / ♀ vera ….]

(That I have subtracted here nearly **1′** more from the declination of day 26 than in the preceding hypothesis perhaps came about because there I used Mästlin's [Mæſtlini] table of diurnal motion, which agrees with 28. But I do not know whether I did more correctly there or here, since the declination on this day is almost uncertain. However that may be, one minute of declination in this place changes the longitude little). [(Quod autem hîc, fere … Minutum, a / declinatione diei 26 magis quam in / præcedenti hypotheſi ſubtraxerim, id / fortaße ideo contigit, quod illic uſus / fuerim tabula motus diurnj Mæſtlini, / quæ 28 congruit. Sed neſcio illic ne an / hîc rectius fecerim, cum declinatio / hoc die fere ſit incerta. Utut fuerit, / unum minutum declinationis hoc in / loco, longitudinem parum variat).]

FOR INVESTIGATING THE PARALLAXES OF ♀.[538]

With the data that were used in the other hypothesis, [Datis quorum fuit uſus in altera Hy- / potheſj,]

Diagram. A circle, set in the right column. A straight line runs across the circle a little below its middle, from edge to edge, nearly level. A second straight line crosses the circle from its left side, above the level line, down to its lower right side, crossing the level line near the middle of the circle. From A, just above the top of the circle and left of centre, a curved line descends toward the lower left and ends on the level line. From B, on the circle at the upper right, two curved lines descend toward the lower left, close together at first and then separating; each ends on the slanting straight line, the upper one with a short stroke across it near its end. C stands at the left of the point where the line from A crosses the upper line from B; D stands at the right of the point, lower down, where the line from A crosses the lower line from B. Four letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

[537] A short rule stands over the value file between the second and third lines above.

[538] Printed as two centred lines in roman capitals, PRO PARALLAXIBUS ♀ / INDAGANDIS., ending with a point.

- A: just above the top of the circle, left of centre, at the head of the line descending to the lower left
- B: on the circle at the upper right, where the two curved lines begin
- C: inside the circle, upper left, at the crossing of the line from A with the upper line from B
- D: inside the circle, right of C and lower, at the crossing of the line from A with the lower line from B

AB **34 5½**. AC **46 31⅔**. BC **74 53½**. BAC 139 27. ABC 29 15. But now CD **5⅚′**. AD **46 37½**. BD 74 58 45. ABD 29 17 35. [AB …. AC …. BC …. BAC / …. ABC …. At nunc CD …. / AD …. BD …. ABD ….]

The difference of BC from BD is therefore **5′15″**. [Eſt ergo differentia BC a BD. …]

- difference of ABC and ABD 2 35 [differentia ABC & ABD]
- true Declin. of ♀ **14 59′ 0″** [Declin. ♀ vera]
- Parall. declin. 5 15
- apparent declin. of ♀ 15 53 45 [recte: 14 53 45 — Corrigenda, p. 429] [declin. ♀ viſa][539]

Diagram. A curved triangle standing in the left column. From A at the apex two curved sides descend, one to the lower left and one to the lower right. The left side comes down to B; D stands on it a little above B. The right side comes down to E; C stands on it a little above E. Between the two sides two lines cross each other a little left of the middle: as drawn, one runs from D down to E and the other from B up to C. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: at the apex, above the meeting of the two sides
- D: on the left side, above B, at the left end of the upper crossing line
- C: on the right side, above E, at the right end of the upper crossing line
- B: at the lower left, at the foot of the left side
- E: at the lower right, at the foot of the right side
- E ⊙
- D ♀[540]
- AE **95 14⅓** AD **75 6¼**
- ♀ from ⊙, DE 46 10 [♀ a ⊙ … DE]

From this comes out the angle DAE, **41 55′23″**. [Hinc provenit Angulus DAE …]

- Aſc. R. of ⊙ **347 54′41″** [Aſc. R. ⊙]
- apparent Aſc. R. of ♀ 29 50 4 [Aſc. R. ♀ viſa]
- Parall. ad. 2 35

[539] A short rule stands over the value file between the fourth and fifth lines above.

[540] The two lines E ⊙ and D ♀ stand beside the figure at the right, as a key; the figure itself carries only the five letters.

- true Aſc. R. of ♀, 29 52 39, for the hour 4¾ [Aſc. R. ♀ vera, / ad Horam …][541]

H. 7 2. Between ♀ and Aldebaran [Aldeboram] 31 55. Altitude 26 41. [H. …. Inter ♀ & Aldeboram / …. Altit. ….]

Diagram. A circle, set in the left column. A straight line runs across the circle a little below its middle, nearly level, from edge to edge. A second straight line enters the circle at the left, above the level line, and runs down to the right, crossing the level line near the middle of the circle and meeting the circle at its lower right. From A, just above the top of the circle and a little left of centre, a line descends to the lower left, passing down by D and C, and ends on the level line. From B, on the circle at the upper right, a curved line descends to the left, passing by E, and ends on the slanting straight line. A short stroke joins the point by D to the point by E. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: just above the top of the circle, a little left of centre
- B: on the circle at the upper right
- D: inside the circle near the top, below and left of A, at the left end of the short stroke
- E: right of D and a little lower, at the right end of the short stroke
- C: below D, on the line descending from A
- DCE 34 20
- CDE 55 40
- DC 0 7⅙
- DE 0 4′2″
- CE 0 5 55
- true Aſc. R. of ♀ 29 58 4 [Aſc. R. ♀ vera]
- Parall. 4 2
- apparent Aſc. R. of ♀ 29 54 2 [Aſc. R. ♀ viſa][542]
- true Declin. of ♀ 15 1 45 [Declin. ♀ vera]
- Parall. declin. 5 55
- apparent Declin. of ♀ 14 55 50 [Declin. ♀ viſa]
- Declin. of Aldeb. 15 36 30 [Declin. Aldeb.][543]

From which comes out the difference of right Aſcen. of ♀ and Aldeb.: [Unde prodit differentia Aſcen. Rectæ / ♀ & Aldeb.]

- 33 6 37
- apparent Aſc. R. of ♀ 29 54 2 [Aſc. R. ♀ viſa]
- Aſc. R. of Aldeb. 63 0 39 [Aſc. R. Aldeb.][544]

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[541] Two short rules stand over the value file above: one under 347 54′41″, one under 2 35. The value 29 52 39 stands on the line of Aſc. R. ♀ vera,; ad Horam 4¾ is a line of its own beneath it.

[542] A short rule stands over the value file between the second and third lines above.

[543] A short rule stands over the value file between the second and third lines above.

[544] The value 33 6 37 stands on the second line of the label, after ♀ & Aldeb. A short rule stands over the value file between the second and third values above.

H. 8 4, between ♀ and Aldeb. 31 52. [H. … Inter ♀ & Aldeb. …]
- altitude 18 13 [Alt.]
- angle DCE 35 27. CDE 54 33 [Angulus DCE …. CDE]
- side CD 0 7 37. DE 0 4 25 [latus CD …. DE]
- CE 0 6 12
- true Aſc. R. of ♀ **30 0′33″** [Aſc. R. ♀ vera]
- Parall. 4 25
- apparent Aſc. R. of ♀ 29 56 8 [Aſc. R. ♀ viſa][545]
- true Declin. of ♀ 15 3 0 [Declin. ♀ vera]
- Parall. 6 12
- apparent Declin. of ♀ 14 56 48 [Declin. ♀ viſa][546]
- difference of Aſc. R. of ♀ and Aldebaran 33 3 36 [Differentia Aſc. R. ♀ & / Aldeboræ]
- apparent Aſc. R. of ♀, 29 56 8 [Aſc. R. ♀ viſa,]
- Aſc. R. of Aldeb. 62 59 44 [Aſc. R. Aldeb.][547]

ON 26 FEBR.[548]

At H. **2 50′** ♀, in meridi., had an altitude of 49 26 ἐν πλάτει [Greek: *en platei*, "in breadth"]. [H. … ♀ in meridi. habuit Altitudi- / nem … ἐν πλάτει·]

H. 3 35: ♀ from ☉ **46 10½**. [H. … ♀ a ☉ ….]
- Parall.:
- long. of ☉ **2′10″** [long. ☉]
- lat. 1 52
- H. **3 35′**, true long. of ☉ **17 49′44″**)([long. ☉ vera]
- Parall. long. of ☉ 2 10 [Parall. long. ☉]
- apparent Long. of ☉ 17 47 34)([Long. ☉ viſa]
- apparent Decl. of ☉ 4 52 8 A. [Decl. ☉ viſa]
- apparent Aſc. R. of ☉ 348 47 20 [Aſc. R. ☉ viſa][549]

According to the hypotheses of Copernicus, the distance of ♀ from the Earth is 815. [Juxta Copernici Hypotheses diſtan- / tia ♀ a Terra ….]
- apparent altitude, Merid. **49 26′ ″** [Alt. Merid. viſa]
- Parall. of altitude, ad. 2 45 [Parall. Alt. ad.]
- true altitude of ♀ 49 28 45 [Alt. ♀ vera]
- 34 5 30
- H. **2⅚**, true Declin. of ♀ 15 23 15 [Declin. ♀ vera]
- It changed in **45′** Temp.: 52 [Mutata eſt in … Temp.]

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[545] No point is printed after H. 8 4. The line Alt. 18 13 is set to the right, its value in the value file. A short rule stands over the value file between the seventh and eighth lines of this group.

[546] A short rule stands over the value file between the second and third lines above.

[547] A short rule stands over the value file between the second and third lines above.

[548] Printed as one centred line in roman capitals, DIE 26 FEBR., ending with a point.

[549] A printed brace after Parall. embraces the two lines long. ☉ and lat.. The sign)(after **17 49′44″** and after 17 47 34 is the sign of Pisces as the edition sets it. A short rule stands over the value file between Parall. long. ☉ **2 10** and Long. ☉ viſa.

• H. 3 35, true decl. of ♀ 15 24 7 [decl. ♀ vera][550]

See the first of the three immediately preceding figures. [Vide primam / trium proxime / præcedentium / figurationum.]

• AB **34 5½**
• BC 74 36
• ABC 11 15
• AC **41 24 57″**
• BAC 163 28[551]
• CD **0 2′47″**. AD 41 27 44
• BD 74 38 39. ABD 11 15 57

The difference between BC and BD, that is, the parallax of declin. of ♀, is therefore **0 2′39″**; [Eſt ergo differentia inter BC & BD ſeu / Parall. declin. ♀ …]

between ABC and ABD it is 0 0 57, which is the parallax of right ascension. [Inter ABC & ABD, … / quæ eſt Parall. Aſc. R.]

• true declin. of ♀ 15 24 7 [Declin. ♀ vera]
• parallax of declin. 2 39 [Parall. declin.]
• apparent declin. of ♀ 15 21 28 [Declin. ♀ viſa][552]

Let the second of the three immediately preceding figures be repeated here. [Repetatur hîc / ſecunda trium / proxime præ- / cedentium / figurationum.]

• E the Sun, D ♀, [E Sol D ♀,]
• AE **94 52′ 8″**
• AD 74 38 30
• DE 46 10 30
• angle DAE 41 55 6 [Angulus DAE]
• right ascension of ☉ 348 47 20 [Aſc. R. ☉]
• apparent right ascension of ♀ 30 42 26 [Aſc. R. ♀ viſa]
• parallax, ad. 0 57 [Parall. ad.]
• H. 3 35, true right ascension of ♀ **30 43′23″** [Aſc. R. ♀ vera][553]

H. **7 5′**, between ♀ and Aldeb. 30 59. Azim. ♀ **76 27′**. Altitude 27 26. From this, BC 74 38 3. [H. … Inter ♀ & Aldeb. … / Azim. ♀ …. Alt. … / Hinc BC …]

See the last figure of the three preceding. [vide ultimam fi- / gurationem / trium præce- / dentium.]

• ACB 34 25

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[550] In the first line the leaf sets a minute mark after 26 and a second mark at the right of the value file with no figure before it; the seconds place is blank. The line 34 5 30 carries no label. Three short rules stand over the value file: under 2 45, under 34 5 30, and under 52.

[551] The four lines of the instruction stand at the left beside the first four lines of this file; BAC 163 28 stands alone below them. A rule stands under the file, from a little left of the middle of the column to its right edge.

[552] A short rule stands over the value file between the second and third lines above.

[553] The five lines of the instruction stand at the left; the file stands beside them from their second line down, and Angulus DAE 41 55 6 runs from the middle of the column below them. Two short rules stand over the value file: under 348 47 20 and under 0 57.

- CDE 55 35
- DC 0 3 45
- DE 0 2 7
- CE 0 3 5[554]

Diurnal motion of ☿ **59′**. [Motus diurnus ☿ ….]

- H. 3 30, Reſp. in the zodiac **8′36″** [Reſp. in Zodiaco]
- in the Equator 8 17 [in Æquatore]
- true right ascension of ☿ 30 51 40 [Aſc. R. ☿ vera]
- parallax of right ascension 2 7 [Parall. Aſc. R.]
- apparent right ascension of ☿ 30 49 33 [Aſc. R. ☿ viſa][555]

H. 3 30, Reſp. in declin. **4′ 5″**. [H. … Reſp. in declin. …]

- true declin. of ☿ 15 28 12 [declin. ☿ vera]
- parallax of decl. 3 5 [Parallaxis decl.]
- apparent decl. of ☿ 15 25 7 [decl. ☿ viſa][556]
- Decl. of Aldebaran [Aldeboræ] 15 36 30

From which comes out the difference [Unde prodit differentia]

- of the right ascension of ☿ and Aldebaran 32 11 8 [Aſc. R. ☿ & Aldeboræ]
- right ascension of ☿ 30 49 33 [Aſc. R. ☿]
- right ascension of Aldebaran 63 0 40 [Aſc. R. Aldeboræ][557]

IN THE SAME WAY.[558]

H. 8 7. Between ☿ and Aldebaran **30 57½**. Azim. ☿ 89 50. Altitude **18° 47′**. [H. …. Inter ☿ & Aldeboram … / Azim. ☿ …. Alt. ….]

Repeat here the same last figure. [Repete hîc ean- / dem ultimam / figurationem.]

- BC **74 37′35″**
- ACB **35 32½**
- CDE **54 27½**
- DC 0 4 0
- DE 0 2 20
- CE 0 3 15[559]
- H. 4 32, Reſp. in the Equator 10 45 [Reſp. in Æquat.]
- true right ascension of ☿ 30 54 8 [Aſc. R. ☿ vera]
- parallax 2 20 [Parall.]
- apparent right ascension of ☿ 30 51 48 [Aſc. R. ☿ viſa][560]

[554] The instruction, beginning with a lower-case vide, stands at the left beside the second to fifth lines of this file; ACB 34 25 stands alone above it, directly under Hinc BC 74 38 3.

[555] A comma is printed after H. 3 30. A short rule stands over the value file between the fourth and fifth lines above.

[556] A short rule stands over the value file between the second and third lines above.

[557] A short rule stands over the value file between the second and third values above.

[558] Printed as one centred line in roman capitals, PARI RATIONE., ending with a point.

[559] The three lines of the instruction stand at the left beside the first three lines of this file. A rule stands under the file, from about a third of the column to its right edge.

[560] A short rule stands over the value file between the third and fourth lines above.

- true declin. of ♀ 15 29 24 [Declin. ♀ vera]
- parallax of declin. 3 15 [Parall. declin.]
- apparent declin. of ♀ 15 26 9 [Declin. ♀ viſa]
- declin. of Aldebaran 15 36 30 [Declin. Aldeboræ][561]

And from this comes out the difference of right ascension of ♀ and Ald.: [Ac provenit hinc differentia Aſcenſio- / nis R. ♀ & Ald.]

- 32 9 40
- apparent right ascension of ♀ 30 51 48 [Aſc. R. ♀ viſa]
- right ascension of Aldeb. 63 1 28 [Aſcenſ. R. Aldeb.][562]

According to the Ptolemaic distance of ♀ from the Earth, which is 425. [Juxta Ptolomaicam ♀ a terra diſtanti- / am, quæ eſt ….]

With the same procedure remaining, and nothing differing from the earlier ones except as regards the size of the parallaxes: at H. 2⅝ the apparent meridian altitude of ♀, 49 26. [Manente eodem proceßu, & nihil a / prioribus diſcrepante, præterquam / quo ad parallaxium magnitudinem, / H. … Altitudo ♀ Meridi- / ana viſa …]

- parallax of altitude 5 15 [Parall. Altit.]
- true altitude of ♀ 49 31 15 [Alt. ♀ vera]
- 34 5 30
- true declin. of ♀ 15 25 45 [Declin. ♀ vera]
- Add 52 [Adde]
- H. 3 35, true decl. of ♀ 15 26 37 [decl. ♀ vera]
- parallax of declin. 0 5 12 [Parall. declin.]
- apparent decl. of ♀ 15 21 25 [decl. ♀ viſa][563]
- apparent Decl. of ☉ 4 52 8 [Decl. ☉ viſa]
- distance of ☉ and ♀ 46 10 30 [diſtan. ☉ & ♀]

And there comes out the difference of right Aſc. of ☉ and ♀, 41 55 7. [Provenitque differentia Aſc. / Rectæ ☉ & ♀ …]

- Aſc. R. of ☉ 348 47 20 [Aſc. R. ☉]
- apparent Aſc. R. of ♀ 30 42 27 [Aſc. R. ♀ viſa]
- parallax of Aſc. R., ad. 1 22 [Parall. Aſc. R. ad.]
- H. 3 35. True Aſc. R. of ♀ 30 43 49 [H. …. Aſc. R. ♀ vera][564]

H. 7 5′. Between ♀ and Aldebaran [Aldeboram] 30 59. [H. …. Inter ♀ & Aldeboram …]

- true Aſc. R. of ♀ 30 52 7 [Aſc. R. ♀ vera]
- parallax of Aſc. R. 4 3 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 30 48 4 [Aſc. R. ♀ viſa][565]

[561] A short rule stands over the value file between the second and third lines above.

[562] The value 32 9 40 stands on the second line of the label, after nis R. ♀ & Ald. A short rule stands over the value file between the second and third values above.

[563] The line 34 5 30 carries no label. Four short rules stand over the value file: under 5 15, under 34 5 30, under 52, and under 0 5 12.

[564] The value 41 55 7 stands on the second line, after Rectæ ☉ & ♀, which is set to the right. Two short rules stand over the value file: under 348 47 20 and under 1 22.

[565] A short rule stands over the value file between the second and third lines above.

- true declination of ♀ 15 30 42 [Declin. ♀ vera]
- parallax of declination 5 55 [Parall. declin.]
- apparent declination of ♀ 15 24 47 [declin. ♀ viſa][566]

The declination of Aldeb. as before; from which comes the difference of Aſc. R. of ♀ and Aldeb. [Declin. Aldeb. ut prius unde provenit / diff. Aſc. R. ♀ & Aldeb.]

- 32 11 6
- apparent Aſc. R. of ♀ 30 48 4 [Aſc. R. ♀ viſa]
- Aſc. R. of Aldebaran 62 59 10 [Aſc. R. Aldeboræ][567]

H. 8 7. Between ♀ and Aldebaran **3 57½**. [H. … Inter ♀ & Aldeboram …]

- true Aſc. R. of ♀ 30 54 35 [Aſc. R. ♀ vera]
- parallax of Aſc. R. 4 27 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 30 50 8 [Aſc. R. ♀ viſa][568]
- true declination of ♀ 15 31 54 [Declin. ♀ vera]
- parallax of declination 6 15 [Parall. declin.]
- apparent declination of ♀ 15 25 39 [declin. ♀ viſa]
- declination of Aldeb. 15 36 30 [declin. Aldeb.]

From which is given the difference of Aſc. R. of ♀ and Aldebaran [Ex quibus datur differentia Aſc. R. ♀ / & Aldeboræ]

- 32 9 36
- apparent Aſc. R. of ♀ 30 50 8 [Aſc. R. ♀ viſa]
- Aſc. R. of Aldeb. 62 59 44 [Aſc. R. Aldeb.][569]

ON 5 MARCH.[570]

At H. 2 47 ♀ had on the Meridian an apparent altitude of **52 17½**. And its distance from ☉ was then 45 59. [H. … ♀ in Meridiano habuit Altitu- / dinem viſam …. Fuitque tunc ejus / a ☉ diſtantia ….]

- parallax ſol.:
- Long. **1′ 59″**
- Latit. 1 54
- true Long. of ☉ **24 45′ 29″** [Long. ☉ vera]
- parallax of long. 1 59 [Parall. long.]
- apparent Long. of ☉ 24 43 30 [Long. ☉ viſa]

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[566] A short rule stands over the value file between the second and third lines above.

[567] The value 32 11 6 stands on the second line of the sentence, after ♀ & Aldeb. No value stands on the line Declin. Aldeb. ut prius unde provenit. A short rule stands over the value file between the second and third values above.

[568] No point is printed after H. 8 7. The value on that line is printed **3 57½**: its 3 stands in the units place of the degree file, under the 0 of the 30s above and below it, and the space between 3 and **57½** is the ordinary space between two figure groups on this side. A short rule stands over the value file between the second and third lines above.

[569] A short rule stands over the value file between Parall. declin. 6 15 and declin. ♀ viſa. The value 32 9 36 stands on the second line of the sentence, after & Aldeboræ. A second short rule stands over the value file between the second and third values above.

[570] Printed as one centred line in roman capitals, DIE 5 MARTIJ., ending with a point.

- apparent declination of ☉ 2 7 53 [Declin. ☉ viſa]
- apparent Aſc. R. of ☉ **355 10′ 17″** [Aſc. R. ☉ viſa][571]

For the place of ☿ according to the Copernican hypothesis. [Pro loco ☿ juxta Copernianam hypo- / theſin.]

Distance of ☿ from the Earth 756. [Diſtantia ☿ a terra ….]

- H. 2 47. Apparent altitude of ☿ **52 17½** [H. …. Alt. ☿ viſa]
- **34 5½**
- apparent declination of ☿ 18 12 0 [declin. ☿ viſa]
- parallax of altitude, ad. 2 47 [Parall. alt. ad.]
- true declination of ☿ 18 14 47 [declin. ☿ vera][572]

Diagram. A curved triangle standing at the left of the right column. From A at the apex two curved sides descend, one to the lower left and one to the lower right. On the left side B stands a little above D, which is at its foot; on the right side E stands a little above C, which is at its foot. Near the foot two lines run across between the two sides and cross each other a little right of the middle. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: at the apex, above the meeting of the two sides
- B: on the left side, above D, at the left end of the upper line
- D: at the lower left, at the foot of the left side
- E: on the right side, above C
- C: at the lower right, at the foot of the right side
- C ☉ B ☿
- AB 71 48
- AC 92 8
- BC 45 59
- BAC 41 54 30
- Aſc. R. of ☉ 355 10 17 [Aſc. R. ☉]
- Aſc. R. of ☿ 37 4 47 [Aſc. R. ☿][573]

Both apparent and true, for H. 2 47. [Tam viſa quam vera ad H. ….]

H. 7 0. Between ☿ and Aldeb. 24 48. [H. …. Inter ☿ & Aldeb. ….]

It seems good, however, to investigate the parallaxes of ☿ for H. 7 8, which can be fitted without sensible error to three observations made about this time. [Lubet autem ad H. … parallaxes ☿ / indagare quæ tribus obſeruationibus / circa hoc tempus factis ſine ſenſibilj / errore accomodarj poßunt.]

H. 7 8. Azim. ☿ 80 24. Altitude **28 23½**. [H. …. Azim. ☿ …. / Alt. ….]

From this is given [Hinc datur]

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[571] A printed brace after Parall. ſol. embraces the two lines Long. and Latit. A short rule stands over the value file between Parall. long. 1 59 and Long. ☉ viſa.

[572] The line **34 5½** carries no label. Two short rules stand over the value file: under **34 5½** and under 2 47.

[573] The key line C ☉ B ☿ and the file beneath it stand beside the figure at the right; the figure itself carries only the five letters. A short rule stands over the value file between Aſc. R. ☉ **355 10 17** and Aſc. R. ☿ **37 4 47**.

- BC **71 50′50″**
- ACB 35 34
- CDE 54 26
- DC 0 4 0
- DE 0 2 20
- CE 0 3 15[574]

Diagram. A circle, set in the right column. A straight line runs across the circle a little below its middle, level, from edge to edge. A second straight line enters the circle at the left, above the level line, and runs down to the right, crossing the level line near the middle of the circle and meeting the circle at its lower right. From A, just above the top of the circle and a little left of centre, a line descends, passing by D and C, and ends on the level line. From B, on the circle at the upper right, a curved line descends to the left, passing by E and crossing the line from A near C, and ends on the slanting straight line. A short stroke joins the point by D to the point by E. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: just above the top of the circle, a little left of centre
- B: on the circle at the upper right
- D: inside the circle near the top, below A, at the left end of the short stroke
- E: right of D and a little lower, at the right end of the short stroke
- C: below D, where the line from A and the curve from B cross

Diurnal Motion of ♀ 56. For H. **7 0′**. [Diurnus Motus ♀ …. / Ad H. … ….]

- H. 4 13. Reſp. in the Zodiac **9′ 50″** [H. …. Reſp. in Zodiaco]
- in the Equator 9 38 [in Æquatore]
- true Aſc. R. of ♀ 37 14 25 [Aſc. R. ♀ vera]
- parallax of Aſc. R. 2 20 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 37 12 5 [Aſc. R. ♀ viſa][575]
- H. 4 13 Reſp. in declination 3 52 [H. … Reſp. in declin.]
- true declination of ♀ 18 18 39 [declin. ♀ vera]
- parallax of declination 3 15 [Parall. declin.]
- apparent declination of ♀ 18 15 24 [declinatio ♀ viſa][576]
- declination of Aldeb. 15 36 30 [declin. Aldeb.]

From this comes the difference of right ascension of ♀ and Aldebaran [Aldeboræ] [Unde provenit differentia Aſc. Rectæ / ♀ & Aldeboræ]

- 25 47 50

[574] Hinc datur stands at the left on the line of BC **71 50′50″**; the last five lines of the file stand beside the top of the circle figure that follows.

[575] The line in **Æquatore 9 38** is set in under **Reſp.** A short rule stands over the value file between the fourth and fifth lines above.

[576] No point is printed after H. 4 13 on this line. A short rule stands over the value file between the third and fourth lines above.

• apparent right ascension of ♀ 37 12 5 [Aſc. R. ♀ viſa]
• right ascension of Aldeb. 62 59 55 [Aſcen. R. Aldeb.][577]

H. 7 8. Between ♀ and the heel of the foot of ♊ 48 52½. [H. …. Inter ♀ & calcem pedis ♊ / …]

• H. 4 21. Reſp. in the zodiac 10′ 9″ [H. …. Reſp. in zodiaco]
• in the Æquat. 9 57 [in Æquat.]
• true right ascension of ♀ 37 14 44 [Aſc. R. ♀ vera]
• parallax of Aſc. 2 20 [Parall. Aſc.]
• apparent right ascension of ♀ 37 12 24 [Aſc. R. ♀ viſa][578]
• true declination of ♀ 18 18 46 [Declinatio ♀ vera]
• parallax of declination 3 15 [Parall. declin.]
• apparent declination of ♀ 18 15 31 [Declin. ♀ viſa]
• declination of the heel of the foot of ♊ 22 38 0 [declin. Calc. pedis ♊]

There comes out the difference of right ascension of ♀ and the heel of ♊ [Provenit differentiaAſc.R. ♀ & Calcis ♊]

• 52 12 26
• apparent right ascension of ♀ 37 12 24 [Aſc. R. ♀ viſa]
• right ascension of the heel of ♊ 89 24 50 [Aſc. R. Calcis ♊][579]

H. 7 15. Between ♀ and the end of the toe of the foot of ♊ 47 1½. [H. …. Inter ♀ & Extremam digitj pe- / dis ♊ …]

• true right ascension of ♀ 37 15 0 [Aſc. R. ♀ vera]
• parallax of right ascension 2 20 [Parall. Aſc. R.]
• apparent right ascension of ♀ 37 12 40 [Aſc. R. ♀ viſa][580]
• true declination of ♀ 18 18 52 [Declin. ♀ vera]
• parallax of declination 3 15 [Parall. declin.]
• apparent declination of ♀ 18 15 37 [declin. ♀ viſa]
• declination of the end of the foot of ♊ 22 32 30 [Declin. ext. ped. ♊]

From which is given the difference of right ascension of ♀ and the end of the foot of ♊ [Ex quibus datur differentia Aſcenſi- / onis R. ♀ & extremæ pedis ♊]

• 50 11 20
• apparent right ascension of ♀ 37 12 40 [Aſc. R. ♀ viſa]

[577] The value 25 47 50 stands on the second line of the sentence, after ♀ & Aldeboræ. A short rule stands over the value file between the second and third values above.

[578] The value 48 52½ stands on a line of its own, in the value file. The line in Æquat. 9 57 is set in under Reſp. A short rule stands over the value file between the fourth and fifth lines above.

[579] A short rule stands over the value file between Parall. declin. 3 15 and Declin. ♀ viſa. The line Provenit differentiaAſc.R. ♀ & Calcis ♊ is set close, with no space seen between differentia and Aſc. or between Aſc. and R.; its value 52 12 26 stands on a line of its own. A second short rule stands over the value file between the second and third values above.

[580] A short rule stands over the value file between the second and third lines above.

- right ascension of the end of the foot of ♊ 87 24 0 [Aſc. R. extr. pedis ♊][581]

For the place of ☿ according to the Ptolemaic hypothesis. [Pro loco ☿ juxta Ptolomaicam hypo- / theſin.]

Distance of ☿ from the Earth 398 [Diſtantia ☿ à terra …]

- H. 2 47. True declination of ☿ **18 17′17″** [H. …. declin. ☿ vera]
- parallax of altitude of ☿ 5 17 [Parall. Alt. ☿]
- apparent declination of ☿ 18 12 0 [declin. ☿ viſa][582]

Since this does not differ at all from the one we used before, and both the declination of the Sun and the distance of ☿ from ☉ remain the same, the right ascension of ☿, both true and apparent, will also be the same at H. 2 47 as before, **37 4′47″**. [Quæ quia nihil diſcrepat ab ea, qua / prius uſi ſumus, manente & Solis de- / clinatione & diſtantia ☿ a ☉ eadem erit / etiam Aſc. R. ☿ tam vera quam viſa / ad H. …. ut prius …]

H. 7 8. Azim. ☿ 80 24. Altitude **28 23½**. [H. …. Azim. ☿ …. Altitudo …]

From these, in the same way as before, keeping the same figure, there are given: [Ex quibus eodem modo quo ante ſer- / vata eadem figuratione dantur.]

- CD 0 7 36 par. of altitude [par. Alt.]
- DE 0 4 25 par. of right ascension [par. Aſc. R.]
- CE 0 6 11 parallax of declination [parall. declin.]

These agree safely with these earlier observations, or can be fitted to them. [Quæ prioribus his obſervationibus tu- / to conveniunt vel accomodarj poßunt.]

- H. 7 0. Between ☿ and Aldeb. 24 48 [H. …. Inter ☿ & Aldeb.]
- true right ascension of ☿ 37 14 25 [Aſc. R. ☿ vera]
- parallax 4 25 [Parall.]
- apparent right ascension of ☿ 37 10 0 [Aſc. R. ☿ viſa]
- true declination of ☿ 18 21 9 [Declin. ☿ vera]
- parallax of declination 6 11 [Parall. decl.]
- apparent declination of ☿ 18 14 58 [declin. ☿ viſa]
- declination of Aldeb. 15 36 30 [Declin. Aldeb.][583]

And from this is given the difference of right ascension of ☿ and Aldeb. [datur autem hinc differentia Aſcen. / R. ☿ & Aldeb.]

- 25 47 50
- apparent right ascension of ☿ 37 10 0 [Aſc. R. ☿ viſa]

[581] A short rule stands over the value file between Parall. declin. 3 15 and declin. ☿ viſa. The value 50 11 20 stands on the second line of the sentence, after pedis ♊. A second short rule stands over the value file between the second and third values above.

[582] No point is printed after 398. A short rule stands over the value file between the second and third lines above.

[583] No point is printed after **28 23½** at the end of the first line of this column. The three lines CD …, DE …, CE … are set in; in each a wide columnar space stands between the 0 and the next figure. The line to conveniunt vel accomodarj poßunt. is set close, its word spaces much narrower than the column's ordinary spacing. Two short rules stand over the value file above: under 4 25 and under 6 11.

- right ascension of Aldebaran 62 57 50 [Aſc. R. Aldeboræ][584]
- H. 7 8, ♀ from the heel of the foot of ♊ 48 52½ [H. … ♀ a calce ped. ♊]
- true right ascension of ♀ 37 14 44 [Aſc. R. ♀ vera]
- parallax 4 25 [Parallaxis]
- apparent right ascension of ♀ 37 10 19 [Aſc. R. ♀ viſa]
- true declination of ♀ 18 21 15 [Declin. ♀ vera]
- parallax of declination 6 11 [Parall. declin.]
- apparent declination of ♀ 18 15 4 [declin. ♀ viſa]
- declination of the heel of the foot 22 38 [declin. Calcis pedis][585]

From this comes the difference of right ascension of ♀ and the heel of the foot of ♊ [Unde provenit differentia Aſc. R. ♀ & / Calcis pedis ♊]

- 52 12 18
- apparent right ascension of ♀ 37 10 19 [Aſc. R. ♀ viſa]
- right ascension of the heel of ♊ 89 22 37 [Aſc. R. Calcis ♊][586]
- H. 7° 15′, ♀ and the end of the foot 47 1½ [H. … ♀ & Extrema pedis]
- true right ascension of ♀ 37 15 0 [Aſc. R. ♀ vera]
- parallax of right ascension 4 25 [Parall. Aſ. R.]
- apparent right ascension of ♀ 37 10 35 [Aſc. R. ♀ viſa][587]
- true declination of ♀ 18 21 22 [Decl. ♀ vera]
- parallax of declination 6 11 [Parall. decl.]
- apparent declination of ♀ 18 15 11 [declin. ♀ viſa]
- declination of the end of the foot of ♊ 22 32 30 [declin. ext. ped. ♊]

And the difference of right ascension of ♀ and the end of the foot of ♊ is given [daturque differentia Aſc. R. ♀ & Ext. / pedis ♊]

- 50 11 15
- apparent right ascension of ♀ 37 10 35 [Aſc. R. ♀ viſa]
- right ascension of the end of the toe of the foot of ♊ 87 21 50 [Aſc. R. Ext. digiti pedis ♊][588]

[584] The sentence begins with a lower-case datur. The value 25 47 50 stands on its second line, after R. ♀ & Aldeb. A short rule stands over the value file between the second and third values above.

[585] No point is printed after H. 7 8 on this line. The line declin. Calcis pedis 22 38 prints no sign after pedis and no figure in the seconds place of its value. Two short rules stand over the value file above: under 4 25 and under 6 11.

[586] The value 52 12 18 stands on the second line of the sentence, after Calcis pedis ♊. A short rule stands over the value file between the second and third values above.

[587] The time in the first line is printed H. 7° 15′, with a degree mark after 7 and a minute mark after 15. That line prints no sign after pedis. The third line prints Aſ., not Aſc. A short rule stands over the value file between the third and fourth lines above.

[588] A short rule stands over the value file between Parall. decl. 6 11 and declin. ♀ viſa. The value 50 11 15 stands on the second line of the sentence, after pedis ♊. A second short rule stands over the value file between the second and third values above.

ON 9 MARCH.[589]

- H. 3 30. Between ☿ and ☉ **45 38½** [H. … Inter ☿ & ☉]
- Parall.:
- long. ☉ **2′ 10″**
- lat. ☉ 1 46
- true long. of ☉ **28 45 9″** ♓ [long. ☉ vera]
- parallax of long. 2 10 [Parall. long.]
- apparent long. of ☉ 28 43 0 [long. ☉ viſa]
- apparent Declin. of ☉ **0 32′ 20″** Auſt. [Declin. ☉ viſa … Auſt.]
- apparent Aſc. R. of ☉ 358 50 4 [Aſc. R. ☉ viſa][590]

For the place of ☿ according to its Copernican distance from the earth, which is 721. [Pro loco ☿ juxta Copernianam ejus a / terra diſtantiam, quæ eſt ….]

- H.**2 47′**. Apparent meridian Alt. of ☿ 53 43 [H.….Alt. ☿ meridianav-iſa…]
- parallax of Alt. 2 50 [Parall. Alt.]
- true Alt. of ☿ 53 45 50 [Alt. ☿ vera]
- 34 5 30
- H. 2 47 true decl. of ☿ 19 40 20 [H. … decl. ☿ vera]
- Add for H. 0 43 40 [Adde pro H. …]
- H. **3½** true decl. of ☿ 19 41 0 [H. … decl. ☿ vera][591]

Diagram. A circle, set at the left of the left column. A straight line runs across the circle below its middle, level, from edge to edge. A second straight line enters the circle at the left, above the level line, and runs down to the right, crossing the level line near the middle and meeting the circle at its lower right. From A, just above the top of the circle and a little left of centre, a line descends to the left past C. From B, on the circle at the upper right, two close curved lines descend to the left and end on the slanting straight line. A further line descends from the region of C and D and ends on the level line. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: just above the top of the circle, a little left of centre
- B: on the circle at the upper right
- C: below and left of A, where the line from A meets the curves from B

[589] Printed as one centred line in roman capitals, DIE 9 MARTIJ., ending with a point.

[590] A printed brace after Parall. embraces the two lines long. ☉ and lat. ☉. The sign after **9″** on the line long. ☉ vera is the sign of Pisces (♓), printed after the value. A short rule, longer than the others on this side, stands over the value file between Parall. long. 2 10 and long. ☉ viſa.

[591] The first of these lines is close-set as printed, **H.2 47′.**Alt. ☿ meridianaviſa**53 43**, with no space after H., a point directly after **47′**, and no spaces between meridiana, viſa and 53. The line 34 5 30 carries no label. The value 40 of the Adde line stands alone in the last place of the value file. Three short rules stand over the value file: under 2 50, under 34 5 30, and under 40.

- E: just right of and below C
- D: below C
- AB 34 5 30
- BC 70 19
- ABC 10 45
- AC 37 6 49
- BAC 163 4
- CD **0 2′ 53″**
- BD 70 21 45
- ABD 10 46 5[592]

Since, then, BD is greater than BC by **2′ 45″**, these will represent the parallax of declin. of ♀, so that the apparent declin. of ♀ at H. **3½** is **19 38′ 15″**. The excess of the angle ABD over ABC, however, represents the parallax of right Aſc., **1′ 5″**. Accordingly, in the following figure, C is the Sun, B ♀. [Cum itaque BD majus ſit BC … / repræſentabunt illa parallaxin declin. / ♀, vt ſit declin. ♀ viſa ad H. … … / …. Exceßus autem Angulj ABD ſu- / pra ABC repræſentat parallaxin Aſc. / Rectæ … / Proinde in figuratione ſequente, C Sol. / B ♀][593]

Diagram. A curved triangle standing at the left of the left column, below the paragraph. From A at the apex two curved sides descend, one to the lower left and one to the lower right. On the left side B stands a little above D, which is at its foot; on the right side E stands a little above C, which is at its foot. Near the foot two lines run across between the two sides and cross each other a little left of the middle: one from B descending to C, one from D rising to E. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: at the apex, above the meeting of the two sides
- B: on the left side, above D
- D: at the lower left, at the foot of the left side
- E: on the right side, above C
- C: at the lower right, at the foot of the right side
- AC 90 32 20
- AB 70 21 45
- BC 45 38 30
- Angle BAC 41 46 48 [Angulus BAC]
- Aſc. R. of ☉ 358 50 4 [Aſc. R. ☉]
- apparent Aſc. R. of ♀ 40 36 52 [Aſc. R. ♀ viſa]
- parallax of Aſc. R. 1 5 [Parall. Aſc. R.]

[592] The lettered file stands beside the circle at the right, with no head row.

[593] The value **19 38′ 15″** is divided across a line end as printed, **19 38′** ending the third line and **15″**. opening the fourth. The value **1′ 5″** stands at the right of the sixth line, after Rectæ, with a wide space between. The last line carries only B ♀.

• H. 3½ true Aſc. R. of ♀ 40 37 57 [H. … Aſc. R. ♀ vera][594]
• H. 7 15′ ♀ from Aldeb. 21 37 [H. … ♀ ab Aldeb.]
• Azim. of ♀ 82 0 from Mer. Alt. 29 15 [Azim. ♀ … a Mer. Alt. …]
• see the earlier figure of this page:
• BD 70 19½
• ADB 36 7
• DCE 53 53
• Parall.:
• Alt. CD 0° 4′ 10″
• Aſc. R. CE 0 2 27
• declin. DE 0 3 21[595]

Diurnal motion of ♀ 54′. [Motus diurnus ♀ …]
• H. 3 45 Reſp. in the Zodiac 8′ 26″ [H. … Reſp. in Zodiaco]
• in the Equator 8 22 [in Æquat.]
• true Aſc. R. of ♀ 40 46′ 19″ [Aſc. R. ♀ vera]
• Parallax 2 27 [Parallaxis]
• apparent Aſc. R. of ♀ 40 43 52 [Aſc. R. ♀ viſa]
• H. 3 45′ Reſp. in declin. 3 17 [H. … Reſp. in declin.]
• true Declin. of ♀ 19 44 17 [Declin. ♀ vera]
• parallax of declin. 3 21 [Parall. declin.]
• apparent declin. of ♀ 19 40 56 [declin. ♀ viſa]
• declin. of Aldebaran [Aldeboræ] 15 36 30 [declin. Aldeboræ]

From this comes the diff. of Aſc. R. of ♀ and Aldebaran [Unde provenit diff. Aſc. R. / ♀ et Aldeboræ]
• 22 17 18 [recte: 22 17 48 — Corrigenda, p. 429]
• apparent Aſc. R. of ♀ 40 43 52 [Aſc. R. ♀ viſa]
• Aſc. R. of Aldebaran 63 1 40 [Aſc. R. Aldeboræ][596]

H. 7 50′ Between ♀ and the end of the foot of ♊ 43 27½. [H. … Inter ♀ & extremam pedis ♊ / …]

Azim. of ♀ Mer. 89 50. Alt. 24 0 [Azim. ♀ Mer. …. Alt. …]
• Let the earlier figure of the preceding page be repeated here as well:
• BD 70 24½
• ADB 36 31

[594] Two short rules stand over the value file of the right column: under 358 50 4 and under 1 5.

[595] vide priorem / figurationem / hujuspaginæ is set on three lines, hujuspaginæ close-set without a space, and a printed brace follows it, embracing BD, ADB and DCE. A second printed brace follows Parall., embracing the three lines Alt. CD, Aſc. R. CE, declin. DE. The line Azim. ♀ 82 0 a Mer. Alt. 29 15 runs across the measure, its values not standing in the value file. The degree mark in 0° 4′ 10″ is printed; the two lines below it print 0 with no mark.

[596] Motus diurnus ♀ 54′ is set in, with no terminal point. in Æquat. is set in under Reſp.. The value 22 17 18 stands on the second line of the sentence, after ♀ et Aldeboræ. Three short rules stand over the value file: under 2 27 of Parallaxis, under 3 21 of Parall. declin., and under the second 40 43 52.

- DCE 53 29
- Parall.:
- Alt. CD **0 4′ 21″**
- Aſc. R. CE 0 2 36
- declin. DE 0 3 30
- H. 4 20 Reſp. in the Zodiac **9′ 45″** [H. … Reſp. in Zodiaco]
- in the Equator 9 40 [in Æquatore]
- true Aſc. R. of ♀ 40 47 37 [Aſc. R. ♀ vera]
- parallax of Aſc. 2 36 [Parall. Aſc.]
- apparent Aſc. R. of ♀ 40 45 1 [Aſc. R. ♀ viſa]
- H. 4 20 Reſp. of declin. 3 48 [H. … Reſp. de declin.]
- true Declin. of ♀ 19 44 48 [Declin. ♀ vera]
- parallax of declin. 3 30 [Parall. declin.]
- apparent declin. of ♀ 19 41 18 [declin. ♀ viſa][597]
- declin. of ext. ped. ♊ 22 32 30 [declin. ext. ped. ♊]

From these data comes the difference of right Aſcenſi. of ♀ and the end of the foot of ♊ [Ex quibus datis provenit differentia / Aſcenſi. Rectæ ♀ & Extremæ pedis ♊]

- 46 40 13
- apparent Aſc. R. of ♀ 40 45 1 [Aſc. R. ♀ viſa]
- Aſc. R. of extr. ped. ♊ 87 25 14 [Aſc. R. extr. ped. ♊][598]

H. 7 35. Between ♀ and the heel of the foot of ♊ 45 17. [H. …. Inter ♀ & Calcem pedis ♊ / …]

- apparent Aſc. R. of ♀ 40 44 32 [Aſc. R. ♀ viſa]
- apparent declination of ♀ 19 41 9 [Declin. ♀ viſa]
- declination of the heel of the foot of ♊ 22 38 [Declin. Calcis pedis ♊]

And from this is given the difference of right Aſcenſ. of ♀ and the heel of the foot of ♊ [daturque hinc differentia Aſcenſ. Rec- / tæ ♀ & Calcis pedis ♊]

- 48 39 54
- apparent Aſc. R. of ♀ 40 44 32 [Aſc. R. ♀ viſa]
- right Aſc. of the heel of the foot of ♊ 89 24 26 [Aſc. Recta Calcis pedis ♊][599]

[597] The value **43 27½** stands on a line of its own below **H. 7 50′ Inter ♀ & extremam pedis ♊**; the sign ♊ ends the first line. **Repetatur & / hîc prior fi- / guratio præ- / cedentis / paginæ** is set on five lines, the last three centred, and a printed brace follows it, embracing **BD**, **ADB** and **DCE**, which stand level with the second, third and fourth lines of the label. A second printed brace follows **Parall.**, embracing **Alt. CD**, **Aſc. R. CE**, **declin. DE**. in **Æquatore** is set in under **Reſp.** Three short rules stand over the value file: under **2 36** of **Parall. Aſc.**, under **40 45 1**, and under **3 30** of **Parall. declin.**

[598] The value **46 40 13** stands on a line of its own below the sentence. A short rule stands over the value file between **40 45 1** and **87 25 14**.

[599] The value **45 17** stands on a line of its own below **H. 7 35. Inter ♀ & Calcem pedis ♊.** The line **Declin. Calcis pedis ♊ 22 38** prints two figure groups only. The value **48 39 54** stands on the second line of the sentence, after **pedis ♊.** A short rule stands over the value file between the second **40 44 32** and **89 24 26**.

According to the hypothesis of Ptolemy. [Juxta Hypotheſin Ptolomæi.][600]
Distance of ☿ from the earth 382. [Diſtantia ☿ a terra ….]

- H. 2 47. Apparent Alt. merid. of ☿ 53 43 [H. …. Alt. merid. ☿ viſa]
- parallax of Alt. 5 20 [Parall. Alt.]
- true Alt. of ☿ 53 48 20 [Alt. ☿ vera]
- 34 5 30
- H. 2 47. true declination of ☿ 19 42 50 [H. …. decl. ☿ vera]
- Add for H. 0 43′ 38 [Adde pro H. …]
- H. 3½ true declination of ☿ 19 43 28 [H. … declin. ☿ vera][601]

The parallaxes were investigated according to the following figure. [Parallaxes inveſtigatæ / ſunt juxta ſequentem figuram.]

Diagram. A circle, set at the left of the left column. A straight line runs across the circle below its middle, level, from edge to edge. A second straight line enters the circle at the left, above the level line, and runs down to the right, crossing the level line a little left of the middle and meeting the circle at its lower right. From A, just above the top of the circle and a little left of centre, a line descends to the left past C and D and ends on the level line. From B, on the circle at the upper right, two close curved lines descend to the left and end on the slanting straight line. A short stroke runs from the crossing near C to E. Five letters are cut in a decorative cursive; the C is small. Which line passes exactly through which lettered point is not asserted beyond this.

- A: just above the top of the circle, a little left of centre
- B: on the circle at the upper right
- C: inside the circle near the top, below A
- E: right of C and a little lower, at the end of the short stroke
- D: below C, on the line descending from A
- AB 34 5½
- BC 70 19
- ABC 10 45
- AC 37 6 49
- BAD 163 4
- CD, moreover, is 0 5 26 [Eſt autem / CD …]
- Therefore [Itaque]
- AD 37 12 15
- BD 70 24 17
- ABD 10 46 25[602]

Accordingly, the parallax of declination ED is 0 5 17, and the parallax of Aſc. R. CE 0 1 25; finally, the apparent declination of ☿ is 19 38 11, which

[600] Printed as one centred line in roman, upper and lower case, ending with a point.

[601] The line 34 5 30 carries no label. The value 38 of the Adde line stands alone in the last place of the value file. Three short rules stand over the value file: under 5 20, under 34 5 30, and under 38.

[602] The lettered file stands beside the circle at the right, with no head row; Eſt autem is set in on a line of its own above CD, and Itaque stands on a line of its own above AD.

is at any rate 4″ less than the declination of ♀ in the Copernican hypothesis. [Proinde parall. declin. ED … / Et parall. Aſc. R. CE … / denique declin. ♀ viſa … / quæ ſaltem … minor eſt declinatione / ♀ in hypotheſj coperniana.]

Since, however, the declination of ♀ is nearly the same as that of ☉, and the distance the same as before, the same apparent Aſc. R. of ♀, 40 36 52, will also necessarily result. [Quia vero eadem fere eſt declina- / tio ♀ quam ☉ eademque diſtantia // quæ prius, proveniet etiam neceßario / eadem Aſc. R. ♀ viſa …][603]

- parallax of Aſc. R. 1 25 [Parall. Aſc. R.]
- true Aſc. R. of ♀ 40 38 17 [Aſc. R. ♀ vera][604]
- H. 7 15′ ♀ and Aldeb. 21 37 [H. … ♀ & Aldeb.]
- See the preceding figure:
- CDE 36 7
- DCE 53 53
- CD 0 7 51″
- CE 0 4 38
- DE 0 6 21
- true Aſc. R. of ♀ 40 46 39 [Aſc. R. ♀ vera]
- Parallax 4 38 [Parall.]
- apparent Aſc. R. of ♀ 40 42 1 [Aſc. R. ♀ viſa][605]
- true declination of ♀ 19 46 45 [declin. ♀ vera]
- Parallax 6 21 [Parall.]
- apparent declination of ♀ 19 40 24 [decl. ♀ viſa]
- declination of Aldeb. 15 36 30 [Declin. Aldeb.]

From this is given the difference of right Aſc. of ♀ and Aldebaran [Aldeboræ] [datur hinc differentia Aſc. Rectæ ♀ & / Aldeboræ]

- 22 17 52
- apparent Aſc. R. of ♀ 40 42 1 [Aſc. R. ♀ viſa]
- Aſc. R. of Aldeb. 62 59 53 [Aſc. R. Aldeb.][606]

H. 7 50. Between ♀ and the end of the foot of ♊ 43 27½. [H. …. Inter ♀ & extremam pedis ♊ / …]

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[603] The three lines from Proinde to denique are set as displayed lines, their values in the value file; the clause quæ ſaltem 4″ minor eſt declinatione / ♀ in hypotheſj coperniana. follows them. coperniana is printed with a lower-case initial. The sentence beginning Quia vero opens with an indent and runs from the foot of the left column to the head of the right column (the column turn is marked by the double stroke inside the bracket above); its value 40 36 52 stands on the second line of the right column, after eadem Aſc. R. ♀ viſa.

[604] A short rule stands over the value file between 1 25 and 40 38 17.

[605] Vide præcedentem / figurationem is set on two lines, the second set in, and a printed brace follows it embracing CDE and DCE only; CD, CE and DE stand below in the same lettered file, outside the brace. The second mark is printed on 51″ only; no degree or minute mark stands on that line or on the lines below it. A rule, longer than the others, stands under DE 0 6 21, running from the lettered file across the value file; a short rule stands over the value file between 4 38 and 40 42 1.

[606] The value 22 17 52 stands on the second line of the sentence, after Aldeboræ. Two short rules stand over the value file: under 6 21 and under the second 40 42 1.

Azim. 89 50. Alt. 24 0 [Azim. …. Alt. …]

- See here too the preceding figure:
- CDE 36 31
- DCE 53 29
- CD 0 8 13″
- EC 0 4 54
- DE 0 6 36
- true Aſc. R. of ♀ 40 47 57 [Aſc. R. ♀ vera]
- Parallax 4 54 [Parall.]
- apparent Aſc. R. of ♀ 40 43 3 [Aſc. R. ♀ viſa][607]
- true declination of ♀ 19 47 16 [declin. ♀ vera]
- parallax of declination 6 36 [Parall. declin.]
- apparent declination of ♀ 19 40 40 [declin. ♀ viſa]
- declination of extr. ped. 22 32 30 [declin. extr. ped.]

From these data is given the difference of Aſc. R. of ♀ and the end of the foot of ♊ [Ex quibus datis datur differentia Aſc. / R. ♀ & Extremæ pedis ♊]

- 46 40 2
- apparent Aſc. R. of ♀ 40 43 3 [Aſc. R. ♀ viſa]
- Aſc. R. of the end of the foot of ♊ 87 23 5 [Aſc. R. Extremæ pedis ♊][608]

H. 7 35. Between ♀ and the heel of the foot of ♊ 45 17. [H. …. Inter ♀ & Calcem pedis ♊ / …]

- apparent Aſc. R. of ♀ 40 42 36 [Aſc. R. ♀ viſa]
- apparent declination of ♀ 19 40 30 [declinatio ♀ viſa][609]
- declination of the heel of the foot 22 38 [declin. Calcis pedis]

From this comes the difference of the Aſc. R. of ♀ and of the heel of the foot [Unde provenit differentia Aſc. R. ♀ & / Calcis pedis]

- 48 39 45
- apparent Aſc. R. of ♀ 40 42 36 [Aſc. R. ♀ viſa]
- Aſc. R. of Cal. pe. ♊ 89 22 21 [Aſc. R. Cal. pe. ♊][610]

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[607] The value **43 27½** stands on a line of its own below **H. 7 50. Inter ♀ & extremam pedis ♊.** On the Azim. line, Alt. 24 0 stands to the right, in the value file. **vide & hîc / præcedentem /** figuram is set on three lines, the first and third centred, and a printed brace follows it embracing CDE, DCE and CD; EC and DE stand below in the same lettered file, outside the brace. The second mark is printed on **13″** only. A rule, longer than the others, stands under DE 0 6 36, running from the lettered file across the value file; a short rule stands over the value file between 4 54 and 40 43 3.

[608] The value 46 40 2 stands on the second line of the sentence, after **pedis ♊.** Two short rules stand over the value file: under 6 36 and under the second 40 43 3.

[609] The value 45 17 stands on a line of its own below **H. 7 35. Inter ♀ & Calcem pedis ♊.** The side ends on the value line **declinatio ♀ viſa 19 40 30**, with no point.

[610] The value 48 39 45 stands on the second line of the sentence, after Calcis pedis. The line declin. Calcis pedis 22 38 prints two figure groups only. A short rule stands over the value file between 40 42 36 and 89 22 21.

ON 15 MARCH.[611]

- H. 3 5 ♀ from ⊙ 44 50½ [H. … ♀ a ⊙]
- For the place of ⊙: [Pro loco ⊙]
- Parall. ⊙:
- long. 2′ 3″
- latit. 1 48
- true Longit. of ⊙ 4 39 51 ♈ [Longit. ⊙ vera]
- parallax of long. 2 3 [Parall. long.]
- apparent Longit. of ⊙ 4 37 48 ♈ [Longit. ⊙ viſa]
- apparent Declin. of ⊙ 1 49 6 B [Declin. ⊙ viſa]
- apparent Aſc. R. of ⊙ 4 15 36 [Aſc. R. ⊙ viſa][612]

For the place of ♀ according to its Copernican distance from the earth, which is 666. [Pro loco ♀ juxta Copernianam ejus a / terra diſtantiam quæ eſt ….]

- H. 2 45. Apparent Merid. altitude of ♀ 55 42 [H. …. Alt. ♀ Merid. viſa]
- parallax of altitude 2 55 [Parall. Alt.]
- true altitude of ♀ 55 44 55 [Alt. ♀ vera]
- 34 5 30
- true declination of ♀ 21 39 25 [declin. ♀ vera]
- Add for H. 0 20′ 15 [Adde pro H. …]
- H. 3 5′ true declination of ♀ 21 39 40 [H. … declin. ♀ vera]

For the daily variation of the declination of ♀ is 18′. [Eſt enim variatio declinationis ♀ di- / urna ….][613]

The parallaxes of ♀ were found according to the following figure. [Parallaxes ♀ inventæ ſunt juxta / ſequentem figurationem.]

Diagram. A circle, set at the left of the left column, under the centred sentence. A straight line runs across the circle below its middle, level, from edge to edge. A second straight line enters the circle at the left, above the level line, and runs down to the right, crossing the level line a little left of the middle and meeting the circle at its lower right. A, above the top of the circle and left of centre, stands at the head of a line that descends to the left inside the circle. B stands on the circle at the upper right; curved lines descend from it to the left. C stands inside the circle below and left of A, where lines cross; a short

[611] Printed as one centred line in roman capitals, DIE 15 MARTIJ., ending with a point; the last letter of MARTIJ is a capital J.

[612] Pro loco ⊙ is set in, on a line of its own, with no value. A printed brace after Parall. ⊙ embraces the two lines long. and latit.. The sign after 51 and after 48 on the two Longit. lines is the sign of Aries (♈), printed after the value. The letter B stands after the value 1 49 6 as printed. A short rule stands over the value file between Parall. long. 2 3 and Longit. ⊙ viſa.

[613] The line 34 5 30 carries no label. The value 15 of the Adde line stands alone in the last place of the value file. Two short rules stand over the value file: under 34 5 30, and under 15.

stroke runs from that crossing down to the right towards H. D stands below C, on a line that runs down to the level line. Several descending lines end on the slanting or the level line. Five letters are cut in a decorative cursive. Which line passes exactly through which lettered point is not asserted beyond this.

- A: above the top of the circle, left of centre
- B: on the circle at the upper right
- C: inside the circle, below and left of A
- H: right of C and lower, at the end of the short stroke
- D: below C
- AB 34 5 30
- BC 68 20 20
- ABC 5 0
- AC 34 27
- ACB, which is presupposed equal [ACB qui præ- / ſupponitur / æqualis]
- ADB **4° 50′**
- CDH 4 50
- DCH 85 10 [DCH85 10][614]
- Parall.:
- Alt. CD **0 2 55″**
- Aſc.R. CH 0 0 15
- decl. DH 0 2 55
- true Declination of ♀ 21 39 40 [Declin. ♀ vera]
- parallax of declination 2 55 [Parall. declin.]
- apparent declination of ♀ 21 36 45 [declin. ♀ viſa][615]
- B ⊙ C ♀
- AB 88 10 54
- AC 68 23 15
- BC 44 50 30
- BAC 41 22 3

Diagram. A pointed figure at the right of the right column, at its head. Two curved sides rise from the lower left and the lower right and meet at an apex, A. The left side comes down to B and ends at D, just below B. The right side comes down through C and on through E, continuing a little below E. A curved line runs from B up to the right to C; a second, nearly level line runs from D to E. Five letters are cut in a decorative cursive. The five-line file (B ⊙ C ♀, AB, AC, BC, BAC) stands at the left of the figure, level with its middle.

- A: at the apex

[614]The file stands at the right of the figure, level with its upper two-thirds. The line ACB qui præ- is divided at a line end within the column (præ- / ſupponitur), and the words ſupponitur and æqualis are set in on lines of their own; no value is printed for ACB. DCH85 10 is close-set as printed, the letters touching the first figure group.

[615]A printed brace after Parall. embraces the three lines Alt. CD, Aſc.R. CH and decl. DH; Aſc.R. is close-set as printed. A short rule stands over the value file between 2 55 of Parall. declin. and 21 36 45.

- C: at the right, on the right side, at the end of the line from B
- B: at the lower left, on the left side, above D
- D: at the lower left, at the foot of the left side
- E: at the lower right, on the right side, at the end of the line from D[616]
- apparent Aſc. R. of ☉ 4 15 36 [Aſc. R. ☉ viſa]
- apparent Aſc. R. of ♀ 45 37 39 [Aſc. R. ♀ viſa]
- parallax of Aſc. R. 0 15 [Parall. Aſc. R.]
- H. 3 5′. true Aſc. R. of ♀ 45 37 54 [H. …. Aſc. R. ♀ vera][617]
- H. 8 37 ♀ from the heel of ♊ 40 16¼ [H. … ♀ a Calce ♊]
- Azim. of ♀ from Sept. toward occ. 78 48 [Azim. ♀ a Sept. verſus occ.]
- altitude 18 57 [Altitudo]
- See the upper figure: [Vide ſuperi- / orem figuram]
- BD 68 10
- ADB 36 19
- DCH 53 41
- CD 0 4 53″
- CH 0 2 54
- DH 0 3 56

And these parallaxes can suit the following observation as well as this one. [Atque hæ parall. tam ſequentj obſer- / vationi quam huic congruere poßunt.][618]

Daily motion of ♀ 49′. [Motus diurnus ♀ ….]

- H. 5 32. Reſp. in the Zodiac 11 18 [H. …. Reſp. in Zodiaco]
- in the Equator 11 21 [in Æquatore]
- apparent Aſc. R. of ♀ 45 49 15 [Aſc. R. ♀ viſa]
- parallax of Aſc. R. 2 54 [Parall. Aſc. R.]
- apparent Aſc. *R.* of ♀ 45 46 21 [Aſc. *R.* ♀ viſa][619]
- H. 5 32 Reſp. in declin. 4′ 9″ [H. … Reſp. in declin.]
- true declination of ♀ 21 43 49 [declin. ♀ vera]
- parallax 3 56 [Parall.]
- apparent declination of ♀ 21 39 53 [declin. ♀ viſa]
- declination of the heel of the foot 22 38 [declin. calcis pedis]
- Angle DAE (in prox. fig.) 43 37 32 [Angulus DAE (in prox. fig.)]
- apparent Aſc. R. of ♀ 45 46 21 [Aſc. R. ♀ viſa]

[616] The first line of the file, B ☉ C ♀, prints the letters B and C each followed by a sign, with no value.

[617] The values 4 15 36 and 45 37 39 stand at the far right of the column, below the figure. A short rule stands over the value file between 0 15 and 45 37 54.

[618] Altitudo 18 57 is set in towards the right. The two-line label Vide ſuperi- / orem figuram stands at the left beside the file lines BD and ADB, with no printed brace; the file runs on below it.

[619] Motus diurnus ♀ 49′. is a centred line. in Æquatore 11 21 is set in. The line over which the parallax is taken (45 49 15) and the line under the rule (45 46 21) are both printed viſa. A short rule stands over the value file between 2 54 and 45 46 21.

- Aſc. R. of the heel of ♊ 89 23 53 [Aſc. R. Calcis ♊][620]
- H. 8 42 ♀ from Extr. ped. 38 27 [H. … ♀ ab Extr. ped.]
- true Aſc. R. of ♀ 45 49 25 [Aſc. R. ♀ vera]
- parallax 2 55 [Parall.]
- apparent Aſc. R. of ♀ 45 46 30 [Aſc. R. ♀ viſa][621]
- apparent declination of ♀ 21 40 0 [declin. ♀ viſa]
- declination of Extr. pedis 22 32 30 [declin. Extr. pedis]

From this comes the difference of the Aſc. R. of ♀ and of the end of the foot [Hinc provenit differentia Aſc. R. ♀ & / extremæ pedis]

- 41 37 33
- apparent Aſc. R. of ♀ 45 46 30 [Aſc. R. ♀ viſa]
- Aſc. R. of the end of the foot of ♊ 87 24 3 [Aſc. R. Extremæ pedis ♊][622]

According to the hypothesis of Ptolemy, the distance of ♀ from the earth is 354. [Juxta hypotheſin Ptolomæj / diſtantia ♀ a terra ….]

- For the place of ♀: [Pro loco ♀]
- H. 3 5′ ♀ from ☉ 44 50½ [H. … ♀ a ☉]
- H. 2 45 apparent meridian altitude of ♀ 55 42 [H. … Altitudo meridiana / ♀ viſa]
- parallax of altitude 5 28 [Parall. Alt.]
- true altitude of ♀ 55 47 28 [Alt. ♀ vera]
- 34 5 30
- true declination of ♀ 21 41 58 [declin. ♀ vera]
- Add for H. 0 20 15 [Adde pro H. …]
- H. 3 5 true declination of ♀ 21 42 13 [H. … declin. ♀ vera][623]

see the earlier figure of the preceding page [vide priorem / figuram præce- / dentis paginæ]

Angles CDH and DCH. As in the other hypothesis. [Angulj CDH & / DCH. Ut in altera / hypotheſj.]

- CD 0 5 29
- CH 0 0 28
- DH 0 5 28
- true declination of ♀ 21 42 13 [declin. ♀ vera]

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[620] The parentheses round in prox. fig. are printed. calcis is lower-case here and capitalised elsewhere on the side. Two short rules stand over the value file: under 3 56, and under the second 45 46 21.

[621] A short rule stands over the value file between 2 55 and 45 46 30.

[622] The value 41 37 33 stands on the second line of the sentence, after extremæ pedis. No rule stands over the value file between 45 46 30 and 87 24 3.

[623] The two lines Juxta hypotheſin Ptolomæj / diſtantia ♀ a terra 354. are centred, and Pro loco ♀ is a centred line of its own with no value. On the line H. 3 5′ ♀ a ☉ a wide space stands between 3 and 5′. The words ♀ viſa and the value 55 42 stand on the line below H. 2 45 Altitudo meridiana, set to the right. The line 34 5 30 carries no label. The value 15 of the Adde line stands alone in the last place of the value file, and 0 20 on that line carries no mark. Two short rules stand over the value file: under 5 28, and under 34 5 30; no rule stands under 15.

- parallax of declination 5 28 [Parall. declin.]
- apparent declination of ♀ 21 36 45 [declin. ♀ viſa][624]

Since this agrees with the one found at the Copernican distance of ♀ from the earth, the declination of the Sun varying not at all, the same apparent Aſcenſio R. of ♀ will also necessarily be given: [Hæc quia cum ea, quæ in coperniana / ♀ a terra diſtantia inventa eſt, con- / gruit, ſolis declinatione nihil variante, / dabitur quoque neceßario eadem ♀ / Aſcenſio R. viſa]

- 45 37 39
- parallax 0 28 [Parall.]
- H. 3 5 true Aſc. R. of ♀ 45 38 7 [H. … Aſc. R. ♀ vera][625]
- H. 8 37 ♀ from the heel of pe. ♊ **40 16¼** [H. … ♀ a calce pe. ♊]
- altitude of ♀ 18 50 [Alt. ♀]

The parallaxes were found in the same way as before, keeping the same angles at D and C that were given, at H. 8 37. Accordingly: [Parallaxes inventæ eodem modo quo / ante, ſervatis iiſdem angulis ad D & / C qui dabantur, ad H. … Proinde]

- Parall.:
- Alt. CD **9′ 11″**
- Aſc. R. CH 5 27
- declin. DH 7 24
- true Aſcenſ. R. of ♀ 45 49 28 [Aſcenſ. R. ♀ vera]
- parallax 5 27 [Parall.]
- apparent Aſcen. R. of ♀ 45 44 1 [Aſcen. R. ♀ viſa][626]
- true declination of ♀ 21 46 24 [declin. ♀ vera]
- parallax of declination 7 24 [Parall. declin.]
- apparent declination of ♀ 21 39 0 [declin. ♀ viſa][627]
- declination of the heel of ♊ 22 38 0 [declin. calcis ♊]

From this is given the difference of the Aſc. R. of ♀ and of the heel of ♊ [Unde datur differentia Aſc. R. ♀ & / Calcis ♊]

- 43 37 20
- apparent Aſc. R. of ♀ 45 44 1 [Aſc. R. ♀ viſa]

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[624] The two three-line groups vide priorem / figuram præce- / dentis paginæ and Angulj CDH & / DCH. Ut in altera / hypotheſj. stand side by side, the first at the left and the second at the right of the column, with no rule or brace between them. The lines CD, CH and DH stand under the right-hand group. A short rule stands over the value file between 5 28 and 21 36 45.

[625] The value 45 37 39 stands on the fifth line of the sentence, after Aſcenſio R. viſa. coperniana is printed with a lower-case initial. A short rule stands over the value file between 0 28 and 45 38 7.

[626] Alt. ♀ 18 50 is set in on a line of its own. calce is lower-case. A printed brace after Parall. embraces the three lines Alt. CD, Aſc. R. CH and declin. DH. Two short rules stand over the value file: under 7 24 of the brace, and under 5 27.

[627] A short rule stands over the value file between 7 24 and 21 39 0.

- Aſc. R. of the heel of the foot of ♊ 89 21 21 [Aſc. R. Calcis pedis ♊][628]
- H. 8 42 ♀ from Extr. ped. 38 27 [H. … ♀ ab Extr. ped.]
- apparent Aſc. R. of ♀ 45 44 11 [Aſc. R. ♀ viſa]
- apparent declination of ♀ 21 39 0 [declin. ♀ viſa]
- declination of Extre. ped. 22 32 30 [declin. Extre. ped.]

From this comes the difference of the right Aſcenſ. of ♀ and of the end of the foot of ♊ [Unde provenit differentia Aſcenſ. Rec- / tæ ♀ & Extremæ pedis ♊]

- 41 37 22
- apparent Aſc. R. of ♀ 45 44 11 [Aſc. R. ♀ viſa]
- Aſcenſ. R. of the end of the foot of ♊ 87 21 33 [Aſcenſ. R. Extremæ pedis ♊][629]

ON 20 MARCH.[630]

- H. 2 25 ♀ from the Sun 43 50 [H. … ♀ a Sole]
- Parall. ☉:
- Long. **1′ 48″**
- Latit. 1 50
- true Long. of ☉ 9 33 40 ♈ [Long. ☉ vera]
- parallax of Long. 1 48 [Parall. Long.]
- apparent Long. of ☉ 9 31 52 ♈ [Long. ☉ viſa]
- apparent Declin. of ☉ 3 45 36 B. [Declin. ☉ viſa … B.]
- apparent Aſc. R. of ☉ 8 46 3 [Aſc. R. ☉ viſa][631]

For the place of ♀ according to the hypothesis of Copernicus. [Pro loco ♀ juxta hypotheſin Copernici.]

Its distance from the earth is 623. [diſtantia ejus a terra ….]

The daily variation of the declination is **16′**. [Variatio declin. diurna ….]

- H. 2 45. apparent meridian altitude of ♀ 57 7 20 [H. …. Alt. mer. ♀ viſa]
- parallax of altitude 0 3 0 [Parall. Alt.]
- true meridian altitude of ♀ 57 10 20 [Alt. mer. ♀ vera]
- 34 5 30
- true declination of ♀ 23 4 50 [declin. ♀ vera]
- Subtr. for H. **0 20′** 13 [Subtr. pro H. …]

[628] The value 43 37 20 stands on the second line of the sentence, after Calcis ♊. A short rule stands over the value file between 45 44 1 and 89 21 21.

[629] The value 41 37 22 stands on the second line of the sentence, after pedis ♊. A short rule stands over the value file between the second 45 44 11 and 87 21 33.

[630] Printed as one centred line in roman capitals, DIE 20 MARTIJ., ending with a point; the last letter of MARTIJ is a capital J.

[631] A printed brace after Parall. ☉ embraces the two lines Long. and Latit.. The sign after 40 and after 52 on the two Long. lines is the sign of Aries (♈), printed after the value. B. stands after the value 3 45 36, with a point. A short rule stands over the value file between 1 48 and 9 31 52.

- H. 2 25 true declination of ♀ 23 4 37 [H. … declin. ♀ vera][632]
- AB 34 5 30
- BC 66 55½
- ABC 5 0
- ACB 5 3
- CDE 84 57
- DC 0 3′ 0″
- DE 0 0 16
- CE 0 3 0

Diagram. A circle at the right of the right column, at its foot, with the eight-line file above standing at its left. A straight line runs across the circle a little below its middle, level, from edge to edge. A second straight line enters the circle at the left, above the level line, and runs down to the right, crossing the level line near the middle and meeting the circle at its lower right. From A, on the circle at the top, a line descends to the left inside the circle. B stands on the circle at the upper right; a curved line descends from it to the left and ends on the slanting line. D stands inside the circle below and left of A; a short stroke runs from near D to E, which stands right of D and lower, on or beside the curve from B. C stands below D, where lines cross; a line runs down from near C to the level line. Five letters are cut in a decorative cursive. Inside the lower half of the circle, below the slanting line and partly crossed by it, four lines of handwriting are reproduced, given below. Which line passes exactly through which lettered point is not asserted beyond this.

- A: on the circle at the top
- B: on the circle at the upper right
- D: inside the circle, below and left of A
- E: right of D and lower, at the end of the short stroke
- C: below D, where lines cross

Handwriting inside the figure, line by line as written:

- [Later hand: Hanc figurã in inq[?]ſitio-]
- [Later hand: ne parallaxiũ,]
- [Later hand: Deinceps ſem per]
- [Later hand: obſervato.]

[632] diſtantia ejus a terra 623. and Variatio declin. diurna 16′. are each a centred line ending with a point. The line 34 5 30 carries no label. The value 13 of the Subtr. line stands alone in the last place of the value file. Three short rules stand over the value file: under 0 3 0, under 34 5 30, and under 13.

[Later hand: Hereafter always keep to this figure in the investigation of the parallaxes.][633]

- true declination of ♀ 23 4 37 [Declin. ♀ vera]
- Parall. of declination 3 0 [Parall. declin.]
- apparent declination of ♀ 23 1 37 [declin. ♀ viſa]
- apparent declination of ☉ 3 45 36 [declin. ☉ viſa]
- distance 43 50 — therefore [diſtantia … Ergo]
- difference of the Aſc. R. of ♀ and ☉ 40 45 0 [differentia Aſc. R. ♀ et ☉]
- apparent Aſc. R. of ☉ 8 46 3 [Aſc. R. ☉ viſa]
- apparent Aſc. R. of ♀ 49 31 3 [Aſc. R. ♀ viſa]
- Parall. 0 16
- true Aſc. R. of ♀ 49 30 47 [Aſc. R. ♀ vera]
- at the Hour 2 25 [ad Horam …][634]
- H. 7 55′ ♀ from the lower head of ♊ [H. … ♀ ab Inferiori Capite ♊]
- 53 55
- Azim. 86 20 Sep. — Alt. 25 50 [Azim. … Sep. … Alt. …]
- From this is given BC 66 51 [Hinc datur BC]
- DCE 37 28
- CDE 52 32
- CD 0 4′58″
- DE 0 3 1
- CE 0 3 57[635]

Diurnal motion of ♀ 45′. [Motus diurnus ♀ ….]

- H. 5 30 Reſp. in the Zodiac 10 18 [H. … Reſp. in Zodiaco]
- In the Equator 10 29 [In Æquatore]
- true Aſc. R. of ♀ 49 41 16 [Aſc. R. ♀ vera]
- Parall. 3 1
- apparent Aſc. R. of ♀ 49 38 15 [Aſc. R. ♀ viſa]
- H. 5½ Reſp. for the declination 3′40″ [H. … Reſp. de declin.]
- true declination of ♀ 23 8 17 [declin. ♀ vera]
- Parall. of declination 3 57 [Parall. declin.]
- apparent declination of ♀ 23 4 20 [declin. ♀ viſa]
- declination of the Mer. head of ♊ 28°57′ [declin. Mer. Cap. ♊]

[633] The four lines inside the circle are handwriting reproduced as part of the figure, not type. The first line runs under the slanting line of the figure at its right end. In figurã and parallaxiũ the marks stand as written: the a of figurã has an exit stroke looping back over it, and whether that loop is a suspension for -m is a matter of construal; the u of parallaxiũ carries a curved mark. The u after inq lies under the drawn line of the figure. The first word of the third line is Deinceps; ſem per is written as two groups. No printed statement on this side names the writer of these lines.

[634] Ergo is set in smaller type in the last value place of the diſtantia line, after 43 50. Three short rules stand over the value file: under 3 0, under 8 46 3, and under 0 16. ad Horam 2 25 is set in on a line of its own, with no mark on either figure.

[635] The value 53 55 stands on a line of its own under the value file. Azim. 86 20 Sep. stands at the left of its line and Alt. 25 50 in the value file of the same line.

From this results the difference of the Aſc. R. of ♀ and of the merid. head of ♊ [Hinc provenit differentia Aſc. R. ♀ & / merid. Cap. ♊]

- 60 16 2
- Aſc. R. of ♀ 49 38 15 [Aſc. R. ♀]
- Aſcenſ. R. of the lower head of ♊ 109 54 17 [Aſcenſ. R. Inferioris / Capitis ♊][636]
- H. 8 32 ♀ from the end of the foot of ♊ 34 43 [H. … ♀ ab Extrema pedis♊]
- Azim. of ♀ Sept. 78 45. — Alt. 20 39 [Azim. ♀ Sept. …. Alt. …]
- From this is given BC 66 47 [Hinc datur BC]
- Angle ACB 36 45 [Angulus ACB]
- CDE 53 15
- DC **0 5′10″**
- DE 0 3 5
- CE 0 4 8
- H. **6 7′**. Reſp. in the Equator **11′40″** [H. …. Reſp. in Æquatore][637]
- true Aſc. R. of ♀ 49 42 27 [Aſc. R. ♀ vera]
- Parall. of Aſc. R. 3 5 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 49 39 22 [Aſc. R. ♀ viſa][638]
- H. 6 7 Reſp. for the declination 4 5 [H. … Reſp. de declin.]
- true declination of ♀ 23 8 42 [declin. ♀ vera]
- Parall. of declination 4 8 [Parall. decl.]
- apparent declination of ♀ 23 4 34 [declin. ♀ viſa]
- declination of the end of the foot of ♊ **22 32½** [declin. Extr. ped. ♊]

The difference of the Aſc. R. of ♀ and of the end of the foot of ♊ results: [Provenit differentia Aſc. R. ♀ & Ex- / tremæ pedis ♊]

- 37 45 50
- apparent Aſcen. R. of ♀ 49 39 22 [Aſcen. R. ♀ viſa]
- Aſcen. R. of the end of the foot of ♊ 87 25 12 [Aſcen. R. Extremæ pedis ♊][639]
- H. **8 11′** ♀ from the heel of ♊ 36 32 [H. … ♀ a Calce ♊]
- apparent Aſc. R. of ♀ 49 38 44 [Aſc. R. ♀ viſa]
- apparent declination of ♀ 23 4 30 [declin. ♀ viſa]
- declination of the heel of ♊ 22 38 [declin Calcis ♊]

[636] **Motus diurnus ♀ 45′.** is a centred line of text-size roman, ending with a point. The value 60 16 2 stands on the second line of the sentence, after **merid. Cap. ♊.** Three short rules stand over the value file: under 3 1, under 3 57, and under the second 49 38 15. **Capitis ♊** is set in on a second line; the value 109 54 17 stands on the first.

[637] pedis and the sign ♊ stand close together, with no clear space between them. **Azim. ♀ Sept. 78 45.** stands at the left of its line, with a point after 45, and Alt. 20 39 in the value file of the same line.

[638] A short rule stands over the value file under 3 5.

[639] The value 37 45 50 stands on the second line of the sentence. Two short rules stand over the value file: under 4 8, and under the second 49 39 22.

From which is given the difference of the Aſc. R. of ♀ and of the heel of ♊ [Unde datur differentia Aſc. R. ♀ & / Calcis ♊]

- 39 46 6
- Aſc. R. of ♀ 49 38 44 [Aſc. R. ♀]
- Aſc. R. of the heel of ♊ 89 24 50 [Aſc. R. Calcis ♊][640]

For the place of ♀ according to its Ptolemaic distance from the earth, which is 330. [Pro loco ♀ juxta Ptolomaicam ejus a / terra diſtantiam quæ eſt ….]

- H. **2 45′** apparent Alt. of ♀ 57 7 20 [H. … Alt. ♀ viſa]
- Parall. of Alt. 5 40 [Parall. Alt.]
- true Alt. of ♀ [Alt. ♀ vera]
- 57 13 0
- 34 5 30
- true declination of ♀ 23 7 30 [declin. ♀ vera]
- ſub. for H. **0 20′** 13 [ſub. pro H. …]
- H. 2 25 true declination of ♀ 23 7 17 [H. … declin. ♀ vera][641]
- Angle DCE **5° 3′** [Angulus DCE]
- CDE 84 57
- DC **0 5′ 40**
- DE 0 0 30
- CE 0 5 40

Therefore the apparent declination of ♀ is the same as before, 23 1 37. And from the same data is given the same apparent Aſc. R. of ♀: [Ergo declinatio ♀ viſa eadem quæ / antea …. Ex ijsdemque datis da- / tur eadem Aſc. R. ♀ viſa]

- 49 31 3
- Parall. of Aſc. R. 0 30 [Parall. Aſc. R.]
- true Aſc. R. of ♀ 49 30 33 [Aſc. R. ♀ vera]
- at the Hour **2 25′**. [ad Horam …]
- H. 7 55 ♀ from the lower head of ♊ 53 55 [H. … ♀ ab inferiori Capite ♊]
- Alt. of ♀ 25 50 [Alt. ♀]

The angles at C and D as in the other hypothesis. [Angulj ad C & D ut in altera hypotheſj.]

- DC 0 9 22
- DE 0 5 42
- CE 0 7 27[642]

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[640] declin in declin Calcis ♊ is printed without a point. The value 39 46 6 stands on the second line of the sentence. A short rule stands over the value file under the second 49 38 44.

[641] The label Alt. ♀ vera is set once, level between the two value lines 57 13 0 and 34 5 30, with no brace; which of the two lines it names is not marked. Three short rules stand over the value file: under 5 40, under 34 5 30, and under 13.

[642] In DC **0 5′ 40** the minutes carry a mark and the seconds are bare, as printed. The value 49 31 3 stands at the end of the third line of the sentence. A short rule stands over the value file under 0 30. **ad Horam 2 25′.** is set in on a line of its own. The last three lettered lines are set in under the sentence.

- H. 5 30. Reſp. in the Equator **10′29″** [H. …. Reſp. in Æquatore]
- true right ascension of ♀ 49 41 2 [Aſc. R. ♀ vera]
- Parall. of right ascension 5 42 [Parall. Aſc. R.]
- apparent right ascension of ♀ 49 35 20 [Aſc. R. ♀ viſa][643]
- true declination of ♀ 23 10 57 [Declin. ♀ vera]
- Parall. of declination 7 27 [Parall. declin.]
- apparent declination of ♀ 23 3 30 [declin. ♀ viſa]
- declination of Cap. ♑ 28 57 0 [Declin. Cap. ♑]

From these results the difference of the right ascension of ♀ and of Cap. inf. ♑ [Ex quibus provenit differentia Aſc. R. / ♀ & Cap. inf. ♑]

- 60 15 42
- right ascension of ♀ 49 35 20 [Aſc. R. ♀]
- right ascension of Inferi. Cap. ♑ 109 51 2 [Aſc. R. Inferi. Cap. ♑][644]
- H. 8 32. ♀ from the end of the foot of ♑ 34 43 [H. …. ♀ ab Extrema pedis ♑]
- Altitude 20 39. — DC 0 9 45 [Alt. …. DC]
- DE 0 5 50
- CE 0 7 49
- H. 6 7 Reſp. in the Equator **11′40″** [H. … Reſp. in Æqua.][645]
- true right ascension of ♀ 49 42 13 [Aſc. R. ♀ vera]
- Parall. 5 50
- apparent right ascension of ♀ 49 36 23 [Aſc. R. ♀ viſa][646]
- true declination of ♀ 23 11 22 [Declin. ♀ vera]
- Parall. 7 49
- apparent declination of ♀ 23 3 33 [declin. ♀ viſa]
- declination of the end of the foot 22 32 30 [declin. Extr. ped.]

From which comes the difference of the right ascension of ♀ and of the end of the foot [Unde prodit differentia Aſc. R. ♀ et / Extr. ped.]

- 37 45 42
- apparent right ascension of ♀ 49 36 23 [Aſc. R. ♀ viſa]
- right ascension of the end of the foot of ♑ 87 22 5 [Aſcen. R. Extremæ pedis ♑][647]
- H. 8 11 ♀ was distant from the heel of the foot of ♑ [H. … ♀ diſtabat a Calce pedis ♑]
- 36 32

[643] A short rule stands over the value file under 5 42.

[644] The value 60 15 42 stands on the second line of the sentence. Two short rules stand over the value file: under 7 27, and under the second 49 35 20.

[645] Alt. 20 39. stands at the left of its line, with a point after 39, and the lettered group DC 0 9 45 on the same line; DE and CE are set in under DC. A short rule stands over the value file under 0 7 49.

[646] A short rule stands over the value file under 5 50.

[647] No sign stands after Extr. ped. on either of its two lines. The value 37 45 42 stands on the second line of the sentence. Two short rules stand over the value file: under 7 49, and under the second 49 36 23.

- apparent right ascension of ♀ 49 35 47 [Aſc. R. ♀ viſa]
- apparent declination of ♀ 23 3 30 [Declin. ♀ viſa]
- declination of the heel of the foot of ♊ 22 38 [declin. Calcis pedis ♊]

From this is given the difference of the right ascension of ♀ and of the heel of the foot of ♊ [Hinc datur differentia Aſc. R. ♀ & Cal- / cis pedis ♊]

- 39 45 58
- apparent right ascension of ♀ 49 35 47 [Aſc. R. ♀ viſa]
- right ascension of the heel of the foot of ♊ 89 21 45 [Aſcen. R. Calcis pedis ♊][648]

ON 24 MARCH.[649]

- H. **2½** ♀ from ☉ **42°44′** [H. … ♀ a ☉]
- Parall. ☉:
- Long. **1 46″**
- Latit. 1 49
- true Long. of ☉ 13 29 35 ♈ [Long. ☉ vera][650]
- Parall. long. 1 46
- apparent Long. of ☉ 13 27 49 ♈ [Long. ☉ viſa]
- apparent declination of ☉ 5 18 10 [Declin. ☉ viſa]
- apparent right ascension of ☉ 12 23 51 [Aſc. R. ☉ viſa]

For the place of ♀. [Pro loco ♀.]

Over a space of 8 days, from 20 March up to the 28th, the meridian altitude of ♀ became P. **1 49′** higher. So I have distributed its daily variation so that it is: [Altitudo ♀ meridiana ſpacio … dierum / a … Martij uſque in …. P. … altior / facta eſt, ſic ergo variationem ejus di- / urnam diſtribuj ut ſit]

Day	Min.
20	16
21	15
22	15
23	14
24	13
25	13
26	12
27	12
Sum of all	1 49′

[648] The value 36 32 stands on a line of its own under the value file. The value 39 45 58 stands on the second line of the sentence. A short rule stands over the value file under the second 49 35 47.

[649] Printed as one centred line in roman capitals, DIE 24 MARTIJ., ending with a point; the last letter of MARTIJ is a capital J. No year is printed with it.

[650] A printed brace after Parall. ☉ embraces the two lines Long. and Latit.. In **1 46″** only the second place carries a mark; 1 49 is bare. The sign after 35 is the sign of Aries (♈), printed after the value.

Accordingly, the apparent declination at the time of this observation will be a whole degree greater than the apparent declination at about the same time on 20 March, since exactly one degree corresponds to the first 4 days. [Proinde declinatio / viſa tempore hujus / obſervationis inte- / gro gradu major / erit declinatione / viſa circa idem tem- / pus die … Martij, / Cum … diebus pri- / mis unus gradus / præciſe conveniat.][651]

- Day 20, H. **2½**, apparent declination of ☿ 23 1 40 [Die … H. … Declin. ☿ viſa]
- For 4 days 1 0 [Pro … diebus]
- Day 24, H. **2½**, apparent declination of ☿ 24 1 40 [die … H. … decl. ☿ viſa]
- apparent declination of ☉ 5 18 10 [declin. ☉ viſa]
- distance 42 44 [diſtantia]

From which results the difference of the right ascension of ☿ and ☉ [Unde provenit differentia Aſc. R. ☿ & ☉]

- 39 58 43
- right ascension of ☉ 12 23 51 [Aſc. R. ☉]
- apparent right ascension of ☿ 52 22 34 [Aſc. R. ☿ viſa]
- Parall. according to Copernicus, the same as on the 20th, 13 [Parall. juxta Copernicum eadem quæ / die 20]
- true right ascension of ☿ 52 22 21 [Aſc. R. ☿ vera]

It is therefore established that ☿, as regards right ascension, advanced **2° 51′ 34″** in the space of four days. So that its daily motion is: [Conſtat ergo ☿ quo ad Aſc. R. quatuor / dierum ſpacio progreßam eße, … / …. Ut ſit motus diurnus ejus]

Day	
20	45 0
21	43 34
22	42 0
23	41 0

Therefore, for two days, **1° 28′ 34″** must be added to the right ascension of 20 March at H. **2½**, so that the right ascension of ☿ is obtained for the same time on 22 March. [Itaque pro duobus diebus addenda / ſunt ad Aſcenſionem

[651] Pro loco ☿. is a centred line ending with a point. The table's printed head row reads Die over the first column and Min. over the second; its foot row reads Summa omnium (set in two lines, in type smaller than the text) against 1 49′. A printed vertical rule divides the two columns from the head row to the foot row; printed horizontal rules run across both columns under the row 23 14 and under the row 27 12. The table has no difference column. The ten-line passage beginning Proinde declinatio stands at the right of the table, its lines centred on one another; it is set in text-size roman. Cum after the comma is printed with a capital C.

Rectam diej … / Martij H. …, … vt habeatur ♀ / Aſcenſio Recta, ad idem tempus die …. / Martij.][652]

DIE 22 MARTIJ. — 22 March.

According to the Copernican hypothesis, the distance of ♀ from the Earth is 606. [Juxta Copernianam hypotheſin, / diſtantia ♀ a terra 606.]

- H. 2½ true Aſc. R. of ♀ 50 59 21 [H. … Aſc. R. ♀ vera]
- altitude of ♀ 57½ [Alt. ♀]

The parallax of altitude and of declination is the same, 3′ 33″, and this because of the small distance of ♀ from the meridian. [Parallaxis Altitudinis & declinationis / eadem … idque propter exiguam / diſtantiam ♀ a Meridiano.]

- apparent declination of ♀ 23 32 37 [Declin. ♀ viſa]
- parallax of declination 3 3 [Parall. declin.]
- true declination of ♀ 23 35 40 [declin. ♀ vera][653]
- H. 8 2′ ♀ from the lower Cap. ♑ 52°29′ [H. … ♀ ab inf. Cap. ♑]
- Azim. 84 53. altitude 25 28 [Azim. …. Alt. …]
- AB 34 5 30
- BC 66 21
- AC 64 32
- DCE 37 33
- CDE 52 27
- CD 0 5 7
- DE 0 3 7
- CE 0 4 4[654]

Diurnal motion of ♀ in the Equator 42′ [Motus diurnus ♀ in Æquatore …]

- H. 5 32 Reſp. in the Equator 9′41″ [H. … Reſp. in Æquatore]
- true Aſc. R. of ♀ 51 9 2 [Aſc. R. ♀ vera]
- parallax of Aſc. R. 3 7 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 51 5 55 [Aſc. R. ♀ viſa]
- H. 5 32 Reſp. for the declination 3 27 [H. … Reſp. de declin.]
- true declination of ♀ 23 39 7 [declin. ♀ vera]
- parallax of declination 4 4 [Parall. declin.]
- apparent declination of ♀ 23 35 3 [declin. ♀ viſa]
- declination of Cap. ♑ 28 57 [declin. Cap. ♑]

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[652] Four short rules stand over the value file in the working after the table: under 1 0, under 5 18 10, under 12 23 51, and under 13. The value 39 58 43 stands on a line of its own under the sentence that names it; the value 13 stands on the second line of the two-line Parall. entry. The group 2° 51′ 34″ is divided at a line end in the print (2° 51′ / 34″.). The second table's printed head row carries Die over its first column and nothing over its second; a printed vertical rule divides its columns; it has no horizontal rule and no difference column. diej and vt are printed so; the side also prints ut and Ut. The date in the last sentence is printed die 22. / Martij. with a point after 22 and after Martij.

[653] One short rule stands over the value file under 3 3.

[654] The time 8 2′ carries a minute mark on its second figure; the value 52°29′ is set close, with a degree mark and a minute mark. Azim. 84 53. Alt. 25 28 is set in on a line of its own, with a point after 53. The letter-groups AB to CE are set in further under the Azim. line.

From these results the difference of the Aſc. R. of ♀ and of the lower Cap. ♊ [Ex quibus provenit differentia Aſc. R. / ♀ et inferioris Cap. ♊]

- 58 48 31
- apparent Aſc. R. of ♀ 51 5 55 [Aſc. R. ♀ viſa]
- Aſcen. R. of the lower Cap. ♊ 109 54 26 [Aſcen. R. infer. Cap. ♊][655]
- H. 8 37 ♀ from the northern horn of ♉ 21 54 [H. … ♀ a Bor. Cornu ♉]
- parallax of ♀ [Parall. ♀]
- altitude **5′19″** [Alt.]
- Aſc. R. 3 10
- declination 4 15 [declin.][656]

These parallaxes were computed in no other way than by my having increased the earlier ones, and that with probability, taking account of the increase of the parallaxes on other days. [Quæ parallaxes non aliter ſupputatæ / ſunt quam, quod priores auxerim, id- / que probabiliter habita ratione incre- / mentj parallaxium aliis diebus.]

- H. 6 7 Reſp. in the Equator **10′42″** [H. … Reſp. in Æquat.]
- true Aſc. R. of ♀ 51 10 3 [Aſc. R. ♀ vera]
- parallax of Aſc. R. 3 10 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 51 6 53 [Aſc. R. ♀ viſa][657]
- true declination of ♀ 23 39 29 [declin. ♀ vera]
- parallax of declination 4 15 [Parall. declin.]
- apparent declination of ♀ 23 35 14 [declin. ♀ viſa]
- declination of the northern horn of ♉ 28 9 30 [declin. Bor. Cornu ♉]

From which results the difference of the Aſc. R. of ♀ and of the northern horn of ♉ [Unde provenit differentia Aſc. R. ♀ & / Borealis Cornu ♉]

- 23 50 52
- apparent Aſc. R. of ♀ 51 6 53 [Aſc. R. ♀ viſa]
- Aſc. R. of the northern horn of ♉ 74 57 45 [Aſc. R. Bor. Cornu ♉][658]

On the same day, the 22nd, according to the Ptolemaic distance of ♀ from the Earth, 321. [Eodem die 22 juxta Ptolomaicam ♀ / a terra diſtantiam 321.]

- H. **2½** true Aſc. R. of ♀ 50 59 7 [H. … Aſc. R. ♀ vera]
- altitude of ♀ **57½** [Alt. ♀]
- apparent declination of ♀ 23 32 37 [declin. ♀ viſa]
- parallax of declination 5 45 [Parall. declin.]

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[655] Motus diurnus ♀ in Æquatore **42′** is a full-column line with no terminal point; **42′** carries a minute mark. **9′41″** is set close. The value 58 48 31 stands on the second line of the sentence, after inferioris Cap. ♊. Three short rules stand over the value file: under 3 7, under 4 4, and under the second 51 5 55.

[656] Parall. ♀ stands at the left of a printed curly brace which groups the three lines Alt., Aſc. R. and declin.; **5′19″** is set close, with a minute mark and a second mark; 3 10 and 4 15 are bare.

[657] **10′42″** is set close. One short rule stands over the value file under 3 10.

[658] The value 23 50 52 stands on the second line of the sentence, after Borealis Cornu ♉. Three short rules stand over the value file: under 4 15, under 23 35 14, and under 51 6 53.

- H. 2½ true declination of ♀ 23 38 22 [H. … declin. ♀ vera][659]
- H. 8 2 ♀ from the lower Cap. ♑ 52 29′ [H. … ♀ ab infer. Cap. ♑]

The angles at C and D as in the other hypothesis. [Angulj ad C & D. Ut in altera hypotheſj]

- DC 0 9 40
- DE 0 5 54
- CE 0 7 40
- true Aſc. R. of ♀ 51 8 48 [Aſc. R. ♀ Vera]
- parallax of Aſc. R. 5 54 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 51 2 54 [Aſc. R. ♀ viſa][660]
- true declination of ♀ 23 41 49 [declin. ♀ vera]
- parallax of declination 7 40 [Parall. decl.]
- apparent declination of ♀ 23 34 9 [declin. ♀ viſa]
- declination of Cap. ♑ 28 57 [declin. Cap. ♑]

Therefore the difference of the Aſc. R. of ♀ and of the lower Cap. ♑ [differentia ergoAſc.R. ♀ &infer.Cap. ♑]

- 58 48 8
- apparent Aſc. R. of ♀ 51 2 54 [Aſc. R. ♀ viſa]
- Aſc. R. of the lower Cap. ♑ 109 51 2 [Aſc. R. inferio. Cap. ♑][661]
- H. 8 37 ♀ from the northern horn of ♉ 21 54 [H. … ♀ a Bor. Cornu ♉]
- true Aſc. R. of ♀ 51 9 49 [Aſc. R. ♀ vera]
- parallax of Aſc. R. 6 0 [Parall. Aſc. R.]
- apparent Aſc. R. of ♀ 51 3 49 [Aſc. R. ♀ viſa]
- true declination of ♀ 23 42 11 [declin. ♀ vera]
- parallax of declination 8 0 [Parall. decl.]
- apparent declination of ♀ 23 34 11 [decl. ♀ viſa]
- declination of the northern horn of ♉ 28 9 30 [decl. Bor. Cornu ♉]

From which results the difference of the Aſc. R. of ♀ and of the northern horn of ♉ [Unde provenit differentia Aſc. R. ♀ & / Borei cornu ♉]

- 23 50 30
- apparent Aſc. R. of ♀ 51 3 49 [Aſc. R. ♀ viſa]
- Aſc. R. of the northern horn of ♉ 74 54 19 [Aſc. R. Borealis cornu ♉][662]

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[659] One short rule stands over the value file under 5 45.

[660] Here the time 8 2 is bare and the value 52 29′ carries a minute mark only; the left column sets the same entry as 8 2′ and 52°29′. The line Angulj ad C & D. Ut in altera hypotheſj runs the full width of the column, set close, with no terminal point; a space stands between hypothe and ſj. The letter-groups DC, DE and CE are set in. Vera has a capital here. One short rule stands over the value file under 5 54.

[661] The sentence differentia ergoAſc.R. ♀ &infer.Cap. ♑ is set close across the full column, with no space between ergo and Aſc.; its value 58 48 8 stands on a line of its own. Two short rules stand over the value file: under 7 40, and under the second 51 2 54.

[662] Short rules stand over the value file under 6 0, under 8 0, and under the second 51 3 49. The side prints the northern horn of ♉ in three forms — Bor. Cornu, Borealis Cornu / Borealis cornu, and Borei cornu. The value 23 50 30 stands on the second line of the sentence, after Borei cornu ♉.

DIE 28 MARTIJ. — 28 March.

- H. 2 15 ☿ from ☉ **41 21½** [H. … ☿ a ☉]
- Parall. of ☉ [Parall. ☉]
- Long. 1 42
- Latit. 1 45
- true Long. of ☉ 17 24 6 ♉ [recte: ♈ — Corrigenda, p. 429] [Long. ☉ vera]
- Parall. of long. 1 42 [Parall. long.]
- apparent Long. of ☉ 17 22 24 ♉ [recte: ♈ — Corrigenda, p. 429] [Long. ☉ viſa][663]
- apparent declination of ☉ 6 48 58 [declin. ☉ viſa]
- apparent Aſc. R. of ☉ 16 1 27 [Aſc. R. ☉ viſa]

For the place of ☿, according to its Copernican distance from the Earth, 554. [Pro loco ☿ juxta Copernianam ejus / a terra diſtantiam 554.]

Let the variation of the daily declination on this day be **10′**. For it is likely that the meridian observation of the following day is smaller than it should be, if one considers the observation of the 3rd of April. [Variatio declinationis diurnæ hoc die / ſit 10′. Nam ſequentis diej Obſeruati- / onem meridianam juſto minorem eße / veriſimile eſt, ſi quis obſeruationem / diei 3 Aprilis conſideret.][664]

- H. 2 37. The apparent meridian altitude of ☿ [H. …. Altitudo meridiana ☿ viſa]
- **58 56½**
- Parall. of altitude 3 12 [Parall. Alt.]
- true altitude of ☿ 58 59 42 [Alt. ☿ vera]
- 34 5 30
- true declination of ☿ 24 54 12 [declin. ☿ vera]
- Sub. for H. **0 22′** 9 [Sub. pro H. …]
- H. **2¼** true declination of ☿ 24 54 3 [H. … decl. ☿ vera]
- altitude of ☿ 58 46 [Alt. ☿]
- Angle DCE **5°33′** [Angulus DCE]
- CDE 84 27
- DC 0 3 13
- DE 0 0 18
- CE 0 3 12
- apparent declination of ☿ 24 50 51 [declin. ☿ viſa]
- apparent declination of ☉ 6 48 58 [declin. ☉ viſa]
- distance of ☿ and ☉ 41 21 30 [diſtantia ☿ & ☉]
- difference of the Aſc. R. of ☿ and ☉ 38 56 58 [differentia Aſc. R. ☿ & ☉]
- apparent Aſc. R. of ☉ 16 1 27 [Aſc. R. viſa ☉]

[663] Parall. ☉ stands at the left of a printed curly brace which groups the two lines Long. and Latit.. The sign ♉ stands after the value on the lines Long. ☉ vera and Long. ☉ viſa. One short rule stands over the value file under the second 1 42.

[664] eße is printed with a single sharp-s sort for the double s.

- apparent Aſc. R. of ♀ 54 58 25 [Aſc. R. ♀ viſa]
- Parall. of Aſc. R. 0 18 [Parall. Aſc. R.]
- H. 2¼ true Aſc. R. of ♀ 54 58 7 [H. … Aſc. R. ♀ vera][665]
- H. 8 27 ♀ from the southern Cap. ♑ 48 37⅔ [H. … ♀ a Merid. Cap. ♑]
- computed altitude 21 48 [Supputata Alt.]
- Angle DCE 37 5½ [Angulus DCE]
- CDE 52 54 30
- DC 0 5 45
- DE 0 3 28
- CE 0 4 36
- diurnal motion of ♀ 36 [Motus diurnus ♀][666]
- H. 6 12 Reſp. in the Zodiac 9′ 18 [H. … Reſp. in Zodiaco]
- in the Equator 9 37 [in Æquatore]
- true Aſc. R. of ♀ 55 7 44 [Aſc. R. ♀ vera]
- parallax 3 28 [Parallaxis]
- apparent Aſc. R. of ♀ 55 4 16 [Aſc. R. ♀ viſa][667]
- H. 6 12 Reſp. for the declination 2 35 [H. … Reſp. de declin.]
- true declination of ♀ 24 56 38 [declin. ♀ vera]
- parallax 4 36 [Parallaxis]
- apparent declination of ♀ 24 52 2 [declin. ♀ viſa]
- declination of Cap. ♑ 28 57 [declin. Cap. ♑]

From which results the difference of the Aſc. R. of ♀ and of the lower Cap. ♑ [Unde provenit differentia Aſc. R. ♀ & / inf. Cap. ♑]

- 54 49 15
- apparent Aſc. R. of ♀ 55 4 16 [Aſc. R. ♀ viſa]
- Aſcen. R. of the lower Cap. ♑ 109 53 31 [Aſcen. R. infer. Cap. ♑][668]

According to the Ptolemaic distance of ♀ from the Earth, 292. [Juxta Ptolomaicam ♀ a terra diſtan- / tiam 292.]

- Angle DCE 5°33′ [Angulus DCE]
- CDE 84 27
- DC 0 6′ 6″
- DE 0 0 35

[665] H. 2 37. carries a point after 37; the value 58 56½ stands on the next line, in the value file. The line 34 5 30 carries a value with no label. Sub. pro H. 0 22′ carries a minute mark on the time 22′; its value 9 stands alone in the last place of the value file. 5°33′ is set close, with a degree mark and a minute mark. The letter-groups CDE to CE are set in under Angulus DCE. Four short rules stand over the value file: under 3 12, under 9, under the second 16 1 27, and under 0 18.

[666] Motus diurnus ♀ 36 is set in to the depth of the letter-groups and is the last line of the left column; 36 carries no mark.

[667] 9′ 18 carries a minute mark on its first figure only; 18 is bare. One short rule stands over the value file under 3 28.

[668] The value 54 49 15 stands on the second line of the sentence, after inf. Cap. ♑. Two short rules stand over the value file: under 4 36, and under the second 55 4 16.

- CE 0 6 4[669]
- H. 2¼ apparent declination of ♀ 24 50 51 [H. … declin. ♀ viſa]
- Parall. of declination 6 4 [Parall. declin.]
- true declination of ♀ 24 56 55 [declin. ♀ vera][670]
- apparent Aſc. R. of ♀ 54 58 25 [Aſc. R. ♀ viſa]
- Parall. 0 35
- H. 2¼ true Aſc. R. of ♀ 54 57 50 [H. … Aſc. R. ♀ vera][671]
- H. 8 27 ♀ from the southern Cap. ♑ [H. … ♀ a meridionali Cap. ♑]
- 48 37⅔
- computed altitude of ♀ 21 48 [Supputata Alt. ♀]

The angles at C and D as in the other hypothesis. [Angulj ad C & D ut in altera hypotheſj]

- DC 0 10′56″
- DE 0 6 35
- CE 0 8 43[672]
- true Aſc. R. of ♀ 55 7 27 [Aſc. R. ♀ vera]
- parallax 6 35 [Parallaxis]
- apparent Aſc. R. of ♀ 55 0 52 [Aſc. R. ♀ viſa]
- true declination of ♀ 24 59 30 [Declin. ♀ vera]
- Parall. of declination 8 43 [Parall. declin.]
- apparent declination of ♀ 24 50 47 [declin. ♀ viſa]
- declination of Cap. ♑ 28 57 [Decl. Cap. ♑][673]

Therefore the difference of the Aſc. R. of ♀ and the lower head of ♑ is given: [Ergo datur differentia Aſc. R. ♀ & Cap. / inferioris ♑]

- 54 48 50
- Aſc. R. of ♀ 55 0 52 [Aſc. R. ♀]
- Aſc. R. of the lower head of ♑ 109 49 42 [Aſc. R. Cap. inf. ♑][674]

DIE 3 APRILIS. — 3 April.

- H. 1 40′ ♀ from the Sun 38 39 [H. … ♀ a Sole]
- Parall. of ☉ [Parall. ☉]
- Long. 1′27″
- Latit. 1 44
- true Long. of ☉ 23 14 19 ♈ [Long. ☉ vera]

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[669] 5°33′ is set close, with a degree mark and a minute mark; 0 6′ 6″ carries a minute mark and a second mark; the other groups are bare.

[670] One short rule stands over the value file under 6 4.

[671] One short rule stands over the value file under 0 35.

[672] The value 48 37⅔ stands on a line of its own under a meridionali Cap. ♑. Angulj ad C & D ut in altera hypotheſj runs the full width of the column with no terminal point. 10′56″ is set close.

[673] Short rules stand over the value file under 6 35 and under 8 43. Declin. and Decl. have capitals here.

[674] These three lines stand above the rubric and carry no date on this side. The value 54 48 50 stands on the second line of the sentence, after inferioris ♑. One short rule stands over the value file under 0 52.

- Parall. Long. 1 27
- apparent Long. of ☉ 23 12 52 ♈ [Long. ☉ viſa]
- apparent declin. of ☉ 9 1 21 [declin. ☉ viſa]
- apparent Aſc. R. of ☉ 21 29 13 [Aſc. R. ☉ viſa][675]

According to Copernicus, the distance of ☿ from the Earth 501. [Juxta Copernicum diſtantia ☿ / a terra 501.]

- H. 2 26 ☿ Alt. mer. 59 53 [H. … ☿ Alt. mer.]
- Parall. Alt. 3 27
- true Alt. of ☿ 59 56 27 [Alt. ☿ vera]
- 34 5 30
- true declin. of ☿ 25 50 57 [declin. ☿ vera]
- For **46′** ſubt. 15 [Pro … ſubt.]
- H. 1 40 true declin. of ☿ 25 50 42 [H. … declin. ☿ vera]

And at that time the ſupput. Alt. was 58 48. [Ac tunc fuit ſupput. Alt.]

- Angle DCE 12 28 [Angulus DCE]
- CDE 77 32
- DC 0 3 33
- DE 0 0 46
- CE 0 3 28
- apparent Declin. of ☿ 25 47 14 [Declin. ☿ viſa]
- apparent declin. of ☉ 9 1 20 [declin. ☉ viſa]
- distance of ☿ and ☉ 38 39 [diſt. ☿ & ☉]
- difference of the Aſc. R. of ☿ and ☉ 36 43 34 [Differentia Aſc. R. ☿ & ☉]
- apparent Aſc. R. of ☉ 21 29 13 [Aſc. R. ☉ viſa]
- apparent Aſc. R. of ☿ 58 12 47 [Aſc. R. ☿ viſa]
- Parall. Aſc. R. 0 0 46
- H. 1⅔ true Aſc. R. of ☿ 58 12 0 [H. … Aſc. R. ☿ vera][676]

H. 8 53: between ☿ and the southern head of ♊ [H. … Inter ☿ & meridionale Caput ♊]

- 45 37
- Alt. of ☿ 17 0 [Alt. ☿]

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[675] **40′** carries a minute mark on the time; **1′27″** is set close, with a minute mark and a second mark. Parall. ☉ stands at the left of a printed curly brace which groups the two lines Long. and Latit.. A sign stands after the value, set close, on the lines Long. ☉ vera and Long. ☉ viſa; it is transcribed ♈; its arms end in outward-curling, horn-like terminals, unlike the straight arms of a letter V. One short rule stands over the value file under 1 27 of Parall. Long..

[676] The line 34 5 30 carries a value with no label. Pro **46′** ſubt. carries a minute mark on **46′**; its value 15 stands alone in the last place of the value file; the setting does not say whether **46′** is a time or an arc. Here the time H. 1 40 is bare; the same side sets H. **1 40′** twice with a minute mark. The letter-groups CDE to CE are set in under Angulus DCE. The same line declin. ☉ viſa is printed 9 1 21 above and 9 1 20 here. Five short rules stand over the value file: under 3 27, under 34 5 30, under 15, under the second 21 29 13, and under 0 0 46 of Parall. Aſc. R..

- true declin. of ♀ 25 53 6 [declin. ♀ vera]
- Angle DCE **35 29½** [Angulus DCE]
- CDE **54 30½**
- DC 0 6 34
- DE 0 3 49
- CE 0 5 21[677]

Diurnal motion of ♀ 28. [Motus diurnus ♀ 28.]

- H. 7 13 Reſp. in the Zodiac **8′25″** [H. … Reſp. in Zodiaco]
- in Æquat. 8 46 [in Æquat.]
- true Aſc. R. of ♀ 58 20 46 [Aſc. R. ♀ vera]
- Parall. Aſc. 0 3 49
- apparent Aſc. R. of ♀ 58 16 57 [Aſc. R. ♀ viſa][678]
- H. 7 13 Reſp. de declin. **2′ 24″** [H. … Reſp. de declin.]
- true declin. of ♀ 25 53 6 [declin. ♀ vera]
- Parall. declin. 0 5 21
- apparent declin. of ♀ 25 47 45 [declin. ♀ viſa]
- declin. of the head of ♊ 28 57 [declin. Cap. ♊]

From which results the difference of the Aſc. R. of ♀ and the southern head of ♊ [Unde provenit differentia Aſc. R. ♀ & / merid. Cap. ♊]

- 51 39 5
- Aſc. R. of ♀ 58 16 57 [Aſc. R. ♀]
- Aſc. R. of Hercules 109 56 2 [Aſc. R. Herculis][679]

According to the Ptolemaic hypothesis, the distance of ♀ from the Earth 264. [Juxta hypotheſin Ptolomaicam Di- / ſtantia ♀ a terra 264.]

- H. **1 40′** ♀ from ☉ 38 39 [H. … ♀ a ☉]
- Parall. Alt. of ♀ 0 6 45 [Parall. Alt. ♀]
- DE 0 1 27
- CE 0 6 35
- apparent declin. of ♀ 25 47 12 [declin. ♀ viſa]
- Parall. declin. 6 35
- H. **1⅔** true declin. of ♀ 25 53 47 [H. … declin. ♀ vera][680]
- apparent Aſc. R. of ♀ 58 12 48 [Aſc. R. ♀ viſa]

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[677] The value 45 37 stands on a line of its own under **meridionale Caput ♊**. The letter-groups CDE to CE are set in under Angulus DCE. No short rule in this group.

[678] **Motus diurnus ♀ 28.** is centred at the head of the column and ends with a point; 28 carries no mark. **8′25″** is set close, with a minute mark and a second mark. One short rule stands over the value file under 3 49.

[679] "Hercules" here is an old name for the following (southern) head of Gemini, Pollux, from the tradition that the Twins are Apollo and Hercules; it is not the constellation Hercules. **2′ 24″** is spaced, with a minute mark and a second mark. The value 51 39 5 stands on the second line of the sentence, after **merid. Cap. ♊**. Two short rules stand over the value file: under 5 21, and under the second 58 16 57.

[680] **Diſtantia** has a capital. **40′** carries a minute mark on the time. The letter-groups DE and CE are set in under **Parall. Alt. ♀**. A long rule stands under CE 0 6 35, starting at the letter-groups; a short rule stands under 6 35 of Parall. declin..

- Parall. Aſc. R. 1 27
- true Aſc. R. of ♀ 58 11 21 [Aſc. R. ♀ vera][681]

H. 8 53′: ♀ and the southern head of ♊ [H. … ♀ & meridionale Cap. ♊]

- 45 37
- Alt. of ♀ 17 0 [Alt. ♀]
- DC 0 12′27″
- DE 0 7 14
- CE 0 10 8
- true Aſc. R. of ♀ 58 20 7 [Aſc. R. ♀ vera]
- Parall. Aſc. R. 7 14
- apparent Aſc. R. of ♀ 58 12 53 [Aſc. R. ♀ viſa][682]
- true Declin. of ♀ 25 56 11 [Declin. ♀ vera]
- Parall. declin. 10 8
- apparent declin. of ♀ 25 46 3 [declin. ♀ viſa]
- declin. of the head of ♊ 28 57 [declin. Cap. ♊]
- difference of the Aſc. R. of ♀ and the southern head of ♊ [diff. Aſc. R. ♀ & merid. Cap. ♊]
- 51 38 31
- Aſc. R. of ♀ 58 12 53 [Aſc. R. ♀]
- Aſc. R. of the southern head of ♊ 109 51 24 [Aſc. R. merid. Cap. ♊][683]

DIE 13 APRILIS. — 13 April.

- H. 6½: ♀ in the azimuth 90 0 [H. … ♀ in Azimutho]
- Alt. 32 25

According to the Copernican distance of ♀ from the Earth, which is 426. [Juxta Copernianam ♀ a terra diſtan- / tiam quæ eſt 426.]

- AB 34 5 30
- AC 57 35 0
- BC 63 38 39
- DCE 38 43
- CDE 51 17
- DC 0 6 49
- CE 0 5 19
- apparent declin. of ♀ 26 21 21 [declin. ♀ viſa]
- Parall. declin. 5 19
- true declin. of ♀ 26 26 40 [declin. ♀ vera]

[681] One short rule stands over the value file under 1 27.

[682] Here the time 8 53′ carries a minute mark; the left column sets the same time bare, H. 8 53. The value 45 37 stands on a line of its own under meridionale Cap. ♊. Alt. ♀ and the letter-groups DC, DE, CE are set in. 12′27″ is set close, with a minute mark and a second mark. One short rule stands over the value file under 7 14.

[683] The value 51 38 31 stands on a line of its own under diff. Aſc. R. ♀ & merid. Cap. ♊. Two short rules stand over the value file: under 10 8, and under the second 58 12 53. Declin. has a capital on the first line of this group.

And this can agree with all the observations of this day. For although ♀ is moving direct in ♊, its latitude is nevertheless descending. [Atque hæc omnibus obſervationibus / hujus diei congruere poteſt. Nam licet / ♀ directe procedat in ♊, tamen Lati- / tudo ejus eſt deſcendens.]

- H. 3½: ♀ from ⊙ 31 43 [H. … ♀ a ⊙]
- Parall. of ⊙ [Parall. ⊙]
- Long. 1 59
- latitude 1 39 [Latit.]
- true Long. of ⊙ 3 2 13 ♉ [Long. ⊙ vera]
- Parall. Long. 1 59
- apparent Long. of ⊙ 3 0 14 ♉ [Long. ⊙ viſa]
- apparent decl. of ⊙ 12 31 39 [decl. ⊙ viſa]
- apparent Aſc. R. of ⊙ 30 47 47 [Aſc. R. ⊙ viſa][684]

For the apparent declin. of ♀. [Pro declin. ♀ viſa.]

If ♀ is presupposed to have been in the merid. at hour 2 0′ (which perhaps does not stray far from the truth), then at H. 3½ the angle ABC will be 22 30, and the Alt. of ♀ 56 12, the true decl., of course, having already been given above. [Si præſupponatur ♀ Hora 2 0′ fuiße / in merid. (quod a vero fortaßis non / multum aberrat), / Erit H. 3½ Angulus ABC 22 30 / Et Alt. ♀ 56 12, data nimirum jam an- / tea decl. vera.][685]

Diagram. A line figure set at the left of the left column, with the lettered file standing to its right. It is a half-circle standing on a straight base line. Inside it: a straight line descending from the top of the arc, a little left of centre, down to the left; a curved line coming from the right-hand part of the arc and crossing the first line a little below the top, then running down to the base line left of centre; a straight line running from the left-hand part of the arc down to the right to the base line; and a curved line running from the crossing down to the left, to meet that straight line. The letters are drawn in a slanted, cursive-looking form unlike the roman type of the text; whether they are type cannot be told from the scan.

- A (above the arc, at the head of the straight line from the top): A
- B (on the arc at upper right, where the curved line begins): B
- D (left of the crossing, above it): D
- C (left of the crossing, below D): a small c-form; whether a capital or a lower-case form is not decided

[684] One short rule stands over the value file under 5 19. directe is set with a c–t ligature. Parall. ⊙ stands at the left of a printed curly brace which groups the two lines Long. and Latit.. The sign ♉ stands after the value, spaced, on the lines Long. ⊙ vera and Long. ⊙ viſa. One short rule stands over the value file under 1 59 of Parall. Long..

[685] The parenthesis is printed. fuiße and fortaßis are each printed with a single sharp-s sort for the double s. Hora 2 0′ carries a minute mark on the second figure only. Erit and Et begin their lines with capitals; the value 22 30 stands in the value file at the end of the Erit line.

- one letter to the right of the crossing, below it: E (a script capital, its middle arm reduced to a knot on the spine)
- DCE 22 39
- CDE 67 21
- CD 0 4 30
- DE 0 1 44
- CE 0 4 8
- true declin. of ♀ 26 26 40 [declin. ♀ vera]
- apparent declin. of ♀ 26 22 32 [declin. ♀ viſa][686]

With this given, together with the apparent declin. of ☉ and the distance of ♀ from ☉, the difference of the Aſc. R. of ♀ and ☉ is given: [Qua data una cum declin. ☉ viſa & / diſtantia ♀ a ☉ datur differentia Aſc. / R. ♀ & ☉]

- 30 24 17
- apparent Aſc. R. of ☉ 30 47 44 [Aſc. R. ☉ viſa]
- apparent Aſc. R. of ♀ 61 12 1 [Aſc. R. ♀ viſa]
- Parall. Aſc. R. 0 1 44
- H. 3½: true Aſc. R. of ♀ 61 13 45 [H. … Aſc. R. ♀ vera][687]

H. 9 0: between ♀ and the meridion. head of ♊ [H. … Inter ♀ & meridion. Caput ♊]

- 42 59

With the same time of the transit of ♀ through the meridian presupposed, namely H. 2 0, the angle ABC will be **105 0′**. [Eodem tempore tranſitus ♀ per meri- / dianum præſuppoſito nempe H. 2 0 / Erit Angulus ABC …]

- AC 76 11
- Alt. 13 49 — DCE 33 53
- CDE 56 7
- DC **0 7 50″**
- DE 0 4 22
- CE 0 6 30[688]
- Diurnal motion of ♀ 8′ [Motus diurnus ♀]
- H. 5 30 Reſp. **1 50″** [H. … Reſp.]
- H. 9 0. true Aſc. R. of ♀ 61 15 35 [H. …. Aſc. R. ♀ vera]
- Parall. Aſc. R. 4 22

[686] The letter-groups DCE to CE stand to the right of the figure. Letters cited in this passage: A, B, C in Angulus ABC; C, D, E in the letter-groups. A, B, C, D and E are drawn on the figure. One short rule stands over the value file under 26 26 40.

[687] Aſc. R. ☉ viſa is printed 30 47 47 at the foot of the left column's group and 30 47 44 here. Two short rules stand over the value file: under 30 47 44, and under 0 1 44.

[688] The value 42 59 stands on a line of its own under meridion. Caput ♊. H. 2 0 ends its line with no terminal point, and Erit begins the next line with a capital. **105 0′** carries a minute mark on the second figure only; **0 7 50″** carries a second mark on the last figure only. Alt. 13 49 stands at the left of the DCE line, level with it, with no connecting sign; the letter-groups AC to CE are set in.

- apparent Aſc. R. of ♀ 61 11 13 [Aſc. R. ♀ viſa][689]
- true declin. of ♀ 26 26 40 [declin. ♀ vera]
- Parall. declin. 0 6 30
- apparent declin. of ♀ 26 20 10 [declin. ♀ viſa]
- declin. of the head of ♊ 28 57 [declin. Cap. ♊]
- difference of the Aſc. R. of ♀ and the merid. head of ♊ [differentia Aſc. R. ♀ & merid. Cap. ♊]
- 48 46 28
- apparent Aſc. R. of ♀ 61 11 13 [Aſc. R. ♀ viſa]
- Aſc. R. of the merid. head of ♊ 109 57 41 [Aſc. R. merid. Cap. ♊][690]

On the same day, according to the Ptolemaic distance of ♀ from the Earth, which is 223. [Eodem die juxta Ptolomaicam ♀ / a terra diſtantiam quæ eſt 223.]

- H. 6½: ♀ in the azimuth 90 0, Alt. 32 25. [H. … ♀ in Azim. … Alt. ….]

The angles at C and D as in the other hypothesis. [Angulj ad C&D, ut in altera hypotheſj.]

- CD **0 13′ 0″**
- CE 0 10 9
- apparent declin. of ♀ 26 21 21 [declin. ♀ viſa]
- true declin. of ♀ 26 31 30, agreeing with the remaining observations of this day. [declin. ♀ vera … / reliquis obſeruationibus hujus diei / congruens.][691]
- H. 3½: ♀ from ☉ **31 43′** [H. … ♀ a ☉]
- Alt. of ♀ 56 20 [Alt. ♀]
- DC **0 8 33″**
- DE 0 3 17
- CE 0 7 53
- true Declin. of ♀ 26 31 30 [Declin. ♀ vera]
- apparent declin. of ♀ 26 23 37 [declin. ♀ viſa][692]

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[689] **8′** carries a minute mark; **1 50″** carries a second mark on its last figure only. H. 9 0. carries a point after 0. One short rule stands over the value file under 4 22.

[690] The value 48 46 28 stands on a line of its own under differentia Aſc. R. ♀ & merid. Cap. ♊. Two short rules stand over the value file: under 0 6 30, and under the second 61 11 13.

[691] H. 6½ ♀ in Azim. 90 0 Alt. 32 25. is a single line ending with a point. C&D is set close. **0 13′ 0″** is spaced, with a minute mark and a second mark. On the two declin. lines the values stand close after the label, not in the value file, with one short rule between them under 26 21 21. reliquis obſeruationibus hujus diei / congruens. continues the declin. ♀ vera line; the column spells obſeruationibus here with u, where the left column spells obſervationibus with v.

[692] **31 43′** carries a minute mark on its second figure; the left column sets the same entry bare, 31 43. **0 8 33″** carries a second mark on its last figure only. The letter-groups DC, DE and CE are set in under Alt. ♀. One short rule stands over the value file under 26 31 30. Declin. has a capital.

• apparent declination of ☉ 12 31 40 [declin. ☉ viſa]

From which results the difference of the Aſc. R. of ♀ and ☉ [Unde provenit differentia Aſc. R. ♀ & ☉]

• 30 23 49
• apparent Aſc. R. of ☉ 30 47 44 [☉ Aſc. R. viſa]
• apparent Aſc. R. of ♀ 61 11 33 [Aſc. R. ♀ viſa]
• parallax 3 17 [Parall.]
• true Aſc. R. of ♀ 61 14 50 [Aſc. R. ♀ vera]

for hour 3½. [ad Horam 3½.]

• H. 9 0: ♀ from the merid. Cap. ♊ 42 59 [H. … ♀ a merid. Cap. ♊]
• DC 0 14 58
• DE 0 8 20
• CE 0 12 26[693]
• true Aſc. R. of ♀ 61 16 40 [Aſc. R. ♀ vera]
• parallax of Aſc. R. 8 20 [Parall. Aſc. R.]
• apparent Aſc. R. of ♀ 61 8 20 [Aſc. R. ♀ viſa]
• true declination of ♀ 26 31 30 [declin. ♀ vera]
• parallax of declination 12 26 [Parall. declin.]
• apparent declination of ♀ 26 19 4 [declin. ♀ viſa]
• declination of Cap. ♊ 28 57 [declin. Cap. ♊]

From these results the difference of the Aſc. R. of ♀ and inf. Cap. ♊ [Ex quibus provenit differentia Aſc. R. / ♀ & inf. Cap. ♊]

• 48 46 10
• apparent Aſc. R. of ♀ 61 8 20 [Aſc. R. ♀ viſa]
• Aſcen. R. of mer. Cap. ♊ 109 54 30 [Aſcen. R. mer. Cap. ♊][694]

AD ELEVATIONEM / Æquatoris 34° 9′ 50″. — For the elevation of the equator **34° 9′ 50″**.

DIE 25 FEBRUARIJ. — 25 February.

• H. **4 45′**: ♀ from ☉ 46 10 [H. … ♀ a ☉]
• parallax of ☉ [Parall. ☉]
• Long. **2′22″**
• Latit. 1 45
• true Long. of ☉ 16 42 40 ♓ [Long. ☉ vera]

[693] The sentence **Unde provenit differentia Aſc. R. ♀ & ☉** is set close, with narrow word spaces. The value 30 23 49 stands on a line of its own. **☉ Aſc. R. viſa** sets the sign before the label. Parall. stands alone as a label. **ad Horam 3½.** stands on a line of its own under the **Aſc. R. ♀ vera** line, carries no value and ends with a point. In H. 9 0 a wide gap stands between 9 and 0, where a single-figure value is aligned in a two-figure place. The letter-groups DC, DE and CE are set in under the H. 9 0 line. Two short rules stand over the value file: under 30 47 44, and under 61 11 33.

[694] The value 48 46 10 stands at the end of the second line of the sentence, after **inf. Cap. ♊**. The sentence names **inf. Cap. ♊**; the result line names **mer. Cap. ♊**, and the left column **merid. Cap. ♊**; the setting does not say whether one star is meant. **Aſcen.** is set on the last line where every other line of the side sets **Aſc.**. Three short rules stand over the value file: under 8 20 of **Parall. Aſc. R.**, under 12 26, and under the second 61 8 20.

- parallax of Long. 2 22 [Parall. Long.]
- apparent Long. of ☉ 16 40 18 [Long. ☉ viſa]
- apparent declination of ☉ 5°17′27″ [declin. ☉ viſa]
- apparent Aſc. R. of ☉ 347 45 0 [Aſc. R. ☉ viſa][695]

For the place of ♀ [Pro Loco ♀]

According to the hypothesis of Copernicus. [Juxta Copernici hypotheſin.]

26 February, H. 2 50′ [Die 26. Feb. H. 2 50′]

- apparent merid. Alt. of ♀ 49 26 [Alt. ♀ merid. viſa]
- parallax of Alt. 2 45 [Parall. Alt.]
- true merid. Alt. of ♀ 49 28 45 [Alt. ♀ merid. vera]
- 34 9 50
- true declination of ♀ 15 18 55 [declin. ♀ vera]

Hence, since the declination varies by 29′ in one day, subtract for hours 22 5′.26′40″, so that it is for day 25, H. 4¾. [Hinc cum declinatio uno die 29′ variet / ſubtrahe pro Horis 22 5′.26′40″. Ut ſit / Die 25 H. 4¾.]

- true declination of ♀ 14 52 15 [Declin. ♀ vera]
- parallax of declination 2 50 [Parall. decl.]
- apparent declination of ♀ 14 49 25 [declin. ♀ viſa]
- apparent declination of ☉ 5 17½ [Declin. ☉ viſa]
- diſtant. of ♀ and ☉ 46 10 [diſtant. ♀ & ☉]

From which results the difference of the Aſc. R. of ♀ and ☉ [Unde provenit differentia Aſc. R. ♀ & ☉]

- 41 55 40
- Aſc. R. of ☉ 347 45 0 [Aſc. R. ☉]
- apparent Aſc. R. of ♀ 29 40 40 [Aſc. R. ♀ viſa]
- parallax of Aſc. R. 1 10 [Parall. Aſc. R.]

[695] The heading AD ELEVATIONEM / Æquatoris 34° 9′ 50″. runs across both columns; its value is spaced, with a degree mark, a minute mark and a second mark, and ends with a point. The rubric DIE 25 FEBRUARIJ. is centred in the left column, in roman capitals, with IJ and a terminal point. 45′ carries a minute mark on the time. 2′22″ is set close, with a minute mark and a second mark. Parall. ☉ stands at the left of a printed curly brace which groups the two lines Long. and Latit.. The sign ♓ stands after the value, spaced, on the Long. ☉ vera line only; the Long. ☉ viſa line carries no sign. 5°17′27″ is set close, with a degree mark, a minute mark and a second mark. One short rule stands over the value file under 2 22 of Parall. Long..

• H. 4¾: true Aſc. R. of ♀ 29 41 50 [H. … Aſc. R. ♀ vera][696]

For this elevation of the equator I computed no parallaxes of ♀, but I also used here those that had been found at the other elevation. [Ad hanc Elevationem Æquatoris nul- / las parallaxes ♀ ſupputavi, ſed ijs quæ / in altera Elevatione inventæ fuerunt, / etiam hîc uſus ſum.]

• H. 7 2′: ♀ and Aldeb. 31°55′ [H. … ♀ & Aldeb.]
• diurnal motion of ♀ 59 [Motus diurnus ♀]
• H. 2 17 Reſp. in the zodiac 5′37″ [H. … Reſp. in Zodiaco]
• in the equator 5 24 [in Æquatore]
• true Aſc. R. of ♀ 29 47 14 [Aſc. R. ♀ vera]
• parallax of Aſc. R. 2 7 [Parall. Aſc. R.]
• apparent Aſc. R. of ♀ 29 45 7 [Aſc. R. ♀ viſa][697]
• true declination of ♀ 14 55 [Declin. ♀ vera]
• parallax of declination 0 3 [Parall. declin.]
• apparent declination of ♀ 14 52 [declin. ♀ viſa]
• declination of Aldeb. 15 32 [declin. Aldeb.]

Hence the difference of the Aſc. R. of ♀ and Aldeb. is given [Hinc datur differentia Aſc. R. ♀ & Al- / deb.]

• 33 5 58
• apparent Aſc. R. of ♀ 29 45 7 [Aſc. R. ♀ viſa]
• Aſc. R. of Aldebaran [Aldeboræ] 62 51 5 [Aſc. R. Aldeboræ][698]
• H. 8 4′: ♀ and Aldeb. 31 52′ [H. … ♀ & Aldeb.]
• H. 3 19 Reſp. in the equator 7 53″ [H. … Reſp. in Æquat.]
• true Aſc. R. of ♀ 29 49 43 [Aſc. R. ♀ vera]
• parallax of Aſc. R. 2 18 [Parall. Aſc. R.]
• apparent Aſc. R. of ♀ 29 47 25 [Aſc. R. ♀ viſa]
• true declination of ♀ 14 56 15 [Declin. ♀ vera]
• parallax of declination 3 15 [Parall. declin.]

[696] Pro Loco ♀ and Juxta Copernici hypotheſin. are centred lines. Die 26. Feb. H. 2 50′ sets a point after 26 and after Feb., and a minute mark on the time; it carries no value. The line 34 9 50 carries a value with no label; the same figures stand in the heading as 34° 9′ 50″, there with marks, here bare. In ſubtrahe pro Horis 22 5′.26′40″. the group is set as printed: 5′ with a minute mark, a point, then 26′40″ close with a minute mark and a second mark, then a point. Ut ſit ends its line with a capital U, and the centred line Die 25 H. 4¾. completes the sentence. declin. ⊙ viſa is printed 5°17′27″ above and Declin. ⊙ viſa 5 17½ here. ♀ a ⊙ 46 10 and diſtant. ♀ & ⊙ 46 10 agree. The value 41 55 40 stands on a line of its own. H. 4¾ is printed twice in this column, once in the centred line and once at the column foot. Five short rules stand over the value file in this stretch of the column: under 2 45, under 34 9 50, under 2 50, under the second 347 45 0, and under 1 10.

[697] hîc carries a circumflex. 2′ carries a minute mark on the time. 31°55′ is set close, with a degree mark and a minute mark. 59 carries no mark. H. 2 17 is bare. 5′37″ is set close, with a minute mark and a second mark. One short rule stands over the value file under 2 7.

[698] the value 33 5 58 stands on the second line, after deb.. Parall. declin. 0 3 sets 0 in the place where the other Parall. lines of the column set nothing. Two short rules stand over the value file: under 0 3, and under the second 29 45 7.

- apparent declination of ♀ 14 53 0 [declin. ♀ viſa][699]
- declin. of Aldeb. 15 32 [declin. Aldeb.]

From these results the difference of the right ascension of ♀ and Aldeb. [Ex quibus provenit differentia Aſ. R. / ♀ & Aldeb.]

- 33 2 57
- right ascension of ♀ 29 47 25 [Aſc. R. ♀]
- right ascension of Aldeb. 62 50 22 [Aſc. R. Aldeb.][700]

According to the hypothesis of Ptolemy. [Juxta Ptolomai hypotheſin.]

- H. 4¾ true declin. of ♀ 14 54 45 [H. … declin. ♀ vera]
- Parall. declin. 5 15
- apparent declin. of ♀ 14 49 30 [declin. ♀ viſa]
- apparent Declin. of ☉ 5 17½ [Declin. ☉ viſa]
- distance of ♀ and ☉ 46 10 [Diſtantia ♀ & ☉]
- difference of the right ascension of ♀ and ☉ [differentia Aſcenſionis Rectæ ♀ & ☉]
- 41 55 40
- right ascension of ☉ 347 45 0 [Aſc. R. ☉]
- apparent right ascension of ♀ 29 40 40 [Aſc. R. ♀ viſa]
- Parall. ad. 2 35
- H. 4¾ true right ascension of ♀ 29 43 15 [H. … Aſc. R. ♀ vera][701]
- H. 7 2′: between ♀ and Aldeb. 31 55 [H. … Inter ♀ & Aldeb.]
- true right ascension of ♀ 29 48 40 [Aſc. R. ♀ vera]
- Parall. of right ascension 4 2 [Parall. Aſc. R.]
- apparent right ascension of ♀ 29 44 38 [Aſc. R. ♀ viſa][702]
- true declin. of ♀ 14 57 30 [declin. ♀ vera]
- Parall. declin. 5 55
- apparent declin. of ♀ 14 51 35 [declin. ♀ viſa]
- declin. of Aldeb. 15 32 [declin. Aldeb.]

From this results the difference of the right ascension of ♀ and Aldeb. [Provenit hinc differentia Aſc. R. ♀ & / Aldeb.]

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[699] 4′ carries a minute mark on the time; 31 52′ carries a minute mark on its last figure only; 7 53″ carries a second mark on its last figure only; H. 3 19 is bare. A small dark speck stands after vera on the Declin. ♀ vera 14 56 15 line; it is not read as a sort. One short rule stands under 2 18, and one under 3 15.

[700] The sentence sets Aſ. R., two sorts before the point, where every other instance on the side sets Aſc.. The value 33 2 57 stands at the end of the second line of the sentence, after Aldeb.. One short rule stands over the value file under 29 47 25.

[701] Ptolomai is printed without a diphthong. Diſtantia has a capital. Rectæ is set with a c–t ligature. The value 41 55 40 stands on a line of its own under differentia Aſcenſionis Rectæ ♀ & ☉. Parall. ad. is printed so, a and d before the point, on the line where the other groups of the side set Parall. Aſc. R.. No rule stands between Parall. ad. 2 35 and H. 4¾ Aſc. R. ♀ vera 29 43 15. Two short rules stand over the value file: under 5 15, and under 347 45 0.

[702] 2′ carries a minute mark on the time; 31 55 is bare. One short rule stands over the value file under 4 2.

- 33 5 55
- right ascension of ♀ 29 44 38 [Aſc. R. ♀]
- right ascension of Aldebaran [Aldeboræ] 62 50 33 [Aſc. R. Aldeboræ][703]
- H. 8 4′: between ♀ and Aldebaran 31 52 [H. … Inter ♀ & Aldeboram]
- true right ascension of ♀ 29 51 8 [Aſc. R. ♀ vera]
- Parall. of right ascension 4 25 [Parall. Aſc. R.]
- apparent right ascension of ♀ 29 46 43 [Aſc. R. ♀ viſa][704]
- true Decl. of ♀ 14 58 45 [Decl. ♀ vera]
- Parall. declin. 0 6 12
- apparent Declin. of ♀ 14 52 33 [Declin. ♀ viſa][705]
- Declin. of Aldeb. 15 32 [Declin. Aldeb.]

From which results the difference of the right ascension of ♀ and Aldeb. [Unde provenit differentia Aſc. R. ♀ et / Aldeb.]

- 33 2 54
- apparent right ascension of ♀ 29 46 43 [Aſc. R. ♀ viſa]
- right ascension of Aldebaran 62 49 37[1] [Aſc. R. Aldeboræ][706]

ASCENSIONES RECTÆ STELLARUM INVENTÆ SINGULIS / DIEBUS JUXTA UTRAMQUE HYPOTHESIN / COPERNIANAM & PTOLOMAICAM. — The right ascensions of the stars found on the individual days according to both hypotheses, the Copernican and the Ptolemaic.

For the altitude of the equator 34 5 30. [Ad Altitudinem Æquatoris 34 5 30.]

DIE 25 FEBRUARIJ. — 25 February.

Aldebaran. [Aldeboram.]

- H. 7 2 according to Copernicus 63 0 43 according to Ptolemy 63 0 39 [H. 7 2 juxta Co- 63 0 43 juxtaPto- 63 0 39]
- H. 8 4 63 0 0 62 59 44 [H. 8 4 pernicum 63 0 0 lomæum 62 59 44][707]

DIE 26 FEBRUARIJ. — 26 February.

Aldebaran. [Aldeboram.]

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[703] The value 33 5 55 stands on the second line of the sentence, after Aldeb.. Two short rules stand over the value file: under 5 55, and under 29 44 38.

[704] H.8 4′Inter is set close: no space after H. and none between the minute mark and Inter; ♀ &Aldeboram is likewise set close. 4′ carries a minute mark on the time; 31 52 is bare. One short rule stands over the value file under 4 25.

[705] One short rule stands over the value file under 0 6 12.

[706] This sentence sets et where the other sentences of the side set &. The value 33 2 54 stands on the second line of the sentence, after Aldeb.. A raised 1 stands after 62 49 37; it calls the footnote at the foot of the side. One short rule stands over the value file under the second 29 46 43.

[707] The heading runs across both columns in three centred lines of roman capitals and ends with a point; JUXTA UTRAMQUE has a wide space. Ad Altitudinem Æquatoris 34 5 30. is a centred line; its value is bare and ends with a point. The two small-type labels juxta Co- / pernicum and juxtaPto- / lomæum are each divided across the two value lines, the first standing between the time and the first value, the second between the two values. juxtaPto- is set close. In H. 7 2 and H. 8 4 a wide gap stands between the hour and the minute, where a single-figure value is aligned in a two-figure place.

• H. 7 5 63 0 40 62 59 10
• H. 8 7 63 1 28 62 59 44

DIE 5 MARTIJ. — 5 March.

Aldebaran. [Aldeboram.]
• H. 7 0 62 59 55 **62 57 50″**[708]

The heel of the foot of ♊. [Calx pedis ♊.]
• H. 7 8 89 24 50 89 22 37

Extr. of the foot of ♊ [Extr. pedis ♊]
• H. 7 15 87 24 0 87 21 50

DIE 9 MARTIJ. — 9 March.

Aldebaran. [Aldeboram.]
• H. 7 15 63 1 40 62 59 53

The heel of the foot of ♊. [Calx pedis ♊.]
• H. 7 35 89 24 26 89 22 21

Extr. of the foot of ♊. [Extr. ped. ♊.]
• H. 7 50 87 25 14 87 23 5[709]

[1] We have omitted the remaining computations from the observations of the days 26 February, 5 March, 9 March and 13 April. [Reliquas ſupputationes ex obſeruationibus dierum 26 Feb., 5 Martii, 9 Martii, 13 Aprilis omiſimus.][710]

According to Copern. — according to Ptol. [juxta Copern. juxta Ptol.]

DIE 15 MARTIJ. — 15 March.

The heel of the foot of ♊. [Calx pedis ♊.]
• H. 8 37 89 23 53 89 21 21

Extre. of the foot of ♊. [Extre. ped. ♊.]
• H. 8 42 87 24 3 87 21 33

DIE 20 MARTIJ. — 20 March.

Merid. Cap. ♊.
• H. 7 55 109 54 17 109 51 2

The heel of the foot of ♊. [Calx pedis ♊.]
• H. 8 11 89 24 50 89 21 45

Extr. of the foot of ♊. [Extr. pedis ♊.]
• H. 8 32 87 25 12 87 22 5

DIE 22 MARTIJ. — 22 March.

Merid. cap. ♊.
• H. 8 2 109 54 26 109 51 2

The northern horn of ♉. [Boreale cornu ♉.]

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[708] **62 57 50″** carries a second mark on its last figure only; every other value in this band is bare.

[709] Calx pedis ♊. stands at the head of the right column with no date above it in this column; the setting names no day for it or for Extr. pedis ♊. Extr. pedis ♊ carries no terminal point; Calx pedis ♊. (twice) and Extr. ped. ♊. end with a point. H. 7 8 has a wide gap between hour and minute.

[710] The footnote is the editor's, set in a smaller roman across the full measure. The note spells Martii with ii, where the rubrics of the side print MARTIJ; obſeruationibus is spelled with u.

• H. 8 37 74 57 45 74 54 19

DIE 28 MARTIJ. — 28 March.

Merid. Cap. ♑.

• H. 8 27 109 53 31 109 49 42

DIE 3 APRIL. — 3 April.

Merid. Cap. ♑.

• H. 8 53 109 56 2 109 51 24

• 55½

DIE 13 APRIL. — 13 April.

Merid. Cap. ♑

• H. 9 0 109 57 41 109 54 30

) Note: the observations of the days 3 and 13 are not to be trusted too much, because Venus was then sinking low. *[) nota obſeruationibus diej 3 & 13 non nimis fidendum eſt quia Venus tunc eßet decliuis.*][711]

For the elevation of the equator 34 9 50. [Ad Elevationem Æquatoris 34 9 50.]

According to Copern. — according to Ptolo. [juxtaCopern. juxtaPtolo.]

DIE 25 FEBRUARIJ. — 25 February.

Aldebaran. [Aldeboram.]

• H. 7 2 62 51 5 62 50 33

• H. 8 4 62 50 22 62 49 37

DIE 26 FEBRUARIJ. — 26 February.

Aldebaran. [Aldeboram.]

• H. 7 5 62 50 45 62 49 18

• H. 8 7 62 51 32 62 49 52

DIE 5 MARTIJ. — 5 March.

Aldebaran. [Aldeboram.]

• H. 7 0 62 48 30 62 46 24

The heel of the foot of ♑. [Calx pedis ♑.]

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[711] The side opens on the line juxta Copern. juxta Ptol., which stands over the two value files of the left column; no heading, altitude or elevation stands above it on this side. The object is set **Extre. ped. ♑.** on 15 March and **Extr. pedis ♑.** on 20 March; **Merid. Cap. ♑.** sets a capital C on 20 March, 28 March and 3 April and a lower-case c on 22 March; **Merid. Cap. ♑** on 13 April carries no terminal point, where every other object line of the column ends with one. The rubrics set APRIL. with a point, and MARTIJ. with IJ. The line **55½** stands alone under the 53 of H. 8 53, in the minutes place of the time file, with nothing else on its line; the setting does not say what it stands for. In H. 8 2 and H. 9 0 a wide gap stands between the hour and the minute, where a single-figure value is aligned in a two-figure place; the same alignment stands in 87 24 3, 109 51 2 (twice), 87 22 5 and 109 56 2. A printed closing curly brace stands at the right of the column from the DIE 3 APRIL. line down to the H. 9 0 109 57 41 109 54 30 line; an asterisk stands at its point, and *) — an asterisk and a printed closing parenthesis — opens the italic note, which names the days 3 and 13. The note is set in italic at body size inside the column. obſeruationibus and decliuis are spelled with u, diej ends in j, eßet sets ß. Venus is printed as a word, not a sign.

• H. 7 8 89 12 25 89 10 14
Extre. of the foot of ♊. [Extre. ped. ♊.]
• H. 7 15 87 11 40 87 9 26
DIE 9 MARTIJ. — 9 March.
Aldebaran. [Aldeboram.]
• H. 7 15 62 50 46 62 49 1
The heel of the foot of ♊. [Calx ped. ♊.]
• H. 7 35 89 12 37 89 10 33
Extr. of the foot of ♊. [Extr. ped. ♊.]
• H. 7 50 87 13 25 87 11 21
DIE 13 APRIL. — 13 April.
Merid. Cap. ♊.
• H. 9 0 109 45 19 109 42 6[712]
LIMITATIO ET RECTIFICATIO ANTECEDENTIUM / OB REFRACTIONEM SOLAREM. — The limitation and rectification of the foregoing on account of solar refraction.

In the year 1584, from meridian observations of ☉, the place of ☉ being presupposed from our latest restitution, the solar rays were found to have been refracted under the elevation of the equator **34 5½**: [Anno 1584 ex obſervationibus Meridi- / anis ☉, præſuppoſito loco ☉ ex po- / ſtrema noſtra reſtitutione, ſub Eleva- / tione Æquatoris 34 5½ deprehenſj ſunt / radij ſolares refractj fuiße.]

At an altitude of Part. 21. [In altitudine Part. 21.]
• as to altitude **3′ 2″** [Quo ad Altitud.]
• as to Longitud. 2 10 [Quo ad Longitud.]
• as to Latitud. 2 6 [Quo ad Latitud.]

At an altitude of Part. 23. [In altitudine Part. 23.]
• refraction [Refractio]
• altitude **2′41″** [Altitud.]
• Longitud. 2 1
• Latitud. 1 46[713]

At an altitude of Part. **29½**. [In altitudine Part. 29½.]
• refraction [Refractio]
• altitude **1′11″** [Altitud.]

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[712] **Ad Elevationem Æquatoris 34 9 50.** heads the right column; its value is bare and ends with a point. The labels `juxtaCopern.` and `juxtaPtolo.` are each set close, with no space after `juxta`; the right column prints `Ptolo.` where the left prints `Ptol.`. **Calx ped. ♊.** on 9 March sets `ped.` where the other `Calx` lines set `pedis`. In `H. 7 2`, `H. 8 4`, `H. 7 5`, `H. 8 7`, `H. 7 0`, `H. 7 8` and `H. 9 0` a wide gap stands between the hour and the minute; the same alignment stands in `62 51 5`, `87 9 26`, `62 49 1` and `109 42 6`. No brace or asterisk stands in this column.

[713] **34 5½** is bare, with a wide gap between 34 and **5½**. **3′ 2″** is spaced, **2′41″** set close; each carries a minute mark and a second mark, both set as small raised curved sorts. `2 6` has a wide gap where a single figure is aligned in a two-figure place. `Refractio` sets a c–t ligature and stands at the left of a printed opening curly brace which groups the three lines `Altitud.`, `Longitud.`, `Latitud.`.

- Longitud. 0 49
- Latitud. 0 51

Now, with these things presupposed, we must see how, from the established places of certain fixed stars observed from ☿ in the year 1582 — taking account of the refraction of the solar rays at the time when ☿ was observed from ☉ — the place of Spica [Spicæ] ♍ can be correctly established; this will be done in the following way. [Jam vero his præſuppoſitis videndum / eſt quomodo ex conſtitutis locis qua- / rundam fixarum a ☿, Anno 1582 ob- / ſervatarum, habita ratione refracti- / onis radiorum ſolarium, tum cum ☿ a / ☉ obſervaretur, Locus Spicæ ♍ recte / conſtitui poßit, id quod fiet in hunc / modum.][714]

On 5 March the right ascension of the heel of ♊ was found to be **89 24′50″**, while its declination was 22 38 0. Therefore the longitude falls in 29 27 44 ♊, the latitude being 0 52 52 M. The distance of the heel of ♊ from Spica ♍, however, was observed as **108ᴾ28′ 5″**. Therefore the difference of longitude: [Die 5 Martij Inventa eſt Aſc. R. Cal- / cis ♊ 89 24′50″ / declınatio vero fuit 22 38 0 / Ergo Long. incidit in 29 27 44 ♊ / Latitudine exiſtente 0 52 52 M. / Diſtantia autem Calcis ♊ a Spica ♍ ob- / ſervata eſt 108ᴾ28′ 5″ / Ergo differentia Longitud.]

- 108 30 55

On the day already mentioned, at the time when ☿ was being observed from ☉, ☉ had an altitude of about Part. 22. It is therefore credible that its refraction in longitude was **2′ 6″**, and so we shall gather the place of Spica ♍ as follows: [Prædicto die, quo tempore ☿ a ☉ ob- / ſervabatur, ☉ habuit Altitudinem cir- / citer Part. 22. Unde refractionem ejus, / ſecundum Longitudinem fuiße 2′ 6″ / eſt credibile, ideoque ſic colligemus / Spicæ ♍ Locum,]

- longitude of the heel of ♊ 29 27 44 ♊ [Longit. Calcis ♊]
- difference of longitude of the heel and Spica [differentia Longit. Cal. & Spicæ]
- 108 30 55
- refraction of the rays of ☉ 0 2 6 [Refractio radiorum ☉]
- longitude of Spica 18 0 45 ♎ [Longit. Spicæ][715]

DIE 20 MARTIJ — 20 March.

The right ascension of the heel of ♊ was found to be 89 24 50, the declination being the same; therefore both the longitude and the latitude remain

[714] **1′11″** is set close, with a minute mark and a second mark. Refractio stands at the left of a printed opening curly brace grouping Altitud., Longitud., Latitud.. refracti- and recte set a c-t ligature; poßit sets ß.

[715] declınatio shows no dot on its ı on the scan. **89 24′50″** sets a minute mark and a second mark, with **24′50″** close. **108ᴾ28′ 5″** sets a small raised P after 108, then a minute mark and a second mark, with a wide gap before **5″**. 22 38 0 has a wide gap before 0. **2′ 6″** is spaced, with a minute mark and a second mark. The value 108 30 55 stands on a line of its own twice, once after Ergo differentia Longitud. and once after differentia Longit. Cal. & Spicæ. One short rule stands over the value file under 0 2 6. The sign ♎ stands after 18 0 45, spaced.

the same. But since ☉, when the observation was made that day, had an altitude of about Part. 29, the refraction of its rays will be somewhat less than before, namely [inventa eſt Aſc. R. Calcis ♊ 89 24 50 / declinatione exiſtente eadem, quare / & Long. & Latitudo manet eadem. / Sed cum ☉ eo die facta obſeruatione / haberet Altitudinem circiter Part. 29 / erit refractio radiorum ejus aliquan- / tum minor, quam ante, nimirum]

- **0′49″**

so that the difference of refraction is 1 17. Therefore the longitude of Spica too is found smaller by that much, in **17ᴾ59′28″** ♎. [ut ſit differentia refractionis 1 17 / Quare et Spicæ longitudo tanto minor / inuenitur in 17ᴾ59′28″♎][716]

But on the same day the right ascension of the Mer. head of ♊ was also found to be 109 54 17, its declination being 28 57 north. Hence its longitude **17 27½** ♋, and the latitude 6 38 5 north. The distance of Spica from the same head of ♊ was observed as **90°46′35″**; the difference of longitude computed from this is [Sed & eodem die deprehenſa eſt Aſc. / R. Mer. Cap. ♊ 109 54 17 / declin. exiſtente 28 57bor. / Unde ejus Longit. 17 27½ ♋ / Et Latitudo 6 38 5bor. / diſtantia autem Spicæ ab eodem Ca- / pite ♊ obſervata eſt 90°46′35″ / differentia long. hinc ſupputata eſt]

- 90 32 35

Therefore the longitude of Spica will be given in this way: [Ergo dabitur Long. Spicæ hoc modo.]

- longitude of Hercules [Herculis] 17 27 30 ♋ [Longit. Herculis][717]
- difference of longitude from Spica 90 32 35 [differentia Long. a Spica]
- refraction of the rays of ☉ 0 50 [Refractio radiorum ☉]
- longitude of Spica ♍ 18 0 55 ♎ [Long. Spicæ ♍][718]

From these longitudes of Spica, found in this way, the one does not differ much which was found from the given greatest declination of the ecliptic **23° 31′** and the given latitude of Spica **1°59½** mer., and likewise its declination, mer. 8 56, such as it was in the year 1582, and which falls in **18ᴾ 1′43″** ♎, as the doctrine of triangles supplies it to us by the aid of calculation. But if the latitude of Spica ♍ is presupposed as Part. **2 0′**, the remaining givens staying as before, its place falls in **18 0′31″** ♎. [Ab hiſce longitudinibus Spicæ ſic in- /

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[716] The rubric DIE 20 MARTIJ is centred and carries no terminal point, where every other DIE rubric of the opening ends with one. inventaeſtAſc.R.Calcis is set close, with no word spaces. 0′49″ stands on a line of its own and is set close, with a minute mark and a second mark; 1 17 is bare. 17ᴾ59′28″♎ sets a small raised P, a minute mark and a second mark, and the sign ♎ close after the second mark. This sentence sets et where the column sets & elsewhere. obſeruatione and inuenitur are spelled with u.

[717] "Hercules" here is an old name for the following (southern) head of Gemini, Pollux, from the tradition that the Twins are Apollo and Hercules; it is not the constellation Hercules.

[718] bor. is set in a smaller roman, close after the value, in 28 57bor. and 6 38 5bor.; 6 38 5bor. has a wide gap before 5. 90°46′35″ sets a degree mark, a minute mark and a second mark. The value 90 32 35 stands on a line of its own after differentia long. hinc ſupputata eſt, and again on the differentia Long. a Spica line. One short rule stands over the value file under 0 50. The sign ♎ stands after 18 0 55, spaced.

ventis non multum diſcrepat ea, quæ, / ex data declin. maxima Eclipticæ 23° / 31′, & data Latitudine Spicæ 1°59½ mer. / item declin. ejuſdem, mer. 8 56 qua- / lis fuit Anno 1582 inventa eſt, quæ in- / cidit in 18ᴾ 1′43″♎ / Prout doctrina triangulorum nobis / Calculi beneficio ſuppeditat. Verum / ſi præſupponatur latitudo Spicæ ♍ / Part. 2 0′ manentibus reliquis datis / ut ante incidit locus ejus in 18 0′31″♎.]

And this, in the year 1582. [Atque hoc, Anno 1582.]

Let us therefore use, for this year 1582: [*Utamur itaque hoc anno 1582*]

- *longitude of Spica* 18 1 [*Longitudine ſpicæ*]
- *latitude* 2 0 [*Latitudine*]

without any sensible error; and its right ascension was 195 50, [*abſque omnj ſenſibili errore, eratque / ipſius aſc. recta 195 50*]

- *declination* 8 56 [*Declinatio*][719]

PRO ASCENSIONE R. ♀ EX DISTANTIA EIUS A ☉ ET ITEM / PRO FIXARUM QUARUNDAM ASC. R. EX EARUM A ♀ / DISTANTIA UT SEQUITUR. — For the right ascension of ♀ from its distance from ☉, and likewise for the right ascension of certain fixed stars from their distance from ♀, as follows.

DIE 27 FEBRUARIJ. — 27 February.

- declination of ♀ Merid. 15 48 [Declinatio ♀ Merid.]
- diurnal motion of declination 23 [Motus declin. diurnus]

For the right ascension of ♀ [Pro Aſcen. R. ♀]

- time of observation H. 4 M. 4 [Tempus obſ. H. 4 M. 4]
- declination of ♀ 15 49 [Declinatio ♀]
- apparent declination of ☉ 4 29 42 [Declinatio ☉ viſa]
- right ascension of ☉ 349 38 [Aſc. R. ☉][720]
- distance of ♀ and ☉ 46 10 [Diſtantia ♀ et ☉]
- angle of distance 41 54 [Angulus diſtant.]
- right ascension of ♀ 31 32 [Aſc. R. ♀]
- longitude of ♀ 4 49 ♉ [Longitudo ♀]

[719] The group **23° / 31′** is divided at a line end: **23°** with a degree mark ends one line, and **31′** with a minute mark, followed by a comma, begins the next. **1°59½** sets a degree mark and no minute mark. `mer.` stands after **1°59½** and before `8 56`. **18ᴾ 1′43″♎** sets a small raised `P`, a gap, then **1′43″** close and the sign ♎ close after the second mark. **Part. 2 0′** sets a wide gap and a minute mark on the `0` only. **18 0′31″♎.** sets a minute mark and a second mark with no degree mark, and a point after the sign. `doctrina` and `recta` set a c-t ligature. `Atque hoc, Anno 1582.` is a centred line. The last six lines of the column are set in italic; within them **ſpicæ** has a lower-case long **ſ**, `omnj` ends in `j`, and **aſc.** is lower-case.

[720] The heading runs across both columns in three centred lines of roman capitals, the first line in a larger size than the other two; it prints `EIUS` with `I`, `ASC. R.`, and the signs ♀ (twice) and ☉ (once); it ends with a point. The rubric `DIE 27 FEBRUARIJ.` is centred in the left column, with `IJ` and a terminal point. **Pro Aſcen. R. ♀** is a centred line with no terminal mark. The time `H. 4 M. 4` is given by the order-words `H.` and `M.`; no mark stands in it. `23` stands alone as the diurnal motion, with no mark. In **Declinatio ♀**, **Declinatio ☉ viſa** and **Aſc. R. ☉** the signs are set in a file of their own, apart from the labels.

• latitude 2 51 north [Latitudo … Borea]

For the right ascension of Aldebaran [Aldeboræ]. [Pro Aſcenſione R. Aldeboræ.]

• time of observation H. 6 M. 23 [Tempus obſeruationis H. 6 M. 23]
• longitude of ♀ 4 55 ♉ [Longitudo ♀][721]
• latitude 2 51 11 [Latitudo]
• declination 15 51 20 [Declinatio]
• declination of Aldebaran 15 35 [Declinatio Aldeboræ]
• ascension R. of ♀ 31 37 [Aſcenſ. R. ♀]
• distance of ♀ and Aldebaran 30 6 [Diſtantia ♀ et Aldeb.]
• angle of distance 31 18 [Angulus diſtantiæ]
• ascension R. of Aldebaran 62 55 [Aſc. R. Aldeboræ]

II Time of observation. H. 6 M. 27. [II Tempus obſeruationis. / H. 6 M. 27.]

The longitude of ♀ the same, and the latitude, as in the preceding; the distance also the same, from which there also came out the same ascension R. of Aldebaran, 62 55. [Longitudo eadem ♀ & latitudo quæ in / ſuperiori eadem quoque diſtantia vnde / proueniebat eadem quoque aſcenſio / R. Aldeboræ 62 55]

III Time H. 8° M. 3′ 5″. [III Tempus H. 8° M. 3′ 5″.]

• longitude of ♀ 4 59 [Longitudo ♀]
• latitude of ♀ 2 51 [Latitudo ♀]
• ascension R. of ♀ 31 41 [Aſcen. R. ♀]
• declination of ♀ 15 53 [Declinatio ♀]
• declination of Aldebaran 15 35 [Declinatio Ald.]
• distance of Aldebaran and ♀ 30 0 [Diſtantia Ald. et ♀]
• angle of distance 31 12 [Angulus diſtantiæ]
• ascension R. of Aldebaran 62 53 [Aſc. R. Ald.]

IV Time H. 8 M. 6. [IV Tempus H. 8 M. 6.]

• longitude of ♀ 4 59 28 ♉ [Longitudo ♀]
• latitude of ♀ 2 51 [Latitudo ♀]
• declination 15 53 [Declinatio]
• ascension R. 31 41 [Aſc. R.]
• declination of Aldebaran 15 35 [Declinatio Aldeboræ]
• distance 30 0 [Diſtantia]
• angle 31 12 [Angulus]
• ascension R. of Aldebaran 62 53 [Aſcen. R. Aldeb.][722]

Pro Aſcenſione R. Capitis ♈. — For the ascension R. of the head of ♈.

[721] Borea is set in a smaller roman after 2 51. The sign ♉ stands after 4 49 and after 4 55, spaced. obſeruationis is spelled with u.

[722] The Roman numerals II, III and IV stand before Tempus; no line numbered I stands on this side. III Tempus H. 8° M. 3′ 5″. sets a degree mark after the hour figure 8, a minute mark after 3, a wide gap, and a second mark after 5, the order-words H. and M. standing as well.

Time of observation H. 6 M. 41. [Tempus obſeruat. H. 6 M. 41.]
- longitude of ♀ 4 56 ♉ [Longitudo ♀]
- latitude 2 51 [Latitudo]
- ascension R. 31 38 [Aſc. R.]
- declination 15 52 [Declinatio]
- declination of the head of ♈ 21 25 [Declinatio capitis ♈]
- distance of the head from ♀ 7 50 [Diſtantia capitis a ♀]
- angle of distance 5 50 [Angulus diſtantiæ]
- ascension R. of the head of ♈ 25 48 [Aſcen. R. Capitis ♈]

DIE 28 FEBRUARIJ. — 28 February.

For the ascension R. of ♀ at the time of transit through the meridian. [Pro aſcenſione R. ♀ Tempore tranſitus / per meridianum.]
- apparent declination of ☉ **4° 4′** south [Declinatio ☉ viſa … Merid.]
- ascension R. of ☉ 350 30 [Aſcenſio R. ☉]
- declination of ♀ **16° 11′** north [Declinatio ♀ … Borea.]
- distance of ♀ and ☉ 46 10 [Diſtantia ♀ et ☉]
- angle of distance 41 58 [Angulus diſtantiæ]
- ascension R. of ♀ 32 28 [Aſc. R. ♀]

For the ascension R. of Aldebaran. [Pro aſcenſione R. Aldeboræ.]
Time of observation H. 6 M. 40. [Tempus obſeruationis H. 6 M. 40.]
- declination of ♀ 16 37 [Declinatio ♀]
- declination of Aldebaran 15 35 [Declinatio Aldeboræ]
- distance 29 16 [Diſtantia]
- angle of distance 30 16 [Angulus diſtantiæ]
- ascension R. of Aldebaran 62 58 [Aſc. R. Ald.]

II Time H. 8 M. 36. [II Tempus H. 8 M. 36.]
- declination of ♀ 16 17 [Declinatio ♀]
- ascension R. of ♀ 32 41 [Aſc. R. ♀]
- distance of the observation 29 6 [Diſtantia obſeruationis]
- angle of distance 30 16 [Angulus diſtantiæ]
- ascension R. of Aldebaran 62 57 [Aſc. R. Aldeboræ]

The head of ♈. [Caput ♈.]
Time of observation H. 8 M. 51. [Tempus obſeruationis H. 8 M. 51.]
- declination of ♀ 16 17 [Declinatio ♀]
- ascension R. of ♀ 32 41 [Aſcenſ. R. ♀]
- declination of the head of ♈ 21 25 [Declinatio capitis ♈]
- observed distance 8 14 [Diſtantia obſeruata]
- angle of distance 6 48 30 [Angulus diſtantiæ]
- ascension R. of the head of ♈ 25 53 [Aſc. R. capitis ♈]

DIE 1 MARTIJ. — 1 March.

For the ascension R. of ♀. [Pro aſcenſione R. ♀.]
- southern declination of ♀ 16 34 [Declinatio ♀ Meridiana]
- diurnal motion of the declination 23 0 [Declinationis motus diurnus]

Time of observation H. 3 M. 14. [Tempus obſeruationis H. 3 M. 14.]

- declination of ♀ 16 34 [Declinatio ♀]
- apparent declination of ☉ 3 43 4 M. [declinatio ☉ viſa … M.]
- ascension R. of the apparent place of ☉ 351 26 [aſcenſ. R. viſ. loci ☉]
- distance of ♀ from ☉ 46 8 [Diſtantia ♀ a ☉]
- angle of distance 41 56 [Angulus diſtantiæ]
- ascension R. of ♀ 33 22 [Aſcenſ. R. ♀]
- longitude of ♀ 6 44 ♉ [Longitudo ♀]
- latitude 2 58 north [Latitudo … Borealis.]

DIE 5 MARTIJ. — 5 March.

For the ascension R. of ♀. [Pro aſcenſione R. ♀.]

Time of observation H. 2 30. [Tempus obſeruationis H. 2 30.]

- ☉ and ♀ were 45 59 apart [Diſtabant ☉ & ♀]
- declination of ♀ 18 10 north [Declinatio ♀ … Borea.][723]
- declination of ☉ 2 10 south [Declinatio ☉ … meri.]
- ascension R. of ☉ 355 3 35 [Aſcenſ. R. ☉]
- angle of distance 41 54 19 [Angulus diſtantiæ]
- ascension R. of ♀ 36 58 [Aſcenſ. R. ♀]
- longitude 10 30 ♉ [Longitudo]
- latitude 3 22 Bor. [Latitudo … Bor.]

For the ascension R. of Aldebaran [Aldeboræ]. [Pro aſcenſione R. Aldeboræ.]

Time of observation H. 6 54. [Tempus obſeruationis H. 6 54.]

- declination of ♀ 18 14 [Declinatio ♀]
- ascension R. of ♀ 37 7 43 [Aſcenſ. R. ♀]
- declination of Aldebaran 15 35 [Declinatio Aldeboræ]
- observed distance 24 48 [Diſtantia obſeruata]
- angle of distance 25 47 37 [Angulus diſtantiæ]
- ascension R. of Aldebaran **62° 55′ 20″** [Aſcenſ. R. Ald.]

II Time H. 7 M. 2. [II Tempus H. 7 M. 2.]

- declination of ♀ 18 14 [Declinatio ♀]
- declination of Aldebaran 15 35 [Declinatio Aldeboræ]
- ascension R. of ♀ 37 8 [Aſcenſ. R. ♀]
- observed distance 24 48 [Diſtantia obſer.]
- angle of distance 25 47 38 [Angulus diſtantiæ]
- ascension R. of Aldebaran **62 55′ 38″** [Aſcenſ. R. Ald.][724]

For the ascension R. of the heel of the foot of ♊. [Pro aſcenſione R. calcis pedis ♊.]

Time of observation H. 6 58. [Tempus obſeruationis H. 6 58.]

- declination of ♀ 18 14 [Declinatio ♀]

[723] 3 43 4 sets a third figure 4 in a file of its own, and the line below carries only M., standing under that 4. Tempus obſeruationis H. 2 30. sets the order-word H. before 2 and no M. before 30.

[724] Tempus obſeruationis H. 6 54. sets the order-word H. and no M.. **62° 55′ 20″** carries a degree mark, a minute mark and a second mark; **62 55′ 38″** carries a minute mark and a second mark and no degree mark.

- ascension R. of ♀ 37 8 [Aſcenſ. R. ♀]
- declination of the heel 22 37 [Declinatio calcis]
- observed distance 48 53 [Diſtantia obſeruata]
- angle of distance 52 12 26 [Angulus diſtantiæ]
- ascension R. of the heel of the foot of ♊ 89 20 26 [Aſcenſ. R. calcis pedis ♊]

II Time of observation H. 7 M. 7. [II Tempus obſeruationis H. 7 M. 7.]
- declination of ♀ 18 14 [Declinatio ♀]
- ascension R. of ♀ 37 8 12 [Aſcen. R. ♀]
- observed distance 48 52 30 [Diſtantia obſeruata]
- angle of distance 52 11 57 [Angulus diſtantiæ]
- ascension R. of the heel of ♊ 89 20 9 [Aſcen. R. calcis ♊]

III Time of observation H. 8 M. 3. [III Tempus obſeruationis H. 8 M. 3.]
- declination of ♀ 18 15 [Declinatio ♀]
- ascension R. of ♀ 37 10 15 [Aſcen. R. ♀]
- observed distance 48 50 [Diſtantia obſeruata]
- angle of distance 52 9 31 [Angulus diſtantiæ]
- ascension R. of the heel of ♊ 89 19 46 [Aſcenſ. R. calcis ♊]

IV Time H. 8 M. 9. [IV Tempus H. 8 M. 9.]
- declination of ♀ 18 15 [Declinatio ♀]
- ascension R. of ♀ 37 10 29 [Aſcenſio R. ♀]
- declination of the heel 22 37 [Declinatio calcis][725]
- observed distance 48 50 [Diſtantia obſeruata]
- angle of distance 52 9 27 [Angulus diſtantiæ]
- ascension R. of the heel 89 19 56 [Aſcenſ. R. calcis][726]

Further, for the ascension of Aldebaran. [Adhuc pro aſcenſione Aldeboræ.]

III Time of observation H. 8 M. 25. [III Tempus obſeruationis H. 8 M. 25.]
- declination of ♀ 18° 15′ 18″ [Declinatio ♀]
- ascension R. of ♀ 37 11 4 [Aſcenſ. R. ♀]
- observed distance 24 45 [Diſtantia obſeruata]
- angle of distance 25 44 28 [Angulus diſtantiæ]
- ascension R. of Aldebaran 62 55 32 [Aſcenſio R. Aldeboræ]

IV Time H. 8 M. 29. [IV Tempus H. 8 M. 29.]
- declination of ♀ 18 15 22 [Declinatio ♀]
- ascension R. of ♀ 37 11 13 [Aſcenſ. R. ♀]
- declination of Aldebaran 15 35 [Declinatio Aldeboræ]
- observed distance 24 45 [Diſtantia obſeruata]
- angle of distance 25 44 38 [Angulus diſtantiæ]

[725] Tempus obſeruationis H. 6 58. sets H. and no M.. Angulus dıſtantiæ under Diſtantia obſeruata 48 53 shows no dot on the i of dıſtantiæ on the scan.
[726] calcis stands here without a sign.

• ascension R. of Aldebaran 62 55 51 [Aſcenſ. R. Ald.][727]

For the ascension R. of the end of the foot of ♊ [Pro aſcenſione R. Extre. pedis ♊]

Time of observation H. 7 M. 15. [Tempus obſeruationis H. 7 M. 15.]

• declination of ☿ 18 14 15 [Declinatio ☿]
• ascension R. 37 8 30 [Aſcenſio R.]
• declination of the end of the foot 22 32 [Declinatio extremi pedis]
• distance of the observation 47 1 30 [Diſtantia obſeruationis]
• angle of distance 50 10 52 [Angulus diſtantiæ]
• ascension R. of the end of the foot 87 19 24 [Aſcen. R. extrem. pedis]

II Time H. 7 52. [II Tempus H. 7 52.]

• declination of ☿ 18 15 [Declinatio ☿]
• ascension R. of ☿ 37 9 51 [Aſcenſ. R. ☿]
• distance 47 0 [Diſtantia]
• angle of distance 50 9 37 [Angulus diſtantiæ]
• ascension R. of the end of the foot 87 19 27 [Aſcenſio R. extremæ / pedis][728]

DIE 9 MARTIJ. — 9 March.

• southern declination of ☿ 19 36 15 [Declinatio ☿ meridiana]
• diurnal motion of the declination 21 [Motus diurnus / declinationis]

For the ascension R. of ☿. [Pro aſcenſione R. ☿.]

Time of observation H. 3 M. 32. [Tempus obſeruationis H. 3 M. 32.]

• declination of ☿ 19 36 54 [Declinatio ☿]
• declination of ☉ 0 34 50 south [Declinatio ☉ … me- / rid.]
• ascension R. of ☉ 358 43 46 [Aſcenſio R. ☉]
• distance of ☿ and ☉ 45 38 30 [Diſtantıa ☿ & ☉]
• angle of distance 41 46 [Angulus diſtantiæ]
• ascension R. of ☿ 40 29 46 [Aſcenſio R. ☿][729]
• longitude of ☿ 14 7 30 ♉ [Longitudo ☿]
• latitude 3 42 north [Latitudo … Borea]

For the ascension of the eye of ♉. [Pro aſcenſione oculi ♉.]

Time of observation H. 7 M. 16. [Tempus obſeruationis H. 7 M. 16.]

• declination of ☿ 19 40 10 [Declinatio ☿]
• ascension R. of ☿ 40 37 51 [Aſcenſio R. ☿]
• declination of Aldebaran [Aldeboræ] 15 35 [Declinatio Aldeboræ]
• observed distance 21 37 [Diſtantia obſeruata]
• angle of distance 22 17 33 [Angulus diſtantiæ]

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[727] Adhuc pro aſcenſione Aldeborææ. prints no R., where every other Pro aſcenſione line of the opening prints one. The block it heads numbers its times III and IV; no I or II stands under it on this side.

[728] Pro aſcenſione R. Extre. pedis ♊ carries no terminal point, where the matching line Pro aſcenſione R. calcis pedis ♊. in the left column ends with one. II Tempus H. 7 52. sets H. and no M..

[729] Diſtantıa ☿ & ☉ shows no dot on the second i on the scan.

• ascension R. of Aldebaran 62 55 24 [Aſcenſio R. Aldeboræ]
II. Time H. 8 M. 24. [II. Tempus H. 8 M. 24.]
• declination of ♀ 19 41 9 [Declinatio ♀]
• ascension R. of ♀ 40 40 19 [Aſcenſio R. ♀]
• distance 21 34 30 [Diſtantia]
• angle of distance 22 14 43 [Angulus diſtantiæ]
• ascension R. of Aldebaran 62 55 2 [Aſcenſio R. Aldeboræ]
III Time H. 8 M. 21. [III Tempus H. 8 M. 21.]
• declination of ♀ 19 41 7 [Declinatio ♀]
• ascension R. of ♀ 40 40 12 [Aſcenſio R. ♀]
• observed distance 21 34 45 [Diſtantia obſeruata]
• angle of distance 22 15 [Angulus diſtantiæ]
• ascension R. of Aldebaran 62 55 12 [Aſcenſio R. Aldeboræ][730]

For the ascension R. of the heel of the foot of ☊. [Pro aſcenſione R. Calcis pedis ☊.]

Time of observation H. 7 M. 36. [Tempus obſeruationis H. 7 M. 36.]
• declination of ♀ 19 40 27 [Declinatio ♀]
• ascension R. of ♀ 40 38 32 [AſcenſioR. ♀]
• declination of the heel 22 37 [Declinatio calcis]
• observed distance 45 17 30 [Diſtantia obſeruata]
• angle of distance 48 40 11 [Angulus diſtantiæ]
• ascension R. of the heel 89 18 43 [Aſcenſio R. Calcis]
II Time H. 7 M. 47. [II Tempus H. 7 M. 47.]
• declination of ♀ 19 40 37 [Declinatio ♀]
• ascension R. of ♀ 40 38 58 [Aſcenſio R. ♀]
• observed distance 45 16 40 [Diſtantia obſeruata]
• angle of distance 48 39 19 [Angulus diſtantiæ]
• ascension R. of the heel 89 18 17 [AſcenſioR. Calcis]

For the ascension R. of the end of the foot. [Pro aſcenſione R. Extrem. pedis.]

Time of observation H. 8 M. 2. [Tempus obſeruationis H. 8 M. 2.]
• declination of ♀ 19 40 50 [Declinatio ♀]
• ascension R. 40 39 31 [Aſcenſio R.]
• distance 43 27 15 [Diſtantia]
• angle of distance 46 39 47 [Angulus diſtantiæ]
• ascension R. of the end of the foot 87 19 18 [Aſcenſio R. extre. pedis]
II Time H. 8 M. 7. [II Tempus H. 8 M. 7.]
• declination of ♀ 19 40 54 [Declinatio ♀]
• ascension R. of ♀ 40 39 42 [Aſcenſio R. ♀]
• declination of the end of the foot 22 32 [Declinatio extrem. ped.]

[730] Pro aſcenſione oculi ♉. prints no R., where every other Pro aſcenſione line on this side prints one. The block it heads names "the eye of ♉" and then gives the declination and ascension R. of Aldebaran. The side gives the times H. 8 M. 24. (II.) and then H. 8 M. 21. (III).

- observed distance 43 27 [Diſtantia obſeruata][731]
- angle of distance 46 39 34 [Angulus diſtantiæ]
- ascension R. of the end of the foot 87 19 16 [Aſcenſio R. Extremæ / pedis]

DIE 15 MARTIJ. — 15 March.

- southern declination of ♀ 21 35 [Declinatio ♀ meridiana]
- apparent declination of ☉ 1 45 44 [Declinatio ☉ viſa]
- ascension R. of ☉ 4 8 9 [Aſcenſio R. ☉]
- observed distance 44 51 [Diſtantia obſeruata]
- angle of distance 41 21 26 [Angulus diſtantiæ]
- ascension R. of ♀ 45 29 34 [Aſcenſio R. ♀]
- longitude of ♀ 19 11 57 ♉ [Longitudo ♀]
- northern latitude 4 13 6 [Latitudo Borealis]

The diurnal motion of ♀ from the Alphonsine tables, 48. [Motus diurnus ♀ ex tabulis alphon- / ſinis 48.]

To these, Reſp. in the equator, ascension R. 48 30. [His Reſp. in Æquatore Aſc. R. 48 30]

- daily change of declination **19′ 30″** [Mutatio declinationis / diurna][732]

For the ascension R. of the heel of the foot of ♊. [Pro aſcenſione R. Calcis pedis ♊.]

Time of observation H. 8 M. 37. [Tempus obſeruationis H. 8 M. 37.]

- declination of ♀ 21 39 46 [Declinatio ♀]
- ascension R. of ♀ 45 41 39 [Aſcenſio R. ♀]
- declination of the heel of ♊ 22 37 [Declinatio calcis ♊]
- observed distance 40 16 30 [Diſtantia obſeruata]
- angle of distance 43 37 36 [Angulus diſtantiæ]
- ascension R. of the heel of ♊ 89 19 15 [Aſcenſio R. calcis ♊]

II Time H. 8 M. 47. [II Tempus H. 8 M. 47.]

- declination of ♀ 21 39 54 [Declinatio ♀]
- ascension R. of ♀ 45 41 45 [Aſcenſio R. ♀]
- observed distance 40 16 [Diſtantia obſeruata]
- angle of distance 43 37 6 [Angulus diſtantiæ]
- ascension R. of the foot of ♊ 89 18 51 [Aſcenſio R. pedis ♊]

For the ascension R. of the end of the foot. [Pro aſcenſione R. extre. pedis.]

Time of observation H. 8 M. 42. [Tempus obſeruationis H. 8 M. 42.]

- declination of ♀ 21 39 50 [Declinatio ♀]
- ascension R. of ♀ 45 41 49 [Aſcenſio R. ♀]
- declination of the end of the foot 22 32 [Declinatio extremæ / pedis]
- observed distance 38 26 45 [Diſtantia obſeruata]
- angle of distance 41 37 9 [Angulus diſtantiæ]

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[731] Pro aſcenſione R. Extrem. pedis. names no sign. Aſcenſio R. 40 39 31 prints no ♀ after R., where the matching line in every other block of the side prints one.

[732] The 15 March lines assign no time of observation. Declinatio ☉ viſa 1 45 44 carries no direction word.

• ascension R. of the end of the foot 87 18 58 [Aſcenſio R. extremæ / pedis][733]

DIE 20 MARTIJ. — 20 March.

• southern declination of ♀ 23 0 20 [Declinatio Meridiana ♀]
• diurnal motion of the declination 16 [Motus diurnus / declinationis]

For the ascension R. of ♀. [Pro aſcenſione R. ♀.]

Time of observation H. 2 M. 22. [Tempus obſeruationis H. 2 M. 22.]

• apparent declination of ☉ 3 42 10 north [Declinatio ☉ viſa … Bor.]
• declination of ♀ **23 0′ 5″** [Declinatio ♀]
• ascension R. of ☉ 8 39 2 [Aſcenſio R. ☉]
• distance of ☉ and ♀ 43 50 [Diſtantia ☉ & ♀]
• angle of distance 40 43 35 [Angulus diſtantiæ]
• ascension R. of ♀ 49 22 39 [Aſcenſio R. ♀]
• longitude of ♀ 23 2 37 ♉ [Longitudo ♀]
• northern latitude 4 36 48 [Latitudo Borealis]

The diurnal motion of ♀ from the Alphonsine tables is **44′**, to which there corresponds, from the equator, **44′ 58″**. [Motus diurnus ♀ ex Alphonſinis ta- / bulis 44′ cui reſpondet ex / æquatore 44′ 58″.]

For the ascension R. of Aldebaran [Aldeboræ]. [Pro aſcenſione R. Aldeboræ.]

Time of observation H. 7 29 [Tempus obſeruationis H. 7 29]

• declination of ♀ 23 3 29 [Declinatio ♀]
• ascension R. of ♀ 49 32 12 [Aſcenſio R. ♀]
• declination of Aldebaran 15 35 [Declinatio Aldeboræ]
• observed distance 14 40 [Diſtantia obſeruata]
• angle of distance 13 23 30 [Angulus diſtantiæ]
• ascension R. of Aldebaran 62 55 42 [Aſcen. R. Aldeboræ][734]

For the ascension of the head of ♊. [Pro aſcenſione capitis ♊.]

Time of observation H. 8 M. 4 [Tempus obſeruationis H. 8 M. 4]

• declination of ♀ 23 3 53 [Declinatio ♀]
• ascension R. of ♀ 49 33 18 [Aſcenſio R. ♀]
• declination of the M. head of ♊ 28 56 30 [Declinatio M. capitis ♊]
• observed distance 53 55 [Diſtantia obſeruata]
• angle of distance 60 15 43 [Angulus diſtantiæ]
• ascension R. of the m. head of ♊ 109 49 1 [Aſcenſio R. m. capitis ♊]

II Time H. 8 M. 46. [II Tempus H. 8 M. 46.]

• declination of ♀ 23 4 21 [Declinatio ♀]
• ascension R. of ♀ 49 34 36 [Aſcenſio R. ♀]
• declination of the head of ♊ 28 56 30 [Declinatio capitis ♊]
• distance 53 52 45 [Diſtantia]
• angle of distance 49 37 36 [Angulus diſtantiæ]

[733] Aſcenſio R. pedis ♊ 89 18 51 names "the foot of ♊", without "heel", in a block headed Calcis pedis ♊. Pro aſcenſione R. extre. pedis. names no sign.

[734] Tempus obſeruationis H. 7 29 sets the order-word H., no M., and no terminal point; it is set from the left edge of the column, not centred.

• ascension R. of the head 109 50 58 [Aſcenſio R. capitis][735]

For the ascension R. of the heel of the foot of ♊. [Pro aſcenſione R. calcis pedis ♊.]

Time of observation H. 8 M. 20. [Tempus obſeruationis H. 8 M. 20.]

• declination of ♀ 23 4 4 [Declinatio ♀]
• ascension R. of ♀ 49 33 38 [Aſcenſio R. ♀]
• declination of the heel 22 37 [Declinatio calcis]
• observed distance 36 32 [Diſtantia obſeruata]
• angle of distance 39 45 51 [Angulus diſtantiæ]
• ascension R. of the heel 89 19 29 [Aſcenſio R. calcis]

II Time H. 9 M. 3. [II Tempus H. 9 M. 3.]

• declination of ♀ 23 4 32 [Declinatio ♀]
• ascension R. of ♀ 49 35 8 [Aſcenſio R. ♀]
• declination of the heel 22 37 [Declinatio calcis][736]
• observed distance 36 30 30 [Diſtantia obſeruata]
• angle of distance 39 43 57 [Angulus diſtantiæ]
• ascension R. of the heel 89 19 5 [Aſcenſio R. calcis]

For the ascension R. of the end of the foot of ♊. [Pro aſcenſione R. Extremæ pedis ♊.]

Time of observation H. 8 M. 32 [Tempus obſeruationis H. 8 M. 32]

• declination of ♀ 23 4 12 [Declinatio ♀]
• ascension R. of ♀ 49 34 10 [Aſcenſio R. ♀]
• declination of the end of the foot 22 32 [Declinatio extremæ / pedis]
• observed distance 34 43 [Diſtantia obſeruata]
• angle of distance 37 45 40 [Angulus diſtantiæ]
• ascension R. of the end of the foot 87 19 50 [Aſcenſio R. Extremæ / pedis]

II Time of observation H. 8 M. 58. [II Tempus obſeruationis H. 8 M. 58.]

• declination of ♀ 23 4 29 [Declinatio ♀]
• ascension R. of ♀ 49 34 59 [Aſcenſio R. ♀]
• declination of the end of the foot 22 32 [Declinatio extremæ / pedis]
• observed distance 34 42 15 [Diſtantia obſeruata]
• angle of distance 37 44 53 [Angulus diſtantiæ]
• ascension R. of the end of the foot of ♊ 87 19 52 [AſcenſioR.extre.pedis ♊][737]

DIE 28 MARTIJ — 28 March.

• southern declination of ♀ 24 49 30 [Declinatio ♀ Meridiana]
• daily change of declination 8 30 [Mutatio declinationis / diurna]

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[735] **Pro aſcenſione capitis ♊.** prints no R.. **Tempus obſeruationis H. 8 M. 4** has no terminal point, and a wider space stands between 8 and M.. **Aſcenſio R. capitis 109 50 58** names no sign.

[736] The block for the heel gives Time I at H. 8 M. 20., and the preceding block for the head of ♊ gives its II at H. 8 M. 46..

[737] **Tempus obſeruationis H. 8 M. 32** has no terminal point.

For the ascension R. of ☿. [Pro aſcenſione R. ☿.]

Time of observation H. 2 M. 14. [Tempus obſeruationis H. 2 M. 14.]

- apparent declination of ☉ 6 44 46 [Declinatio viſa ☉]
- ascension R. of ☉ 15 53 45 [Aſcenſio R. ☉]
- declination of ☿ 24 20 30 [Declinatio ☿]
- angle of distance 38 53 57 [Angulus diſtantiæ]
- ascension R. of ☿ 54 47 42 [Aſcenſio R. ☿]
- longitude of ☿ 28 18 24 ♉ [Longitudo ☿]
- northern latitude 5 9 50 [Latitudo Borealis][738]

For the ascension R. of the Merid. head of ♊. [Pro aſcenſione R. Merid. capitis ♊.]

Time of observation H. 8 M. 54. [Tempus obſeruationis H. 8 M. 54.]

The daily change of declination on this day is 8 30. [Mutatio diurna declinationis hoc / die 8 30.]

- daily change of ascension R. 40 13 [Mutatio aſcenſionis / R. diurna]
- declination of ☿ 24 51 44 [Declinatio ☿]
- ascension R. of ☿ 54 58 52 [Aſcenſio R. ☿]
- declination of the head of ♊ 28 56 30 [Declinatio capitis ♊]
- observed distance 48 37 30 [Diſtantia obſeruata]
- angle of distance 54 48 55 [Angulus diſtantiæ]
- ascension R. of the merid. head of ♊ 109 47 47 [Aſcenſ. R. merid. / capitis ♊]

II Time of observation H. 8 M. 27. [II Tempus obſeruationis H. 8 M. 27.]

- declination of ☿ 24 51 34 [Declinatio ☿]
- right ascension of ☿ 54 57 57 [Aſcen. R. ☿]
- observed distance 48 37 45 [Diſtantia obſeruata]
- angle of distance 54 49 53 [Angulus diſtantiæ]
- right ascension of the head Me. of ♊ 109 47 50 [AſcenſioR.capitisMe.♊]

For the right ascension of Aldebaran [Aldeboræ]. [Pro aſcenſione R. Aldeboræ.]

Time of observation H. 8 M. 43. [Tempus obſeruationis H. 8 M. 43.]

- declination of ☿ 24 51 40 [Declinatio ☿]
- right ascension of ☿ 54 58 34 [AſcenſioR. ☿]
- observed distance 11 52 30 [Diſtantia obſeruata]
- angle of distance 7 54 45 [Angulus diſtantiæ]
- right ascension of the eye of ♉ 62 53 19 [Aſcen. R. oculi ♉]

II Time H. 9 M. 26. [II Tempus H. 9 M. 26.]

- declination of ☿ 24 51 52 [Declinatio ☿]
- right ascension of ☿ 54 59 46 [Aſcenſio R. ☿]
- observed distance 11 52 0 [Diſtantia obſeruata]
- angle of distance 7 53 30 [Angulus diſtantiæ]

[738] The rubric DIE 28 MARTIJ has no terminal point. The block Pro aſcenſione R. ☿. at H. 2 M. 14. prints no distance line between Declinatio ☿ 24 20 30 and Angulus diſtantiæ 38 53 57.

• right ascension of Aldebaran 62 53 16 [Aſcenſio R. Aldeboræ][739]

DIE 29 MARTIJ. — 29 March.

Declination of ♀ Merid. 24 58. [Declinatio ♀ Merid. 24 58.]

Daily change of declination 8′ [Mutatio declinationis diurna 8′]

For the right ascension of ♀. [Pro aſcenſione R. ♀.]

Time of observation H. 2 M. 38. [Tempus obſeruationis H. 2 M. 38.]

• apparent declination of ☉ 7 6 44 [Declinatio ☉ viſa]
• right ascension of ☉ 16 47 15 [Aſcenſio R. ☉]
• declination of ♀ 24 57 44 [Declinatio ♀]
• observed distance 41 0 [Diſtantia obſeruata]
• angle of distance 38 39 40 [Angulus diſtantiæ]
• right ascension of ♀ 55 26 55 [Aſcenſio R. ♀]
• longitude of ♀ 28 55 17 [Longitudo ♀]
• latitude of ♀ 5 9 51 [Latitudo ♀][740]

For the right ascension of the head M. of ♊. [Pro aſcenſione R. M. capitis ♊.]

Time of observation H. 8 M. 27. [Tempus obſeruationis H. 8 M. 27.]

• declination of ♀ 24 59 44 [Declinatio ♀]
• right ascension of ♀ 55 36 34 [Aſcenſio R. ♀]
• declination of the head of ♊ 28 56 30 [Declinatio capitis ♊]
• observed distance 48 4 [Diſtantia obſeruata]
• angle of distance 54 12 57 [Angulus diſtantiæ]
• right ascension of the head of ♊ 109 49 31 [Aſcenſ. R. capitis ♊]

II Time H. 9 M. 13. [II Tempus H. 9 M. 13.]

• declination of ♀ 25 0 16 [Declinatio ♀]
• right ascension of ♀ 55 37 40 [Aſcenſio R. ♀]
• declination of the head 28 56 30 [Declinatio capitis]
• observed distance 48 3 [Diſtantia obſeruata]
• angle of distance 54 11 57 [Angulus diſtantiæ]
• right ascension of the head of ♊ 109 49 37 [Aſcenſ. R. Capitis ♊][741]

For the right ascension of Aldebaran. [Pro aſcenſione R. Aldeboræ.]

Time of observation H. 8 M. 36. [Tempus obſeruationis H. 8 M. 36.]

• declination of ♀ 25 0 3 [Declinatio ♀]
• right ascension of ♀ 55 36 47 [Aſcenſ. R. ♀]
• declination of the eye of ♉ 15 35 [Declinatio oculi ♉]
• observed distance 11 42 30 [Diſtantia obſeruata]
• angle of distance 7 26 [Angulus diſtantiæ]
• right ascension of the eye of ♉ 63 2 47 [Aſcenſio R. oculi ♉]

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[739] The block headed for Aldebaran gives, under its first time, the right ascension "of the eye of ♉", and under its second time the right ascension "of Aldebaran".

[740] The 29 March lines give no sign after **Longitudo ♀ 28 55 17** and no direction word after **Latitudo ♀ 5 9 51** or **Declinatio ☉ viſa 7 6 44**. **Diſtantia obſeruata 41 0** names neither body.

[741] `Declinatio capitis 28 56 30` names no sign.

II Time H. 8 M. 54. [II Tempus H. 8 M. 54.]
- declination of ♀ 25 0 9 [Declinatio ♀]
- right ascension of ♀ 55 37 13 [Aſcenſio R. ♀]
- declination of Aldebaran 15 35 [Declinatio Aldeboræ]
- observed distance 11 42 15 [Diſtantia obſeruata]
- angle of distance 7 25 40 [Angulus diſtantiæ]
- right ascension of Aldebaran 63 2 53 [Aſcenſio R. Aldeb.][742]

ASCENSIONES RECTÆ QUARUNDAM STELLARUM FIXARUM PER DOCTRINAM TRIANGULORUM EX DISTANTIA ♀ A ⊙ ET DISTANTIIS EARUNDEM STELLARUM A ♀ CERTIS QUIBUSDAM DIEBUS INUENTÆ.

Right ascensions of certain fixed stars, found by the Doctrine of Triangles from the distance of ♀ from ⊙ and the distances of the same stars from ♀ on certain days.

Right ascensions of Aldebaran. [Aſcenſiones Rectæ Aldeboræ.]
- 27 February, H. 6 M. 23 — **62° 55′** [Die27Februarij H.6 M.23 62° 55′]
- 6 27 — 62 55
- 8 3 — 62 53
- 8 6 — 62 53
- 28 — 6 40 — 62 58
- 8 36 — 62 57
- 5 March, H. 6 M. 54 — **62° 55′ 20** [Die 5 Martij H. 6 M. 54 62° 55′ 20]
- 7 2 — 62 55 38
- 8 25 — 62 55 32
- 8 29 — 62 55 51
- 9 March, H. 7 M. 16 — 62 55 24 [Die 9 Martij H. 7 M. 16 62 55 24]
- 8 21 — 62 55 12
- 8 24 — 62 55 2[743]
- 20 March, H. 7 M. 29 — 62 55 42 [Die 20 Martij H. 7 M. 29 62 55 42]
- 28 March, H. 8 M. 42 — 62 53 19 [Die 28 Martij H. 8 M. 42 62 53 19]
- 9 26 — 62 53 16
- 29 March, H. 8 M. 36 — 63 2 47 [Die 29 Martij H. 8 M. 36 63 2 47]
- 8 54 — 63 2 53

And these right ascensions[1] are from the distance written down as G. 11 M. 42. I think this was counted wrongly, so that **42′** were set down for **38′**, since

[742] In this block, too, the lines under the first time name "the eye of ♉" and those under the second time name Aldebaran. The block at H. 8 M. 36. is followed by its second time at H. 8 M. 54., and the block for the head of ♊ above it runs from H. 8 M. 27. to H. 9 M. 13..

[743] The fifth line of the left column sets the bare figure 28 in the day file, with no month. Only the first line of each column sets H. and M.; the lines under them set bare figures in the same files.

each number stands equally far from the intermediate division, and since from the distance G. 11 M. 38 there comes a right ascension of Aldebaran [Aldeboræ] of 62 55, as from very many others. [Atque hæ aſcenſiones rectæ[1] ſunt ex diſtantia adſcripta G. 11 M. 42. Quam puto perperam numeratam eße, vt 42′ poſita ſint pro 38′, cum vterque nume- / rus a diviſione intermedia æqualiter diſtet, et ex diſtantia G. 11 M. 38 pro- / ueniat aſcenſio recta Aldeboræ 62 55, vt ex quam plurimis aliis.][744]

Right ascensions of the head of ♈. [Aſcenſiones rectæ capitis ♈.]

- 27 February, H. 6 M. 41 — 25 48 [Die 27 Februarij H. 6 M. 41 25 48]
- 28 — 8 51 — 25 53[745]

Right ascensions of the end of the toe of the foot of ♊. [Aſcenſiones rectæ extremæ digiti pe- / dis ♊.]

- 5 March, H. 7 M. 15 — **87° 19′ 24″** [Die 5 Martij H. 7 M. 15 87° 19′ 24″]
- 7 52 — 87 19 27
- 9 March, H. 8 M. 2 — 87 19 18 [Die 9 Martij H. 8 M. 2 87 19 18]
- 8 7 — 87 19 16
- 15 March, H. 8 M. 42 — 87 18 58 [Die 15 Martij H. 8 M. 42 87 18 58]
- 20 March, H. 8 M. 32 — 87 19 50 [Die 20 Martij H. 8 M. 32 87 19 50]
- 8 58 — 87 19 52

Right ascensions of the heel of the foot of ♊. [Aſcenſiones rectæ calcis pedis ♊.]

- 5 March, H. 6 M. 58 — 89 20 26 [Die 5 Martij H. 6 M. 58 89 20 26]
- 7 7 — 89 20 9
- 8 3 — 89 19 46
- 8 9 — 89 19 56
- 9 March, H. 7 M. 35 — 89 18 43 [Die 9 Martij H. 7 M. 35 89 18 43]
- 7 47 — 89 18 17
- 8 13 — 89 18 14
- 15 March, H. 8 M. 37 — 89 19 15 [Die 15 Martij H. 8 M. 37 89 19 15]
- 8 47 — 89 18 51
- 20 March, H. 8 M. 20 — 89 19 29 [Die 20 Martij H. 8 M. 20 89 19 29]
- 9 3 — 89 19 5

Right ascensions of the southern head of ♊. [Aſcenſiones rectæ meridionalis / capitis ♊.]

- 20 March, H. 8 M. 4 — 109 49 1 [Die 20 Martij H. 8 M. 4 109 49 1]
- 8 46 — 109 50 58
- 28 March, H. 8 M. 54 — 109 47 47 [Die 28 Martij H. 8 M. 54 109 47 47]
- 8 27 — 109 47 50
- 29 March, H. 8 M. 27 — 109 49 31 [Die 29 Martij H. 8 M. 27 109 49 31]
- 9 13 — 109 49 37

And all these right ascensions are relative to the place of the Sun as our Ephemerides then gave it; if need be, they will have to be adjusted a little. [*Atque hæ omnes*

[744] rectæ carries a raised 1, the call of the note at the foot of this column.
[745] The second line sets the bare figure 28 in the day file, with no month.

aſcenſiones rec- / tæ ſunt ad locum Solis prout tunc / Ephemerides noſtræ dabant eum, / Si opus fuerit, limitandæ paululum / erunt.][746]

[1] Namely, the last two. [Scilicet duæ ultimæ.][747]

[746] The 28 March lines give H. 8 M. 54 and then 8 27.

[747] The note stands below the left column, in a smaller roman, opening with a raised 1; its call is the raised 1 after rectæ in the first line of the roman paragraph of the left column.

OBSERUATIONES ANNI 1583.

Observations of the Year 1583.

OBSERUATIONES SOLIS.

Observations of the Sun.

Altitudines Meridianæ.

Meridian Altitudes.

DIE 18 JANUARIJ[1].

18 January[1].

From the beginning of this year until 18 January it was never clear at noon; but on that very day, which was very clear, although the winds were blowing hard from the east, I observed the altitude of the Sun with three instruments, in this way.

- *Altitude of the Sun [Solis Alt.] by the Sext. Trigon. 15 51⅓*
- *by the mural Q. 15 51¼*
- *by the Q. Max. 15 50½ — good [bo-næ]*[748]

DIE 19 JANUARIJ.

19 January.

- Meridian altitude of ⊙ [Alt. ⊙ merid.] by the mural Q. 16 6⅓
- by the lesser Q. 16 7 very nearly [fere]
- by the Sext. Trig. 16 6½
- The corresponding altitude of the Equator [Reſpondet Alt. Æquatoris] is 34° 8′ 8″

DIE 21 JANUARIJ

21 January

- By the mural Q. 16 39
- By the lesser Q. 16 37
- By the Sext. Trig. 16 38

DIE 26 JANUARIJ.

26 January.

⊙ on the meridian [in merid.], by the greater clock [per maius horologium]:

- H. 11 49′ 10″ by the mural Q. 18 6

[748] A printed right-hand brace embraces the second and third of these lines; the word "bo-" / "næ", divided, stands beside the brace.

- 50 15 by the greater Q. 18 6
- 50 15 by the lesser Q. 18 6
- 50 30 by the Square [per Quadratum]
- by the Sext. Trig. 18 6

At the seconds-index on the lesser clock, which completes its circuit every single minute, the call was given by the mural Quadrant at 21″; the index then went round as far as 26″, at which count of seconds the call was given by both the greater and the lesser quadrants; and so Master Johannes called by the Mural 65″ before them. Afterwards, at 42″, the call was given by the line of the □ of the meridian [per lineam □ meridiej]; and so there were very nearly 16″ between the call by the line q. merid. and the greater and lesser quadrant.

Good observations, on which you can rely.

The clock therefore completed its circuit 9 M. 45 S. more slowly than it should have [opportebat].

DIE 27 JANUARIJ.

27 January.

⊙ on the meridian [in meridiano]:

- H. 11 17′ 30″ by the mural Q. 18° 24′ 10″
- 18 40 by the lesser Q. 18 24 0
- 18 40 by the Sext. Trig. 18 24
- 18 45 by the line of the square [per lineam quadrati].

DIE 2 FEBRUARIJ.

2 February.

⊙ on the meridian.

- H. 12 1′ 30″ by the mural Q. 20 15
- 2 50 by the lesser Q. 20 18
- 2 52 by the Square line [per Quadratum lin.]. But not certain enough, because it was not clear.

DIE 7 FEBRUARIJ.

7 February.

- H. 11 58′25″ by the mural Q. 22 1
- 59 16 together [ſimul.]: by the Square [per Quadratum]
- by the greater Q. 22 1¾
- by the lesser Q. 22 1
- by the Sext. Trig. 22 1[749]

DIE 10 FEBRUARIJ.

10 February.

[749] "59 16" and "ſimul." stand on two lines to the left of a printed left-hand brace that embraces the three lines "per Quadratum", "per Q. Maior. 22 1¾" and "per Q. Minor. 22 1"; the line "per Sext. Trig. 22 1" stands below, outside the brace.

• By the lesser Q. 23 3
Not certain enough, however, because of the presence of clouds.

DIE 12 FEBRUARIJ.

12 February.
• By the lesser Q. 23 48
Not exact enough because of clouds.

DIE 20 FEBRUARIJ.

20 February.
• H. 12 8′ 56″ by the mural Q.
• 9 1 by the Square.
• 9 2 by the lesser Q. 26 48, not exact enough because the sky was rather overcast [propter cœlum obſcurius].

DIE 22 FEBRUARIJ.

22 February.
• By the mural Q. 27 32
• By the greater Q. 27 30½, not exact [non exquiſita]
[1] Day 18 from codex V. [Dies 18 e codice V.]
• By the lesser Q. 27 32
• By the Sext. Trig. 27 32½

DIE 23 FEBRUARIJ.

23 February.
• H. 12 1′ 45″ by the lesser Q. 27 53, not exact because of clouds.
• 1 55 by the greater Q. [per Q. maioren.]
• 2 46 by the mural Q.
• 2 45 by the Square.

DIE 24 FEBRUARIJ.

24 February.
• H. 11 59 0 by the Square and the mural Q.
• 12 0 30 by the greater and lesser Q. [per Q. mai. et minor.]
• 1 10 by the mural Q.
• 1 13 by the Square — again [iterum][750]

DIE 2 MARTIJ.

2 March.
• By the mural Q. 30 39
• By the lesser Q. 30 38¼
• By the Sext. Trig. 30 39

[750] A printed right-hand brace embraces the last two lines, with "iterum" beside it.

DIE 9 MARTIJ.

9 March.

- By the greater Q. 33 23½
- By the lesser Q. 33 24
- By the mural Q. 33 24

Die 10 MARTIJ.

10 March.

- By the mural Q. 33 47⅔
- By the greatest Q. [Per Q. Maximum] 33 48¾
- By the lesser Q. 33 47⅔
- By the Sext. Trig. 33 47 20

DIE 13 MARTIJ.

13 March.

The clock was running 1 M. 30 S. faster than it should [citius iuſto].

- By the mural Quadrant [Per Quadrantem Muralem] 34 58½, good [bona]
- By the greatest Q. [Per Q. Max.] 34 59¹
- By the lesser Q. 34 58½
- By the Sext. Trig. 34 58⅓

DIE 14 MARTIJ.

14 March.

- By the mural Q. 35 22¼
- By the lesser Q. 35 21¾¹
- By the portable Q. [Per Q. portatilem] 35 23¹
- By the Sext. Trig. 35 22⅓

At the time of these observations it was not perfectly clear.

DIE 16 MARTIJ.

16 March.

The clock was running 9 M. 20 S. faster than it should [celerius iuſto].

- By the mural Q. 36...
- By the portable Q. rectificat. [Per Q. portat. rectificat.] 36 8½
- By the Sext. Trig. 36 8⅔

DIE 24 MARTIJ.

24 March.

- By the mural Q. 39 15
- By the lesser Q. 39 15½
- By the portable Q. 39 15⅙
- By the Sext. Trigon. 39 15½

DIE 26 MARTIJ.

26 March.

- By the mural Q. 40 1
- By the lesser Q. 40 1
- By the portable Q. 40 1
- By the Sext. Trig. 40 1¾

DIE 27 MARTIJ.

27 March.

- By the mural Q. 40 23 30
- By the greater Q. 40 24
- By the lesser Q. 40 24
- By the portable Q. 40 23 20
- By the Sext. Trig. 40 24

DIE 28 MARTIJ.

28 March.

- By the greater Q. 40 46
- By the mural Q. 40 46 40
- By the portable Q. 40 46½

It was not clear enough.

DIE 31 MARTIJ.

31 March.

- By the mural Q. 41 52⅚
- By the portable Q. 41 52¾
- By the lesser Q. 41 54
- By the Sext. Trigon. 41 54 — not good [non bo-næ][751]

It was moderately clear.

DIE 2 APRILIS.

2 April.

- By the mural Q. 42 37½
- By the greater Q. 42 38⅓
- By the lesser Q. 42 38½
- By the portable Q. 42 37½
- By the Sext. Trig. 42 37⅔

The Sun was obscured by rather sparse clouds [rariuſculis … nubibus].

DIE 4 APRILIS.

4 April.

[751] A printed right-hand brace embraces the last two lines; "non" / "bo-" / "næ" stands beside it on three short lines.

- By the mural Q. 43 21
- By the lesser Q. 43 20½
- By the portable Q. [Per Q. port.] 43 21
- By the Sext. Trig. 43 21

It was not perfectly clear.

DIE 5 APRILIS.

5 April.

It was not very clear [Serenitas magna non erat].

- By the mural Q. 43 42

[1] Struck through with lines. [Lineis inducta.]

- By the greater Q. [Per Q. Maiorem] 43 42⅔
- By the portable Q. [Per Q. port.] 43 42½
- By the lesser Q. [Per Q. Minorem] 43 42½

DIE 8 APRILIS.

8 April.

- By the mural Q. [Per Q. Muralem] 44 46
- By the lesser Q. 44 46½
- By the portable Q. 44 46
- By the greater Q. 44 45[1]
- By the Sext. Trig. 44 46½

April, day [Aprilis Die]	By the mural Q. [Per Q. Mural.]	By the lesser Q. [Per Q. minor.]	By the portable Q. [Per Q. port.]	By the Sext. Trig. [Per Sext. Trig.]
9	45 7½	45 8	45 7⅔	45 7⅔
14	46 49⅙	46 48⅔	46 49¼	46 48⅔
15	47 9	47 8	47 9	47 7¾
16	47 28	47 28½	47 28	47 28 very nearly [fere]
18	48 6¾	48 6½	48 6¾	48 6⅔
19	48 25½	48 25½	48 25½	48 25⅔
20	48 44½	48 44½	48 44½	48 44
21	49 2½	49 2½	49 2½	49 2½
22	49 21	49 21½	49 21	49 21
23	49 38¾	49 39	49 38¾	49 38⅔
24	49 56⅓	49 56½	49 56	49 56
25	50 14	50 14	50 14	50 14 very nearly [fere]
26	50 30⅚	50 31	50 30¾	50 30¾
28	51 4	51 4	51 3½	51 4½

ἐν πλάτει [Greek: *en platei*, "in breadth"] because of the density of the clouds [propter denſitatem nubium].[752]

MAIJ.

May.

May, day [Maij Die]	By the mural Q. [Per Q. Mural.]	By the lesser Q. [Per Q. minor.]	By the portable Q. [Per Q. port.]	By the Sext. Trig. [Per Sext. Trig.]
1	51 52	51 53		51 52
5	52 51¾	52 51¾		52 52½
6	53 5½	53 5		53 5⅔
7	53 19½	53 20		53 19⅓
8	53 32⅚	53 33⅓		53 33¾
10	53 59⅓	54 0		53 59⅓
11	54 12	54 12	54 11⅙	
12	54 24⅓	54 23	54 24	
13	54 36	54 37	54 35½	
14	54 47⅔	54 48½	54 47⅔	
15	54 58⅔	55 0	54 58	
16	55 9 25	55 9½	55 9⅓	
17	55 19 55	55 19¾	55 19 35	
20	55 48½	55 48	55 48¾	
21	55 57 35	55 58⅔	55 57⅔	
22	56 6	56 6	56 6⅓	
25	56 30¼	56 30⅙	56 30⅙	
27		56 43⅓	56 43⅚	

It was not clear enough on this day [non erat ſatis ſerenum hoc die].

29	56 56⅓	56 56⅓	56 56⅓

JUNIJ.

June.

3	57 19	57 19⅚	57 19
5	57 25¼	57 23	57 25⅓

[752] The word "fere" stands twice on a line of its own at the right, under the Sext. Trig. file, once below the 16 line and once below the 25 line; the setting does not show whether it belongs to the line above or the line below. The closing line with the Greek words stands across the column below the 28 line; the setting does not show whether it refers to that line alone.

It was only moderately clear [non erat niſi modice ſerenum].

6	57 28	57 27½	57 28
9	57 33⅔	57 33½	

But there was very little clear sky [ſed ſerenitatis parum admodum fuit].

11	57 35	57 35	57 36
14	57 34⅙	57 34½	57 34½

It was not clear enough [non erat ſatis ſerenum].

16	57 31⅔	57 32½	57 32⅓
17	57 30	57 30½	57 30½

753

Examinatio antecedentium per Altitudinem maximam.[2] [RECTE: PRO ALTITUDINE MAXIMA, "FOR THE GREATEST ALTITUDE" — CORRIGENDA, p. 429]

Examination of the preceding by the greatest altitude.[2]

Since both observations, by the portable and by the mural Quadrant, gave 57 28, and ☉ was in 24 20 ♊, it could change its declination by 7¼′ up to the Solstice itself; therefore at the Solstice itself the greatest altitude should have been 57 35¼. This agrees well enough with the observation made on the 11th by the mural Quadrant; for the fact that the portable gave one minute more on that day was due to an error made in hanging the plumb-line [in appendendo perpendiculo]. So about 15″ come to be added to the altitude observed at noon on the 11th by the mural Quadrant, so that the true greatest apparent altitude at the summer solstice is 57ᵖ 35′ 15″. This also agrees exceedingly well [apprime concordat] with the observation made on 17 June at an altitude of 57 30; for ☉ was then in 4 50 ♋, by which it is removed from the

[753] The May and June lines form one printed table under the single head row set beneath MAIJ.; the heading JUNIJ. and the four remark lines are set inside it, and the head row is not repeated. The empty-headed continuation parts above have the columns of the head row. For 1–10 May the third value on each line stands under the Sext. Trig. head and the portable-quadrant file is empty; from 11 May on, the third value stands under the portable-quadrant head and the Sext. Trig. file is empty; on 27 May the mural file is empty. On 9 June the remark "ſed ſerenitatis" begins on the value line itself, to the right of the lesser-quadrant value where the portable-quadrant value stands on the other June lines, and "parum admodum fuit." is set on a line of its own below; no portable-quadrant value is printed for that day.

solstice in declination by 5′ 15″. So the greatest apparent altitude at the solstice itself was 57 35¼, and to this you can [atque huic potes]

[1] Struck through with lines. [Lineis inducta.]

[2] From codex V. [E codice V.]

give sufficient credence [ſatis fidem adhibere]. The corresponding parallax in the circle of altitude [paralaxis in circulo altitudinis correſpondens] is 1′ 35″; therefore the true solstitial altitude is 57 G. 36′ 50″.

In the same way, on the 19th, with both instruments examined and corrected and the sky very clear, I found the altitude of the Sun to be exactly p. 57 m. 25, by the portable Quadrant as well as by the greater mural one. The position of the Sun was then in 6 43¾ ♋; it was therefore p. 10¼ from its greatest declination, and these, added to the observed altitude, give the true greatest altitude of the Sun as p. 57 35½′, just as we also determined above.

Likewise, on the preceding day, we found by the same mural Quadrant the greatest altitude of the Sun to be p. 57 27½′, which also agrees quite well. You will therefore be able to use, without any hesitation, the greatest altitude of the Sun

- *at the summer solstice [ſolſtitio æſtiuo]:*
- *seen and observed [Viſa et obſeruata] 57° 35′ 15″*
- *true, and from the centre [Vera et ex centro] 57 36 50*[754]

On the 20th, moreover, the position of ☉ was in 7 40⅚ ♋, so that it had changed its declination from the greatest by 13′ 20″ [ſcrupulis 13′ 20″]; these, added to the altitude observed by the Mural, again give

- *the greatest altitude at the solstice [Maximam in ſolſtitio Alt.] 57ᵖ 35′ 15″*
- *hence the true greatest will be [Vnde vera maxima erit] 57 36 50*
- *— as before [vt prius].*[755]

You can therefore rely on this greatest altitude with sufficient certainty [Potes itaque huic altitudini maximæ ſatis certo te fundare].

June, day [Junij die]	By the mural Q. [Per Q. Mural.]	By the lesser Q. [Per Q. minor.]	By the portable Q. [Per Q. port.]
18	57 27½	57 28	57 28
19[1]	57 25	57 25½	57 25
20	57 21 55	57 22	57 22
21	57 18½	57 19	57 19
22	57 14 20	57 14¾	57 15¼
23	57 10	57 10	57 10⅔
26	56 54½	56 55	56 55
30	56 28⅓	56 28½	56 28 50

[754] "ſolſtitio æſtiuo" stands to the left of a printed opening brace that embraces the two displayed lines.

[755] "vt prius." stands to the right of a printed closing brace that embraces the two displayed lines.

JULIJ.

July.

2	56 12½		56 13
5	55 46 10	55 47	

Little clear sky [Parum ſerenitatis].

6	55 37⅓	56 36½	

Moderately clear [Mediocriter ſerenum].

11	54 43 very nearly [fere]	54 43½
12	54 32⅓	54 32

But it was not observed exactly, because of clouds [Sed non eſt exquiſite obſeruatum propter nubes].

13	54 21	54 21⅓	54 21 very nearly [fere].

Moderately clear [Mediocriter ſerenum].

15	53 55½	53 54	53 55
23	52 3¾	52 4	52 3⅔

But it was not clear enough, and so the Sun was visible among the clouds a little late in the observing [Sed non fuit ſatis ſerenum, erat itaque Sol inter nubes paulo ſerius in obſeruando conſpicuus].

28	50 44⅓	50 44½
29	50 27½	50 28 very nearly [fere],

ἐν πλάτει, because ⊙ was at once obscured by clouds, so that it could not be observed exactly [quia ⊙ ſtatim nubibus obſcurabatur, vt exquiſite obſeruari non potuerit].[756]

AUGUSTI.

August.

August, day [Aug. die]	By the mural Q. [Per Q. Mural.]	By the lesser Q. [Per Q. min.]	By the portable Q. [Per Q. Port.]
3	48 59		48 59¼
4	48 41		48 40¾

It was not clear enough [non erat ſatis ſerenum].[757]

6	48 3⅓	48 3 very nearly [fere]	48 3

The sky was very clear [erat ſereniſſimum cœlum].[758]

10	46 46½	46 46⅔	46 46⅓
11	46 26¾	46 27¼	46 26½
12	46 6¾	46 6	46 6 35″
13	45 46⅓		45 46

This one is not certain enough, because of the rough weather, by which the instrument was moved [hæc non ſatis certa propter tempeſtatem, qua mouebatur inſtrumentum].

14	45 25½	45 25½

[756] The June and July lines form one printed table under the single head row set beneath "Potes itaque …"; the heading JULIJ. and the remarks are set inside it, and the head row is not repeated; the empty-headed continuation parts have the columns of the head row. On 5 July the second value stands under the lesser-quadrant head and no portable-quadrant value is printed; on 6 July the value "56 36½" stands under the portable-quadrant head, and the remark follows it.

[757] A printed closing brace stands to the right of the portable-quadrant file, from the level of the head word "Port." down to the 4 line; the remark "non erat" / "ſatis ſere-" / "num." is set beside it on those three lines.

[758] On the 6 August line "fere" is set in smaller type, close between the lesser-quadrant value "48 3" and the portable-quadrant value "48 3"; the remark "erat ſere-" follows on the same line and runs onto "niſſimum" and "cœlum", the last standing level with the 10 August line.

15	45 5	45 5
16	44 44	44 44

17 — At noon we did not see ☉; but it was seen through the slits [per rimulas] of the lesser quadrant at azimuth 3° from the south toward the west [a meridie ad occaſum], when the hour by the lesser clock was 12 8½.

19	43 41	43 41	43 42
23	42 14		42 15
24	41 52	41 53	41 53
25	41 30	41 30	41 31
27	40 45½	40 45⅓	40 46½
28	40 23	40 24	40 24
30	39 37 50		

SEPTEMBRIS.

September.

1	38 52		38 53
2	38 29	38 29	38 30

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1 »After both instruments, the portable and the mural, had been very well rectified« [Cod. V.]. [»Poſt optime rectificata vtraque inſtrumenta Portat. et Murali [recte: Murale — Corrigenda, p. 429]«]

Sept., day [Sept. die]	By the mural Q. [Per Q. Mural.]	By the lesser Q. [Per Q. minor.]	By the portable Q. [Per Q. port.]	By the Trigonic Sextant, rectified [Per Sext. Trig. rectific.]
4	37 43⅙	37 43	37 44	
5	37 20 precisely [exquiſite]		37 20⅔	
8	36 10		36 11	36 11
11	35 0⅓		35 0½	35 1
12	34 36		34 37 40	

759 The August and September lines form one printed table under the single head row set beneath AUGUSTI.; the heading SEPTEMBRIS. and the remarks are set inside it, and the head row is not repeated. The 17 August entry is a remark set in place of values, beginning on the dated line. On 30 August one value, 39 37 50, stands under the mural head, and nothing else is printed on the line.

⊙, however, was surrounded on all sides by clouds, so that its brightness could not be clearly caught [⊙ tamen vndique nubibus circumdabatur, vt conſpicue eius ſplendor intercipi non potuerit]

13	34 13⅙	34 15*	34 14	

*This one is not good [*hæc non bona eſt.].

14	33 50	33 50⅓	33 50½	
16	33 2⅔	33 4¼	33 3 25	33 4*

*The ruler was placed on this one [*huic regula impoſita]. It was perfectly clear [Erat exquiſite ſerenum].

23	30 18½	30 18⅓	30 19	30 20*

*It is not good [*non bona eſt.].

24	29 55 25	29 57	29 56	29 56⅓
28	28 23⅓	28 24	28 23⅔	28 24

But it was not clear enough [ſed non erat ſatis ſerenum].

29	27 59⅚	28 0 very nearly [fere]	28 0	28 1⅓

After this time the portable Quadrant and the Sextant were precisely rectified for taking altitudes [Poſt hoc tempus ſunt Quadrans portatilis et Sextans exquiſite rectificati pro capiendis altitudinibus].

30	27 37	27 38	27 37½	27 37

The shadow was not exact enough in the Sextant. In the portable Quadrant the plumb-line seemed to deviate somewhat from the point, once the observation had been made [Vmbra non erat ſatis exquiſita in Sextante. In Quadrante portatili perpendiculum nonnihil a puncto declinare videbatur, facta obſeruatione].

OCTOBRIS.

October.

1	27 14		27 14	27 14½
10	23 53½	23 54	23 54	
12	23 10⅙		23 10	23 9⅔
14	22 28		22 27¾	22 27⅔
15	22 7¼		22 7⅓	22 7
16	21 46⅙		21 46	21 46 very nearly [fere]
20	20 25⅙		20 25⅓	

By the Sextant the altitude could not be obtained, because it was not clear enough, since, besides, the shadow in it is less exact [Per Sextantem altitudo haberi non potuit propterea quod non eßet ſatis ſerenum, cum alias vmbra in eo ſit minus exquiſita].

21	20 5⅔	20 5¾	20 6
24	19 7¾	19 8	19 7⅓

It was not properly clear [non fuit bene ſerenum].

26	18 30 very nearly [fere]	18 30	18 31

It was not perfectly clear; ⊙ was seen at times among clouds [Non erat exquiſite ſerenum, ⊙ inter nubes interdum conſpiciebatur].

30	17 19¼	17 19¼	17 19¼

The sky was then very clear [erat tunc cœlum ſerenißimum].

NOUEMBRIS.

November.

7	15 10	15 9⅔	15 9½

It was not clear enough [non erat ſatis ſerenum].

8	14 56¼	14 56	14 55

DECEMBRIS.

December.

2[1]	11 2 25″	11 2 20	11 2⅓
3	10 58 20	10 58 18″	10 58

760

A year before, on the same day, 10ᵖ 57½′ was observed, which, allowing for the position of ⊙, differs from this only by 10″ [Ante annum eodem die obſeruabatur 10ᵖ 57½′, quod non differt ab hac habito reſpectu loci ⊙ niſi 10″].

DIE 11 DECEMBRIS.

11 December.

- Altitude of ⊙, merid., by the mural Q. [Alt. ⊙ merid. per Q. Mural.] 10 39 40
- by the portable Q. [per Q. portat.] 10 39 20
- by the Trigonic Sextant [per Sext. Trig.] 10 38 30

Not perfectly clear. Because of the rough weather, too, the instruments were somewhat unsteady [Non exquiſite ſerenum. Propter tempeſtatem etiam nonnihil vacillabant inſtrumenta].

DIE 14 DECEMBRIS.

14 December.

- By the mural Quadr. [Per Quadr. Muralem] 10 41 doubtful [dubia]
- By the portable Quadr. [Per Quadr. Portatil.] 10 40
- By the Trigonic Sextant [Per Sext. Trig.] 10 40
- *You can use 10 40½ here [Potes hic vti 10 40½].*

760 The September to December lines form one printed table under the single head row at the top of the left column; the headings OCTOBRIS., NOUEMBRIS. and DECEMBRIS. and the remarks are set inside it, and the head row is not repeated. On the 5 September line the word ”exquiſite” stands after the mural value, in the space of the lesser-quadrant file, which carries no value that day; the Sext. file is also empty. The asterisks after ”34 15” (13 September), ”33 4” (16 September) and ”30 20” (23 September), and before the three remarks, are printed; the remarks ”*hæc non bona eſt.” and ”*non bona eſt.” are set to the right on lines of their own, ”*huic regula impoſita. Erat exquiſite” / ”ſerenum.” at the left. In the two December lines the middle value stands left of the place of the portable-quadrant file, between the places of the lesser- and portable-quadrant files, and the setting does not show which of the two it belongs to; the third value of each December line stands in the Sext. file.

Taking account of the portable Quadrant, with the Trigonic Sextant agreeing: since the Sun on this day is in 2 parte with ⅕ ♍, and is therefore one minute and 5 seconds [minuto vno ſecundis 5] from its greatest declination, the minimum altitude will be approximately 10ᵍ 39′. To this the parallax adds 3 minutes [3 ſcrupula], so that the true minimum altitude of the Sun is 10ᵍ 42′. And since the maximum, at the summer Solstice, with the parallax added, is observed as approximately 57ᵍ 37′, the difference between the two is 46 55, the whole deviation of the Ecliptic from the Equator. Hence the half of it, representing the greatest declination, is 23 27½, and the altitude of the equinoctial will be 34 9½. But it is doubtful whether the Sun at so small an altitude appears, by a refracted ray, in another place and higher than it really is, since the Pole Star [ſtella Polaris] at its greatest and least altitude does not give so great a height of the equator [non tantam præbeat æquatoris ſublimitatem].

[1] From here to the end of the year from codex V. [Hinc usque ad finem anni e codice V.]

DIE 15 DECEMBRIS.

15 December.

- By the mural Q. [Per Q. Mural.] 10 42 10
- By the portable Q. [Per Q. portat.] 10 41 40
- By the Sext. Trig. [Per Sext. Trig.] 10 41 30

DIE 19 DECEMBRIS.

19 December.

- By the mural Q. 10 51 40
- By the portable Q. 10 51 40
- By the Sext. Trig. 10 50 45
- or at most 50″ [vel ad ſummum 50″]
- By the Ruler [Per Regulam] 1964 15, resp. 10 51 50

It was not perfectly clear [Non erat exquiſite ſerenum].[761]

Having compared and examined the individual observations made around the winter Solstice, and taking account of the distance of the Sun from the tropic — how much it could change its declination in the meantime — I do not find that the minimum altitude seen can be less than 10 39½; and that chiefly taking account of the observation by the Mural Quadrant, with respect to which the greatest altitude at the summer Solstice was also taken. But with the Sun's parallax of 3 minutes [3 ſcrupulorum] added, the true minimum altitude comes out as 10° 42′ 30″. Comparing, then, most of the altitudes, the distance of the tropics and the greatest declination and the altitude of the equator give [collatis itaque pleriſque [recte: vtrisque, "both" — Corrigenda, p. 429] altitudinibus diſtantia tropicorum et declinatio maxima altitudoque æquatoris dant [recte: dantur — Corrigenda, p. 429]]:

- *True maximum altitude [Altitudo vera maxima] 57 36 50*

[761] The 19 December entry begins at the foot of the left column with the mural line and continues at the head of the right column with the portable-quadrant line; "vel ad ſummum 50″" is set to the right on a line of its own, below the seconds of "10 50 45".

- *True minimum altitude [Altitudo vera minima] 10 42 30*
- *Distance of the tropics [Diſtantia tropicorum] 46 54 20*
- *Greatest declination [Declinatio maxima] 23 27 10*
- *Minimum altitude [Altitudo minima] 10 42 30*
- *Greatest declination 23 27 10*
- *Altitude of the equator [Altitudo æquatoris] 34 9 40*
- *Elevation of the pole [Altitudo poli] 55 50 20*[762]

So much for the Sun [Atque hæc quo ad Solem]. But taking account of the observation on day 3, which was exact enough and agreed with the one we had a year before on the same day — the change in the Sun's position, however, being taken into consideration — the minimum altitude could also, I say, be 10° 39′ 50″. With this agrees the observation made on 14 December, which was 10 41; from it, too [recte: enim, "for", in place of the printed etiam — Corrigenda, p. 429], 5″ [minuta ſecunda 5″] come to be subtracted, by which the Sun varies its declination, so that the minimum altitude is 10 39 55. So too the following day subtracts 2′ 20″ from the observed altitude 10 42 10, so that the true minimum altitude is 10 39 50, to which the parallax adds 3 minutes [3 minuta], so that the true one is 10 42 50.

- *Otherwise [Aliter]: True maximum altitude 57 36 50*
- *True minimum altitude 10 42 50*
- *Greatest declination 23 27 0*
- *Altitude of the equator 34 9 50*
- *Elevation of the pole 55 50 10*

DIE 20 DECEMBRIS.

20 December.

- By the mural Q. [Per Q. Muralem] 10 55 20
- By the Sext. Trig. 10 54 20
- By the Ruler 1963 50, resp. 10 57 45

It was not clear enough [Non erat ſatis ſerenum]; *the Ruler had not been corrected [non erat Regula correcta].*

DIE 26 DECEMBRIS.

26 December.

- By the mural Q. 11 26 20
- Ber [recte: Per — Corrigenda, p. 429] Sext. Trig. 11 26 15
- By the Ruler 1960 35, resp. 11 25 40

It is not certain [non eſt certa]. Both observations by the Mural agree well with each other [Vtraque obſeruatio per Muralem ſibi inuicem bene reſpondet].[763]

[762] The eight lines stand in two halves of four, side by side, with a short printed vertical rule between them.

[763] The second line of the 26 December entry begins "Ber" with a capital B; the lines above and below it begin "Per".

DIE 27 DECEMBRIS.

27 December.

- By the mural Q. 11 33 10
- By the portable Q. [Per Q. portatilem] 11 33 0

The observations of these two days presuppose[1]*, with respect to the changed declination for the given position of ☉ from our Ephemerides, that the minimum altitude at the winter tropic was 10 39¼ — and that as regards the Mural. The single observation of the portable takes away ⅙, so that it is 10ᵖ 39′ 5″.*

[1] Difficult to read. [Difficile lectu.]

LOCA SOLIS.[764]

Day	Observed merid. alt.	Par-all.	True Alt.	De-clin.	Longi-tude	Our Ephem.	Prutenic of Michael Mästlin	Alphons. of Giuseppe Moletti
26 Jan.	18° 6′ 0″	2′ 49″	18° 8′ 49″	15° 58′ 11″	16° 15′ 43″ ♓	16° 13′ 36″	15° 45′	16° 36½′
7 Feb.	22 1 0	2 45	22 3 45	12 3 15	28 20 46 ♒	28 19 58	27 52	
	22 1 45		22 4 30	12 2 30	28 22 57 ♒			
22 —	27 32	2 38	27 34 38	6 32 22	13 22 13 ♓	13 21 47	12 56	
	27 32 30		27 35 8	6 31 52	13 23 30 ♓			
2 Mart.	30 39	2 30	30 41 30	3 25 30	21 22 0 ♓	21 19 40		
	30 38 15		30 40 45	3 26 15	21 20 0 ♓			
9 —	33 24 0	2 30	33 26 30	0 40 30	28 18 12 ♓	28 15 59		
10 —	33 47 40	2 28	33 50 8	0 16 52	29 17 37 ♓	29 15 19	28 51	
13 —	34 58 20	2 26	35 0 46	0 53 46	2 15 7 ♈	2 13 4	1 49	
	34 59 0		35 1 26	0 54 26	2 16 47 ♈			
14 —	35 21 45	2 25	35 24 10	1 17 10	3 14 0 ♈			
	35 22 20		35 24 45	1 17 45	3 15 27 ♈	3 12 16	2 49	
16 —	36 9 0	2 24	36 11 24	2 4 24	5 12 58 ♈	5 10 35	4 47	
	36 8 30		36 10 54	2 3 54	5 11 42 ♈			

[764] the printed head row reads, cell by cell: *Die · Alt. merid. obſeruata · Parall. · Alt. Vera · Declin. · Longitudo · Ephem. noſtræ · Prutenicæ Mæſtlini · Alphonſ. Moletii.* Marks of arc stand on the first body line only, and there on every cell; every other figure group on the side is bare. The dashes in the day column are printed on the leaf.

Day	Observed merid. alt.	Par-all.	True Alt.	De-clin.	Longi-tude	Our Ephem.	Prutenic of Michael Mästlin	Alphons. of Giuseppe Moletti
24 —	39 15 0	2 18	39 17 18	5 10 18	13 5 30 ♈	13 2 11	12 41 0	
	39 15 30		39 17 48	5 10 48	13 6 49 ♈			
26 —	40 1 0	2 16	40 3 16	5 56 16	15 4 5 ♈	14 59 45	14 39	15 19
	40 1 45		40 4 1	5 57 1	15 6 0 ♈			
27 —	40 24 0	2 16	40 26 16	6 19 16	16 4 ♈	15 58½	15 38	16 18
	40 23 20		40 25 36	6 18 36	16 2 ♈			
28 —	40 46	2 14	40 48 14	6 41 14	17 1 0 ♈	17 1 23	16 39 0	17 17 0
	40 46 40		40 48 54	6 41 54	17 2 39 ♈			
31 —	41 52 50	2 12	41 55 2	7 48 2	19 57 ♈	19 53	19 34	
	41 54		41 56 12	7 49 12	19 59 35 ♈			
2 Apr.	42 37 30	2 10	42 39 40	8 32 40	21 55 21 ♈	21 50	21 31	22 9 [1]
4 —	43 21	2 10	43 23 10	9 16 10	23 53 ♈	23 28	23 47	24 6 [2]
5 —	43 42	2 8	43 44 8	9 37 8	24 50 ♈	24 46	24 27	25 4 [3]
	43 42 30		43 44 38	9 37 38	24 51 ♈			
8 —	44 46 30	2 6	44 48 36	10 41 36	27 47½ ♈	27 41	27 22	
	44 46		44 48 6	10 41 6	27 46 ♈			
9 —	45 7 30	2 6	45 9 36	11 2 36	28 46½ ♈	28 39	28 21	28 57
	45 8 0		45 10 6	11 3 6	28 48 ♈			
14 —	46 49 10	2 2	46 51 12	12 44 12	3 38½ ♉	3 30	3 13	3 48
	46 48 30		46 50 32	12 43 32	3 36 ♉			
15 —	47 9	2 2	47 11 2	13 4 2	4 37 ♉	4 28	4 12	4 46
	47 7 45		47 9 47	13 2 47	4 33 ♉			
16 —	47 28	2 2	47 30 2	13 23 2	5 34 ♉	5 26	5 10	5 43
18 —	48 6 45	1 59	48 8 44	14 1 44	7 31½ ♉	7 22 22	7 7	7 39
19 —	48 25 30	1 59	48 27 29	14 20 29	8 29 ♉	8 20 23	8 5	8 37
20 —	48 44 30	1 57	48 46 27	14 39 27	9 29 ♉	9 18 23	9 3	9 35

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- [1] Adſcriptum eſt: Pone locum ☉ hoc die in 21 54 ♈. — "Added in writing: Put the place of the ☉ on this day at 21 54 ♈."
- [2] Adſcriptum eſt: Pone locum ☉ in 23 51 ♈. — "Added in writing: Put the place of the ☉ at 23 51 ♈."
- [3] Adſcriptum eſt: Locus ☉ in 24 50 ♈. — "Added in writing: The place of the ☉ at 24 50 ♈."

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Day	Observed merid. alt.	Par-all.	True Alt.	De-clin.	Longi-tude	Our Ephem.	Prutenic of Michael Mästlin	Alphons. of Giuseppe Moletti
20 Apr.	48°44′ 0″		48°45′57″	4°38′57″	9°27′ ♉			
21 —	49 2 30	1′57″	49 4 27	14 57 27	10 26 ♉	10°16′22″		10°32′
22 —	49 21	1 57	49 22 57	15 15 57	11 25 ♉	11 14 19		11 30
23 —	49 38 45	1 54	49 40 39	15 33 39	12 23 ♉	12 12		12 28
24 —	49 56	1 54	49 57 54	15 50 54	13 20 ♉	13 10		
25 —	50 14	1 54	50 15 54	16 8 54	14 20 ♉	14 8	13°53′	14 23
26 —	50 30 45	1 52	50 32 37	16 25 37	15 17 ♉	15 6		
1 Maij	51 52	1 50	51 53 50	17 46 50	20 7 ♉	19 55		
5 —	52 51 45	1 48	52 53 33	18 46 33	23 58 ♉	23 45	23 33	23 58
6 —	53 5 30	1 48	53 7 18	19 0 18	24 55 ♉	24 43	24 31	24 56
7 —	53 19 30	1 48	53 21 18	19 14 18	25 53 ♉	25 40		25 53
15 Aug.	45 5	2 6	45 7 6	11 0 6	1 21 ♍	1 20	1 19	1 19
16 —	44 44	2 6	44 46 6	10 39 6	2 19 ♍	2 18		2 17
19 —	43 41	2 8	43 43 8	9 36 8	5 13 ♍	5 12		5 11
27 —	40 45 30	2 14	40 47 44	6 40 44	13 0 ♍	12 59		
1 Sept.	38 52	2 18	38 54 18	4 47 18	17 53 ♍	17 51		17 51

765 sixteen rows have a blank day cell. The raised figures 1, 2, 3 stand at the far right of the Alphonsine cells of 2, 4 and 5 April and key the three notes below.

766 the footnotes, set in smaller roman type below the frame:

767 Marks of arc stand on the first body line and on the first entry of four columns that begin lower down (*Parall.* and *Our Ephem.* on 21 April, *Prutenic* on 25 April, *Alphons.* on 21 April); every other figure group is bare.

Day	Observed merid. alt.	Par-all.	True Alt.	De-clin.	Longi-tude	Our Ephem.	Prutenic of Michael Mästlin	Alphons. of Giuseppe Moletti
2 —	38 29	2 19	38 31 19	4 24 19	18 52 ♍	18 49½		18 49
5 —	37 20	2 22	37 22 22	3 15 22	21 47½ ♍	21 45½	21 43	21 45[1]
	37 20 40	2 20	37 23 0	3 16 0	21 46 ♍			
8 —	36 10	2 24	36 12 24	2 5 24	24 44 30 ♍	24 42	24 38	24 42
	36 11		36 13 24	2 6 24	24 42 0 ♍			
11 —	35 0 20	2 26	35 2 46	0 55 46	27 40 ♍	27 38⅓	27 34	27 38
	35 1		35 3 26	0 56 26	27 38 ♍			
13 —	34 13 10	2 28	34 15 38	0 8 38	29 38⅓ ♍	29 36¼		29 39
14 —	33 50	2 28	33 52 28	0 14 32	0 36½ ♎	0 35¼		
16 —	33 2 40	2 30	33 5 10	1 1 50	2 35 ♎	2 33⅓		2 33
	33 4		33 6 30	1 0 30	2 32 ♎			
23 —	30 18 30	2 34	30 21 4	3 45 56	9 30 ♎	9 28	9 22	9 29
	30 19		30 21 34	3 45 26	9 29 ♎			
24 —	29 55 30	2 34	29 58 4	4 8 56	10 28½ ♎	10 27		10 28
	29 56		29 58 34	4 8 26	10 27¼ ♎			
29 —	27 59 50	2 37	28 2 27	6 4 33	15 25½ ♎	15 24½	15 18	15 26
1 Oct.	27 14	2 39	27 16 39	6 50 21	17 24⅔ ♎	17 23⅔	17 17	17 25
	27 14 30		27 17 9	6 49 51	17 23⅓ ♎			
10 —	23 53 30	2 43	23 56 13	10 10 47	26 21 ♎	26 21⅔	26 13	26 24
	23 54 0		23 56 43	10 10 17	26 22 ♎			
12 —	23 10 10	2 44	23 12 54	10 54 6	28 22½ ♎	28 21½	28 12	28 25
	23 9 40		23 12 24	10 54 36	about 28 24			
14 —	22 28 0	2 45	22 30 45	11 36 15	0 21¾ ♏	0 21 36		
15 —	22 7 20	2 45	22 9 5	11 57 55	1 24 ♏	1 21⅔	1 11	1 25
20 —	20 25 10	2 47	20 27 57	13 39 3	6 22 24 ♏	6 22⅔	6 11	6 27

Day	Observed merid. alt.	Par-all.	True Alt.	De-clin.	Longi-tude	Our Ephem.	Prutenic of Michael Mästlin	Alphons. of Giuseppe Moletti
24 —	19 8 0	2 48	19 10 48	14 56 12	10 22 6 ♏	10 23 55	10 11	10 29
	19 7 20		19 10 8	14 56 52	10 24 13 ♏			
26 —	18 30	2 49	18 32 49	15 34 11	12 24 50 ♏	12 24 45	12 12	12 30

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• [1] Ephemerides Stadij 21 42 ♍. — "The *Ephemerides* of Stadius: 21 42 ♍."

Day	Observed merid. alt.	Par-all.	True Alt.	De-clin.	Lon-gitude	Our Ephem.	Prutenic of Michael Mästlin	Alphons. of Giuseppe Moletti
26 Oct.	18°31′		18°33′49″	15°33′11″	12°21 38 ♏			
30 —	17 19 15	2′50″	17 22 5	16 44 55	16 24 ♏	16°26¾	16°13′	16°33′
7 Nov.	15 10 0	2 51	15 12 51	18 54 9	24 29 45 ♏	24 32	24 16	24 40
	15 9 30	2 50	15 12 20	18 54 40	24 32 ♏			
8 —	14 56 15	2 50	14 59 5	19 7 55	25 26 45 ♏	25 32 50	25 17	25 41

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OBSERUATIONES LUNÆ.

Observations of the Moon.

DIE 21 JANUARIJ.

21 January.

☾, shortly after the first quarter [primum Quadrantem], near the perigee of the epicycle [perigæum Epicycli], was observed near the 90th degree of the ecliptic and on to the meridian, in the following way. ☾ was in the 90 Gr. from the Aſc. at H. 5 M. 20.

The following observations by the Sext. △:

[768] ten rows have a blank day cell. The parallax cell of the first line (20 April) is blank on the leaf. The longitude cell of the second line under 12 October reads *28 24 fere*, the word set after the figures, and carries no zodiacal sign. A raised figure 1 stands after the Alphonsine cell of 5 September and keys the note below. The first line of this side is dated 20 April, as is the last line of the previous page; the two lines carry different figures.

[769] the footnote, set in smaller roman type below the frame:

[770] the parallax cell of the 26 October line is blank on the leaf, and so are its last three cells; the day cell of the fourth line is blank. The first line of this side is dated 26 October, as is the last line of the previous page; the two lines carry different figures.

- H. 5 24′ — its western limb was distant from the bright foot of Erichthonius [Erichtonij] 24 15
- 5 44 — in the same way, from the same, 24 3
- 5 45 — the same distance 24 2
- 5 49 — the same distance 24 0
- Then by the astronomical Arc [Arcum aſtronomicum].
- H. 6 10 — the same distance 23 50
- 6 15 — the same distance 23 48

Meanwhile several azimuths and altitudes of ☾ were also observed by the Lesser Quadrant, taking the more westerly limb in the azimuths and the upper horn in the altitudes, in this way:

	Azim.	Altit.
H. 3 34 10	58 0	43 44
3 37 58	56 53	44 8
5 26 30	21 36	53 46½
5 40 32	15 45	54 38
5 44 35	14 40	54 42
5 48 10	13 10	54 49
6 3 50	7 0	55 19½
6 9 55	4 35	55 26½
6 15 38	2 20	55 28

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Then ☾ crossed the meridian with its more westerly limb at H. 6 22′ 45″; the Alt. of the inf. limb, 54 58. The Alt. of the upper horn, which inclined a little toward the west, was found by the mural Quadrant [Quadr. Muralem] to be 55 36½. So the altitude of the centre was 55 20, good. The Moon, moreover, was so close to the Pleiades [pleiadibus] that about the time it crossed the meridian it stood, observing by the Radius, 1^{p} 12′ from the one that is the brighter of the Pleiades. This star, moreover, was more northerly than the Moon and a little farther toward the east.

At hour 8⅓, moreover, they appeared joined, as far as sight goes, to the same star of the Pleiades, for a line drawn through both horns pointed at the star itself, as far as the eyes could make out; but the more northerly apex of the Moon was distant from the star itself by two lunar diameters, as far as sight goes, which also agrees well enough with the observation by the Radius.

At the following noon the Clock was found to run 19′ 10″ fast, the transit of the ☉ having been observed through the slits of the sights.

DIE 22 JANUARIJ.

22 January.

The Moon is near the 90th degree at 6^{H} 45′. The following observations by the Sext. Trig.

771 the small table is unframed and unruled; the heads *Azim.* and *Altit.* stand over the second and third figure columns, and no head stands over the first. *H.* is set on the first line only.

- H. 7 1 — Between the western — 9 59
- 7 6 — limb of ☾ and the bright — 9 59
- 7 11 — foot of Erichthonius [Erichtonij] — 9 56
- 7 16 — 9 53½

At the time of these observations it was not clear enough, because of the density of the surrounding clouds.

- H. 7 21 — the same distance 9 56
- 7 23 — 9 53
- 7 26½ — 9 52
- 7 38 — 9 47 and

at the time of this observation ☾ was on the meridian. In these later ones, however, the sky was a little clearer.

H. 6 33′ 35″: Azim. of ☾ from the south toward the east, by the Quad. Lesser [Quad. min.], 23 26; Alt. 55 43 — with respect to the western limb in the azimuth, and with respect to the upper horn in the Alt. This is not good, for it was not clear.

Meanwhile, by the Lesser Q. [Q. Minor.], some azimuths of the western limb of ☾ and altitudes of the upper horn were observed, in this way:

- H. 7 1 40 — Azim. 13 30 — Alt. 56 54
- 7 6 48 — 11 47 — 57 0½
- 7 11 8 — 9 52 — 57 6
- 7 15 54 — 8 4 — 57 12
- 7 21 55 — 5 45 — 57 20

At H. 7 M. 37 54″ the more westerly limb of ☾ was on the meridian; Alt. of the upper horn by the Lesser Q. [Q. Minorem] 57° 30⅓′.

At the following noon the Clock was ahead of noon by H. 1 50′ 40″.

DIE 23 JANUARIJ.

23 January.

☾ near the 90th degree of the ecliptic at H. 8 17′.

- H. 8 9 — Between the limb of ☾ — 26 9
- 8 13 — the western one — and — 26 6½
- 8 17 — the lower head of ♊ — 26 3½
- 8 22 — 26 1½
- 8 25 — 26 0
- 8 31 — 25 59
- 8 35 — 25 57[772]

Meanwhile ☾ was observed by the Lesser Q. [Q. Minorem] in azimuths from the south toward the east, as to the western limb [occid. limbum], and in altitude as to the upper cusp.

[772] in the two runs of this column the words of one phrase are set across three lines beside the figures (*Inter occidentalem / limbum ☾ et lucidum / pedem Erichtonij*; *Inter ☾ limbum / occidentalem et / inferius caput ♊*). The word *et* closes the displayed line *7 38 … 9 47* and runs on into the prose line below.

- H. 8 9′ 5″ — Azim. 17 20 — Alt. 56 56½
- 8 13 40 — 15 52 — 57 5
- 8 17 50 — 14 31 — 57 15
- 8 23 20 — 12 33 — 57 22
- 8 27 20 — 10 1 — 57 29
- 8 33 25 — 8 52 — 57 35
- 8 37 55 — 7 23 — 57 37½

The western limb [Occid. limbus] of ☾ was on the meridian

- 8 57 50 by the mural Q. [Q. Muralem]; Alt. of the upper horn [ſuper. cornu] 57 48½; of the lower horn [inf. cornu] 57 14
- 8 58 0 by the Square [Quadratum]
- 8 58 2 by the Lesser Q. [Q. min.], upper horn [ſup. cor.] 57 49½
- 9 5 22 the right shoulder of Orion [Orionis] was on the meridian, Alt. 40 [recte: 41 — Corrigenda, p. 429] 20½

About the rising of the ☉ on the following day the Clock was found to be running more than two hours faster than it should, an error which applies only to the time elapsed since the setting of the ☉. The time of these observations can, however, be corrected more exactly from the transit of the right shoulder of Orion.[1]

DIE 24 JANUARIJ.

24 January.

At H. 9 14′ 26″ the western limb of ☾ was on the meridian; Alt. of the upper horn [ſuper. cornu] 56 28½, and that by the Lesser Q. [Q. Min.]; by the mural, however, 56 25.

But these observations are not certain enough, because ☾ was being observed as if through clouds.

DIE 27 JANUARIJ.

27 January.

Of the visible ☍ of ☾ and ☉, existing on the western horizon.

DIE 19 FEBRUARIJ.

19 February.

The more westerly limb of ☾ was on the meridian[773]

- [1] Poſtea adſcriptum eſt in codice V.: — "Afterwards there was added in writing in codex V.: —"
- Calculation for the Latit. and diverſitate ☊ ☾ on 23 January [Calculus pro Latit. et diverſitate ☊ ☾ die 23 Januarij.]
- H. 8 M. 21 transit of the centre of ☾ through the meridian.
- Altitude of the centre fixed by the two instruments 57 31 30
- And therefore the apparent declination 23 26 0

[773] the footnote, set across the full measure in smaller roman type with old-style figures; its first line is keyed by the raised 1 after *Orionis* in the right column.

- Longitude from our hypothesis for the year 1600, corr., 22°44′ ♊
- Distance from the earth 56°45′45″
- Distance from the zenith 32 28
- Reſp. Parallax 34 43. The rest is missing.[774]
- H. 6 24 48 by the mural Q. [Q. Muralem]
- 6 24 49 by the lesser Q. [Q. Minorem]; Alt. of the upper cusp of ☾ while it was on the meridian, with respect to the western limb, 57 41, moderately good.
- 6 24 50 by the □.
- 6 30 1 the southern horn of ♉ was on the meridian, by the □ and the mural.
- 6 30 11 by the lesser Q. [Q. min.]. *This belongs to the observation of ☾, so that the time of the transit may be known.*

DIE 22 FEBRUARIJ.

22 February.

☾ on the meridian had an Altit. of 56 16⅓, with respect to the western limb and the upper cusp, by the lesser Q. [Q. minorem].

DIE 14 MARTIJ.

14 March.

Immediately after the setting of the ☉ a new moon [noua luna] appeared, although the new moon [nouilunium] had fallen on the day immediately before, at H. 8 p. m.

DIE 28 MARTIJ.

28 March.

About H. 2 M. 41 a. m. ☾ was found to have come to 90 G.

By the lesser Quad. [Quad. minorem].

	Az. of the western limb from the mer. toward the west [Az. occ. limbi a mer. verſ. occ.]	Alt. of the upper horn [Alt. ſup. cornu]
H. 2 39 10	43 0	14 18
42 40	43 52	13 56
43 30	44 50	13 27⅓
51 50	45 50	13 3½

[775]

[774] in the note's last line the words *Cetera deſunt* stand inside printed square brackets, followed by a full stop. In the note's second line the word *diverſitate* is followed directly by the node glyph and the Moon glyph.

[775] the small table is unframed and unruled; each of the two heads is set in two lines of smaller roman type over its figure column, and no head stands over the time column. *H.* is set on the first line only.

Around the time of these observations, the sky being hardly clear, the distance between Spica [Spicam] ♍ and ☾ could not be taken because of the clouds.

DIE 3 APRILIS A. M.

3 April, a. m.

At H. 4 29′ 58″, by the lesser Quadr. [Quadr. minorem], ☾ crossed the meridian, and its upper horn had an Altitud. of 10 29 by the mural Quadr. [Quadr. Muralem].

- *Therefore the apparent altitude of the centre 10 12*
- *It should have been 10 59*
- *Therefore the parallax of altit. 0 47*

But the multitude of clouds, by which ☾ was almost covered around this time, hindered the observations.

On this very day, 3 April, the Clock was running 2 M. faster than it should.

For finding the parallax from this altitude:

- Simple motion of long. of ☾ from ☉ — 4^{sex} 12^{p} 51′26″
- Mean motion of the anomaly of ☾ — 0 45 56 8
- Double longitude of ☾ from ☉ — 2 25 42 52
- Part II of the epicycle for the equated anomaly [Pars II Epicycli ad: anomaliæ coæquatæ] — 5 53 7
- Equated anomaly — 0 51 49 15
- Observed altitude — 10 29
- Distance from the vertex — 79 31
- Double distance from the vertex — 159 2
- Difference of the I and II limit — 2 11
- Parallax of the second limit — 52 10
- Parallax of the III limit — 62 2
- Difference of the III and IV limit — 3 25
- Proportional minutes of the lesser epicycle [Epicycli minoris ſcrup. proport.] — 54 50
- Congruent part [Pars cong.] — 1 59
- Corrected parallax of the apogee — 50 11
- Other part of the parall. of the III lim., to be added [Pars altera parall. III lim. add.] — 3 7
- Corrected parallax of the perig. — 65 9
- Difference of the parallaxes found — 14 58
- Proportional minutes of the greater epicycle [Scrupula proport. maioris epicycli] — 10 40
- Congruent part of the apog. from the diff. of the par. [Pars congruens apog. de diff. par.] — 2 39

- Parallax sought from the alt. — 52 50[776]

DIE 20 APRILIS.

20 April.

At H. 7 44′ ☾ on the meridian had, with respect to the upper cusp, an alt. by the lesser Q. [Q. min.] of 29 43; by the portable Q. [Q. portatilem] 29 43½.

DIE 24 APRILIS.

24 April.

At H. 10 40′ 30″ P. M., ☾ on the meridian, 20 32; by the Sext. Trigon. 20 31½.

DIE 26 APRILIS.

26 April.

At H. 12 5′, ☾ on the meridian: by the lesser Q. [Q. Min.] 13 38½; by the Sext. Trig. 13 38.

DIE 24 MAIJ.

24 May.

At H. 10 43′ 10″, ☾ on the meridian, Alt. of the upper limb 12 9½; by the portable Q. [Q. portat.] 12 7.

DIE 21 JUNIJ, P. M.

21 June, p. m.

At H. 9 25′ 20″ ☾ was on the meridian with respect to the more westerly limb, having, for the upper horn [ſuperiore cornu], an alt. by the lesser Q. [Q. min.] of 11 P. 5′.

- 10 24 15 Distance of the infer. limb of ☾ from the heart of ♏ [corde ♏], by the Radius, 1 45
- 10 31 the same distance 1 46
- 10 35½ the same 1 48
- 10 40 the same, between ☾ and the heart of ♏, 1 48

DIE 24 JUNIJ.

24 June.

- H. 11 M. 53 20″ the more westerly limb of ☾ was on the meridian; Altit. of the upper circumference by the mural Q. [Q. Mural.] 12 16

[776] Its figures stand in four columns aligned at the right: only the first line carries marks over them — a raised *sex* after the first figure, a raised *p* after the second, a prime after the third and a double prime after the fourth, the last two close-set. The lines *Motus medius Anomaliæ*, *Duplex longitudo* and *Anomalia coæquata* fill all four columns; *Pars II Epicycli* fills the second to fourth; *Altitudo obſeruata*, *Diſtantia a vertice* and *Duplex diſtantia a vertice* stand in the second and third; every line from *I et II limitis differentia* to the end stands in the third and fourth. No mark is printed on any line but the first. The word *ad:* in the fourth line is followed by a colon on the leaf.

• 11 53 30 by the lesser Q. [Q. Minorem] 12 17

Because of rather scattered clouds, ☾ could not be seen clearly enough.

On the 26th the Clock was running 5 M. fast, and this error was common to three days.

DIE 15 SEPTEMBRIS.

15 September.

At H. 7 M. 6 35″ the Moon [Luna] was on the meridian with respect to the more westerly limb, and its upper horn had the Alt.:

• by the lesser Q. [Q. Minor.] 14 27
• by the Portat. 14 26⅓
• by the Sext. Trig. 14 27

DIE 16 SEPTEMBRIS.

16 September.

At H. 8 11′ 0″ the more westerly limb of ☾ was on the meridian; upper horn:

• by the lesser Q. [Q. Min.] 17 44
• 8 11 5 by the mural Q. [Q. Mural.] 17 42
• by the Sext. Trig. 17 42½
• by the Q. portat. 17 43¼[777]

DIE 12 OCTOBRIS.

12 October.

At H. 5 19′ 20″ the more westerly limb of ☾ was on the meridian, by the mural; Alt. of the upper horn 13 38, very nearly [fere]; by the Sext. Trigon. 13 38⅓.

• 5 19 35 by the lesser Q. [Q. Minorem].
• 5 45 25 the bright star of the Vulture [lucida Vulturis] crossed the meridian, by the mural Q. [Q. Muralem]. [recte: add *Alt. 41 56⅓* — Corrigenda, p. 429]
• 5 45 45 by the lesser Q. [Q. Minorem].

DIE 14 OCTOBRIS.

14 October.

• H. 6 51′ 43″ the western limb of ☾ was on the meridian, by the mural Q. [Q. Mural.]; Alt. of the upper horn 20 7½
• 7 14 30 the left shoulder of ♒ crossed the meridian, by the mural Q. [Q. Muralem].

DIE 15 OCTOBRIS.

15 October.

[777] in the second of these lines the time *8 11 5* stands at the left of the line, before the instrument; the other three lines carry no time.

At H. 7 40′ 2″ the western limb of ☾ was on the meridian, and its upper horn had the Alt.:

- by the mural Q. [Q. Mural.] 24 32, very nearly
- by the Sext. Trigon. 24 33, very nearly
- 7 47 24 the right shoulder of ♒ was on the meridian, by the mural Q. [Q. Muralem]; but this observation was not accurate enough, because of the brightness of ☾.

At the next noon the Clock we were using was running 1′ 18″ fast.

DIE 11 DECEMBRIS.

11 December.

☾ about 90 G. at H. 0 M. 36 P. M.

At H. 5 43′ 0″ the more westerly limb of ☾ crossed the meridian, and the Alt. of the upper horn by the mural Q. [Q. Muralem] was 35 46⅔; by the Sext. Trig. 35 48¼.

OBSERUATIONES RELIQUORUM QUINQUE PLANETARUM.

Observations of the remaining five planets.

DIE 16 JANUARIJ.[1]

16 January.

Because from the beginning of this year up to this day there had been no clear sky, this evening we observed ♂ for the first time since its digression from the ☌ of the Sun, while it was still retrograde, in this way:

At H. 7½, by the Sext. Trigon., it was distant from the bright foot of Erichthonius [Erichtonij] P. 23 M. 29, and this was observed carefully two or three times.

Around that time, moreover, ♂ had an Alt. of P. 51.

At about H. 8 ♂ was distant from Hercules [Hercule][778] P. 7 *37′, repeating the same observation three times*

- [1] Sequentia e codice V. "The following from codex V."[779]

except that once the distance found was 7 37¼.

H. 8⅓: between the upper head of ♊ and ♂, once 7 15, but on repeating it twice 7 17; you will therefore be able to use the distance 7 16 without perceptible error.

At H. 10½ ♂ was again distant from the brighter one of the foot of Erichthonius [Erichtonij] 23 25, twice; but once, at the same instant, we observed 23 27 (this is better, or at least 23 26½); you can therefore use, without any perceptible error, a distance of P. 23 M. 26.

[778] "Hercules" here is an old name for the following (southern) Twin of Gemini, Pollux, from the tradition that the Twins are Apollo and Hercules; it is not the constellation Hercules.

[779] the footnote is set in smaller type below the left column of the lower block, keyed by the raised 1 after the rubric *DIE 16 JANUARIJ.*

H. 11: between ♂ and Hercules [Herculem] 7 40,[780] but the observation was made only once.

Note. The star of Mars crossed the meridian. At hour 10, minute 9⅓, ♂ crossed the meridian, having an Alt. by the lesser Quadrant [Q. Minor.] of 61 18, but by the greatest mural Quadrant [Q. Maximum Muralem] 61 16, which you can trust rather more.

At H. 10 30′ 55″ the upper head of ♊ *crossed the meridian, having an altitude of 66 50.*

At H. 10 42 55 the lower head of ♊ *crossed the meridian, having an altitude of P. 63 M. 4. These two altitudes, however, were taken with the lesser Quadrant.*

Then again, on the following morning, after the midnight preceding 17 January, Mars was observed at about the 4th [4^tam] hour after midnight to be distant from Hercules 7^g 42½′, the same three times; Alt. 20^g.

H. 5 M. 0: from the heart of Leo [Leonis] 43^g 58′, three times, the same; Alt. 15^g.

N. B. By the Ruler [Regulam], Mars appeared exactly on the straight line drawn from the bright left foot of Erichthonius to the heart of ♌. And since the distance along this line, in which its motion lay, was given from the foot of Erichthonius on the preceding evening near rising, and now from the heart of ♌ near setting, the parallax of longitude will be obtained from this, once the daily motion is applied.

DIE 17 JANUARIJ.

17 January.

We observed ♂ again, more exactly, in this way.

From hour 5¼ to hour 5½ it was observed three times to be distant from the bright foot of Erichthonius P. 23 M. 16, exactly enough.

It was, moreover, in the 90th degree [in 90 Gradu] at H. 5 26⅙, its azimuth having been verified; and it had an altitude of P. 33 M. 32 by the lesser Quadrant, as I myself observed.

Then from hour 6¼ to hour 6½ the same distance of ♂ from the said foot of Erichthonius was observed as 23 15, less by 1′ [vno ſcrupulo minor].

At H. 7¾ ♂ was distant from the Heart of ♌ P. 44 M. 6½, twice, exactly.

H. 5 M. 45: between the upper head of ♊ *and ♂, 7 24¼, repeating it three times from H. 5 40 to hour 5 50, except that once I found 7^g 24′, once 7 24½. So take the mean of these, which is 7 24¼, and your error will be imperceptible.*

Then from H. 5 56 to hour 6⅙ I again observed, three times, the distance from the lower head to ♂, and found it the same each time, P. 7 M. 47, exactly.

The same evening [eadem veſperi] the distance between the heads of ♊ *was observed as 4 31½.*

And between the lower head of ♊ *and the foot of Erichthonius, 30 34.*

H. 6 27: ♂ again from the upper one of ♊, *P. 7 M. 23⅔.*

H. 7 34: from the lower one of ♊, *7 47.*

[780] "Hercules" is an old name for the following (southern) head of Gemini, Pollux, and "Apollo" (below) for the preceding head, Castor, from the tradition that the Twins are Apollo and Hercules.

Then the distance of ♂ from the little star in the shoulder of the lower ♊ [inferioris ♊] was observed three times, from hour 7¼ to hour 7½, and each time it was found to be 7 51. Meanwhile, moreover, the azimuths and altitudes of ♂ were observed from time to time, in this way:

- *H. 6 M. 10 — Azim. 80 20 — Alt. 39 3*
- *6 20½ — 78 55 — 41 10*

Then I myself observed the transit of the eye of ♉ across the meridian, and found its meridian altitude to be P. 49 M. 41½ by the mural Quadrant [Q. Muralem]; but by the lesser Quadrant [Q. Minorem] its Alt. was found as P. 49 M. 39, less by 2′ [duobus minutis minorem]. This, however, is not to be trusted.

At hour 10, minute 3, ♂ crossed the meridian, having an Alt. by the lesser Quadrant [Q. Minorem] of 61 16, by the mural Quadrant [Q. Muralem] 61 16½; and by the square of the meridian [quadratum Meridiej] it was exactly H. 10 M. 3 S. 5, which you can verify at the following noon.

The altitude, however, is certain enough in both cases.

Then again, when ♂ was near the top of the sky.

At H. 10 35 its distance from the bright foot of Erichthonius [Erichtonij] was observed: 23 12½.

But a quarter of an hour after 11 the same was carefully repeated three times: 23 12.

- *H. 11¼ the lower head of ♊ and ♂ — 7 52½, twice*
- *11¾ between ♂ and Apollo [Apollinem] — 7 26½, twice*
- *12 6 the Heart of ♌ and ♂ — 44 11*
- *12 14 the Heart of ♌ and ♂ — 44 11*
- *12½ between ♂ and the armpit of the lower ♊ [axillam infer. ♊] — 8 10, three times*

Note. I take the distance of ♂ from this star for this reason: its course proceeds, as it were, away from it, so that the distance compared morning and evening will show the parallax of ♂. This one in the armpit had a meridian Alt. [Alt. Merid.] of 59 25; the southern head of ♊ a meridian Alt. [Alt. Mer.] of 63 3; both by the mural Q. [Q. Muralem].

Then again, when ♂ was near the 90th degree [90 Gradum] toward the west, the following were observed:

- *H. 2 54′ Between ♂ and the bright — 23 8⅔*
- *3 0 foot of Erichthonius — 23 9*
- *3 8 — 23 9*
- *3 11 — 23 9*
- *3 16 — 23 9*
- *3 24 ♂ and the heart of ♌ — 44 13*
- *3 30 — 44 13*
- *3 38 — 44 13*
- *3 50 ♂ and the upper ♊ [ſuperius ♊] — 7 28¼*
- *4 0 — 7 28½, good [bona]*
- *4 11 ♂ and the lower ♊ [inferius ♊] — 7 52*
- *4 30 — 7 52½*

- *4 40 the armpit of the lower* ♊ *[Axilla infer.* ♊*] and* ♂ — *8 0*
- *4 46 — 7 59*
- *4 52 — 7 59*
- *4 58* ♂ *and the heart of* ♌ — *44 13½*
- *5 3 — 44 14*
- *5 6 — 44 14*[781]

Meanwhile several altitudes and azimuths of Mars were observed, in the manner that follows:

- *H. 3 2′ — Azim. 85 20 — Alt. 30 26*
- *3 11½ — 83 24 — 29 0*
- *3 16⅙ — 82 33 — 28 24*
- *4 5⅓ — 73 0 — 23 19*
- *4 8½ — 72 40 — 22 14*
- *4 13 — 71 50 — 20 21*
- *4 18¾ — 70 20 — 19 59*
- *4 25½ — 69 0 — 18 56*
- *4 29⅓ — 68 20 — 18 24*
- *4 53⅔ — 63 45 — 15 10*

From these, the altitude of ♂ *corresponding to the observations of the distances can be derived.*

At the following noon the greater Clock [Maius Horologium] was running slower than correct by 5^{m} *[quinis ſcrupulis primis].*

DIE 18 JANUARIJ, VESPERI.

18 January, evening.

At H. 5 5′ we observed between ♂ and the bright foot of Erichthonius, three times, exactly: 23 1½.

- 5 30 Between ♂ and the upper head of ♊, twice — 7 34
- once — 7 33½
- 5 40 Between ♂ and the lower head of ♊, twice — 8 1

At H. 6½ we observed between ♂ and the star in the armpit of the lower ♊: several times 8 5′, once 8 3, once 8 8, several times 8 5½. But these observations are not certain enough — partly because of the smallness of the star, which made it less conspicuous, and partly also because of the wind, by which the instrument was shaken too much, so that it could not be observed exactly enough.

- H. 8 52′ Between the heart of ♌ and ♂ — 44 22
- 8 56 The same distance — 44 22
- 11 20 Between ♂ and the bright foot of Erichthonius — 22 58
- soon repeated [mox repetita] — 22 58[782]

[781] the words *Inter* ♂ *et lucidum / pedem Erichtonij* run across the first two lines of this run.

[782] A printed right brace embraces the two lines ending *22 58*, and beside it, in smaller roman type, stands the word *bo-næ*, divided with a hyphen across the two lines: "good".

When, moreover, ♂ was in the eastern 90 G. [90 G. orientali], it had an Alt. by the lesser Q. [Q. min.] of 33 38; the corresponding declination is 27 18, less good [minus bona].

H. 10 2′ 30″ ♂ on the meridian,

- *Alt. by the lesser Q. [Q. Minorem] 61 17*
- *by the mural Q. [Q. Muralem] 61 16½*

At H. 10 26′ 25″ the upper head of ♊ *was on the meridian, having a maximum altitude*

- *by the lesser Quadrant [per Q. Minorem] 66 49*
- *by the mural Quadrant [per Q. Muralem] 66 48½*

H. 10′ 38′ 12″, exactly, the lower head of ♊ *crossed the meridian, and it had an altitude, by the lesser as well as by the greatest mural [tam per Minorem quam per Muralem maximum], of partium 63 3, exactly, as before.*

At exactly the same time the armpit of the lower ♊ *crossed the meridian together with the lower head; but Canis Minor [Canis minor] had crossed a little before.*

DIE 19 JANUARIJ, MANE.

19 January, morning.

- H. 3 10′ between ♂ and the foot of Ericht. — 22 55′, three times
- H. 3½ between ♂ and the upper head of ♊ — 7 34, three times
- once — 7 33½
- H. 3¾ between ♂ and the lower head of ♊ — 8 3, twice
- once — 8 2
- H. 4 0′ between ♂ and the armpit of the lower ♊ [axillam infer. ♊] — 8 7
- H. 4⅙ — 8 6½, three times
- H. 4¾ between ♂ and the heart of ♌ — 44 27⅓, three times
- H. 5 0 the same distance — 44 27½

Alt. of ♂ in the western 90th degree [in 90 Gradu occidentali], by the Greatest Quadrant [per Quadrantem Max.]: 33 27.

Meanwhile these azimuths were observed, with their altitudes, after ♂ had passed the western 90 Grad. [90 Grad. occidentalem]:

	Azim.	Alt.
H. 3 51′ 10″	76 1	23 32
3 58 30	74 35	22 28
4 4 30	73 29	21 57
4 9 40	72 25	21 0
4 23 50	69 44	19 13
4 51 40	64 24	15 38
5 6 30	61 34	13 45

783

[783] *Azim.* and *Alt.* stand in smaller type on a line of their own above the second and third groups of figures; the time group has no head.

These observations were made with the lesser Quadrant [per Quadrantem Minorem], and 10′ was added to each azimuth for the error which the circle of azimuths has in the meridian line.

Afterwards, at about H. 6⅓, the distance of ♂ from the lower head of ♊ was observed with the Radius [per Radium]: 8 2½.

And at H. 6⅔ the same distance: 8 3.

- H. 6⅚ — 8 3½

At the very next noon the greater Clock [Horologium Maius], which was used in these observations, was running 2′ 20″ faster.

EODEM DIE 19, VESPERI.[1]

The same day, the 19th, evening.

- H. 5 30′ between ♂ and the foot of Ericht., lucid. — 22 47¼
- 5 37 the same distance repeated — 22 47½
- 5 40 repeated again — 22 47½
- 5 47 between the lower head of ♊ — 8 16
- 5 57 and ♂ — 8 16½
- 6 1 — 8 16
- 6 5 — 8 16
- 6 13 between the upper head of ♊ — 7 42
- 6 19 and ♂ — 7 42
- 6 28 — 7 42
- 6 38 between the armpit of the lower ♊ — 8 18
- 6 44 and ♂ — 8 18
- 6 49 — 8 18
- 7 3 between the heart of ♌ and ♂ — 44 32½
- 7 9 — 44 32½
- 7 12 — 44 32½
- 7 16 between ♂ and the luc. foot of Ericht. [luc. ped. Ericht.] — 22 46½
- 9 53 33″ ♂ was on the meridian by the mural Quadrant [per Quad. Muralem], having Alt. 61 16¼
- 9 53 43 by the lesser Quadrant [per Q. Minor.] — 61 17
- 9 53 47 by the Square of the meridian line [per Quadratum lineæ merid.][784]

Meanwhile, while the distances were being observed, the altitudes and azimuths of ♂ were observed in this way. It had, moreover, then passed 90 G. orient.

- H. 5 38′ 49″ — Azim. 84 50 — Alt. 36 30
- 5 44 30 — 84 0 — 37 29
- 6 0 45 — 80 22 — 39 53
- 6 6 10 — 79 8 — 40 34
- 6 10 30 — 77 58 — 41 8
- 6 14 35 — 77 2 — 41 45

[784] *Inter inferius caput* ♊ / *et* ♂ and *Inter ſuperius caput* ♊ / *et* ♂ are set on the lines of two successive times, each line carrying its own value. The line *9 53 47* carries no value.

- 6 18 40 — 76 3 — 42 16
- 6 22 20 — 75 20 — 42 46
- 6 30 10 — 73 52 — 43 48

And in each of these azimuths

[1] Codex C begins [Codex C. incipit].

account was taken [habita eſt ratio] of the aberration which the azimuthal circle has in the south, namely by advancing the index 10 min. toward the south.

At the following noon ☉ did not appear; but on the 21st the greater Clock [Horologium Maius] was found to be running 3′ 45″ slower.

DIE 21 JANUARIJ.

21 January.

- H. 5 6′ 15″ ♂ in 90 G. had Alt. 33 39, very nearly [fere]
- 5 11 between ♂ and the bright — 22 44[1]
- 5 15 foot of Erichthonius [pedem Erichtonij] — 22 24
- 6 45 between ♂ and the upper — 7 59½
- 6 51 head of ♊ — 8 0, very nearly
- 7 7 between ♂ and the lower head of ♊ — 8 41½[785]

This observation is uncertain, since it was made when the air was less clear.

On the meridian ♂ had Alt. by the mural Q. [per Q. Muralem] 61 17; it was not clear enough.

At the next noon, the Sun having been observed through the slits of the sights [per rimulas pinnacidiorum], the greater Clock [Maius Horol.] was found to be running 19′ 10″ faster than correct.

DIE 22 JANUARIJ.

22 January.

- H. 5 4′ 45″ ♂ in the ninetieth degree [in nonageſimo gradu], Alt. 33 33
- 7 45 between ♂ and the heart of ♌ — 45 10
- 7 49 — 45 10

On the meridian ♂ had Alt.:

- 10 5 0 by the greater Clock [per Hor. Mai.] and 10 27 5 by the Clock Min. [per Hor. Min.] — by the mural Q. [per Q. Mu-ral.] 61 15
- 10 5 15 by the greater Clock and 10 27 20 by the Clock Min. — by the Q. Minor. [per Q. Mi-nor.] 61 16

[785] *Inter ♂ et lucidum* stands on the line of *5 11* and *pedem Erichtonij* on the line of *5 15*, each line carrying its own value; *Inter ♂ et ſuperius* and *caput* ♊ likewise stand on the lines of *6 45* and *6 51*; *Inter ♂ et infe-/rius caput* ♊ runs over two lines, the value on the second.

• 10 5 27 by the greater Clock and 10 27 40 by the Clock Min. — by the Square [per Qua-dratum][786]

DIE 23 JANUARIJ, MANE.

23 January, morning.

H. 3 8′ 16″, in 90 G., it had Alt. by the Q. Ma. [per Q. Ma.] 33 23, to which corresponds the Decl. of ♂ 27 6.

• 3 53 between ♂ and the heart of ♌ — 45 14
• 4 7 — 45 14
• 4 11 — 45 14

At the very next noon the greater Clock [Maius Horol.] was running faster than correct by H. 1 M. 50 S. 40.

EODEM DIE 23, P. M.

The same day, the 23rd, P. M.

• H. 5 21′ between ♂ and the bright foot — 22 2
• 5 27 of Erichthonius, by the Sext. △ [Ericht., per Sext. △] — 22 2
• 5 45 between ♂ and the lower — 9 0
• 5 50 head of ♊, by the astronomical Arc [per Arcum aſtronomicum] — 9 2½
• 5 55 — 9 0
• 6 38 between ♂ and the upper — 8 14
• 6 45 head of ♊, by the astronomical arc [per arcum aſtronomicum] — 8 15
• 6 55 — 8 15[787]

About the same time these azimuths of ♂ were observed, from the south toward the rising [a meridie verſus ortum], together with Altitud.:

• 5 38 5 — Azim. of ♂ 82 43 — Alt. 38 16
• 5 50 40 — 80 23 — 39 45
• 6 0 — 78 34 — 40 51
• 6 22 20 — 74 0 — 43 26

Around the rising of ☉ on the following day the Clock [Horol.] was found to be running more than two hours faster than correct; this error applies only to the time elapsed since the setting of ☉.

[786] each of the three items stands on two printed lines, one time to a line, *per Hor. Mai.* on the upper and *per Hor. Min.* on the lower; a printed right brace joins the two lines, and to the right of it the instrument words and value run across both lines (*per Q. Mu-/ral. 61 15*; *per Q. Mi-/nor. 61 16*; *per Qua-/dratum*, with no value). The word "and" joining the two times is English grammar; the leaf sets the times on separate lines.

[787] in this run the words are set across the lines of successive times: *Inter ♂ et lucidum / pedem* (the second part on the line of the value *22 2*, under *H. 5 21′*), *Ericht., per Sext.* △ on the line of *5 27*; *Inter ♂ et inferius* on the line of *5 45*, *caput* ♊ *per Arcum* on the line of *5 50*, *aſtronomicum* on the line of *5 55*; *Inter ♂ et ſuperius* on the line of *6 38*, *caput* ♊, *per arcum* on the line of *6 45*, *aſtronomicum* on the line of *6 55*. Every line carries its own value.

DIE 24 JANUARIJ.

24 January.

- H. 7 16′ between ♂ and the foot — 21 51½
- 7 30 of Erichthonius [Erichtonij] — 21 51½
- 7 30 between ♂ and the heart of ♌ — 45 29¾
- 7 37 — 45 29¾
- 7 40 — 45 29¾[788]

♂ was still on the straight line drawn from the heart of ♌ to the foot of Erichthonius, except that it lay below that line by the size of its body.

- 8 0 — Azim. of ♂ 36° 48′ — Alt. 57 26
- 8 4 — 35 12 — 57 46

At the following noon ☉ did not appear; but two days later, namely on 26 January, the Clock [Horol.] was found to be running 10′ slower.

DIE 25 JANUARIJ.

25 January.

On the meridian ♂ had Alt. by the Q. Minor. [per Q. Minor.] 61 15, ἐν πλάτει [Greek: *en platei*, "in breadth"], because of the clouds by which it was almost entirely covered.

- H. 5 22′ between ♂ and the bright foot — 21 34½
- 5 30 of Erichthonius [pedem Erichtonij] — 21 34½
- 5 41 — 21 34[789]

[1] Thus in codex C. It should be 24′ [Sic in codice C. Debet eße 24′.].

- 5 46 — 21 33½
- 5 48 — 21 33
- 5 57 — 21 34½
- 6 2 — 21 34½
- 6 5 — 21 34½
- 7 10 between ♂ and the heart of ♌ [Inter ♂ et cor ♌] — 45 45½
- 7 18 — 45 45
- 9 6 28″ ♂ on the meridian had alt. by the lesser Q. [per Q. Minorem] — 61 12½

DIE 26 JANUARIJ.

26 January.

- H. 9 5′48″ ♂ on the meridian [in merid.] by — the mural [Mur.]...
- 6 28 — the lesser [Minor.] 61 12

[788] *Inter ♂ et pedem* stands on the line of *H. 7 16′* and *Erichtonij* on the line of the first *7 30*, each line carrying its own value. The time *7 30* is printed on two successive lines.

[789] *Inter ♂ et lucidum* stands on the line of *H. 5 22′* and *pedem Erichtonij* on the line of *5 30*, each line carrying its own value.

• 6 33 — the line of the Square [lineam Quadrat.][790]

DIE 27 JANUARIJ.[1]

27 January.

• H. 5 49′ between ♂ and the foot of Erichthonius [Inter ♂ et pedem Erichtonij] — 21 27½
• 9 9¼ ♂ on the meridian had Alt. by the mural Q. [per Q. Mural.] — 61 12
• by the lesser Q. [per Q. Minor.] — 61 11, very nearly [fere]
• 9 51 40″ the lower head of ♊ [Inferius caput ♊] on the meridian.

DIE 1 FEBRUARIJ.[1]

1 February.

H. 8 55′32″: ♂ on the meridian had Alt., by the mural Q. as well as by the lesser [tam per Q. Mural. quam per Minor.], 61 6.

• 9 34 between ♂ and the foot — 21 3
• 9 47 of Erichthonius [Erichtonij] — 21 5¾
• 9 56 — 21 4¾
• 10 1 — 21 4¼
• 10 8 — 21 4½[791]

DIE 2 FEBRUARIJ.

2 February.

♂ on the meridian had Alt.:

• H. 8 49′18″ by the mural Q. — 61 4½
• 49 38 by the lesser Q. — 61 5
• 49 42 by the Square [per Quadratum].
• 9 22 15 — the Sup. head of ♊ on the meridian [Sup. caput ♊ in mer.] by — the mural [Mural.]
• 9 22 30 — the lesser [Minor.]
• 9 22 39 — the Square [Quadr.]
• 9 49 between ♂ and the foot — 21 2⅓
• 9 55 of Erichthonius — 21 1½
• 10 5 — 21 2⅓
• 10 9 — 21 1½
• 10 12 — 21 1½

[790] the words ♂ *in*, *merid.* and *per* stand one to a line on the three time lines and are closed by a printed right brace; to the right of the brace stand, one to a line, *Mur.* followed by three spaced points and no value, *Minor. 61 12*, and *lineam Quadrat.* with no value. The brace is the only printed sign that ♂ *in merid. per* belongs to all three lines.

[791] *Inter* ♂ *et pedem* stands on the line of *9 34* and *Erichtonij* on the line of *9 47*, each line carrying its own value.

• 10 16 — 21 1½[792]

[1] From codex V [E codice V.].

Of these observations the second, together with the three later ones, agrees better than the rest with yesterday's observation, according to the diurnal motion from the ephemerides of Michael Mästlin [ex ephemeridibus Mœſtlini].

DIE 6 FEBRUARIJ.

6 February.

• *H. 5 57 between* ♂ *and the foot — 21 0*
• *6 2 of Erichthonius — 21 0*

Note. The straight line drawn from the heart of ♌ *[a corde* ♌*] to the foot of Erichthonius no longer intercepted Mars, but left it in its place at an interval of about 20 Minutes, a little more [ad ſpatium quaſi 20 Minutorum paulo plus], which is the semidiameter of the Sun; and* ♂ *was more southerly than this line and nearer the Horizon.*

• *H. 6 11′ between the lower [infer.] head — 10 8⅔*
• *6 18 of* ♊ *and* ♂ *— 10 8⅔*
• *6 27 between* ♂ *and — 10 7*
• *6 32 the armpit of* ♊ *[axillam* ♊*] — 10 7*

♂*, moreover, was on the straight line drawn from this one in the armpit of the lower* ♊ *as far as the lower foot of Erichthonius, exactly, by the Ruler [exquiſite per Regulam].*

• *H. 6 38 between* ♂ *and the heart of* ♌ *— 46 21⅓*
• *6 42 — 46 21*
• *6 46 — 46 21⅓*
• *10 0 between* ♂ *and the foot — 21 0*
• *10 2 of Erichthonius — 21 0*
• *10 2 — 21 0*[793]

Toward the evening of 6 February [Ad veſperas diej 6 Feb.], the azimuths of ♂ from the meridian toward the rising [a mer. verſus ortum], and its Alt.:

• H. 6 2′50″ — Azim. 59 23 — Alt. 50 5½
• 7 14 0 — 35 11 — 57 25½
• 7 21 40 — 32 32 — 58 3
• 7 27 30 — 32 32 — 58 36

♂ on the meridian had altit.:

• 8 35 44 by the mural Q. [per Q. Muralem] — 61 0
• 8 36 0 by the lesser Q. [per Q. Minorem] — 61 1

[792] the three times *9 22 15*, *9 22 30*, *9 22 39* are closed by a printed right brace; to its right *Sup. caput*, ♊ *in mer.* and *per* stand one to a line and are closed by a printed left brace, to the right of which stand *Mural.*, *Minor.* and *Quadr.*, one to a line, with no values. *per Quadratum.* carries a full point and no value. *Inter* ♂ *et pedem* stands on the line of *9 49* and *Erichtonij* on the line of *9 55*, each line carrying its own value.

[793] in the italic runs the words are set across the lines of successive times: *Inter* ♂ *et pedem* / *Erichtonij*; *Inter infer. caput* / ♊ *et* ♂; *Inter* ♂ *et* / *axillam* ♊; each line carries its own value. The time *10 2* is printed on two successive lines.

• 8 36 20 by the Square [per Quadratum]

DIE 7 FEBRUARIJ, MANE.

7 February, morning.

H. 1 15′20″: ♂ was in the 90th degree [in 90 gradu fuit], having Altit. by the lesser Q. [per Q. Minor.] 33 0; but it was not clear enough.

At the very next noon the Clock [Horologium] was running slower by about 44″ [circiter 44″ ſcrupulis ſecundis].

DIE 7 FEBRUARIJ P. M.

7 February, P. M.

• H. 5 37′ between ♂ and the foot — 21 2
• 42 of Erichthonius [Erichtonij] — 21 2
• 46 — 21 2
• 51 between ♊ [recte: ♂ — Corrigenda, p. 429] and the lower [infer.] — 10 7⅔
• 6 0 head of ♊ — 10 7½
• 6 — 10 7½
• 6 16 between ♂ and the upper [ſup.] — 9 16½
• 23 head. ♊ [caput. ♊] — 9 15½
• 6 27 between ♂ and the heart of ♌ [cor ♌] — 46 20
• 31 — 46 19½
• 34 — 46 20
• 36 — 46 19½
• 37 — 46 19½[794]

And from this it is clear that since yesterday it has moved forward [ab heſterno die progreßus ſit], and that on the preceding day it was stationary.

• H. 9 41′ between ♂ and the foot — 21 2½
• 45 of Erichthonius — 21 2½
• 51 — 21 2⅔
• 10 1 — 21 2½

Azim. of ♂ from the meridian toward the rising [a merid. verſus ortum], by the lesser Quadrant [per Quadrantem Minorem]:

• H. 5 43 0 — Azim. 63 50 — Alt. 48 9
• 49 40 — 61 50 — 49 0
• 53 30 — 60 59 — 49 26
• 57 55 — 59 40 — 49 59
• 8 31 5 — ♂ on the meridian [in merid.] by — the mural Quadrant [Q. mural.] 60 56½
• 31 33 — the lesser Quadrant [Q. minor.] 60 57½

[794] the words are set across the lines of successive times — *Inter* ♂ *et pedem* / *Erichtonij*; *Inter* ♊ *et infer.* / *caput* ♊; *Inter* ♂ *et ſup.* / *caput.* ♊ — each line carrying its own value. The fourth of these lines prints the sign ♊ where the other runs print ♂, and the eighth prints a full point after *caput*. The line after *6 0* prints only *6*, in the minutes place.

• 31 36 — the Square [Quadratum][795]

DIE 8 FEBRUARIJ, MANE.

8 February, morning.

• H. 1 11′12″ ♂ in 90 G. had Alt. 33 0
• 2 17 distance between ♂ and the heart of ♌ [Diſtantia inter ♂ et cor ♌] — 46 19½

DIE 9 FEBRUARIJ, MANE.

9 February, morning.

• H. 12 23′ distance between ♂ and — 46 17½
• 30 the heart of ♌ — 46 17½
• 35 — 46 17½

And these observations were made with the sky moderately, though not entirely, clear [cœlo mediocriter, non tamen plane ſereno].

Eodem die poſt Meridiem

The same day, after noon.

• H. 5 47 between ♂ and the foot — 21 7½
• 5 52 of Erichthonius — 21 7½
• 5 55 — 21 7½
• 6 1 between ♂ and the heart of ♌ — 46 14
• 6 8 — 46 14

These are not accurate enough [non ſunt ſatis exquiſitæ], because the heart of ♌ was nearer the Horizon, and not visible enough because of the twilight.

• H. 6 17′ between ♂ and the lower head — 10 4½
• 24 of ♊ — 10 4½
• 6 40 the same distance between ♂ [Diſt. eadem inter ♂] — 46 15
• 46 and the heart of ♌ — 46 15 — good [bonæ]
• 49 — 46 15
• 7 6 distance between the upper [Diſt. inter ſuperius] — 9 13½
• 11 head of ♊ and ♂ — 9 13½[796]

And all these distances were taken with the Trigonic Sextant [per Sext. Trig. ſumtæ].

• H. 8 16′30″ Canis Major [Canis maior] crossed the meridian.
• 8 24 40 ♂ on the meridian had Alt. 60 53½

DIE 10 FEBRUARIJ.

10 February.

[795] The times *8 31 5*, *31 33*, *31 36* are closed by a printed right brace; to its right ♂ *in*, *merid.* and *per* stand one to a line, closed by a printed left brace, to the right of which stand *Q. mural. 60 56½*, *Q. minor. 60 57½* and *Quadratum* with no value.

[796] the three values *46 15* are joined by a printed right brace, to the right of which stands *bo-/næ*, in smaller type, divided over two lines. The words of each pair of lines are set across the lines of successive times, each line carrying its own value.

Before noon [Ante meridiem], by the lesser Quadrant [per Q. minor.]:

- H. 1 5′50″ ♂ in 90 G. had Alt. 32 52½

After noon [Poſt meridiem], by the lesser Quadrant:

- H. 8 22′21″ Alt. of ♂ in the south [in meridie] — 60 52½

DIE 12 FEBRUARIJ.

12 February.

- H. 6 10′ distance between ♂ and — 46 5
- 6 15 the heart of ♌, by the Sextant [cor ♌ per Sextantem] — 46 3¼
- 6 20 Trigonic [Trigonicum] — 46 3¼
- 6 25 — 46 3¼
- 8 2 53 — Canis Major on the meridian [in merid.] by — the Square [Quadratum]
- 3 9 — each Quadrant [vtrumque Q.]
- 8 12 8″ — ♂ on the meridian by — the Square
- 10 — the lesser Quadrant [Q. minor.] 60 49
- 28 — the mural Quadrant [Q. muralem]...[797]

DIE 13 FEBRUARIJ.

13 February.

- H. 7 58 53 — Canis Major on the meridian by — the mural [Muralem]
- 59 4 — the Square [Quadratum]
- 8 8 49 — ♂ on the meridian by — the mural Quadrant [Q. muralem]
- 50 — the lesser Quadrant [Q. minorem] 60 46
- 55 — the Square[798]

DIE 19 FEBRUARIJ.

19 February.

- H. 7 10 20 distance between ♂ [Diſt. inter ♂] — 45 10¼
- 7 15 40 and the heart of ♌, by the — 45 11
- 7 21 Sextant △ [Sext. △] — 45 11
- 7 26 — 45 11
- 7 29 40 — 45 11

Canis Major on the meridian

[797] *Diſtantia inter ♂ et / cor ♌ per Sextantem / Trigonicum* stand one part on each of the lines of *H. 6 10′*, *6 15* and *6 20*, each line carrying its own value. The two times *8 2 53*, *3 9* are closed by a printed right brace; to its right *Canis maior* and *in merid. per* stand one to a line, closed by a printed left brace, to the right of which stand *Quadratum* and *vtrumque Q.*, with no values. The three times *8 12 8″*, *10*, *28* are closed by a printed right brace; to its right ♂ *in*, *merid.* and *per* stand one to a line, closed by a printed left brace, to the right of which stand *Quadratum* with no value, *Q. minor. 60 49*, and *Q. muralem* followed by three points and no value.

[798] each group is set as on 12 February: the times closed by a printed right brace, the words *Canis maior / in merid. per* and ♂ *in / merid. / per* closed by a printed left brace, and the instrument words one to a line to its right; only *Q. minorem* carries a value.

- 7 43 35 by the mural Quadrant [per Quad. Muralem][799]
- 7 43 38 by the Square [per Quadratum]
- 7 57 0 altitude of ♂ on the merid. [Alt. ♂ merid.]
- by the Quadrant min. [per Q. min.] 60 32

Mars, therefore, has moved forward from its station on 6 February by p. 1 10′, according to observation, directly [per obſeruationem directe], which agrees exactly with the Alphonsine motion [motui Alphonſino], while in Copernicus [apud Copernicum] 25 minutes [25 ſcrupulis] are lacking over the space of 13 days.

At the very next noon the Clock [Horologium] was running 9 M. fast, but this error applies to many days, and to an uncertain number of them [ſed error hic multis diebus eorumque incerto numero congruit].

DIE 21 FEBRUARIJ.

21 February.

- H. 7 29 14 Canis Major [Canis maior] — the mural Quadrant [Q. Muralem]
- 29 18 on the merid. [in merid.] — the Square [Quadratum]
- 29 19 by — the Quadrant min. [Q. min.]
- 7 44 0 ♂ on the merid. — the mural Quadrant [Q. Mural.] 60 26⅔
- 44 4 by — the Square
- 44 6 — the Quadrant min.[800]

The mural Quadrant was not adjusted accurately enough in altitude [Quadrans Muralis non erat ſatis rectificatus in altitudine].

DIE 22 FEBRUARIJ.

22 February.

- H. 7 27 16 Canis Major — the mural Quadrant [Q. Mural.]
- 27 25 on the merid. by [in merid. per] — the Square
- 7 42 47 ♂ on the — the mural Quadrant
- 42 50 merid. — the Quadrant min. 60 25⅓
- 42 51 by — the Square[801]

DIE 24 FEBRUARIJ.

24 February.

- H. 7 20 1 Canis Major — the mural [Muralem]
- 20 11 on the merid. by — the Square

[799] *Diſt. inter* ♂ / *et cor* ☋ *per* / *Sext.* △ stand one part on each of the first three lines, each line carrying its own value. *Canis maior in meridiano* stands on a line of its own.

[800] each group is set with its times closed by a printed right brace; the words *Canis maior* / *in merid.* / *per* and ♂ *in merid.* / *per* stand to the right of it, closed by a printed left brace, to the right of which the instrument words stand one to a line. Only *Q. Mural.* in the second group carries a value.

[801] set as on 21 February, the times closed by a printed right brace, the words by a printed left brace; ♂ *in* / *merid.* / *per* stand one part to a line. Only *Q. min.* carries a value.

- 37 11 ♂ on the mer. [in mer.] — the mural and the Square [Mur. et Quadrat.]
- 37 13 by — the Quadrant min. 60 21¾[802]

DIE 7 MARTIJ.

7 March.

- H. 6 39 10 Canis Major [Can. maior] — the Square
- 39 30 on the mer. by [in mer. per] — the mural Quadrant
- 7 8 15 ♂ on the — the Quadrant min. 59 50 10
- 8 20 merid. — the Square
- 8 23 by — the mural Quadrant 59 49½[803]

DIE 9 MARTIJ.

9 March.

- H. 7 6 5 ♂ on the mer. — the mural Quadrant
- 6 8 by — the Square
- 7 25 20 distance of ☿ from Aldebaran [Diſt. ☿ ab Aldebora]
- by the Sext. △ 49 48
- 7 31 15 distance of ☿ from the bend of Cassiopeia [a flexura Caßiopeæ]
- by the Sext. △ 51 38½[804]

At about the time of these observations the altitude of ☿ was about two degrees [quaſi duorum graduum].

- H. 9 30 20 the bright star in the head [Lucida in capite] — the Square [Quadrat.]
- 30 30 of ☋ on the merid. by — the mural Quadrant [Q.Mural.][805]

DIE 13 MARTIJ.

13 March.

At H. 6 57 ☿ was in azimuth [in Azim.] from the ſeptent. toward the setting [a ſeptent. verſus occaſum] 86 0′, altitude [Alt.] 9 8′, by the Quadrant Max. [per Q. Max.]; and the observation was accurate enough [fuit ſatis exquiſita obſeruatio]: from it its declination can be derived.

- H. 7 4′ distance between ☿ and [Diſt. inter ☿ et] — 43 57
- 7 7 the eye of ♉ [oculum ♉] — 43 56½
- 7 9 by the Sext. △ — 43 56¾

[802] two groups of two lines, each set as on 21 February; *Mur.et Quadrat.* stands on one line. Only *Q. min.* carries a value.

[803] two groups set as on 21 February. In the first group the brace after *Can. maior* / *in mer. per* appears to face the same way as the brace after the times; in every other group on this side the second brace faces the other way.

[804] the first group is set with a printed right brace after the two times and a printed left brace before the two instrument words.

[805] the two times are closed by a printed right brace; *Lucida in capite* / ☋ *in merid. per* stand to its right, closed by a printed left brace, to the right of which stand *Quadrat.* and *Q.Mural.*, with no value.

- 7 16 distance between [Diſtantia inter] — 45 46
- 7 22 Schedar of Cassiopeia [Schedir Caßiopeæ] — 45 44¼
- 7 25 and ☿ — 45 44½[806]

At H. 7 17′ 18″ ☿ was, by the Quadrant Minor. [per Q. Minor.], in azimuth 81 50, altitude 6 21.

You can therefore, without any perceptible error, use the distance of ☿ from Schedar of Cassiopeia, p. 45 45′, and its distance from Aldebaran, 43 57, for the hour 7¼ p. M. [ad Horam 7¼ p. M.], and from them verify its longitude and latitude. You can also find its declinations by the azimuths and altitudes [per Azimutha et Altitudines], and from these, and from the distance from Aldebaran [ab Aldeboram] alone, determine its right ascension [Aſcenſionem eius rectam], and afterwards verify both the longitude and the latitude.

- H. 7 M. 37 distance between ☿ [Diſtantia inter ☿] — 13 50
- 7 43 and the head of ♈ [et caput ♈] — 13 50 nearly [fere]
- 7 49 by the Radius [per Radium] — 13 51
- 7 51 distance between ☿ and Schedar by the Sext. △ 45 36; the altitude was about 2 Gr. [erat Alt. circiter 2 Gr.][807]

At the very next noon the Clock was running faster than it should [iuſto velocius] by 1 M. 30 S.

DIE 14 MARTIJ.

14 March.

At H. 6 52′20″ ☿ was in azimuth from the Sept. toward the setting [a Sept. verſus occaſ.], by the Quadrant Max., 87 0, altitude 10 38. A fairly certain observation, and taken exactly [Satis certa obſeruatio et exquiſite ſumta].

- 7 4 10 azimuth of ☿ by the Quadrant Max. 84 31, altitude 9 0′
- 7 13 distance between ☿ — 42 39
- 7 19 and the eye of ♉ by the — 42 37
- 7 22 Sext. △ — 42 37

It was moderately clear. In the following observations there was very little clear sky [admodum parum erat ſerenitatis].

- H. 7 26′ distance between [Diſtantia inter] — 45 28
- 7 29 ☿ and — 45 23
- 7 31 Schedar of Cassiopeia [Schedir Caßiopeæ] — 45 20
- 7 34 by the Sextant △ [per Sext. △] — 45 20
- 7 41 — 45 18[808]

[806] the words of each run are set across the lines of successive times, each line carrying its own value.

[807] the first three lines carry the words across successive times; the fourth entry runs over three printed lines, the second and third set to the right. *M.* stands between *H. 7* and *37* in the first line.

[808] the words are set across the lines of successive times, each line carrying its own value; the line *7 41* carries no words.

The variation in these observations arose [recte: add after *contigit* the words *partim propter vicinitatem ☿ ad Horizontem*, "partly because of the nearness of ☿ to the horizon" — Corrigenda, p. 429] partly because of the presence of clouds, by which the sky was almost covered.

☿, moreover, appeared so large that it was thought to be equal in magnitude to the eye of ♉ [oculo ♉], or to another star of the first magnitude.

DIE 27 MARTIJ, P. M.

27 March, P. M.

A little after the setting of ☉ we saw ♀, but very dimly; and at H. 7 M. 17, taken exactly by the greater Clock [per maius Horologium], it was in Azim. from the Sept. toward the setting [a Sept. verſus occaſum] p. 75¾, and it had an Alt. of one degree [vnius gradus] by the Radius [per Radium], taking the Alt. above the Horizon.

At H. 7 M. 18 it also had, by the Radius, an Alt. of about 45 M.

At the first observation, moreover, the degree of the equator on the meridian [in meridiano gradus æquatoris] was 124.5, and in the setting [in occaſu] 34⁹ 5′. The place on the globe [in globo], therefore, would have been in 24½ G. ♈, with a latitude of about 1 G. south [Meridionali] — which agrees nearly with the Ephemerides [cum Ephemeridibus]. It should be noted, however, that ♀ was seen at a distance of 8 partium from ☉ with southern latitude, whereas according to the table of Occultations [iuxta tabulam Occultationum] it ought to have been 14 degrees [14 Gradibus] away before it could be seen at the end of ♈. Mercury [Mercurium] we did not see that evening, although it was farther from the Sun, which proves that the Alphonsines [Alphonſinos] are in error.

DIE 19 APRILIS.

19 April.

About hour 10¾ [Circa Horam 10¾] the distance of ♂ from the heart of ♌ [a corde ♌] was observed three times with the Trigonic Sextant [per Sextantem Trigonicum]: p. 24 14′. Considering this observation in passing: since, according to our recent observations, the heart of ♌ is now in 24⁹ 4′ ♌, the longitude of ♂ will be at most in 29 50 ♋. For [recte: *non* for the printed *Nam*, "not" — i.e. "without taking account of the latitude" — Corrigenda, p. 429] *when account is taken of the latitude [habito reſpectu Lat.], which adds little, so that it is about 29 55 ♋ — the place of ♂, however, according to the Alphonsines is 27 52, according to Copernicus 29 47. Here, therefore, Copernicus's reckoning [Copernici ratio] agrees better, and does not depart perceptibly from the truth.*

DIE 20 APRILIS.

20 April.

- H. 11 14 distance between [Diſtantia inter] — 23 45
- 11 18 ♂ and the heart of ♌ by the [♂ et cor ♌ per] — 23 45
- 11 20 Trigonic Sextant [Sext. Trigonicum] — 23 45

DIE 21 APRILIS P. M.

21 April, P. M.

- H. 9 26 There was the same distance between ♂ and the heart of ☋, by the Trigonic Sextant [Fuit eadem diſtantia inter ♂ et cor ☋ per Sext. Trig.] — 23 17½
- 9 30 The same [Eadem] — 23 17½
- 9 32 The same — 23 17½

DIE 22 APRILIS.

22 April.

- 9 24 distance between ♂ and Canis [Diſt. inter ♂ et Canem] — 20 57⅔
- 9 31 Minor, by the [minorem per] — 20 58
- 9 38 Sextant △ [Sext. △] — 20 58
- 9 45 between ♂ [Inter ♂] — 22 47½
- 9 49 and — 22 47½
- 9 52 the heart of ☋ [cor ☋] — 22 47½[809]

DIE 6 MAIJ, MANE.

6 May, morning.

- H. 3 2′40″ Alt. of ☿ by the Radius [Alt. ☿ per Radium] 4ᵖ17′
- 3 6 45 the distance of ☿ from the more eastern limb of ☾ [ab orientaliori limbo ☾], by the Radius, was 13ᵖ20′
- 3 12 50 the same distance [diſt. eadem] by the Radius 13 15
- 3 17 24 the same distance 13 13½
- 3 23 18 Alt. of ☿ by the Radius 7 0
- 3 25 20 distance between ☿ and the more eastern limb of ☾ by the Radius [per Rad.] 13ᵖ 6
- 3 47 ☿ could indeed be seen, but it could not be observed because of the daylight [propter lucem diej].

(♄, however, we did not see.

At the very next noon the clock [horologium] was running 2 minutes [2 minutis] faster than it should).[1]

[1] From codex V [E codice V.]. They are missing in codex C [Deſunt in cod. C.].

DIE 7 MAIJ, MANE.

7 May, morning.

At H. 3 19′ the altitude [alt.] of ☿ appeared to be about 8° 2′ by the Radius [per Radium].

At 3 28 20 ☿ stood p. 5 19 from the lower horn of ☾ [ab inferiori cornu ☾], toward the south [verſus auſtrum], by the Radius [per Rad.].

[809] no *H.* stands before the first time of this day. The words of each run are set across the lines of successive times, each line carrying its own value.

(At this time a straight line drawn through both horns of ☾ seemed to touch ♃, but the dawn [aurora] so obscured ♃ that it could scarcely be seen).[1]

DIE 11 MAIJ.

11 May.

- H. 2 49′ 20″ altitude of ♃ by the Radius [Alt. ♃ per Radium] 4 36
- 2 57 2 altitude of ♃ by the Radius [per Rad.] 5 35
- 3 4 50 Azim. of ♃ 73 28 from the meridian toward the rising [a merid. verſus ort.] by the lesser Q. [per Q. minorem], altitude 6 30
- 3 18 Azim. of ♃ 71 32, altitude 8 18
- 3 22 — 69 49 — 8 44[810]

ἐν πλάτει [Greek: *en platei*, "in breadth"], because of the dawn [propter Auroram].

- H. 3 30 30 the altitude of ♃ by the radius [per radium] was about 10 p. [10 p. fere]
- 3 37 — 11 p.

At the very next noon the clock [horologium] was running 9 M. 40 S. fast [celerius … ibat].

DIE 12 MAIJ.

12 May.

- H. 2 52 25 Azim. of ♃ from the meridian toward the rising [a meridie verſus ortum] by the lesser Q. [per Q. min.] 75 32, altitude 5 1½
- 3 8 5 Azim. 72 20, altitude p. min. [Alt. p. min.] 7 5
- 3 15 10 — 71 0 — 8 7,

these not good enough because of the dawn [hæc non ſatis bona propter auroram]. Nor on this day, although the sky was very clear [eßet ſerenißimum] in the morning [mane], were we able to see ♄.

DIE 13 MAIJ, MANE.

13 May, morning.

- H. 3 9 altitude of ♃ by the Radius [Alt. ♃ per Rad.] 8 46
- 3 20 — about 10 [10 fere]

But it should be known that ♃ was not free of vapours [a vaporibus liberum non fuiße] on this day, so that it could not be seen clearly enough.

DIE 14 MAIJ.

14 May.

- H. 2 48 25 by the lesser Q. [per Q. Minor.] ♃ was in Azim. from the meridian toward the rising [a meridie verſus ort.] 73 29, altitude 6 45
- 2 58 45 Azim. of ♃ about 71 11 [fere], altitude 8 7
- 3 12 20 Azim. of ♃ ἐν πλάτει 68 20, altitude 9 51

[810] The three altitude values *6 30*, *8 18*, *8 44* are closed on the right by a printed brace whose point stands at the middle line; nothing is set to the right of it.

DIE 21 MAIJ.

21 May.

By the lesser Q. [Per Q. min.], Azim. from the meridian toward the rising [a mer. verſus ortum]:

- H. 2 18 10 Azim. of ♃ 75 47, altitude 5 46½
- 2 25 30 — 74 18 — 6 42½

DIE 30 MAIJ, A. M.

30 May, A. M.

Distance between ♃ and ♄ by the Radius [Diſtantia inter ♃ et ♄ per Radium]:

- H. 1 47 — about 3 p. 24 M. [fere]
- 1 50 — 3 p. 24 M.

At hour 2 [Ad horam 2] the altitude of ♃ appeared to be 8 G. by the Radius, but it was not perfectly clear [non erat exquiſite ſerenum].

DIE 5 JUNIJ.

5 June.

At about hour 11 M. 6 [Circa horam 11 M. 6] the distance between ♂ and the heart of ♌ [cor ♌] was p. 1 M. 5 by the Radius — ἐν πλάτει, however [tamen], because of the uncertain light [propter dubium lumen] and because both were near the horizon [prope Horizontem]. ♂, moreover, appeared more westerly [occidentalior] than the heart of ♌.

The heart of ♌ is in 24 5 ♌, latitude [latit.] 0 27 B. Let A be the heart of ♌, B ♂. In the triangle ACB, since all the sides are given — AC, the complement of the latitude [complementum latitudinis] of the heart of ♌, 89 33; BC, the complement of the latitude [compl. lat.] of ♂, 89 15; and AB, the observed distance, 1° 5′ — therefore by theorem IX [per IX dogma] the angle ACB is given, which measures the diff. long. between the heart of ♌ and ♂. The angle ACB sought [quæſitus]: 1° 2′ 28″.[2]

DIE 10 JUNIJ.

10 June.

H. 11.0 Distance between ♂ and Spica [Spicam] ♍ by the Sext. △: I. 50 31;

ἐν πλάτει II. 50 33 (for ♂ was near the horizon [vicinus Horizonti], and these [hæ] were made in twilight [in crepuſculo]).[2]

DIE 11 JUNIJ, MANE.

11 June, morning.

- H. 0 36′ 0″ distance between [Diſtantia inter] — 4 14
- 0 47½ ♃ and ♄ by the [♃ et ♄ per] — 4 12
- 0 51 Radius [Radium] — 4 11
- 0 55½ — 4 12

• 1 0 10 — about 4 12 [fere][811]

[1] From codex V. They are missing in codex C [E codice V. Deſunt in cod. C.].

[2] From codex V [E codice V.].

At the next noon [proxima meridie] the clock [Horologium] was running 9′40″ fast [citius ibat].[1]

DIE 18 JUNIJ, A. M.

18 June, A. M.

• H. 0 3′ distance between ☽ and ♄ by the Rad. [Diſt. inter ☽ et ♄ per Rad.] 4 37
• 0 7 — 4 36 twice [bis]
• 0 13 distance between the same [Diſtantia inter eoſdem] about 4 37 [4 37 fere]

DIE 19 JUNIJ, MANE.

19 June, morning.

Distance between ♄ and ☽ by the Rad. [Diſtantia inter ♄ et ☽ per Rad.] 4 40

DIE 20 JUNIJ, MANE.

20 June, morning.

Distance between ♄ and ☽ by the Rad. 4 42

DIE 21 JUNIJ, A. M.

21 June, A. M.

• H. 1 11½ distance between ☽ and ♄ by the Rad. [Diſt. inter ☽ et ♄ per Rad.] 4 48
• 1 14 the same distance [Diſtantia eadem] about 4 48 [4 48 fere]; 4 47½

By the Q. minor. [Per Q. minor.], on the same day [eodem die], A. M., with the sky exceptionally clear [cœlo apprime ſereno exiſtente], these azimuths [hæc Azimutha] of ♄ and ☽ from the meridian toward the rising [a meridie verſus ortum] were taken together with the altitudes [cum altitudinibus captæ ſunt]:[2]

• H. 1 17′ azimuth of ♄ [Azim. ♄] 58 42½, altitude [Alt.] 13 59½
• 1 23½ — 57 23 — 14 41
• 1 28 20″ azimuth of ☽ [Azim ☽] 61 21 — 15 36
• 1 31 10 — 60 33 — 16 1½
• 1 35 10 — 59 42 — 16 33[812]

At the very next noon the clock was turning 2 minutes faster than it should [2 minutis iuſto celerius circumvoluebatur].

[811] the words are set across the lines of successive times, each line carrying its own value; the lines *0 55½* and *1 0 10* carry no words.

[812] *Azim* on the third line is printed without a full stop.

DIE 22 JUNIJ.

22 June.

H. 12 10′ Between ♃ and ♄ [Inter ♃ et ♄]: 4 53 twice [bis.]

DIE 23 JUNIJ.

23 June.

H. 12 6 The same distance [Eadem diſtantia]: 4 53½

At noon the next day [in Meridie prox.] the clock was running 2 Min. fast [citius mouebatur].

DIE 25 JUNIJ A. M.

25 June, A. M.

- H. 0 10′ 30″ the same distance [Eadem diſtantia] — 4 56
- 0 14 — 4 55½

DIE 5 JULIJ.

5 July.

Between ♃ and ♄ by the Sext. Trigon. [Inter ♃ et ♄ per Sext. Trigon.]:

- 5 12
- 5 12⅓
- 5 12
- 5 12[813]

DIE 5 AUGUSTI.[3]

5 August.

Distance between ♄ and the bright star in the head of ♈ [Diſtantia inter ♄ et lucidam in capite ♈]:

- H. 10½ — 41 37
- 10 43′ — 41 37 by the Sext. △ [per Sext. △]

Between ♄ and the bright star in the neck of Pegasus [Inter ♄ et lucidam in collo Pegaſi]:

- 11 3 — 23 2½
- 11¼ — 23 2½ by the Sext. △

Between ♃ and the brighter star in the head of ♈ [Inter ♃ et lucidiorem in capite ♈]:

- 11 47 — 36 15 — by the same [per idem]
- 11 49 — 36 15¼ — instrument [inſtrumentum]
- 11 59 — 36 15[814]

[813] the phrase stands on two printed lines level with the second and third values; a printed brace between the phrase and the four values opens toward the values, its point toward the phrase.

[814] in the first two groups *per Sext.* △ is set to the right of the value column, raised between the two value lines; in the third group *per idem* / *inſtrumentum* stand to the right of the first two value lines.

DIE 6 AUGUSTI, MANE.

6 August, morning.

- H. 0 29½ between ♃ and [Inter ♃ et] — 25 28
- 0 38 20 the bright star in [lucidam in] — 25 27¾
- 0 57 the neck of Pegasus [collo Pegaſi] — 25 28
- 1 11 distance [Diſtantia] — 5 28
- 1 14½ between ♄ and ♃ [inter ♄ et ♃] — 5 27½
- 1 21½ by the Sext. Trig. [per Sext. Trig.] — 5 27½
- 1 48 40 ♄ was in azimuth from the meridian toward the rising [fuit in Azim. a mer. verſus ortum] 2 29, having an altitude [habens Alt.] of 28 43
- 1 59 45 ♄ in azimuth 0° 22′, altitude 28° 44′, by the Q. min. [per Q. min.], observed among clouds [inter nubes obſeruat.]
- 2 7 15 ♃ in azimuth from the meridian toward the rising, by the Q. minor. [per Q. minor.], 2 51½, altitude 31 37⅔
- 2 16 17 ♃ crossed the meridian [tranſiuit mer.] having an altitude, by the Q. minor., of 31 38¼; by the Q. portat. [per Q. portat.] 31 38 20[815]

At noon on the very next day [Meridie proxime ſequenti] the clock was running 2′ 40″ fast [celerius ibat].

Examinatio præcedentium obſeruationum.

Examination of the preceding observations.

About the midnight following the day of 5 August [Circa mediam noctem diej 5 Auguſtj ſequentem], the distance of ♄ and ♃ from the head of ♈, the bright star that is in it [a capite ♈ quæ lucida in eo eſt], and of the stars from one another [et ſtellarum inter ſe], was observed in this way [in hunc modum].

[1] Added in writing [Adſcriptum eſt]: On 12 June in the morning, ♄ in the very place of the 3rd [3tiæ] of the unformed stars [informium] below the southern fish [infra piſcem auſtrinum]. Scultetus at Görlitz [Gorlicij].

[2] Added in writing much later in codex V. [Longe poſterius adſcriptum eſt in codice V.]: »The place of ♃ can in some way be gathered from the observation made in the Year 95, on 21 July [Julij 21 d.], so that the differences from our calculation are duly applied, account being taken, however, of the change of the Apogee [mutationis Apogæi]; and from this, by the distance, the place of ♄ [locus ♄[i]] can be confirmed for the latitudes [ad latitudines comprobari]«.

[3] The observations and calculations of 5 and 6 August are found in codex V alone [in ſolo codice V. reperiuntur].

- ♄ *from the head of* ♈ *[a capite* ♈*] 41 37*
- ♃ *from the head of* ♈ *36 15*
- ♄ *from* ♃ *[a* ♃*] 5 27½*

[815] in the first six lines the words of each run are set across the lines of successive times, each line carrying its own value.

repeated with the Trigonic Sextant [reiterata per Sextantem Trigonicum][816]

Moreover, when each of the planets was crossing the meridian, I found with the lesser Quadrant [per Quadrantem minorem]:

- ♄ *altitude [Altitudinem] 28 45*
- ♃ *altitude [altitudinem] 31 38*

therefore [ergo] declination [Declinatio] 5 22 M; 2 29 M[817]

From this I wish to find the right ascension [Aſcenſionem rectam] of each, from the given right ascension of the head of ♈, found in the preceding year, 25 55, and the declination 21 25. Let B be the head of ♈, C one of the planets [alter planetarum], AB the complement of the declination of the head of ♈, 68 35, and AC the distance of the planet from the north pole of the equator [a polo æquatoris boreo], which results from adding its declination to the quadrant [quæ ſit addita ipſius declinatione ad quadrantem]. BC is the distance given by observation. Therefore, since in the triangle CAB all three sides are given, the angle CAB will be given, which measures the difference between the right ascension of the planet and the right ascension [Aſc. R.] of the head of ♈. These stand as follows [Habent autem ſe hæc in hunc modum]:

For ♄no [In ♄no]

- *AB 68 35*
- *AC 95 22*
- *BC 41 37*
- *BAC 32 30*

For ♃ [In ♃]

- *AB 68 35*
- *AC 92 29*
- *BC 36 15*
- *BAC 27 51⅔*[818]

Diagram. A spherical triangle drawn with curved sides, its apex at the top and its base below, with a further arc crossing the lower part of the figure from the lower left toward the right side, and a longer, shallow arc running across the foot of the figure beyond both lower sides. Three letters, all upright capitals; *C* is lighter and more rounded than *A* and *B*.

- A (apex, top): A — cited in the prose (*CAB*, *AB*, *AC*, *BAC*)
- B (right side, where the crossing arc meets it): B — cited in the prose (*B ſit caput* ♈, *AB*, *BC*)
- C (lower left, below the foot of the left side): C — cited in the prose (*C alter planetarum*, *AC*, *BC*)

[816] a printed brace stands to the right of the three values, its point toward the phrase, whose two lines stand level with the second and third value lines.

[817] a brace closes the two altitude lines, its point toward *ergo*; a second brace opens from *ergo* toward the two declination values, *Declinatio 5 22 M* on the first line and *2 29 M* on the second. *Altitudinem* is capitalised on the first line, *altitudinem* lower-case on the second.

[818] the two groups stand side by side, *In* ♄*no* on the left and *In* ♃ on the right, each head set small and raised above its group; the letters *no* after ♄ are raised.

Hence the right ascension of each planet is evident: for when the angle CAB, of the difference of right ascension, is subtracted in each case from the right ascension of the head of ♈, 25 55, there remains the right ascension of the planet, thus [vt]:

- *Right ascension [Aſc. recta] ♄ 353 25*
- *Right ascension ♃ 358 3*

From this, and from the declination of each found earlier, their longitude and latitude are given. But first, examining this declination and right ascension: since in the triangle [trigono] ABC, AC is the complement of the declination of ♄, 84 38, AB that of the declination of ♃, 87 31, and the angle BAC is the difference of the right ascension of the two just found [modo reperta], 4 38, the side BC is therefore given as 5 27 — the distance of the planets, which I found by observation to be greater by only half a minute [dimidio ſaltem ſcrupulo]. It is therefore evident that the right ascensions [Aſc. rectas] and the declinations are correct [juſtas].

Diagram. A tall, narrow triangle: two long sides, the left one curved, converge to a point at the top; near the foot a short slanting line joins the two sides, and below it a straight base closes the figure. Three letters, upright capitals, set outside the figure.

- A (top, right of the apex): A — cited in the prose (*ABC*, *AC*, *AB*, *BAC*)
- B (lower left, level with the short slanting line): B — cited in the prose (*AB*, *BAC*, *BC*)
- C (lower right, level with the short slanting line): C — cited in the prose (*ABC*, *AC*, *BAC*, *BC*)

For the longitude and latitude of ♄ and ♃ from the given declinations and right ascensions [Aſc. rectis].

- *BLK the ecliptic [Ecliptica], pole E*
- *GLH the equator [æquator], pole F*
- *C the place of the planet [locus planetæ]*
- *A its right ascension [ipſius Aſc. recta]*
- *AC the southern declination [declinatio meridiana]*

Diagram. A circle crossed by two diameter-like straight lines meeting at an interior point, one running from the left edge to the right edge, the other from the upper left edge to the lower right edge; two further lines, slightly curved, cross each other at an interior point below the near-horizontal line — one runs from a point on the slanting line down through the near-horizontal line to the lower-left circumference, the other from a point on the near-horizontal line down to the bottom of the circumference. Eleven letters, upright capitals of mixed weight; *K* stands slightly slanted.

- G (circumference, upper left, at one end of the slanting line): G — cited in the prose (*GLH*)
- I (circumference, left, at one end of the near-horizontal line): I — NOT cited in the prose on this side
- A (inside, above the near-horizontal line, where a curved line meets the slanting line): A — cited (*A ipſius Aſc. recta*, *AC*, *AD*)
- L (inside, where the two straight lines cross): L — cited (*BLK*, *GLH*)

- K (circumference, right, at the other end of the near-horizontal line): K — cited (*BLK*)
- B (inside, on the near-horizontal line, left of D): B — cited (*BLK*, *BDC*, *ad B*, *BC*)
- D (inside, on the near-horizontal line, right of B): D — cited (*BDC*, *AD*, *DC*, *ad D*)
- C (inside, below B and D, where the two curved lines cross): C — cited (*C locus planetæ*, *AC*, *BDC*, *DC*, *BC*)
- H (circumference, lower right, at the other end of the slanting line): H — cited (*GLH*)
- F (circumference, lower left, at the foot of one curved line): F — cited (*polus F*)
- E (circumference, bottom, at the foot of the other curved line): E — cited (*polus E*)

In the triangle BDC, the inclination of the meridian and the ecliptic, BDC, is given from the table [ex tabella]: for ♃ 66 34, for ♄ⁿᵒ 66 43. And there corresponds to the right ascension [Aſc. rectæ] in the ecliptic, for ♄ⁿᵒ, 22 50 ♓, whose declination AD is 2 51; for ♃, 27 52 ♓, whose declination AD is 0 51. When these are subtracted from the planet's declination AC, there remains DC: for ♄ⁿᵒ 2 31, for ♃ 1 38. Hence the angle at D and the side DC are given in each case; and since the one at B [is qui ad B] is right, BC will be, by 27 IIII [per 27 IIII], for ♄ⁿᵒ 2 18⅔, for ♃ 1 30. Thus the southern latitude of each planet is given [Data itaque eſt vtriuſque planetæ latitudo meridiana].

Moreover, in the same triangle [trigono], by 25, the third side BD is given: for ♄ⁿᵒ 0 59¾, for ♃ 0 38⅔; and it is the difference between the longitude of the planets and the point of the culmination of the heaven [punctum cœli culminationis] corresponding to the planet's Aſc. rectæ in the ecliptic [reſpondens Aſc. rectæ planetæ in Ecliptica]:

for Saturn [in Saturno]

- *22 50 ♓*
- *BD 1 0*
- *longitude of ♄ [Long. ♄] 21 50*

for Jupiter [in Joue]

- *27 52½ ♓*
- *0 38 40*
- *longitude of ♃ [Long. ♃] 27 14 ♓*[819]

We have therefore found the places of these planets in longitude and latitude, for the observations of the given time, as follows:

5 August [Auguſti die 5], H. 12 p. m.

[819] in each computation a short printed rule stands above the result line — on the left under the whole *BD 1 0* line, on the right over the figures *27 14* ♓ only. The left result line carries no sign after *21 50*.

	Longitude [Longitudo]	Latitude [Latitudo]
♄	*21 50 ♓*	*2 19 M*
♃	*27 14 ♓*	*1 30 M*

That these longitudes and latitudes were correctly found is evident: if, from the difference of longitude as the angle, and the complement of each latitude as the two including sides, the third side is sought, it is found to be p. 5 27, equal to the observed distance of the planets — and this is what ought to have been found [atque hæc inueniſſe oportuit].

Collatio obſeruationis cum calculo vtroque Copernici et Alphonſi.

Comparison of the observation with both calculations, of Copernicus and of Alfonso X [Alphonſi].

Longitude and latitude of ♄ and ♃ at the beginning of the day 6 August 1583 [ad initium diej 6 Auguſti 1583]

	From observation [Ex obſeruatione]: longitude [Long.]	From observation: latitude [Lat.]	From Copernicus [Ex Copernico]: longitude	From Copernicus: latitude	From Alfonso X [Ex Alphonſo]: longitude	From Alfonso X: latitude
♄	*21 50 ♓*	*2 19 M*	*22 14 ♓*	*1 55 M*	*23 16 ♓*	*2 29 M*
♃	*27 14 ♓*	*1 30 M*	*27 2 ♓*	*1 37 M*	*27 47 ♓*	*1 51 M*

It is therefore evident that in the place of Saturn [in loco Saturni], as to longitude, the calculation of Copernicus exceeds by 24 minutes [24 ſcrupulis], that of Alfonso X by 1 G. 26 M.; as to latitude, Copernicus also falls short by 24 minutes [deſint Copernico etiam 24 minuta], while Alfonso X [Alphonſus] exceeds by 10 minutes [10 ſcrupulis]. In Jupiter [In Ioue], as to longitude, Copernicus falls short by 12 minutes [12 ſcrupula], while the latitude exceeds by 7 minutes [excedit vero latitudo 7 minutis]; Alfonso X, for his part, exceeds in longitude by 33 minutes, and in latitude is over by 21 minutes [in latitudine ſcrupulis 21 ſuperat].

DIE 8 AUGUSTI.

8 August.

- H. 1 46 ♄ on the meridian had an altitude [in meridiano habuit altitudinem], by the Q. minor. [per Q. minor.], of 28 40½; by the Q. portat. [per Q. portat.] 28 40⅔

At the next following noon the clock [Horologium] was running 3 minutes slow [tardius 3 Minutis ibat].

DIE 9 AUGUSTI, MANE.

9 August, morning.

- H. 1 43½ ♄ on the meridian had an altitude, by the Q. portat., of 28 39; by the Q. minor. 28 39½

• H. 2 1 30 ☽ on the meridian [in meridiano]: by the Q. minor. 31 30; by the Q. portat. 31 29⅓

At the next following noon the clock was running 2 M. slow [Horologium proxime meridie ſequenti 2 M. tardius ibat].

DIE 11 AUGUSTI A. M.

11 August, A. M.

• H. 1 36 ♄ on the meridian [in merid.] by the Q. min. [per Q. min.] 28 36¾; by the Q. portat. 28 36¼
• 1 55 ☽ on the meridian by the Q. min. 31 25; by the Q. portat. 31 25

At the next following noon on the same day [Proxime ſequenti in eodem die meridie], the clock kept its revolution exactly [horologium ſuam revolutionem juſte ſeruauit].

DIE 17 AUGUSTI A. M.

17 August, A. M.

♄ on the meridian had an altitude, by the mural Q. [per Q. muralem], of 28 24[820]

• by the Q. portat. [per Q. portat.] 28 24 40″
• ☽ on the meridian [in merid.] by the mural Q. [per Q. mural.] 31 8½; by the Q. portat. 31 9[821]

DIE 25 AUGUSTI.

25 August.

• H. 1 5½ ☽ on the meridian [in meridiano] had an altitude [habuit altitudinem], by the Q. minor. [per Q. minor.], of 30 46

DIE 26 AUGUSTI.

26 August.

• ☽ on the meridian [in meridie] by the Q. min. [per Q. min.] 30 43½

DIE 27 AUGUSTI.

27 August.

• Morning [Mane]. ☽ on the meridian: by the mural Q. 30 39⅙; by the Q. portat. 30 39

In the evening [Ad Veſperas], the distance between ♄ and the lucida of ♈ [lucidam ♈], at about hour 9¼ [circiter horam 9¼], was found three times [ter inventa eſt] with the rectified Sext. Trig. [per Sext. Trig. rectificatum]: 43 4¼

The distance between ☽ and the lucida of ♈, at about H. 9 30, was taken three times [capta eſt ter] with the Sext. Trig.: 38 32

At H. 10 the distance between ♄ and ☽ was taken three times: 4 33¾

[820] the entry runs over two printed lines, *per Q. muralem 28 24* set to the right on the second; no time is printed for it.

[821] the side opens on the value line *per Q. portat. 28 24 40″*, with no planet, time or rubric printed on it.

- H. 10¼ Between the first [Inter primam] 22 9½
- 10 20 of the wing of Pegasus [alæ Pegaſi] 22 9⅔
- 10 25 and ♃ [et ♃] 22 9½
- 10½ Between the first 21 57½
- 10 35 of the wing of Pegasus 21 57½
- 10⅔ and ♄ 21 57½

With the rectified Sext. Trigon. [Per Sext. Trigon. rectificatum.]

- 10 45 Between ♃ and 16 27⅔
- 10 50 the outermost [extremam] 16 27⅔
- 10 55 of the wing of Pegasus 16 27⅔
- 11 0 Between ♄ and 19 45
- 11 5 the outermost 19 45 very nearly [fere]
- 11 10 of the wing of Pegasus 19 45[822]

DIE 28 AUGUSTI, MANE.

28 August, morning.

- H. 0 32′25″ ♄ on the meridian: by the mural Q. [per Q. Mural.] 28 4; by the Q. portat. 28 5
- 0 47 35 ♃ on the meridian: by the mural Q. 30 35½; by the Q. portat. 30 36
- 0 56 0 the outermost of the wing of Pegasus [Extr. alæ Peg.], by the mural Q. [per Q. Mur.] 47 2⅔,

it is not good enough [non ſatis bona eſt]. At the next following noon the clock [horologium] was running 3½ M. fast [velocius ibat].

Examen præcedentium obſeruationum.[1]

Examination of the preceding observations.

- Between ♄ and the brighter one of ♈ [lucidiorem ♈] 43 5
- Between ♃ and the same one of ♈ [eandem ♈] 38 33

for hour 12 of the night [ad horam 12 noctis].[823]

- Declination of the head of ♈ [Declinatio cap. ♈] 21° 25′S.
- Declination of ♄ from observation [ex obſ.] 6 3M.
- Ascension R. of the head of ♈ [Aſcenſio R. cap. ♈] 25 55
- Ascension R. of ♄ 352 4
- Declination of ♃ 3 31½ M.
- Ascension R. of ♃ 355 53 37

Longitude and latitude of ♄ and ♃ at the beginning of the day 28 August in the year 1583 [Longitudo et latitudo ♄ et ♃ ad initium diei 28 Auguſti anno 1583.]

[822] In *10½ Inter primam* and *10⅔ et* ♄ no minute figure stands after the hour; the line *Per Sext. Trigon. rectificatum.* is centred in the right column between *10⅔ et* ♄ and *10 45 Inter* ♃ *et*, and is set close (*PerSext.Trigon.rectificatum.*). Which lines it qualifies is not stated.

[823] a printed brace stands to the right of the two value lines, its point toward *ad horam 12 noctis*., which stands level between them.

	From the observations [Ex obſeruationibus]: longitude [Longitudo]	From the observations: latitude [Latitudo]	From the Prutenics of Michael Mästlin [Ex Prutenicis Mæſtlini]: longitude	From the Prutenics of Michael Mästlin: latitude	From the Alphonsine calculation [Ex Alphonſino calculo]: longitude	From the Alphonsine calculation: latitude
♄	20°19′43″ ♓	2°24′37″M	20°36′30″ ♓	2° 0′ M	21°37½ ♓	2 33 M
☋	24 49 30 ♓	1 36 0 M	24 35 ♓	1 46 M	25 24½ ♓	1 57 M

The distance of the two planets computed from the longitude and latitude [Diſtantia vtriusque planetæ ſupputata ex long. et lat.]: 4° 34′ 0″.

DIE 1 SEPTEMBRIS, A. M.

1 September, A. M.

- ♄ on the meridian [in meridiano]: by the Q. portat. 27 57; by the Mural [per Muralem] 27 56
- ☋ on the meridian: by the mural Q. [per Q. Mural.] 30 22½; by the Portat. [per Portat.] 30 23½

DIE 4 SEPTEMBRIS.

4 September.

- H. 9 2 The distance [Diſtantia] 39 34½
- 9 8 between ☋ and 39 34½
- 9 10 the lucida in [lucidam in] 39 34½
- 9 12 the head of ♈ [capite ♈] 39 34½

[1] From codex V [E codice V.].

- H. 12 0 by the Sext. Trig. [per Sext. Trig.] 39 35½
- 9 15 Between ♄ and 43 42
- 9 17 the same one in [eandem in] 43 42
- 9 19 the head of ♈, the lucida [cap. ♈ lucidam] 43 42
- 12 0 by the rectified Sext. Trig. [per Sext. Trig. rectif.] 43 42½
- 9 22 4 10⅓
- 9 26 Between ♄ and ☋ 4 10⅓
- 9 29 4 10¼
- 12 0 4 10
- 9 31½ Between ♄ and 20 9
- 9 33 the outermost [extremam] 20 9
- 9 37 of the wing of Pegasus [alæ Pegaſi] 20 9
- H. 9 54 Between ☋ and 17 3 very nearly [fere]
- 9 56 the outermost 17 3
- 9 57 of the wing of Pegasus 17 3

And these observations of distance with the rectified Sext. Trig. [Atque hæ obſeruationes diſtantiæ per Sext. Trig. rectificatum.]

At the very beginning of the day 5 September [In ipſo initio diej 5 Sept.]

- ♄ on the merid. had an alt. [in merid. habuit alt.] of 27 48 40 by the Mural. [per Mural.]
- ♃ on the merid. had an alt. of 30 9½ by the Mural.; 30 10½ by the Portat. [per Portat.]

It was perfectly clear [Fuit exquiſite ſerenum]. ♄ near [iuxta] ☍ ☉.

EXAMEN PROXIME PRÆCEDENTIUM OBſERUATIONUM.[1]

Examination of the immediately preceding observations.

For hour 12 of the night of the day 4 September [Ad horam 12 noctis diej 4 Septembris]:

- Between ♃ and the lucida in the head of ♈ [lucidam in capite ♈] 39° 35′
- Between ♄ and the same one of the head of ♈ [eandem capitis ♈] 43 42 20″
- And the distance of ♄ and ♃ [Diſtantia autem ♄ et ♃] 4 10[824]
- Declination of ♄ from observation [ex obſ.] 6°18′20″ M
- Ascension R. of ♄ [Aſcenſio R. ♄] 351 27 48
- Declination of ♃ from observation 3°57½′M
- Ascension R. of ♃ 354 54[825]

Longitude and latitude of ♄ and ♃ at the beginning of the day 5 September [Longitudo et latitudo ♄ et ♃ ad initium d. 5 Sept.]

	From the observations [Ex obſeruation-ibus]: longitude [Longitudo]	From the observa-tions: latitude [Latitudo]	From the Prutenics of Michael Mästlin [Ex Prutenicis Mæſtlini]: longitude	From the Prutenics of Michael Mästlin: latitude	From the Alphonsine calculation [Ex Alphonſino calculo]: longitude	From the Alphon-sine calcula-tion: latitude
♄	19°40′23″ ♓	2°24′33″M	19°56½ ♓	2° 1′ M	20° 57½ ♓	2°33 M
♃	23 45 0 ♓	1 36⅓ M	23 32 ♓	1 46⅓ M	24 19½ ♓	1 58½ M

The distance of the two planets computed from the longitude and latitude [Diſtantia vtriusque planetæ ſupputata ex long. et lat.]: 4°10′

N. B. These calculations of the places of ♄ and ♃ near the opposite of ☉ [in locis ♄ et ♃ iuxta ☉ oppoſitum] must be determined differently [aliter limitandæ ſunt], as is evident after the end, on the planets [vt patet poſt finem de planetis].

DIE 5. SEPTEMBRIS.[1]

5 September.

- H. 8 34 Between ♄ 43 45
- 8 39 and 43 45
- 8 40 the lucida [lucid.] 43 45
- 12 0 of ♈ 43 45⅓

[824] the three words *Ad horam 12 / noctis diej 4 / Septembris* stand on three lines at the left; a printed brace opens from them toward the three value lines on the right.

[825] In *3°57½′M* the minute mark stands after the fraction.

- 8 46 Between ♃ 39 40
- 8 51 and 39 40¼
- 8 56 the lucida [lucidam] 39 40¼
- 8 58½ of the head [capitis] 39 40¼
- 12 0 of ♈ 39 40¾
- 9 7 4 6½
- 9 10½ Between 4 6
- 9 14 ♄ 4 6
- 9 16 and ♃ 4 6
- 9 19 4 6
- H. 9 22 Between ♃ and 17 6 40
- 9 26 the outermost 17 6 40
- 9 31 of the wing of Pegasus 17 6 40
- 9 38½ Between ♄ and 20 12⅔
- 9 44 the outermost 20 12⅔
- 9 46½ of the wing of Pegasus 20 12⅔
- 10 20½ Between the first [Inter primam] 21 49
- 10 26 35 of the wing of Pegasus 21 49
- 10 31 and ♃ 21 49
- 10 34 10 Between the first 21 54
- 10 42 20 of the wing of Pegasus [alæ Peg.] and ♄ 21 54
- 10 54 Between ♄ and the outer- [extre-] 31 55
- 10 58 most of the tail [mam caudæ] 31 55
- 10 59 of Capricornus [Capricorni] 31·55
- 11 4½ Between ♃ and the outer- 35 58¼
- 11 8 most of the tail 35 58[826]

[1] From codex V [E codice V.].

[2] In codex V Tycho added in writing [In codice V. Tycho adſcripſit]: »*Compare these observations too, for the ☌ of ♄ni to the middle of the Sun* [*Confer et has obſeruationes pro ☌ ♄ni ad medium Solis*]«.

- H. 11 15 of Capricornus [Capricorni] 35 58
- 11 23 50″ the star in the neck of ♓ [ſtella in collo ♓] passed through the meridian [tranſiuit … per meridianum]
- 11 34 30 the preceding and more westerly one in the back of ♓ [præcedens et occidentalior in dorſo ♓] was on the meridian [in mer.]
- 11 46 10 The following and more southerly one in the back of ♓ [Sequens et auſtralior in dorſo ♓] passed through the meridian [per merid. tranſiuit], having an altitud. [habens altitud.] of 37 30

[826] the fourteen lines under the rubric form the left column and the sixteen following lines the right column; the words of each distance are set one or two to a line down the run (*Inter ♄ / et / lucid. / ♈*; *Inter ♃ / et / lucidam / capitis / ♈*; *Inter / ♄ / et ♃*), and *extre-/mam* is divided between two lines of the right column, twice. In the line *10 59 Capricorni* a short mark stands at mid-height between *31* and *55*; it is transcribed as a point, and whether it is a point or a short dash is not settled.

By the lesser Quadrant [Per Qua- / dr. / Min.].[827]

- H. 11 53 40 ♄ on the meridian had an altitud. [in merid. habuit altitud.]: 27 47¾ by the lesser Quadrant [per Q. minor.]; 27 47⅓ by the Mural. [per Mural.]

DIE 6 SEPTEMBRIS.

6 September.

- H. 0 7 ♃ on the meridian had an altitud. [in meridiano habuit altitud.]: 30 7½ by the lesser Quadrant; 30 7 by the Mural.

EXAMEN HARUM OBſERUATIONUM.[1]

Examination of these observations.

- Between ♄ and the lucida in the head of ♈ [lucidam in capite ♈] 43° 45′ 20″
- Between ♃ and the same one in the head of ♈ [eandem in capite ♈] 39 40 45
- Distance of ♄ and ♃ [Diſtantia ♄ et ♃] 4 6 0

for H. 12 of the night [ad H. 12 noctis].[828]

- Declination of ♄ from observation [Declinatio ♄ ex obſ.] 6°19′40″M
- Ascension R. of ♄ [Aſcenſio R. ♄] 351 25
- Declination of ♃ from observation 4° 0′
- Ascension R. of ♃ 354 48 18″

Longitude and latitude of ♃ and ♄ at the beginning of the day 6 September [Longitudo et latitudo ♃ et ♄ ad initium diej 6 Septembris]

	From observation [Ex obſeruatione]: longitude [Longitudo]	From observation: latitude [Latitudo]	From Copernicus [Ex Copernico]: longitude	From Copernicus: latitude	From the Alphonsine [Ex Alphonſino]: longitude	From the Alphonsine: latitude
♄	19°37⅓′ ♓	2°24⅔′ M	19°51½′ ♓	2° 1′ M	20°52½′ ♓	2°33′ M
♃	23 38¾ ♓	1 36 24 M	23 24 ♓	1 46½ M	24 10½ ♓	1 59 M

[829]

The distance of the two planets computed from the longitude and latitude [Diſtantia vtriusque planetæ ſupputata ex long. et lat.]: 4° 6′ 0″.

Note [Nota]. ♃ was then almost in ☍ ☉ [tunc fuit quaſi in ☍ ☉], and not far from the perigee of the eccentric [nec longe a perigæo excentrici].

[827] the words *Per / Qua- / dr. / Min.* stand on four lines in the value place of the left column; the printed brace to their left runs from the *11 23 50″* line to the *altitud. 37 30* line and does not reach the *H. 11 15* line.

[828] a printed brace stands to the right of the three value lines, its point toward *ad H. 12 noctis*, which stands level with the middle line.

[829] The main heads read *Ex obſeruatione* (singular) and *Ex Alphonſino*, with no further word printed after either.

DIE 9 SEPTEMBRIS.

9 September.

- H. 8 45 Between ♄ and the lucida [Inter ♄ et lucidam] 44 2
- 8 57 of ♈, by the Sext. Trig. rectif. [♈ per Sext. Trig. rectif.] 44 2
- 9 2 Between ♃ and [Inter ♃ et] 40 10½
- 9 4½ the lucida of ♈ [lucidam ♈] 40 10½
- 9 44 Between ♄ and the luci- [Inter ♄ et luci-] 31 36
- 9 49 -da of the tail [dam caudæ] 31 36
- 9 53 of Capricornus 31 36
- 10 0 Between Jupiter [Inter Iouem] 35 25
- 10 4 and the lucida of the tail [et luc. caudæ] 35 25
- 10 7 of Capricornus 35 25
- H. 10 14 The distance [Diſtantia] 3 51¾
- 10 20 between [inter] 3 52
- 10 27 ♃ and ♄ [♃ et ♄] 3 52
- 10 50 Between ♄ and [Inter ♄ et] 21 52¼
- 10 54 the first of the wing [primam alæ] 21 52½
- 11 0 of Pegasus [Pegaſi] 21 52¼
- 11 11 Between ♃ and 21 42
- 11 15 the first of the wing of Pegasus [prim. alæ Peg.] 21 42

At the next following noon, when ☉ had been sighted [Proxime ſequenti meridie conſpecto ☉] through the slits of the sight of the lesser Quadrant [per rimulas pinnacidij Quadrantis Minoris], the clock [Horologium] was running M. 6½ faster than it should [iuſto citius … ibat].[830]

Examinatio obſeruationum proxime præcedentium[2]

Examination of the immediately preceding observations.

- Between ♄ and the lucida in the head of ♈ 44° 2′ 20″
- Between ♃ and the same one in ♈ [eandem in ♈] 40 11 0
- Between ♄ and ♃ [Inter ♄ et ♃] 3 52

For H. 12 of the night, 9 September [Ad H. 12 noctis 9 Sept.].[831]

[1] From codex V [E codice V.].

[2] From codex V [E codice V.].

- The meridian altitude of ♄ [Altitudo ♄ merid.], proportionally [proportionaliter], 27°40′
- The meridian altitude of ♃, proportionally [proport.], 29 54
- The southern declination of ♄ [Declinatio ♄ Meridionalis] 6 27
- The southern declination of ♃ 4 13
- Right ascension of ♄ [Aſcenſio Recta ♄] 351° 8′ 49″
- Right ascension of ♃ 354 19 26

[830] the ten lines under the rubric form the left column and the eight following lines the right column; the words of each distance are set one or a few to a line down the run.

[831] a printed brace stands to the right of the three value lines, its point toward *Ad H. 12 noctis* and *9 Sept.*, set on two lines.

Longitude and latitude of ♄ and ☋ at the beginning of the day 10 September [Longitudo et Latitudo ♄ et ☋ ad initium diej 10 Septembris]

	From the observations [Ex obſeruationibus]: longitude [Longitudo]	From the observations: latitude [Latitudo]	From the calculation of Copernicus [Ex Copernîci calculo]: longitude	From the calculation of Copernicus: latitude	From the Alphonsine [Ex Alphonſino]: longitude	From the Alphonsine: latitude
♄	19°19½′ ♓	2°25′M	19°31½′ ♓	2° 1′M	20°32½′ ♓	2°33′M
☋	23 7 ♓	1 37 M	22 52 ♓	1 47 M	23 38 ♓	1 59 M

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The distance of the two planets computed from the longitude and latitude [Diſtantia vtriusque planetæ ſupputata ex long. et lat.]: 3°52′23″.

DIE 10 SEPTEMBRIS.

10 September.

- ♄ on the meridian had an altitude [in meridiano habuit altitudinem]: 27 38 by the Mural. [per Mural.]; 27 39 by the Portat. [per Portat.]
- ☋ on the meridian had an altitude [in merid. habuit alt.] 29 50⅓ by the Mural.; 29 51 by the Portat.

DIE 12 SEPTEMBRIS.

12 September.

- ♄ on the meridian had an altitude 27 35 by the Mural.; 27 36 by the Portat.
- ☋ on the meridian had an altitude 29 45 by the Mural.

DIE 13 SEPTEMBRIS.

13 September.

- ♄ on the meridian had an altitude 27 32 by the Mural.; 27 33⅓ by the Portat.
- ☋ on the meridian had an altitude 29 41⅓ by the Mural.; 29 42 by the Portat.

It was not clear enough [Non erat ſatis ſerenum].

DIE 15 SEPTEMBRIS.

15 September.

- ♄ on the meridian had an altitude 27 29⅓ by the Mural.; 27 30 by the lesser Quadrant [per Q.Min.]
- ☋ on the meridian had an altitude 29 35 by the Mural.; 29 35 by the Portat.

but not certain enough, because the Quadrant was being shaken by the wind [ſed non ſatis certa, quia Quadrans vento agitabatur].

[832] The *i* after *n* in *Copernîci* carries a mark shaped like a circumflex rather than a dot. *Ex Alphonſino* has no further word printed after it.

DIE 16 SEPTEMBRIS.

16 September.

- H. 11 27 0 ♃ on the meridian by the lesser Quadrant [in merid. per Q. minor.] 29 34, not good enough [non ſatis bona] because of clouds [propter nubes].

DIE 17 SEPTEMBRIS.

17 September.

- H. 11 M. 19½ ♄ on the meridian had an altitude [in meridiano habuit alt.] of 27 25½ by the lesser Quadrant [per Q. Minor.]
- 27 25⅔ by the Mural.
- 27 26 30″ by the Portat.
- H. 11 M. 31 S. 20 ♃ on the meridian had an altitude [in merid. habuit alt.]: 29 29 by the lesser Quadrant [per Q. Minor.]; 29 29¼ by the Mural.; 29 30 by the Portat.

DIE 20 SEPTEMBRIS.

20 September.

By the lesser Quadrant [Per Quadrantem Minorem].

- H. 11 16 20 ♄ on the meridian [in merid.] 27 21
- 11 27 0 ♃ on the meridian 29 21¾

Not precise enough [Non ſatis exquiſite], because of the nearness of ☾ [propter vicinitatem ☾].

At the next following noon, when the transit of ☉ had been observed through the slits of the lesser quadrant [Proxime ſequenti meridie ☉ tranſitu per rimulas minoris quadrantis obſeruato], the clock [horologium] was moving faster than it should [velocius iuſto] by ¼ of one hour [¼ vnius horæ]. This error is perhaps to be ascribed to the great storm [qui error magnæ tempeſtati fortaßis eſt aſcribendus], which was on the immediately preceding day, and on the day 21 September itself was, however, somewhat milder [quæ die proxime præcedenti et ipſo die 21 Sept. aliquantulum tamen remißior fuit].

DIE 21 SEPTEMBRIS.

21 September.

By the lesser Quadrant [Per Quadr. Minorem].

- H. 10 55 0 ♄ on the meridian 27 20
- 11 5 30 ♃ on the meridian 29 19

not precise enough because of clouds [non ſatis exquiſite propter nubes].

DIE 23 SEPTEMBRIS.

23 September.

By the lesser Quadrant [Per Quadr. Minorem].

- H. 10 51 ♄ on the meridian 27 17
- it is not good [non eſt bona]

- 10 57 30 ☽ on the meridian 29 12[833]

DIE 24 SEPTEMBRIS.

24 September.

- H. 10 40 15 ♄ on the meridian had an altitude [in meridiano habuit alt.]: 27 16 by the lesser Q. [per Q. Minor.]; 27 14½ by the Mural [per Mural.]; 27 15 by the Portat. [per Portat.]
- 10 49 45 ☽ on the meridian had an altitude: 29 12 by the lesser [per Min.], not good [non bona]; 29 14¼ by the Mural; 29 14½ by the Portat.

DIE 29 SEPTEMBRIS.

29 September.

- ♄ on the meridian had an altitude [in meridiano habuit alt.]: 27 7¼ by the Mural; 27 7½ by the Portat.; 27 9 by the Sext. Trig. [per Sext. Trig.]
- ☽ on the meridian had an altitude: 28 56 40 by the Mural; 28 56 45 by the Portat. rect. [per Portat. / rect.]; 28 58 by the Sext. Trig.[834]

DIE 4 OCTOBRRIS.

4 October.

- ♄ on the meridian had an altitude [in meridiano habuit alt.]: 27 1½ by the Sext. Trig.; 27 0½ by the Mural.
- ☽ on the meridian had an altitude: 28 46 by the Sext. Trig.; 28 45 by the Mural.

With the Sext. Trig. the rule [regula] was used in these two observations.[835]

DIE 10 OCTOBRIS.

10 October.

- H. 9 39 15 ♄ on the meridian [in meridiano]: by the Q. Mural [per Q. Mural.] 26 53½; by the Q. Portat. [per Q. Portat.] 26 53; by the Sext. Trig. 26 54½[1]
- 9 46 44 ☽ on the meridian: by the Q. Mural 28 33; by the Q. portat. [per Q. portat.] 28 33⅓[2]
- 10 0 25 The Tail of Piscis Austrinus [Cauda Piſcis auſtralis] on the meridian by the lesser Q. [per Q. minorem].

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[833] *non eſt bona* stands on its own line at the right, between the ♄ and ☽ lines of 23 September; which value it qualifies is not printed.

[834] in each entry a printed brace, its point toward the text and opening toward the values, stands between the two-line text (*in meridiano / habuit alt.*) and the first two value lines only; the third value line (*27 9 per Sext. Trig.*; *28 58 per Sext. Trig.*) stands outside the brace. The word *rect.* stands alone on its own line at the right, below *28 56 45 per Portat.* and above *28 58 per Sext. Trig.*; its construal is not determined by the setting.

[835] the rubric prints *OCTOBRRIS* with two consecutive *R*. In each entry a printed brace, opening toward the text and its point toward the values, stands between the two-line text and the two value lines — the reverse orientation of the braces under 29 September.

On the second day immediately after the preceding observations were made, the transit of ☉ through the meridian [☉ per meridianum tranſitus] showed that the clock had turned 20 M. faster than it should [horologium 20 M. iuſto celerius circumuoluiße].

DIE 14 OCTOBRIS.

14 October.

After sunset [Poſt occaſum Solis].

- H. 5 18 Distance between ☿ [Diſt. inter ☿] 53 17
- 5 23 and the western [et occidentalem] 53 18¼
- H. 5 26 40 limb of the ☾ by the [limbum ☾ per] 53 18
- 5 29 Q. portat. 53 18

☿, however, was very close to the western horizon [Horizonti occidentali admodum vicina], so that its altitude did not exceed 3 G.

- H. 5 36′35″ the Vulture [Vultur] passed through the meridian by the Mural [per Muralem].
- ♄ on the meridian by the Mural [in merid. per Muralem] 26 49½
- ♃ on the meridian by the Mural 28 27½

The clock we used ran only 40″ seconds faster [tantum 40″ ſecundis velocius ibat] at the next noon [proxima meridie].

DIE 15 OCTOBRIS.

15 October.

- H. 5 15 Distance between ☿ and [Diſt. inter ☿ et] 65 7⅔
- 5 17 the western limb of the ☾ [occid. limbum ☾] 65 7⅔
- 5 18½ by the Q. port. [per Q. port.] 65 7⅔

That the distance did not vary at all was caused by the nearness of ☿ to the horizon: for the vapours around the horizon raised Venus [Venerem] by exactly as much as the ☾ had advanced by its own motion. And the altitude of ☿ at the time of these observations was about 3 p.

- H. 7 27 0 The Mouth of Pegasus [Os Pegaſi] was on the meridian by the Mural Quadrant [per Quadrantem Muralem].

At the next noon the clock we were using was turning 1 M. 18″ faster than it should [iuſto velocius] since the preceding noon[836]

DIE 22 OCTOBRIS.

22 October.

H. 8¼ distance of ♃ and ♄ 2° 14½′ by the astronomical Arc [per Arcum aſtronomicum]. Suddenly, however, the sky became covered with clouds, so that we could not make more observations.

DIE 28 OCTOBRIS.

28 October.

[836]no stop is printed after *meridiem*, the last word of the paragraph.

- H. 6 2 Distance between [Diſtantia inter] 2 14
- 6 6 ♄ and ♃ by the Arc [♄ et ♃ per Arcum] 2 14
- 6 10 Astronomical [Aſtronomicum] 2 14
- 6 52 Between ♃ and [Inter ♃ et] 44 25¼
- 7 0 the lucida [lucidam] 44 25¼ bis
- 8 35 cap. ♈ by the [cap. ♈ per] 44 25⅓ bis
- 8 37 Sext. Trig. 44 25½

[1] Perhaps struck through with a line [Fortaße linea inducta].

[2] By the Sext. Trig. 28 35¾, by the Q. min. 28 36, both struck through with lines [ambæ lineis inductæ].

- H. 8⅔ Between the luci- [Inter luci-] 46 37⅓
- 8¾ -da of the head of ♈ and [dam cap. ♈ et] 46 37⅓
- 8 50 ♄ by the Sext. Tr. [♄ per Sext. Tr.] 46 37⅓
- ♄ on the meridian had an alt. [in meridiano habuit alt.]: by the Mural. [per Mural.] 26 41; fere; by the Portat. [per Portat.] 26 41
- ♃ on the meridian had an alt.: by the Mural. 28 15¼; by the Portat. 28 15½[837]

DIE 29 OCTOBRIS.

29 October.

- H. 5 20 approximately [circiter]. Distance between ♄ and ♃ by the astronomical Arc [Diſtantia inter ♄ et ♃ per Arcum Aſtronomicum]. Not good [Non bonæ]: 2 11½; 2 11½; 2 11⅓
- H. 6 10 Distance between ♄ [Diſt. inter ♄] 2 13
- 6 15 and ♃ by the Ar- [et ♃ per Ar-] 2 13
- 6 20 -c, astronomical [cum aſtron.] 2 13

The discrepancy between these observations perhaps occurred [fortaße contigit] because at the time of the earlier observations the planets were nearer the horizon. But which are more certain can be gathered from observations to be made of the lucida in the head of ♈ [ad lucidam in capite ♈].

- H. 7 0 Distance between [Diſtantia inter] 44 27¾
- 7 6 ♃ and the lucida of the head of ♈ [♃ et lucidam cap. ♈] 44 27¾
- 7 10 by the Sext. Trigon. [per Sext. Trigon.] 44 27¾
- 7⅓ Between ♄ and the same [Inter ♄ et ean-] 46 38¾
- in the head [dem in capite] 46 38¾
- of ♈, the lucida [♈ lucidam] 46 38¾
- ♄ on the meridian had an alt.: by the Mural. 26 40½; by the Portat. 26 40 50
- ♃ on the meridian had an alt.: by the Mural. 28 14⅔; by the Portat. 28 15

[837] In each of the two braced entries a printed brace, its point toward the text and opening toward the values, stands between the two-line text and the value lines. The word *fere* stands alone on its own line at the right, between *per Mural. 26 41* and *per Portat. 26 41*; the setting does not determine which value it qualifies.

Around the next sunrise [Circa ortum ☉ proxime] the clock was running ¼ slower than it should [¼ tardius iuſto ibat].[838]

DIE 30 OCTOBRIS.

30 October.

- ♄ on the meridian by the Q. Mural. [in merid. per Q. Mural.] 26 39⅔; by the Portat. 26 40
- ♃ on the meridian by the Q. Mural. 28 14⅔; by the Portat. 28 15¼

It was not clear enough [Non erat ſatis ſerenum].

DIE 1 NOUEMBRIS.

1 November.

- H. 6 0 Distance between ♄ and ♃ by the astronomical Arc [Diſtantia inter ♄ et ♃ per Arcum Aſtronomicum]: 2 14; 2 13⅔; 2 13¾; 2 14

While these distances were being taken the sky was moderately clear, although the wind was blowing rather violently; afterwards the sky suddenly became covered with clouds, so that no more observations could be made.

DIE 8 NOUEMBRIS.

8 November.

	Azim. ♀		Alt. ♀
H. 4 24 25	21 30	a meri- [from the south]	4 32
4 27 10	22 0	die verſ.	4 27
4 34 30	23 39	occaſ.	4 3½

[839]

DIE 11 DECEMBRIS.[1]

11 December.

- H. 5 32 10 ♄ passed through the meridian and had an alt. by the Q. Mural. [Tranſiuit ♄ per meridianum habuitque alt. per Q. Mural.] 27 5⅓; by the Sext. Trig. 27 5¾
- 5 44 15 ♃ passed through the meridian and had an alt. by the Q. Mural. 29 18¼
- 8 22 Between ♃ and the lucida [Inter ♃ et lucidam] 42 13
- 8 26 of ♈ by the Sext. Trig. [♈ per Sext. Trig.] 42 14
- 8 30 good [bonæ] 42 13

[838] under *H. 5 20* the three text lines are closed on the right by a printed brace, its point toward the text and opening toward the three values. The two braced altitude entries have braces of the same orientation. The *¼* stands at the start of a line with no integer before it and no unit after it.

[839] the heads *Azim.* ♀ and *Alt.* ♀ are printed above the second and fourth columns only; the first and third columns have no head. The words *a meri- / die verſ. / occaſ.* run down the third column on three lines.

From this the place of ☊ can be verified, and from the verified place of ☊ the apparent place of the ☾ [locus ☾ viſus] can also be found.

For the difference of Ascension R. from the head of ♈ [Pro differentia Aſcenſionis R. a capite ♈] from these observations:

- Side [Latus] BA 94 47¼ — Ascension R. of the head of ♈ [Aſc. R. cap. ♈] 26° 0′ 0″
- BC 68 32 — Ascension R. of ☊ [Aſc. R. ☊] 352 14¾
- AC 42 13½
- Ang. ABC 33 45 15

It is therefore, on day 11 December, H. 8½ p. m. [Eſt ergo Die 11 Dec. H. 8½ p. m.]:

- Longitude of ☊ [Longitudo ☊] 20° 59½′ ♓
- Latitude Mer. [Latitudo Mer.] 1 18⅔
- Alphonſ. calculation [Calculus Alphonſ.]: 21 38 ♓; 1 30 M
- Prut. calculation [Calculus Prut.]: 20 52 ♓; 1 24 M[840]

In the year 1584 the true place of the apogee of ☊ [verus locus Apogæj ☊] was found: $3^{\text{ſ}e^{x}}$ 3° 45′.

And the true precession of the Æquinoct. from our own restitution [vera præceßio Æquinoct. ex propria reſtitutione]: 28 3.

The place of the apogee of ☊ from the I star of ♈ [a I ſtella ♈]: 2 35 42. Taking the mean place of ☉ from our own tables [Aßumpto loco ☉ medio ex proprijs tabulis], let the place of ☊ be sought for the proposed [recte: *præſuppoſitum*, "presupposed", for the printed *propoſitum* — Corrigenda, p. 429] time, as follows.

[1] The observations of this day and all the following calculations are from codex V [e codice V].

- Simple ☉ from our own tables [Simplex ☉ ex proprijs tabulis] $8^{\text{ſig}}$ 29°42′ 2″
- True precession for the year 83 [Vera præceßio ad Annum 83] 28 2 0
- Mean motion of the longitude of ☉ from I ♈ [Æqualis motus longitudinis ☉ a I ♈] $4^{\text{ſe}^{x}}$ 1 40 2
- Mean commutation of ☊ from the Prut. [Æqualis commutationis ☊ ex Prut.] 4 26 42 25
- Mean longitude of ☊ [Æqualis longitudinis ☊] 5 34 57 37
- Place of the apogee of ☊ from I ♈ [Locus Apogæj ☊ a I ♈] 2 35 41
- Eccentric anomaly [Anomalia Eccentri] 2 59 16 37
- Equation of the eccentric, subtrah. [Æquatio Eccentrj ſubtrah.] 4 9
- Proportional minutes [Scrupula proportionalia] 60 0
- Equated eccentric anomaly [Coæquata Anomalia Eccentrj] 2 59 12 28
- Equated longitude of ☊ [Coæquata longitudo ☊] 5 34 53 28
- Mean commutation, of the anomaly [Æqualis commutat. Anomaliæ] 4 26 42 25
- Add [Adde] 4 9

[840] Each *Calculus* line is followed by a printed brace, its point toward the words and opening toward two value lines.

- Equated commutation of ♃ [Coæquata Commutat. ♃] 4 26 46 34
- The parallax of the orb [Parallaxis orbis] 10 25 8
- The excess [Exceßus] 59 5
- The corresponding part from the excess, ad. [Pars congruens de exceßu ad.] 59 5
- The absolute prosthaphaeresis [Abſoluta proſthaphæreſis] 11 24 13
- Equated longitude of ♃ [Coæquata longitudo ♃] 5 34 53 28
- sub. [ſub.] 11 24 13
- Longitude of ♃ from I ♈ [Longitudo ♃ a I ♈] 5 23 29 15
- True precession of the Æquinoct. [Vera præceßio Æquinoct.] 28 2
- True longitude of ♃ [Vera longitudo ♃] 5 51 31 15
- Place of ♃ from observation [Locus ♃ ex obſeruatione] 20 59½ ♓
- 0 31¾[841]

Therefore the place of ♃ according to this procedure differs from the place found by observation by about 32 M. [in 32 M. fere], and the reason for this must be sought elsewhere [cuius rej ratio aliunde perquirenda eſt].

Demonſtratio inuenti loci ♄ *ad diem 27 Auguſti ex diſtantia eius ab vtraque ala Pegaſi.*

Demonstration of the place of ♄ found for 27 August, from its distance from each wing of Pegasus.

Places of the fixed stars [Loca fixarum]:

- Of the first of the wing of Pegasus [Primæ alæ Pegaſi]: longitude [longit.] 17 41½ ♓, latitude [latit.] 19 26 B
- Of the last of the wing [Extremæ alæ]: 3 21 35 ♈, 12 35 B

H. 11, distance between ♄ and I of the wing [inter ♄ et I alæ] 21°57½′; between ♄ and the poſtr. of the wing [inter ♄ et poſtr. alæ] 19°45′.[842]

Diagram. A figure at the left of the side. From a point at the top, two outer curved lines descend, bowing outward, to the left and right lower ends of the figure; a third, middle curved line descends from the top point to a point near the foot. A curved base line joins the lower ends of the two outer lines. On the left outer line a point stands a little above the base, and on the right outer line a point stands higher than it; straight lines join the left point to the right point, the left point to the foot point, and the right point to the foot point. Four letters are printed, all in a bold roman capital:

- A (top, at the meeting of the curves) — cited in the text (DA, CA, DAC, ACB, BAC, BA)
- D (left, at the point on the left outer line) — cited in the text (DA, DAC, DC, DCB, DCA, BD)
- C (right, at the point on the right outer line) — cited in the text (CA, DAC, DC, BC, DCB, DCA, ACB, BAC)

[841] A short rule is printed under *20 59½* ♓, and *0 31¾* stands below it with no stub.

[842] *Loca / fixarum* stands on two lines at the left, followed by a printed brace, its point toward *Loca fixarum* and opening toward the two star lines.

- B (foot, below the point where the lines from D and C meet the middle curve) — cited in the text (DCB, BC, BD, BAC, BA)

I. Of the triangle DAC there are given [I. Trianguli DAC dantur]:

- DA 70 34 and CA 77 25, the compl. of the latitude of the fixed stars [compl. lat. fixarum]
- DAC 15 40, difference of longitude [differentia longitudinis]
- Therefore DC 16 31½, the distance by computation [Ergo DC 16 31½ diſtantia ex ſupputatione].

II. Of the triangle DCB there are given [II. Trianguli DCB dantur]:

- DC 16 31½, the distance of the fixed stars from each other [diſtantia fixarum ab inuicem]
- BC 19 45 and BD 21 57½, the distances of ♄ from the fixed stars [diſtantiæ ♄ a fixis]
- Therefore DCB 74 48 35 [Ergo DCB 74 48 35][843]

III. Of the triangle DCA all the sides are given as before; therefore the angle DCA 63 30 13, therefore the whole ACB 138 18⅚ [III. Trianguli DCA dantur omnia latera vt prius, ergo angulus DCA 63 30 13, ergo totus ACB 138 18⅚].

IIII. Of the triangle BAC there are given [IIII. Trianguli BAC dantur]:

- CA 77 25
- BC 19 45
- ACB 138 18⅚
- Therefore BA 92 24⅓ [Ergo BA 92 24⅓]
- BAC 12 56 47[844]

By this working-out of the calculation, therefore, the longitude of ♄ is shown to be 20 24 48 ♓, the latitude 2 24 20 M. [Manifeſtatur igitur per hanc calculi inductionem ♄ Longitudo 20 24 48 ♓, Latitudo 2 24 20 M.]

Examination of the calculation for finding the places of ♄ around ☍ with the simple ☉$^{l}{}_{is}$ [Examinatio calculi pro ♄ locis circa ☍ cum ſimplici ☉$^{l}{}_{is}$ inueniendis].

- Day 27 August, hour 10½ [Die 27 Auguſti, hora 10½].
- Declination M. of ♄ [Declinatio M. ♄] 6 1
- Declination of the lucida of ♈ [Declinatio lucidæ ♈] 21 28
- Hence the Ascension R. of ♄ [Hinc Aſc. R. ♄] 352 8 45
- Distance of ♄ from the lucida of ♈ [Diſtantia ♄ a lucida ♈] 43° 4½
- Ascension R. of the lucida of ♈ [Aſcenſio R. lucidæ ♈] 25 58 30
- Angle of the difference of ascension [Angulus differ. aſcenſ.] 33 49 45
- Resp. longitude 20°24′50″ ♓, latitude 2 23 54 M. [Reſp. Long. 20°24′50″ ♓, Lat. 2 23 54 M.]
- At the time stated above, the distance between ♄ and the first of the wing of Pegasus [Prædicto tempore diſtantia inter ♄ et primam alæ Peg.] 21 57½

[843] A printed brace, opening toward the values and its point toward the words, closes *DA 70 34* and *CA 77 25* on the right, with *compl. lat. fixarum* beyond it; a second brace of the same orientation closes *BC 19 45* and *BD 21 57½*, with *diſtantiæ ♄ a fixis* beyond it.

[844] The word *Ergo* stands before *BA* only.

- Declination of the first of the wing of Pegasus 13°0′0″ B, Ascension R. of the same [Declinatio primæ alæ Peg. 13°0′0″ B, Aſcenſio R. eiuſdem] 341 0 45
- Angle of the difference of ascension 11 3$\frac{1}{12}$; hence, therefore, the Ascension R. of ♄ [Angulus diff. aſcenſ. 11 3$\frac{1}{12}$, ergo hinc Aſc. R. ♄] 352 3 50

This agrees less well with the one above, because of the oblique position of each star of Pegasus with ♄ with respect to the equator [propter obliquum ſtellæ vtriuſque [recte: huius, "this" — Corrigenda, p. 429] Pegaſi ſitum cum ♄ reſpectu æquatoris]. But when the place of ♄ that was found is examined from the lucida of ♈, through the assumed longitude and latitude of each, it gives the distance [recte: *redit diſtantia* for the printed *reddit diſtantiam*, "the distance comes out" — Corrigenda, p. 429] by working the triangles as 43°4′20″, which was observed as 43°4′30″ [quæ obſeruata fuit 43°4′30″].

DIE 4 SEPTEMBRIS.

4 September.

H. 9 M. 15, distance of ♄ from the lucida of ♈ [diſtantia ♄ a lucida ♈] 43°42′; declination of ♄ [Declinatio ♄] 6°16$\frac{5}{6}$′ M. Angle of the difference of ascension [Angulus differentiæ aſcenſ.] 34 25$\frac{2}{3}$; therefore the Ascension R. of ♄ [ergo Aſc. R. ♄] 351 32 50. Resp. longitude [Reſp. Longitudo] 19°45′55″ ♓, latitude [Latitudo] 2°24′20″ M.[845]

You should rather put your trust in this observation and compare it with the observation of day 27, for the intermediate daily motion agrees better [Adhibeas potius fidem huic obſeruationi et conferas eam cum diej 27 obſeruatione, nam motus diurnus intermedius rectius congruit].

Δοκιμασία [Greek: *dokimasia*, "test, verification"] of the place of ♄ found from the lucida of ♈ by analysis of the calculation [inuenti loci ♄ a lucida ♈ per analyſin calculi]: the distance computed [diſtantia ſupputata] 43 41 42, which was observed as 43°42′.

DIE 5 SEPTEMBRIS.

5 September.

- H. 10$\frac{2}{3}$[?] distance of ♄ from the lucida of ♈ [diſtantia ♄ a lucida ♈] 43°45$\frac{1}{3}$′; declination of ♄ [Declinatio ♄] 6°18′ 0″ M.
- Angle of the difference of ascension [Angulus differentiæ aſcenſionalis] 34 29$\frac{1}{6}$; hence the Ascension R. of ♄ [hinc Aſc. R. ♄] 351 29 20
- At the same time, between ♄ and the first of the wing of Pegasus [Eodem tempore inter ♄ et primam alæ Pegaſi] 21°54′.
- Angle of the difference of ascension [Angulus differentiæ aſcenſ.] 10 25 0; hence the Ascension R. of ♄ [hinc Aſcenſio R. ♄] 351 25 45
- H. 11 approximately [circiter], distance of ♄ from the following one of the tail of ♑ [diſtantia ♄ a ſequente caudæ ♑] 31°55′

[845]No stop is printed after *6°16$\frac{5}{6}$′ M.*

- Declination of the last of the tail of ♒ [Declinatio extremæ caudæ ♒] 17 55 0 M.; angle of the difference of ascension [Angulus differentiæ aſc.] 30 28 50
- Ascension R. of the extr. of the tail [Aſc. R. extr. caudæ] 321 1 15; therefore, hence, the Ascension R. of ♄ [ergo hinc Aſc. R. ♄] 351 30 5
- H. 10 M. 50, the right ascension limited from the lucida of ♈ and the tail of ♒ [Aſcenſio recta limitata a lucida ♈ et cauda ♒] 351 29⅔
- Resp. longitude [Reſp. Longitudo] 19 42⅗ ♓, latitude [Latitudo] 2 24⅙ M.

Demonſtratio inuenti loci ♄ *ad diem* 4^tam^ *Septembris ex obſeruationibus ab vtraque alæ Pegaſi.*

Demonstration of the place of ♄ found for 4 September, from the observations from each of the wing of Pegasus.

Hour 9½ [Hora 9½]: distance of the last of the wing from ♄ [Diſtantia extremæ alæ a ♄] 20° 9′. The distance of I of the wing of Pegasus at the same time, derived from the preceding and following observations [Diſtantia I alæ Pegaſi eodem tempore ex præcedentibus et ſequentibus obſeruationibus producta [recte: reducta — Corrigenda, p. 429]], 21 54 23.

N. B. See the places of the fixed stars above, and the triangle ACD [Vide ſuperius fixarum loca et triangulum ACD].

II. In the triangle DCB there are given [II. In triangulo DCB dantur]:

- DC 16 31½, the distance of the fixed stars from each other [Diſtantia fixarum ab inuicem],
- BC 20 9 0 and DB 21 54 23, the distances of ♄ from the fixed stars [Diſtantiæ ♄ a fixis]
- Therefore DCB 73 31 53 [Ergo DCB 73 31 53]
- ACB 137 2 6

see above [vide ſupra]

III. Of the triangle BAC [III. Trianguli BAC]:

- CA 77 25
- BC 20 9
- ACB 137 2 6
- Therefore BA 92 22 45 [Ergo BA 92 22 45]
- BAC 13 35 25[846]

Therefore ♄ longitude 19° 46′ 10″ ♓, latitude 2° 22′ 45″ M. [Ergo ♄ Long. 19° 46′ 10″ ♓, Lat. 2° 22′ 45″ M.]

[846]the heading of section II is indented; *III. Trianguli BAC* stands at the right on the same line and prints no verb. A printed brace, opening toward the values and its point toward the words, closes *BC 20 9 0* and *DB 21 54 23* on the right, with *Diſtantiæ ♄ / a fixis* on two lines beyond it. The words *vide ſupra* stand alone on the line of *BC 20 9 0*, between the words *Diſtantiæ ♄* of section II and *BC 20 9* of section III; the setting does not determine which section they belong to. No figure is printed on this side; the letters A, B, C, D and the triangles ACD, DCB, BAC and ACB are cited with no figure here.

Set the limited longitude at 19°46′ 0″ ♓, the ninth hour complete [Pone longitudinem limitatam 19°46′ 0″ ♓, Hora nona completa].

Using chiefly, from the observations above, those phenomena [φαινομένοις (*phainomenois*, "appearances, phenomena")] of ♄ which were observed for 27 August and 4 September, of both, and faithfully worked out by calculation [quæ ad 27^{d} Auguſti et 4 Septembris vtriuſque obſeruata ſunt et calculo fideliter ſubducta], it is further gathered that its ☌ with the simple ☉$^{l_{is}}$ was on day 1 September, H. 5 M. 30 after noon [a Meridie], in 20° 1′34″ ♓ exactly [præciſe].

The daily motion, moreover, is gathered to have been 4′ 52″, from the difference of motion over the eight days from here, agreeing as ♄ is found observed at each limit [ex differentia motus hinc octiduo congruente quemadmodum ad vtrumque terminum obſeruatus ♄ reperitur].

If we take the distance from the lucida of ♈ which it has on day 4, for hour 5½ of day 1 [quam die 4 habet [recte: quæ die 4 fiebat, "which was made on day 4" — Corrigenda, p. 429] in horam 5½ diej 1], the longitude of ♄ comes out at 20^{p} 1′ 40″ ♓; but counting from day 27, at 20 0 50; the true limited place of ♄ [verus locus ♄ limitatus] 20 1 15; for the latitude, in its course [pro latitudine in ſuo ducto], 1′ 50″; its limited place 20 3 5.

You may, however, use 20^{p} 3′ outright [Potes autem vti abſolute 20^{p} 3′], for the observations had been taken on one side only, not the other way round as well [nam obſeruationes tantum erant ab vna parte, non vice verſa habitæ].

Investigation of the latitude of ♄ from the given longitude and declination, for 1 September at the ☌ ☉ [Indagatio latitudinis ♄ ex datis longitudine et declinatione ad diem 1 Septembris in ☌ ☉].

Reduced longitude of ♄ [Longitudo ♄ reducta] 20° 3′ ♓; declination of ♄ M. 6° 9½′ [declinatio ♄ M. 6° 9½′].

Diagram. A circle at the left of the side. A straight horizontal line crosses it from rim to rim a little above its centre. A second straight line runs from a point on the lower left of the rim, rising to the right, to a point on the upper right of the rim; it crosses the horizontal line close to the point marked C. From near C a line descends almost vertically to the foot of the rim, and a curved line descends from C to the lower right of the rim. A small angle-mark is drawn at C between the lines that meet there. Five labels are printed: three roman capitals and two signs.

- ♋ (outside the rim, upper right, at the end of the rising line) — not cited in the prose
- ♍ (outside the rim, left, at the lower end of the rising line) — not cited in the prose
- C (inside, just below the crossing of the two straight lines) — cited in the text (BAC, BC, CA)
- B (below the rim, at the foot of the near-vertical line) — cited in the text (BAC, BA, BC)
- A (below the rim, lower right, at the end of the curved line) — cited in the text (BAC, BA, CA)

In the triangle BAC [In triangulo BAC]:

- BA 23°31½′
- BC 83 50½
- BAC 80 3
- Therefore CA 87 35 50, the compl. of the latitude [Ergo CA 87 35 50 compl. lat.]

The latitude, therefore, is 2°24⅙′ M., which was to be found [Eſt itaque latitudo 2°24⅙′ M., quæ inquirenda fuit].

Pro inuentione loci acronychij ♃ Die 27 Auguſti H. 9½.

For finding the acronychal place of ♃, 27 August, H. 9½.

- Distance of ♃ from the lucida of ♈ [Diſtantia ♃ a luc. ♈] 38°32′
- Declination of ♃ [Declinatio ♃] 3 29¾
- Declination of the lucida of ♈ [Declinatio luc. ♈] 21 27⅙
- Angle of the difference of ascension [Angulus differentiæ aſc.] 29°59′20″
- Right ascension of the lucida of ♈ [Aſc. recta lucidæ ♈] 25 58¾
- Right ascension of ♃ [Aſc. recta ♃] 355 59 25

Resp. longitude 24 56 0 ♓, latitude 1 36½ M. [Reſp. Longitudo 24 56 0 ♓, Latitudo 1 36½ M.]

DIE 4 SEPTEMBRIS.

4 September.

- H. 9⅙, distance of ♃ from the lucida of ♈ [Diſtantia ♃ a lucida ♈] 39 34½
- Declination of ♃ [Declinatio ♃] 3 55½ M
- Declination of the lucida of ♈ [Declinatio lucidæ ♈] 21 27 50 B
- Right ascension of the lucida of ♈ [Aſc. Recta lucidæ ♈] 25 58 45
- Angle of the difference of ascension [Angulus differentiæ aſcenſion.] 31 0 6
- Therefore the right ascension of ♃ [Ergo Aſcenſio Recta ♃] 354 58⅔
- H. 9½, distance of ♃ from ♄ [Diſtantia ♃ a ♄] 4 10¼
- Declination of ♄ [Declinatio ♄] 6 17
- Angle of the difference of ascension [Angulus diff. aſcenſ.] 3 27 0
- Right ascension of ♄ [Aſcenſio R. ♄] 351 33 0
- Therefore the right ascension of ♃ [Ergo Aſcenſio R. ♃] 355 0 0
- Set, at H. 9⅓, the right ascension of ♃ [Pone H. 9⅓ Aſc. R. ♃] 354 59½

Resp. longitude 23° 50¾′ ♓, latitude 1 36½. ♃ stood very close to degree 90 of the ecliptic, and so it had no parallax of longitude [Reſp. Longitudo 23° 50¾′ ♓, Latitudo 1 36½. ♃ proxime exſtitit 90 gradui Eclipticæ, ideoque nullam habuit parallaxin longitudinis].[847]

DIE 5 SEPTEMBRIS.

5 September.

[847]No hemisphere letter is printed after *Latitudo 1 36½* in this line.

- H. 9, distance of ☊ from the lucida of ♈ [Diſtantia ☊ a luc. ♈] 39 40⅙
- Declination of the lucida of ♈ [Declinatio luc. ♈] 21 27 45
- Declination of ☊ [Declinatio ☊] 3 58
- Angle of the difference of ascension [Angulus differentiæ aſcenſ.] 31 5½
- Therefore the right ascension of ☊ [Ergo Aſcenſ. R. ☊] 354 53 15
- H. 10½, distance of ☊ from the first of the wing of Peg. [Diſt. ☊ a prima alæ Peg.] 21 49
- Right ascension of the first of the wing [Aſc. R. primæ alæ] 341 1 0
- Angle of the difference of ascension [Angulus differentiæ aſcenſ.] 13 48 40
- Therefore the right ascension of ☊ [Ergo Aſcenſ. R. ☊] 354 49 40
- H. 11⅙, distance of ☊ from the last of the tail of ♍ [Diſt. ☊ ab extrema caudæ ♍] 35 58¼
- Declination of the last of the tail [Declinatio extr. caudæ] 17 55
- Its right ascension [Aſcenſio R. eius] 321 1 45
- Angle of the difference of ascension [Angulus differentiæ aſcenſ.] 33 52 40
- Therefore the right ascension of ☊ [Ergo Aſcenſio R. ☊] 354 54 25
- H. 10, the limited right ascension [Aſcenſio R. limitata] 354 52⅔
- Resp. longitude [Reſp. Longitudo] 23 44 ♓
- Latitude [Latitudo] 1 36 M

Reductio in ☍ ☉

Reduction to the ☍ ☉.

The daily motion of ☊ from 27 August to 4 VIIbris [a 27 Auguſti in 4 VIIbris] is gathered as 8ᵐ, very nearly. But between 4 and 5 the daily motion is 7ᵐ, and since the ☍ took place between those days, use this daily motion, therefore, and everything will be limited [vtere itaque hoc motu diurno et omnia limitabuntur].[848]

Day 5 Sept. H. 10, our ☉ [Die 5 Sept. H. 10 noſter ☉] 5 24 9 14

- Observed ☊ [Obſeruatus ☊] 23 44 0
- 25 14[849]

The daily motion of ☉ and ☊ is 66⅙′, which corresponds in time to 9ᴴ 10ᴹ [Motus diurnus ☉ et ☊ 66⅙′, reſpondet in tempore 9ᴴ 10ᴹ].

Therefore the ☍ was on day 5 Sept., H. 0 M. 50 p. m.; longitude of ☊ 23° 46⅔′ ♓, latitude 1 37 M. [Ergo ☍ erat die 5 Sept., H. 0 M. 50 p. m., Longitudo ☊ 23° 46⅔′ ♓, Latitudo 1 37 M.][850]

[848] In *8*ᵐ and *7*ᵐ a raised letter *m* is printed.

[849] a short rule is printed under *23 44 0*, and *25 14* stands below it with no stub; between *25* and *14* a small mark stands at mid-height (SUSPECTED printed point or blemish; not transcribed as a value).

[850] in *9*ᴴ *10*ᴹ a raised small capital *H* and a raised small capital *M* are printed.

OBSERUATIONES STELLARUM FIXARUM ET PRIMO ALTITUDINIS ATQUE AZIMUTHI.

Observations of the fixed stars, and first of altitude and azimuth.

**DIE 18 JANUARIJ.*[1]*

18 January.[1]

In the morning, meridian altitude of Spica [Spicæ] ♍ by the mural Q. [Mane Spicæ ♍ Altit. Mer. per Q. Mur.] 25ᵖ 9′ 50″

- *The heart of ♌ [Cor ♌] 48 4*
- *The southern head of ♊ [Meridionale caput ♊] 63 3*
- *The armpit of the lower of ♊ [Axilla inferioris ♊] 59 25*
- *The eye of ♉ [Oculus ♉] 49 41½*
- *The following evening [Sequenti Veſpere] 49 42*
- *All by the Quadr. Maxim. mural [Omnia per Quadr. Maxim. Muralem]*

EODEM DIE VESPERI.[1]

The same day, in the evening.[1]

- H. 7 31′ 10″ the meridian altitude of the eye of ♉ by the mural Q. was [erat Altitud. Merid. oculi ♉ per Q. Mural.] 49 42
- by the lesser Q. (it is not good) [per Q. Minor. (non eſt bona)] 49 41
- 8 19 10 the bright foot of Ericht. had a meridian altitude by the lesser Q. [Lucidus pes Ericht. habuit Alt. mer. per Q. Minor.] 62 16
- by the mural Q. [per Q. Mural.] 62 16
- 9 45 45 meridian altitude of Canis Major [Canis Maioris] by the mural Q. [Altitud. merid. Canis Maioris per Q. Mural.] 17 54½
- 9 45 57 Canis Major had an altitude by the lesser Q. [Canis Maior Altit. habuit per Q. Minor.] 17 54½
- 9 46 2 by reckoning of the Square of the meridian line, Canis Major was on the meridian [Ratione Quadrati lineæ Merid. Canis Maior fuit in meridiano].[851]
- *Canis Major 17 54½ by the mural Quadr. [Canis maior. 17 54½ per Mural. Quadr.]*
- *And also 17 54½ by the lesser [Et etiam 17 54½ per Minorem]*
- *The upper head of ♊ by the mural [Superius caput ♊ per Muralem] 66 48½*
- *The same also by the lesser [Idem etiam per Minorem] 66 49*
- *The lower head of ♊ by the mural [Inferius caput ♊ per Mural.] 63 3*
- *And in the same way by the lesser [Et eodem modo per Minorem] 63 3*

Note. At the same moment of time at which the lower head of ♊ crosses the meridian, the jaw of the lower of ♊ also crosses, precisely, so that they cannot be told apart. These two stars therefore have precisely the same right ascension [Habent itaque hæ duæ ſtellæ eandem exquiſite Aſcenſionem Rectam].

[851] the parentheses round *non eſt bona* are printed.

But Canis Minor crosses a little before, though with a moderate interval between, so that we shall easily search out its right ascension too by the interval of time between [vnde et ipſius Aſcenſionem Rectam per interuallum temporis interiectum facile rimabimur].

- Meridian altitude of the heart of ♌ by the mural Q. [Cordis ♌ Alt. Mer. per Q. Mural.] 48 4
- Spica ♍ by the mural Q. [Spica ♍ per Q. Mural.] 25 9⅔
- good [bonæ][852]

DIE 19 JANUARIJ.

19 January.

The eye of ♉ was on the meridian, having an altitude [Oculus ♉ fuit in merid. habens Alt.]:

- H. 7 22′ 50″ by the mural Q. [per Q. Muralem] 49 41½
- 7 23 30 by the lesser Q. [per Q. Minor.] 49 42

Canis Major had on the meridian an altitude [Canis Maior habuit in merid. Alt.]:

- 9 36 45 by the mural Q. [per Q. Muralem] 17 54½
- 9 38 0 by the Square of the meridian line [per Quadratum lineæ meridiej]
- 9 38 0 by the lesser Q. [per Q. Minor.] 17 56

Apollo was on the meridian [Apollo fuit in meridiano]:

- 10 18 38 by the mural Q. [per Q. Muralem] 66 48
- 18 40 by the lesser Q. [per Q. Minorem]
- 18 49 by the □ of the meridian line [per □ lin. merid.]

Canis Minor on the meridian [Canis Minor in merid.]:

- 10 27 49 by the mural Q. [per Q. Mural.] 40 19¼
- 28 40 by the lesser Q. [per Q. Minorem]
- 28 40 by the Square of the meridian line [per Quadratum lin. merid.]

Hercules on the meridian [Hercules in meridiano]:

- 10 30 28 by the mural Q. [per Q. Mural.] 63 3
- 30 31 by the lesser Q. [per Q. Minor.] 63 3½
- 30 50 by the Square of the meridian line [per Quadratum lin. mer.][853]

DIE 21 JANUARII.

21 January.

- The bright foot of Orion [Luc. pes Orionis], meridian altitude [Alt. merid.] 25 21½
- Meridian altitude of the right shoulder of Orion [Alt. mer. dextri humeri Orion.] 41 20½

[852] In *Canis maior.* the *m* is lower case and a stop follows. In the braced group, *Cordis ♌ Alt. Mer.* stands on one line and *per Q. Mural. 48 4* on the next, set to the right; a printed brace, its point to the right, closes the two value lines *48 4* and *25 9⅔* on the right, and *bo- / næ* stands beyond it on two lines.

[853] The Square is printed as an open square sort, □, in *per □ lin. merid.*

These observations were made by the mural Q. [Hæ obſeruationes factæ ſunt per Q. Mur.]

[1] From codex V [E codice V.].

DIE 22 JANUARIJ.

22 January.

A small star in the left knee of Orion on the meridian, having an Alt. [Parva ſtella in ſiniſtro genu Orionis in meridiano habens Alt.]:

- H. 8 3′25″ by the mural Q. [per Q. Mural.] 28 24
- 4 43 by the lesser Q. [per Q. Minor.] 28 25
- 4 46 by the line □ [per lin. □]

The lucida in the foot of Orion on the meridian [Lucida in pede Orionis in merid.]:

- H. 8 11 0 by the mural Q. [per Q. Mural.] 25 21½
- 12 20 by the lesser Q. [per Q. Minor.] 25 22½
- 12 20 by the Square [per Quadratum]

The bright foot of Ericht. on the meridian [Lucidus pes Ericht. in meridiano]:

- 8 17 48 by the mural Q. [per Q. Mural.] 62 16
- 18 8 by the lesser Q. [per Q. Minor.] 62 15

The first of the Belt of Orion, meridian Alt. [Prima balthej Orionis Alt. Mer.]:

- 8 30 15 by the lesser Q. [per Q. Min.] 33 28, very nearly [fere]
- by the mural Q. [per Q. Mural.] 33 25

The middle one of the Belt had an Altit. [Media balthej habuit Altit.]:

- 8 34 35 by the mural Q. [per Q. Mural.]...
- by the lesser Q. [per Q. Minor.] 32 34[854]

The meridian Altit. of the last one in the Belt [Altit. merid. poſtremæ in baltheo]:

- 8 39 35 by the lesser Q. [per Q. Minor.] 31 49½
- by the mural Q. [per Q. Mural.] 31 51½

The right foot of Orion on the meridian [Dexter pes Orionis in merid.]:

- 8 48 45 by the lesser Q. [per Q. Minor.] 24 13½
- 48 20 by the line of the quadr. [per lineam quadr.]

The right shoulder of Orion on the meridian [Dexter humerus Orionis in merid.]:

- 8 52 20 by the mural Q. [per Q. Mural.] 41 20½
- 53 30 by the lesser Q. [per Q. Minor.] 41 20
- 53 30 by the meridian line of the square [per lineam quadrati merid.]

Canis Major [Canis maior] on the meridian:

- 9 49 55 greater clock [Hor. mai.] and 10 10 50 lesser clock [Hor. min.] — by the mural Q. [per Q. Mural.] 17 54½

[854] three spaced points stand in the value place of the *8 34 35* line; no value is printed there.

- 9 51 23 greater [mai.] and 10 12 32 lesser [min.] — by the Square of the meridian line [per Quadratum lineæ meridiej]
- 9 51 43 greater [mai.] and 10 12 50 lesser [min.] — by the lesser Q. [per Q. Min.] 17 54½

The upper head of ♊ on the meridian [Superius caput ♊ in meridiano]:

- 10 34 45 greater [mai.] and 10 59 52 lesser [min.] — by the mural Q. [per Q. Mural.] 66 48
- 10 35 3 greater [mai.] and 11 0 14 lesser [min.] — by the lesser Q. [per Q. Min.] 66 48
- 10 35 7 greater [mai.] and 11 0 18 lesser [min.] — by the Square [per Quadratum]

Canis Minor [Canis minor] on the meridian:

- 10 44 30 greater [mai.] and 11 10 31 lesser [min.] — by the mural Q. [per Q. Muralem]
- 10 45 30 greater [mai.] and 11 11 41 lesser [min.] — by the lesser Q. and by the Quadr. of the line [per Q. Minorem et per Quadr. lineæ][855]

The lower head of ♊ on the meridian [Inferius caput ♊ in meridiano]:

- 10 47 18 greater [mai.] and 11 13 44 lesser [min.] — by the mural Q. [per Q. Muralem]
- 10 47 40 greater [mai.] and 11 14 13 lesser [min.] — by the lesser Q. [per Q. Minorem]
- 10 47 50 greater [mai.] and 11 14 25 lesser [min.] — by the line of the Square [per lin. Quadrat.][856]

In the three later observations of the lesser clock we used the small index of seconds, and not the larger one as in the preceding ones [In tribus poſterioribus horologij minoris obſeruationibus vſi ſumus paruo ſecundorum indice et non maiori vt in præcedentibus].

At the following noon the clock was running faster by H. 1 M. 50 S. 40 [Horologium ſequenti Meridie celerius mouebatur H. 1 M. 50 S. 40].

DIE 23 JANUARIJ.

23 January.

The eye of ♉ was on the meridian, having an Alt. [Oculus ♉ fuit in merid. habens Alt.]:

- H. 7 31′ 15″ by the mural Q. [per Q. Mural.] 49 41½
- 31 32 by the lesser Q. [per Q. Minor.] 49 42

The left shoulder of Orion on the meridian [Siniſter hum. Orion. in merid.]:

- 9 5 10 by the mural Q. [per Q. Mural.] 41 20½
- 5 22 by the lesser Q. [per Q. Minor.] 41 20

[855] in each of these eight pairs the two times stand on two printed lines, the first ending *mai.* (in the first pair *Hor. mai.*) and the second *min.* (*Hor. min.*), joined by a printed right brace; the instrument words stand to the right of the brace.

[856] set as the pairs in the left column, each pair of lines joined by a printed right brace, the instrument words level with its point.

• and the Square [et Quadratum]

The lucida of the feet of ♊ had a meridian Alt. [Lucida pedum ♊ habuit Alt. mer.]:

• 9 41 9 by the lesser Quadr. [per Minor. Quadr.] 50 46½
• 9 41 24 by the Square [per Quadratum][857]

DIE 24 JANUARIJ.

24 January.

• 6 59 20 The eye [Oculus] — the mural Q. [Q. Mural.] 49 41
• 7 0 5 of ♉ on the [♉ in] — the lesser Q. [Q. Min.] 49 42
• 7 0 8 meridian, by [mer. per] — the Square [Quadrat.][858]

The left foot of Orion had on the meridian [Sinistер pes Orionis habuit in mer.]:

• 7 40 32 by the mural Q. [per Q. Mural.] 25 21
• 41 25 by the lesser Q. [per Q. Minor.] 25 22
• 41 35 by the Square [per Quadratum]
• 9 10 15 Canis Major [Canis] — by the mural [per Mur.] 17 54½
• 11 30 [maior] — by the lesser [per Min.] 17 54½
• 11 35 on the meridian [in mer.] — by the Square [per Quadratum][859]

DIE 26 JANUARIJ.

26 January.

• 6 44 45 The eye [Oculus] — the mural Q. [Q. Mural.] 49 41
• 45 30 of ♉ on the [♉ in] — the lesser Q. [Q. Min.] 49 42
• 45 35 meridian, by [mer. per] — the Quadr., very nearly [fere][860]

DIE 27 JANUARIJ.

27 January.

• H. 7 28 45 The left foot of Orion had on the meridian an Alt., by the mural Q. [Sinistер pes Orionis habuit in mer. Alt. per Q. Mural.] 25 20
• by the lesser Q. [per Q. Minor.] 25 20½
• 7 36 42 Bellatrix had on the meridian an Alt., by the mural Q. [Bellatrix habuit in merid. Alt. per Q. Mural.] 39 59
• by the lesser Q. [per Q. Minor.] 39 59½
• H. 7 48 58 The middle one of the Belt of Orion on the meridian, by the mural Q. [Media balthei Orionis in merid. per Q. Mural.] 32 33

[857] *et Quadratum* stands on a line of its own under *per Q. Minor.*, with no time and no value.
[858] the three times are closed by a printed right brace; *Oculus* / ♉ *in* / *mer. per* stand one part to a line to its right, closed by a printed left brace, to the right of which the instrument words stand one to a line.
[859] set as the group above: the times closed by a printed right brace, *Canis* / *maior* / *in mer.* one part to a line, closed by a printed left brace, the instrument words one to a line.
[860] set as on 24 January, with a printed right brace and a printed left brace. *fere* stands at the right of the *Quadr.* line, in the value place; no value is printed on that line.

- 7 53 25 The last one of the Belt on the meridian, by the mural Q. [Poſtrema balthei in merid. per Q. Mural.] 31 51½
- 8 6 5 The right shoulder of Orion on the meridian, by the mural Q. [Dexter humerus Orionis in merid. per Q. Mural.] 42 21½ [recte: 41 21½ — Corrigenda, p. 430]
- by the lesser Q. [per Q. Minor.] 42 22 [recte: 41 21 — Corrigenda, p. 430]
- 8 37 20 The brighter one in the preceding foot of Canis Major had on the meridian an altitude [Lucidior in præcedente pede Canis maioris habuit in meridiano Alt.] 16 18½
- 9 39 38 Meridian altitude of the upper head of ♊, by the mural Q. as well as by the lesser Q. [Alt. mer. ſuperior. capit. ♊ tam per Q. Mural. quam per Q. Minor.] 66 48
- 9 51 40 Meridian altitude of Hercules [Alt. mer. Herculis] 63 3

DIE 2 FEBRUARIJ AD VESPERAS.

2 February, in the evening.

- 8 40 12 Canis Major [Canis maior] — the mural Q. [Q. Mural.]
- 41 42 on the meridian [in merid.] — the □ lin. of the meridian [□ lin. mer.]
- 41 46 by [per] — the lesser Q. [Q. Minor.]
- 9 22 15 The upper [Superius] — the greater Q. [Q. Maior.]
- 22 30 head of ♊ [caput ♊] — the lesser Q. [Q. Minor.]
- 22 39 on the meridian, by [in mer. per] — □
- 9 31 10 Canis Minor [Canis min.] — the mural Q. [Q. Mur.]
- 32 8 on the meridian [in mer.] — the lesser Q. [Q. Min.]
- 32 12 by [per] — the Square [Quadrat.]
- 9 33 47 The lower [Inferius] — the mural Q. [Q. Mur.]
- 34 18 head of ♊ [caput ♊] — the lesser Q. [Q. Min.]
- 34 24 by [per] — the Square [Quadrat.][861]

DIE 6 FEBRUARIJ.

6 February.

- 6 56 10 The left foot of Orion on the meridian, by the lesser Q. [Siniſter pes Orion. in merid. per Q. minor.] 25 22
- 8 27 4 Canis Major [Canis maior] — the mural Q. [Q. mural.]
- 28 28 on the meridian [in merid.] — as well by the □ [tam per □]
- by [per] — as by the lesser Q. [quam per Q. minor.]
- 42 20 The lowest of the hip [Infima coxæ] — the mural [Mur.] 5 44½
- 43 55 of Canis Major, by [Can.mai.per] — the □ and by the lesser Q. [□ et per Q. min.]

[861] in each group the three times are closed by a printed right brace; the words stand one part to a line to its right, closed by a printed left brace, to the right of which the instrument words stand one to a line. No value is printed in any of the four groups.

- 45 48 The uppermost [Suprema] — the mural Q. [Q. mural.]
- of the hip [coxæ] — 10 52
- 47 19 of Canis Major [Canis maj.] — the lesser Q. [Q. min.]
- by [per] — and by the □ [et per □]
- 51 30 — the mural Q. [Q. mural.]
- The middle of the hip [Media coxæ] — 8 23
- 52 48 of the same, by [eiuſdem per] — the lesser Q. [Minor. Q.]
- and by the □ [et per □]
- 9 8 35 The upper head [Super. caput] — the mural [Muralem]
- 8 50 of ♊ on the meridian [♊ in Merid.] — the lesser Q. [Q. Minor.]
- 9 4 by [per] — the Square [Quadratum][862]
- 9 17 35 Canis Minor [Canis minor] — the mural Q. [Mural. Q.]
- 18 39 on the meridian [in Merid.] — the lesser Q. [Q. minor.]
- 18 44 by [per] — the Square [Quadrat.]
- 20 20 The lower [Inferius] — the mural Q. [Q. mural.]
- 20 58 head of ♊, by [caput ♊ per] — the Square [Quadrat.][863]

Ratio differentiarum inter muralem et quadratum.

Reckoning of the differences between the mural and the square.

- *Canis Major [Canis maior] 1ᵐ 24ˢ, altitude [Altit.] 17½*
- *The lowest of the hip [Infima coxæ] 1 35, 5¾*
- *The middle of the hip [Media coxæ] 1 18, 8½*
- *The uppermost of the hip [Suprema coxæ] 1 31, 11*
- *Canis Minor [Canis minor] 1 9*
- *♂ 0 36, 61*
- *The lower head [Inferius caput.] 38, 62*
- *The upper head [Superius caput] 29, 66*

Therefore an area of altitudes of 10 Gr. will vary 1 M. 32 S.—23′, but in altitude 17—21′ [Quapropter area altitudinum [recte: circa altitudinem, "around an altitude" — Corrigenda, p. 430] 10 Gr. variabit 1 M. 32 S.—23′ in altitudine autem 17—21′].[864]

[862] each of the five groups is set with its times closed by a printed brace, the words one part to a line to its right, closed by a second printed brace, and the instrument words to the right of that. In the first group the third line carries no time, and *quam per Q.* runs over with *minor.* on a fourth line set to the right; no value is printed in that group. *Canis maj.* is printed with *j*.

[863] these two groups head the right column with no rubric, each set with a printed right brace after the times and a printed left brace before the instrument words. No value is printed in either.

[864] In the eight lines the names stand at the left and the figures in three fields to the right: the first field *1*, *1*, *1*, *1*, *1*, *0* and blank in the last two lines; the second *24*, *35*, *18*, *31*, *9*, *36*, *38*, *29*; the third *Altit. 17½*, *5¾*, *8½*, *11*, blank for *Canis minor*, *61*, *62*, *66*. In the first line a raised *m* follows *1* and a raised *s* follows *24*. *Inferius caput.* carries a stop, *Superius caput* none; no sign is printed after either.

DIE 7 FEBRUARIJ.

7 February.

- 8 22 29 Canis Major [Can. mai.] — the mural [Mural.]
- 23 40 on the meridian, by [in Merid. per] — the lesser Q. and □ [Q.min.et□]
- 17° 55′
- 37 42 — the mural [Mural.]
- The lowest of the hip [Infima coxæ]
- 39 0 of Canis Major [Canis mai.] — the lesser Q. [Q. Minor.]
- by [per] — and □ [et □]
- 41 11 The uppermost of the hip [Suprema coxæ] — the mural [mural.]
- 42 30 on the meridian, by [in Merid per] — the Square [Quadrat.]
- 42 33 — the lesser Q. [Q.minor.]
- 8 46 56 The middle of the hip [Media coxæ] — the mural Q. [Q. mural.]
- 48 15 on the meridian [in Merid.] — the Square [Quadratum]
- 48 21 by [per] — the lesser Q. [Q. minor.]
- 8 25, very nearly [fere]
- 9 4 9 The upper head [Super. caput] — the mural Q. [Q. mur.]
- 4 20 of ♊ on the meridian [♊ in Mer.] — the lesser [Minor.]
- 4 35 by [per] — the Square [Quadrat.]
- 66 49
- 13 13 Canis Minor [Canis minor] — the mural Q. [Q. mural.]
- 14 6 on the meridian [in Merid.] — the Square [Quadrat.]
- 14 11 by [per] — the lesser Q. [Q. minor.]
- 40 19½
- 15 55 The lower head [Inferius cap.] — the mural [Mur.]
- 16 24 of ♊ on the meridian [♊ in Mer.] — the lesser [Min.] 63 3
- 16 28 by [per] — the Square [Quadrat.][865]

DIE 8 FEBRUARIJ.

8 February.

On the meridian ſeptent. by the Square [In meridiano ſeptent. per Quadratum].

- 1 43 38 A. M. The uppermost and bright one of the Chair of Cassiopeia [Suprema et lucid. Cathed. Caßiopeæ]
- 2 6 0 The middle of the Chair of Cassiopeia [MediaCathedræ Caßiopeæ]
- 10 8 The head of Cassiopeia [Caput Caßiopeæ]
- 13 20 Schedar [Schedir] of Cassiopeia [Caßiopeæ]
- 20 30 The middle of the body, or the girdle [Media corporis ſeu cingulum]

[865] each group is set with its times closed by a printed right brace, the words one part to a line to its right, closed by a printed left brace, and the instrument words to the right of that. In the third group the words stand on the first two lines only, and *Merid* is printed with no stop. No value is printed in the second or third group.

• 28 12 The star in the bend [Stella in flexura][866]

DIE 10 FEBRUARIJ.

10 February.

On the meridian ſeptent. by the Square [In merid. ſeptent. per Quadratum].

• 1 37 12 The uppermost of the Chair of Cassiopeia [Supr. Cathed. Caßiop.]
• 59 45 The middle of the Chair [Media Cathedræ]
• 2 3 58 The head of Cassiopeia [Caput Caßiopeæ]
• 6 58 Schedar [Schedir]
• 14 2 The girdle [Cingulum]
• 21 47 The bend [Flexura]
• 49 6 The knee [Genu]
• 2 52 53 Spica on the [Spica in] — the Square [Quadrat.]
• 53 10 meridian, by [merid. per] — the lesser Quadrant [Q. minor.] 25 9¾[867]
• 3 14 48 The foot of Cassiopeia on the meridian ſept., by the Square [Pes Caßiop. in merid. ſept. per Quadrat.][868]

At the next noon the clock was turning faster than it should by 2 M. 24 S.; this error, however, is common to three days [Proximo meridie horologium citius iuſto 2 M. 24 S. circumuoluebatur, qui tamen error tribus diebus eſt communis].

• 8 54 50 The upper head of Ⅱ on the meridian [Superius cap. Ⅱ in mer.] 66 49
• 9 4 20 Canis Minor [Canis min.] on the meridian [in mer.] 40 20, very nearly [fere]

DIE 12 FEBRUARIJ.

12 February.

• 6 31 15 The bright foot of Orion on the meridian, by each quadrant and the square [Lucidus pes Orionis in merid. per vtrumque quadrantem et quadratum].
• 6 39 25 The left shoulder [Siniſter hum.] — the Square [Quadrat.]
• 39 28 of Orion on the meridian [Orionis in meridiano] — the mural [Mural.]
• 39 30 by [per] — the lesser Quadrant [Q. Minor.]
• 47 10 — the Square [Quadrat.]
• 47 15 The first of the Belt [Prima balthei] — the mural Quadrant [Q. Mural.]
• 47 26 of Orion, by [Orion. per] — the lesser Quadrant [Q. minor.]

[866]No value is printed on any of these six lines.

[867]the two times are closed by a printed right brace; *Spica in* / *merid. per* stand one part to a line to its right, closed by a printed left brace, to the right of which the instrument words stand one to a line.

[868]No value is printed.

- 56 10 — the Square [Quadrat.]
- 56 13 The last of the Belt [Poſtrema balthei] — the mural [Muralem]
- 56 20 by [per] — the lesser [Minorem]
- 7 4 11 The bright shoulder [Lucid. humerus] — the Square [Quadrat.]
- 4 16 of Orion, by [Orion. per] — the mural [Muralem]
- 8 56 The right foot [Dexter pes] — the Square [Quadrat.]
- 9 3 of Orion, by [Orion. per] — the mural Quadrant [Q. Mural.][869]
- 7 40 30 The lucida in the preceding [Lucida in præcedente] — the Square [Quadrat.]
- 40 56 foot of Canis [pede Can.] — the mural Quadrant [Q. mural.]
- 41 3 Major, by [mai. per] — the lesser [minorem]
- 8 2 53 Canis Major, by [Can. mai. per] — the Square [Quadrat.]
- 3 9 — each Quadrant [vtrumq.Q.]
- 8 18 18 — the Square [Quadrat.]
- 18 35 The lowest of the hip [Infima coxæ] — the lesser Quadrant [Q. Minor.]
- 18 59 by [per] — the mural [Mural.]
- 21 45 — the Square [Quadrat.]
- 22 16 The uppermost [Suprema] — the mural [Mural.]
- 22 20 of the hip, by [coxæ per] — the lesser Quadrant [Q. Minor.]
- 27 32 — the Square [Quadrat.]
- 27 50 The middle of the hip [Media Coxæ] — the lesser Quadrant [Q. Minor.]
- 28 4 by [per] — the mural [Mural.][870]

Alt. 10 gives 8′ later, Alt. 60 gives 5′ later [Alt. 10 dat 8′ tardius Alt. 60 dat 5′ tardius].[871]

- 8 43 47 The upper [Superius] — the Square [Quadrat.]
- 43 52 head of ♊ [caput ♊] — the lesser [Minor.]
- 44 6 by [per] — the mural [Mural.]
- 53 15 Canis Minor [Canis minor] — the Square [Quadrat.]
- 53 25 by [per] — the lesser [Minor.]
- 55 35 The lower head [Infer. caput] — Quadr.
- 55 38 of ♊ — the lesser [Min.]
- 55 54 by [per] — the mural [Mural.][872]

[869] each of the five groups is set with its times closed by a printed right brace, the star words to its right, closed by a printed left brace, and the instrument words one to a line to the right of that. No value is printed on any line under this rubric.

[870] these five groups head the right column with no rubric. Each is set with its times closed by a printed right brace, the star words to its right, closed by a printed left brace, and the instrument words one to a line to the right of that. No value is printed in any of the five groups.

[871] No stop is printed between *tardius* and the second *Alt.*

[872] set as the groups above, each with a printed right brace after the times and a printed left brace before the instrument words. No value is printed in any of the three groups.

Alt. 60 gives in the mural 5′, alt. 10 gives in the same 8′, both later [Alt. 60 dat in murali 5′, alt. 10 dat in eadem 8′ ambo tardius].

DIE 13 FEBRUARIJ.

13 February.

- 6 26 53 The left foot [Siniſter pes] — the mural [Muralem]
- 27 10 of Orion, by [Orionis per] — the Square [Quadrat.]
- 35 10 The left shoulder [Siniſter humerus] — the mural [Muralem]
- 35 25 by [per] — the Square [Quadrat.]
- 43 10 The first of the Belt [Prima balthei] — the mural [Mural.]
- 43 14 of Orion, by [Orionis per] — the Square [Quadrat.]
- 47 28 The middle of the Belt [Media balthei] — the mural [Mural.]
- 47 33 by [per] — the Square [Quadrat.]
- 52 0 The last [Poſtrema] — the mural [Mural.]
- 52 6 of the Belt, by [balthei per] — the Square [Quadrat.]
- 7 58 53 Canis Major, by [Canis maior. per] — the mural [Muralem]
- 59 4 — the Square [Quadrat.]
- 8 14 14 The lowest of the hip [Infima coxæ] — the mural [Mural.]
- 14 30 of Canis Major, by [Can. maior. per] — the Square [Quadrat.]
- 17 40 The uppermost [Suprema] — the mural Quadrant [Q. mural.]
- 17 51 of the hip, by [coxæ per] — the Square [Quadrat.]
- 23 34 The middle of the hip, by [Media Coxæ per] — the mural Quadrant [Q. mural.]
- 23 45 — the Square [Quadrat.][873]
- 8 40 25 The upper head [Superius caput] — the mural [Mur.]
- 40 29 of ♊, by [♊ per] — the Square [Quadrat.]
- 49 39 Canis Minor [Can. minor] — the mural Quadrant [Q. muralem]
- 49 46 by [per] — the Square [Quadratum]
- 52 3 The lower head [Inferius caput] — the mural Quadrant [Q. mur.]
- 52 8 of ♊, by [♊ per] — the Square [Quadrat.][874]

DIE 19 FEBRUARIJ.

19 February.

- 6 11 14 The left foot [Siniſter pes] — the □ and the mural [□ et Mur.]
- 11 30 of Orion., by [Orion. per] — the lesser Quadrant [Q. minor.]
- 19 35 The left shoulder [Siniſt. hum.] — the □ and the mural [□ et Mur.]
- 19 52 by [per] — the lesser Quadrant [Q. minor.]
- 36 30 The last [Poſtrema] — the Square [Quadratum]

[873] each of the nine groups is set with its two times closed by a printed right brace, the star words to its right, closed by a printed left brace, and the instrument words one to a line to the right of that. No value is printed in any of the nine groups.

[874] these three groups head the left column with no rubric. Each is set with its two times closed by a printed right brace, the star words to its right, closed by a printed left brace, and the instrument words one to a line to the right of that. No value is printed in any of them.

- 36 31 of the Belt [balthei] — the mural Quadrant [Q. muralem]
- 36 32 by [per] — the lesser [minorem]
- 44 50 The right foot [Pes dexter] — the Square [Quadrat.]
- and the mural [et Mur.]
- 44 56 by [per] — the lesser Quadrant [Q. minor.]
- 49 20 The right shoulder [Humerus dexter] — the mural Quadrant [Q. mural.]
- 49 24 by [per] — the Square [Quadrat.]
- 7 43 35 Canis Major [Canis maior] — the mural [Muralem]
- 43 38 by [per] — the Square [Quadratum]
- 59 5 The lower of the hip [Inf. coxæ] — the mural [Muralem]
- 59 7 of Canis Major, by [Canis mai. per] — the Square [Quadratum]
- 8 2 27 The uppermost of the hip, by the mural and the □ [Suprema coxæ per Mural. et □].
- 8 15 The middle of the hip [Media coxæ] — the mural [Mural.]
- 8 17 by [per] — the Square [Quadrat.]
- 24 55 The upper head of ♊, by the mural Quadrant [Super. caput ♊ per Q. mur.]
- 36 40 The lower head [Inf. caput] — the mural Quadrant [Q. mural.]
- 36 42 of ♊, by [♊ per] — the Square [Quadratum][875]

It is therefore clear that the Square and the mural Quadrant now agree well enough [Patet itaque quod ſatis nunc conveniant Quadratum et Quadrans muralis].

DIE 21 FEBRUARIJ.

21 February.

- 7 29 14 Canis Major [Canis maior] — the mural Quadrant [Q. Mural.]
- 29 18 on the meridian [in merid.] — the Square [Quadratum]
- 29 19 by [per] — the lesser Quadrant [Q. Minor.][876]

DIE 22 FEBRUARIJ.

22 February.

- 6 28 35 The right foot of Orion. on the meridian, by the mural Quadrant and the Square [dexter Pes Orion. in merid. per Q. mural. et Quadratum].
- 33 10 The right shoulder [Dexter hum.] — the mural Quadrant [Q. Mural.]
- 33 14 of Or., by [Or. per] — the Square [Quadratum]
- 7 27 16 Canis Major [Canis maior] — the mural Quadrant [Q. mural.]

[875] each double-braced group is set with its times closed by a printed right brace, the star words to its right, closed by a printed left brace, and the instrument words one to a line to the right of that. No value is printed on any line under this rubric.

[876] set with a printed right brace after the times and a printed left brace before the instrument words. No value is printed.

- 27 25 by [per] — the Square [Quadratum][877]
- 8 8 25 The upper head of ♊, by the mural and the □ [Sup. cap. ♊ per Mural. et □].
- 17 50 Canis Minor [Canis minor] — the mural Quadrant [Q. mural.]
- 17 57 by [per] — the Square [Quadratum]
- 20 20 The lower head [Inf. caput] — the mural Quadrant [Q. mural.]
- 20 21 of ♊, by [♊ per] — the Square [Quadratum][878]

DIE 24 FEBRUARIJ.

24 February.

- 7 20 1 Canis Major on the [Canis maior in] — the mural [Muralem]
- 20 11 meridian, by [merid. per] — the Square [Quadratum]
- 8 1 15 The upper head of ♊ [Sup. caput ♊] — the lesser Quadrant [Q. minor.]
- 1 18 on the meridian, by [in merid. per] — the mural Quadrant and the □ [Q.mur.et □]
- 8 10 36 Canis Minor [Canis minor] — the mural Quadrant [Q. mural.]
- 10 48 by [per] — the Square [Quadratum]
- 13 6 The lower [Inferius] — the mural Quadrant [Q. mural.]
- 13 7 head of ♊, by [caput ♊ per] — the Square [Quadrat.][879]

DIE 26 FEBRUARIJ.

26 February.

- 6 17 20 The right shoulder [Dext. hum.] — the mural Quadrant [Q. mural.] 40 21½
- 17 30 of Orion., by [Orion. per] — the Square [Quadratum]

The heel of the foot of ♊, meridian altit. [Calcis ped. ♊ altit. merid.] 56 44

- 58 10 The bright foot [Pes lucid.] — the mural Quadrant [Q. mural.] 50 46½
- 58 22 of ♊, by [♊ per] — the lesser [minor.] 50 47, very nearly [fere]
- 7 11 9 Canis Major [Canis maior] — the mural Quadrant [Q. mural.]
- 11 10 on the meridian, by [in merid. per] — the Square [Quadrat.][880]

[877] *dexter* is printed lower case and *Pes* with a capital. The two groups are set with a printed right brace after the times and a printed left brace before the instrument words. No value is printed under this rubric.

[878] these head the right column with no rubric; the two groups are set with a printed right brace after the times and a printed left brace before the instrument words. No value is printed.

[879] each group is set with a printed right brace after the times and a printed left brace before the instrument words. No value is printed under this rubric.

[880] the three groups are set with a printed right brace after the times and a printed left brace before the instrument words. The *Calcis ped.* line carries no time; it begins at the left edge of the column, to the left of the time field.

DIE 7 MARTIJ.

7 March.

- 6 39 10 Canis Major, by [Canis maior per] — □
- 39 30 — the mural [Mur.]
- 7 3 50 The middle of the hip [Media Coxæ] — □
- 4 5 of Canis Major, by [Can. mai. per] — the mural [Mur.]
- 29 20 Canis Minor [Can. min.] — the Square [Quadrat.]
- 29 33 by [per] — the mural Quadrant [Q. Mural.]
- 31 37 The lower head of ♊ [Infer. cap. ♊] — the Square [Quadrat.]
- 31 55 by [per] — the mural Quadrant [Q. mural.][881]

DIE 9 MARTIJ.

9 March.

- 9 17 The lucida of Hydra on the meridian [Lucida Hydræ in meridiano] 27 14
- 30 20 The lucida in the head [Lucid. in cap.] — the Square [Quadrat.]
- 30 30 of ♌, by [♌ per] — the mural Quadrant [Q. mural.]
- 37 20 The uppermost in the head [Supr. in cap.] — the Square [Quadrat.]
- 37 24 of ♌, by [♌ per] — the mural Quadrant [Q. mural.]
- 54 25 The heart of ♌ on the [Cor ♌ in] — the Square [Quadrat.]
- 54 33 meridian, by [mer. per] — the mural Quadrant [Q. mural.] 48 3½[882]
- 10 5 10 The neck of ♌ on the [Ceruix ♌ in] — Quadrat.
- 5 19 meridian, by [merid. per] — the mural Quadrant [Q.mural.] 56 0, very nearly [fere][883]

DIE 13 MARTIJ.

13 March.

- 9 36 55 The heart of ♌ on the meridian, by Quadr. and the mural Quadrant [Cor ♌ in merid. per Quadr. et Q. mur.] 48 3½
- 47 40 The neck of ♌ on the [Ceruix ♌ in] — Quadrat.
- 47 42 meridian, by [merid. per] — the mural Quadrant [Q.mural.] 56 0, very nearly [fere]

DIE 3 APRILIS, P. M.

3 April, P. M.

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[881] each group is set with a printed right brace after the times and a printed left brace before the instrument words; in the first group *Canis maior per* stands on one line level with the brace points, and in the first two groups the sign □ stands alone on the first instrument line. No value is printed under this rubric.

[882] *27 14* stands at the right on the line below *Lucida Hydræ in meridiano*; the time *9 17* carries two figure groups only. The three groups are set with a printed right brace after the times and a printed left brace before the instrument words.

[883] the two times are closed by a printed right brace; the star words stand one part to a line to its right, closed by a printed left brace, to the right of which the instrument words stand one to a line.

- Altitude of the heart of ☌ [Alt.Cordis ☌] — the mural Quadrant [Q. Mural.] 48 3½
- on the meridian, by [in merid. per] — the portable Quadrant [Q. Portat.] 48 2⅔
- — the lesser Quadrant [Q. Minor.] 48 4
- Altitude of the neck [Alt. ceruicis] — the mural Quadrant [Q. Mural.] 56 0¼
- of ☌, meridian, by [☌ merid. per] — the portable Quadrant [Q. Portat.] 56 0
- — the lesser Quadrant [Q. Minor.] 56 0 [recte: 56 0½ — Corrigenda, p. 430][884]

DIE 8 APRILIS.

8 April.

- — the mural Quadrant [Q. Mural.] 50 59½
- Altitude of the tail of ☌ [Alt. caudæ ☌] — Not correct enough, because of [Non ſatis recte [recte: certa, "certain" — Corrigenda, p. 430] propter]
- meridian, by [merid. per] — an error of the sight [errorem pinnacidij.]
- — the portable Quadrant [Q. Portat.] 51 0⅓
- Altitude of the Pole Star min, by the portable Quadrant [Alt.Stellæ Polar. min perQ.Port.] 52 57[885]

DIE 19 APRILIS.

19 April.

- Altitude of the Pole Star min., by the portable Quadrant [Alt. Stellæ Polaris min. per Q. Port.] 52 57⅓
- H. 10 41′30″ Spica — the mural Quadrant [Q. Mural.] 25 9¼
- ♍ was on the meridian and [♍ fuit in merid. et] — the lesser Quadrant [Q. Minor.] 25 9¾
- had altitude by [habuit Alt. per] — the portable Quadrant [Q. Portat.] 25 9¼[886]

DIE 20 APRILIS.

20 April.

- Altitude of the Pole Star min., by the portable Quadrant [Alt. Stellæ Polaris min. per Q. Port.] 52 57⅓

[884] in each group a left brace stands against the first two instrument lines only; the third instrument line (*Q. Minor.*) stands below, outside the brace, with no star words. No right brace is printed in either group, and neither group carries a time.

[885] one left brace spans all four lines of the group; the star words stand on its second and third lines, level with the brace point. The words *Non ſatis recte propter / errorem pinnacidij.* stand inside the brace between the two instrument lines, in the same roman as the rest; the leaf does not say which reading they qualify.

[886] In the braced group a left brace stands against all three instrument lines; no right brace is printed.

- H. 10 38′10″ Altitude [Alt.] — the lesser Quadrant [Q. Minor.] 25 9¾
- of Spica ♍ on the [Spicæ ♍ in] — the mural Quadrant [Q. Mural.] 25 9½
- meridian, by [merid. per] — the portable Quadrant [Q. Portat.] 25 9⅙[887]

DIE 21 APRILIS.

21 April.

- Altitude of the tail of ♌ [Alt. caudæ ♌] — the mural Quadrant [Q. Mur.] 50 59 50
- on the meridian, by [in merid. per] — the portable Quadrant [Q. Portat.] 51 0
- H. 10 34′ Altitude [Alt.] — by the mural Quadrant [per Q. Mur.] 25 9½
- of Spica ♍ on the [Spicæ ♍ in] — by the lesser Quadrant [per Q. Min.] 25 10
- meridian [meridiano] — by the portable Quadrant [per Q. Port.] 25 10[888]

DIE 22 APRILIS.

22 April.

- Altitude of the tail of ♌ [Alt. caudæ ♌] — the mural Quadrant [Q. Mur.] 50 59 50
- on the meridian, by [in merid. per] — the portable Quadrant [Q. Portat.] 50 59 50, very nearly [fere][889]
- Altitude of Spica ♍ [Alt. Spicæ ♍] — the mural Quadrant [Q. Mur.] 25 9⅔
- on the meridian, by [in merid. per] — the lesser Quadrant [Q. Min.] 25 10
- — the portable Quadrant [Q. Portat.] 25 10, very nearly [fere][890]

DIE 23 APRILIS.

23 April.

- Altitude of Spica ♍ [Alt. Spicæ ♍] — the mural Quadrant [Q. Mural.] 25 9½
- on the meridian, by [in merid per] — the portable Quadrant [Q. Portat.] 25 10
- — the lesser Quadrant [Q. Minor.] 25 10[891]

[887] A left brace stands against the three instrument lines; no right brace is printed.

[888] each group is set with a left brace before the instrument lines and no right brace. In the second group *per* stands on each instrument line, not after the star words.

[889] set with a left brace before the instrument lines.

[890] this group heads the right column with no rubric. A left brace stands against the first two instrument lines only; *Q. Portat.* stands below it with no star words.

[891] set as the group above, the brace against the first two instrument lines only. No stop is printed after *merid* in *in merid per*.

DIE 24 APRILIS.

24 April.

- H. 10½ Spica ♍ — the mural Quadrant [Q. Mural.] 25 9½
- was on the meridian [fuit in merid.] — the Sextant △ [Sext. △] 25 9½
- with altitude by [cum Altit. per] — very nearly [fere]
- — the portable Quadrant [Q. Portat.] 25 10
- — the lesser Quadrant [Q. Minor.] 25 10[892]

DIE 25 APRILIS.

25 April.

- Altitude of Spica [Altit. Spicæ] — the mural Quadrant [Q. Mural.] 25 9¼
- ♍ on the meridian [♍ in merid.] — the portable Quadrant [Q. Portat.] 25 10
- by [per] — the lesser Quadrant [Q. Minor.] 25 10
- — the Trigonic Sextant [Sext. Trig.] 25 9¼[893]

DIE 28 APRILIS.

28 April.

- Arcturus on the meridian, by the lesser Quadrant [Arcturus in mer. per Q. Min.] 55 30, very nearly [fere]

DIE 29 APRILIS.

29 April.

- Altitude of Spica [Altit. Spicæ] — the mural Quadrant [Q. Mural.] 25 9½
- ♍ on the meridian [♍ in merid.] — the portable Quadrant [Q. Portat.] 25 9½
- by [per] — the lesser Quadrant [Q. Minor.] 25 9⅔[894]

DIE 3 MAIJ.

3 May.

- Spica ♍ on the [Spica ♍ in] — the mural Quadrant [Q. Mural.] 25 9½
- meridian, by [Merid. per] — the portable Quadrant [Q. Portat.] 25 9½[895]

Note.[1] From later observations, after the sights of the wooden portable Quadrant had been corrected, it was found, both by this instrument and by the mural Quadrant, with the Trigonic Sextant also agreeing, to be P. 25 M. 9 S. 30. You can rely on it safely enough. The same altitude, however, was around the year 1578 25 11, so that in the meantime, over 5 years, it would have changed by 1′ 30″ [Nota.[1] Ex poſterioribus obſeruationibus poſt correcta pinnacidia Quadrantis lignej portatilis fuit deprehenſa tam

[892] a left brace stands against the first three lines only; *fere* stands alone at the right on the third line, below the *25 9½* of the Sextant line; the last two instrument lines stand below the brace with no star words. The sign after *Sext.* is an open triangle.

[893] a left brace stands against the first three instrument lines; *Sext. Trig.* stands below it, set further left, with no star words.

[894] a left brace stands against the three instrument lines; no right brace is printed.

[895] set with a left brace before the two instrument lines. *Merid.* is printed with a capital.

per hoc inſtrumentum quam per Quadrantem Muralem, conſentiente etiam Sextante Trigonico P. 25 M. 9 S. 30. Cuj potes ſatis tuto te fundare. Fuit autem eadem altitudo iuxta annum 1578 25 11, vt mutata fuerit interea per annos 5 1′ 30″.].

DIE 6 MAIJ.

6 May.

- Spica, by the lesser Quadrant [Spica per Q. Min.] 25 10

DIE 9 MAIJ.

9 May.

- H. 10 13′ Arcturus, by the lesser Quadrant [Arcturus per Q. Min.] 55 30

[1] From codex V [E codice V.].

DIE 5 AUGUSTI.

5 August.

- The lucida of Vultur on the meridian had altitude [Lucida Vulturis in meridiano habuit Alt.] by Q. Mur. [per Q. Mur.] 41 56½
- by Q. Portat. [per Q. Portat.] 41 57

DIE 7 AUGUSTI.

7 August.

- The lucida of Vultur [LucidaVulturis] — by Q. Portat. [perQ.Portat.] 41 57
- on the meridian had altitude [in mer. hab. alt.] — by Q. Mural. [perQ.Mural.] 41 56 10[896]

DIE 8 AUGUSTI.

8 August.

- The lucida of Vultur, by Q. Mur. [Lucida Vulturis per Q. Mur.] 41 56⅓
- by Q. Port. [per Q. Port.] 41 56½
- The right shoulder of ♒ on the meridian, by Q. Portat. [Dexter humerus ♒ in meridiano per Q. Portat.] 31 49, very nearly [fere]
- The first of the wing of Pegasus on the meridian [Prima alæ Pegaſi in mer.], by Portat. [per Portat.] 47 5 35

DIE 10 AUGUSTI.

10 August.

- The lucida of Vultur [LucidaVult.] — Q. Mural. 41 56 10
- on the meridian, by [in mer. per] — Q. Portat. 41 56⅔

By Q. Portat. on the meridian [Per Q. Portat. in meridiano]:

- The hand of Antinous [Manus Antinoi] 32 7¾
- The left shoulder of ♒ [Siniſter humerus ♒] 26 46½
- H. 11 27′ The mouth of Pegasus [Os Pegaſi] 42 7⅓

[896] a left brace stands before the two instrument lines.

- The right shoulder of ♒ [Dexter humerus ♒] 31 49
- The head of Pegasus [Caput Pegaſi] 38 18
- The lucida in the neck of Pegasus [Lucida in collo Pegaſi] 42 48
- In the thigh of Pegasus, the lucida [In femore Pegaſi Lucida] 59 56½[897]

DIE 12 AUGUSTI.

12 August.

- Aquila on the meridian, by Q. Mural. [Aquila in merid. per Q. Mural.] 41 56⅙
- by Q. Portat. [per Q. Portat.] 41 56½
- The hand of Antinous [Manus Antinoi] 32 7¾
- The mouth of Pegasus [Os Pegaſi] 42 6½
- The right shoulder of ♒ [Dexter humerus ♒] 31 48 10
- — By Q. Mural. [Per Q. Mural.][898]

DIE 13 AUGUSTI.

13 August.

- Vultur on the meridian, by Q. Mural. [Vultur in merid.per Q.Mural.] 41 56 20
- by Q. Portat. [perQ.Portat.] 41 56½
- The left shoulder of ♒ [Siniſter humerus ♒] 26 46
- The mouth of Pegasus [Os Pegaſi] 42 6½
- The right shoulder of ♒ [Dexter humerus ♒] 31 48
- The head of Pegasus [Caput Pegaſi] 38 18, very nearly [fere]
- — by Q. Mural. [per Q. Mural.][899]

DIE 14 AUGUSTI.

14 August.

- Aquila on the meridian, by Mural. [Aquila in merid. per Mural.] 41 56½
- by Portat., not accurately [per Portat., non exquiſite,] 41 57½

DIE 16 AUGUSTI.

16 August.

- Aquila on the meridian [Aquila in merid.], by Portat. [per Portat.] 41 57
- by Mural. [per Mural.] 41 56
- by the lesser Q. [per Q. Min.] 41 55⅓
- The lower horn [Inferius cornu] — by the lesser Q. [per Q. Min.] 18 5½

[897] a left brace stands before the two instrument lines of the first group; *LucidaVult.* is set close. The line *Per Q. Portat. in meridiano:* is set in and ends in a colon; the seven entries below it carry no instrument words of their own.

[898] the three lines are closed by a printed right brace, to the right of which *Per Q. / Mural.* stands on two lines, level with the brace point.

[899] The five lines of the group are closed by a printed right brace, to the right of which *per Q. / Mural.* stands on two lines, level with the brace point. The fifth line of the group carries only *fere*, at the right, below *38 18*.

• of ♍ on the meridian [♍ in mer.] — by Mural. [per Mural.] 18 5 40
• — by Portat. [per Portat.] 18 6 40[900]

Of the head of Hercules, from the south toward the west, by the lesser Q. [Herculis capitis a meridie verſus occaſum per Q. Minorem]

• H.10 12′35″ Azim. 67 0 Alt. 32 22
• 10 16 45 — 68 0 — 31 50
• 10 25 48 — 70 11 — 30 38
• 10 34 22 — 72 12 — 29 29½
• The left shoulder [Iniſter humerus] — Q. Mural. 26 45¾
• of ♒ on the meridian, by [♒ in mer. per] — Q. Portat. 26 46½
• The mouth of Pegasus, by Q. Mural. [Os Pegaſi per Q.Mural.] 42 6⅔
• by Q. Portat. [per Q.Portat.] 42 7 30
• The head of Pegasus, by Q. Mural. [Caput Pegaſi per Q.Mural.] 38 17 50
• The star in the mouth of ♓, the preceding and occid., by Q. Mural. [Stella in fauce ♓ prior et occid. per Q. Mural.] 35 42
• by Q. Port. [per Q. Port.] 35 41½
• The lower one in mandib. [Inferior in man- dib.] — Q. Mural. 35 7½
• ♓ auſtr., by [♓ auſtr. per] — Q. Portat. 35 8½
• The lower and more western one in the belly of ♓, by Mural. [Inferior et occidentalior in ventre ♓ per Mural.] 33 5½
• The more southern one [Auſtralior in] — Mural. 37 29
• on the back of ♓, by [dorſo ♓ per] — Portat. 37 30[901]

DIE 26 AUGUSTI.

26 August.

• Aquila on the meridian, by Mural. [Aquila in merid. per Mural.] 41 56¼
• by Portat., middling [per Portat., mediocris] 41 56
• The left shoulder [Iniſter humerus] — Mural. 26 46
• of ♒, by [♒ per] — Portat. 26 45¾
• The mouth of Pegasus on the meridian, by Mural. [OsPegaſi in merid.per- Mural.] 42 7, very nearly; not certain enough [fere, non ſatis certa.][902]

DIE 27 AUGUSTI.

27 August.

• H. 11 47′40″ The first of the wing of Pegasus on the meridian, by Q. Mural. [Prima alæ Pegaſi in merid. per Q. Mural.] 47 5 20

DIE 31 AUGUSTI.

31 August.

[900] in the second group a left brace stands against the first two instrument lines only; *per Portat.* stands below it with no star words.

[901] The three braced groups are set with a left brace before the instrument lines and no right brace.

[902] The braced group is set with a left brace before the instrument lines.

- Altitude of the lower wing of Cygnus on the meridian, by Q. Mural. [Altitudo inferioris alæ Cygni in meridiano per Q. Mural.] 62 40

Not accurate enough, because of rather thin clouds [Non ſatis exquiſita propter rariuſculas nubes].

- The left shoulder of ♒ [Iniſter humerus ♒] 26 45½ — by [per]
- The mouth of Pegasus on the meridian [Os Pegaſi in mer.] 46 6 40 — Q.[903]
- The right shoulder of ♒ [Dexter humerus ♒] 31 48 — Mur.
- by Portat. [per Portat.] 31 49, very nearly [fere.][904]

DIE 4 SEPTEMBRIS.

4 September.

- Aquila on the meridian [Aquila in merid.] — Q. Mural. 41 56
- had alt. by [habuit alt. per] — Q. Portat. 41 57
- The hand of Antinous [Manus Antinoi] — by Mural. 32 7
- on the meridian [in merid.] — by Portat. 32 8
- The lower horn of ♉ [Inferius cornu ♉], by Mural. 18 6[905]

DIE 9 SEPTEMBRIS.

9 September.

- Aquila on the meridian [Aquila in merid.]
- by Q. Mural. **41 56⅓**
- by Portat. 41 57
- by Sext. Trig. 41 57, very nearly [57fere]

DIE 10 SEPTEMBRIS.

10 September.

- H. **9 19′30″** The left shoulder of ♒ [Iniſter humerus ♒], by the rectified Sext.·Trigon. [per Sext.·Trigon. rectificatum] 26 46
- by Q. Mural. 26 45 40
- The mouth of Pegasus [Os Pegaſi] — by Sext. Trig. **42 6⅔**
- on the meridian [in merid.] — by Q. Portat. **42 7⅓**
- by Q. Mural. 42 6 35
- The head of Pegasus [Caput Pegaſi] — Sext. Trig. **38 17½**
- on the meridian, by [in merid. per] — Q. Portat. **38 18¼**
- The bright star in [Lucida in] — by Mural. **42 47¼**
- the neck of Pegasus [collo Pegaſi] — by Portat. **42 48¼**
- on the meridian [in merid.] — by Sext. Tr. **42 47¾**
- The first of the wing [Primaalæ] — by Sext. Tr. 47 6

[903]The degrees are printed 46, against 42 in the other entries for this star on this page.

[904]In the group of three lines a left brace stands before *per* / *Q.* / *Mur.*, set one word to a line; the brace opens toward those words, and no right brace stands after the values.

[905]in each of the first two groups a printed left brace spans the two instrument lines, the star words standing one part to a line to its left. The third line is unbraced.

• of Pegasus [Pegaſi] — by Q. Mural. **47 5⅔**[906]

DIE 12 SEPTEMBRIS.

12 September.

• The Vulture on the meridian, by Mur. [Vultur in mer. per Mur.] 41 56 10
• by Sext. Trig. [perSext.Trig.] 41 56 30
• The lower horn of ♍, by Mural. [Inferius cornu ♍ per Mural.] 18 6, very nearly [fere]
• The bright star in the hand of ♒ [Lucida in manu ♒]
• by Mur. 23 9 50
• by Q. Minor. 23 10
• The left shoulder of ♒ [Siniſter humerus ♒]
• by Sext. Tr. **26 46¼**
• The leading star in the tail of ♍ [Præcedens in cauda ♍]
• by Mur. 15 38 20
• It was not clear enough [Non erat ſatis ſerenum].

DIE 15 SEPTEMBRIS.

15 September.

• The lower horn of ♍ on the meridian, by Mur. [Inferius cornu ♍ in mer. per Mur.] 18 5

This is not certain because of the brightness of the nearby ☾ [non certa eſt propter vicinæ ☾ ſplen-dorem].

• The bright star in the tail of ♍ [Lucida in cauda ♍]
• by Mural. **16 9⅔**
• by Q. Min. **16 8½**

But it was somewhat obscured by thin scattered clouds while it was being observed [fuit autem rariuſculis nubibus aliquan-tum obſcurata, dum obſeruabatur].

• The mouth of Pegasus [Os Pegaſi], by Mural. **42 6½**
• by Sext. Tr. 42 6

It was observed too late [tarde nimium obſeruabatur].

• The star in the elbow of ♒ [Stella in cubito ♒], by Q. Min. 30 40

It is not good [non eſt bona].

• The bright star in the shoulder of Pegasus [Lucida in armo Pegaſi]
• by Q. Mural. **59 51⅔**
• The first of the wing of Peg., by Mural. [Prima alæ Peg. per Mural.] **47 5½**

[906] A small mark stands at mid-height between *Sext.* and *Trigon.*; its nature is not settled. Printed left braces: one over the two lines *per Sext. Trig.* / *per Q. Portat.* of the *Os Pegaſi* entry (the third line, *per Q. Mural. 42 6 35*, stands below the brace); one over the two lines of *Caput Pegaſi*; one over the three lines of *Lucida in collo Pegaſi*; one over the two lines of *Primaalæ Pegaſi*.

- by Q. Min. 47 5
- The star in the jaw of ♓ [Stella in mandibula)(]
- by Q. Min. **35 8½**[907]

DIE 16 SEPTEMBRIS.

16 September.

- The bright star of the Vulture [LucidaVultu-ris] — by Mural. **41 56½**
- on the meridian [in merid.] — by Sext. Trig. [perSext.Trig.] **41 56½**
- by Q. Min. 41 57
- The mouth of Pegasus [Os Pegaſi] — by Mural. **42 6⅓**
- on the meridian [inmerid.] — by Q. Min. 42 7

Not accurate enough, because of the nearness of the ☾ [Non ſatis exquiſite propter vicini-tatem ☾.].

- The right shoulder of ♒ [Dexter humerus ♒]
- by Q. Min. **31 48½**

H. **10 37′** The first of the wing of Pegasus on the meridian, by the lesser Q. [Prima alæ Pegaſi in meridi-ano per Q. Minorem.][908]

DIE 17 SEPTEMBRIS.

17 September.

- H. **11 49′ 20″** The last of the wing [Poſtrema alæ]
- of Pegasus [Pegaſi] **47 1½**

by Q. Min. But it was not clear enough when it crossed [per Q. Min. Sed non fuit ſatis ſerenum cum tranſiret.]

DIE 21 SEPTEMBRIS.

21 September.

- The first of the wing of Pegasus on the meridian [Prima alæ Pegaſi in merid.]
- by Q. Min. 47 6

DIE 23 SEPTEMBRIS.

23 September.

- The mouth of Pegasus on [Os Pegaſi in] — by Q. Mural. **42 6⅔**
- the meridian [meridiano] — by Q. Minor. 42 7

DIE 24 SEPTEMBRIS.

24 September.

- Aquila on the meridian [Aquila in merid.]
- by Sext. Trig. **41 56¼**

[907]The sign after *mandibula* is set as two facing arcs.

[908]a printed left brace spans the two lines *per Mural.* / *perSext.Trig.* of the *Vulturis* entry (the third line, *per Q. Min. 41 57*, stands below it), and another the two lines of the *Os Pegaſi* entry. The entry at *H. 10 37′* prints no altitude.

- The Super. horn [Super. cornu] — by Q. Mural. 20 23, very nearly [23fere]
- of ♉ on the meridian [♉ in merid.] — by Q. Min. **20 23½**
- The lower horn [Infer. cornu] — by Q. Mural. 18 6
- of ♉ on the meridian [♉ in merid.] — by Q. Min. **18 4½**
- not good [non bona][909]

DIE 28 SEPTEMBRIS.

28 September.

- The bright star of the Vulture on the meridian had altitude by [Lucida Vult. in mer. habuit Alt. per]
- the rectified Sext. △ [Sext. △ rectificatum] **41 56½**
- The bright star in the tail of ♉ [Lucida in cauda ♉]
- by Mural. **16 9⅔**
- by Portat. 16 10
- It was not clear enough [Non erat ſatis ſerenum].
- The first of the wing of Pegasus [Prima alæ Pe-gaſi] — by Q. Mural. **47 5⅓**
- on the meridian [in merid.] — by Portat. **47 5¼**
- It was not clear enough [Non erat ſatis ſerenum.].[910]

DIE 29 SEPTEMBRIS.

29 September.

- Aquila on the meridian, by Mural. [Aquila in mer. per Mural.] 41 56 10
- by Portat., rectified [per Portat. rectificatum] **41 56¼**
- The right shoulder of ♒, by Mur. [Dexter humer. ♒ per Mur.] **31 48½**
- The bright star in [Lucida in] — by Mural. **42 47¼**
- the neck of Pegasus [collo Pegaſi] — by Portat. **42 47½**
- by Sext. △, very nearly [per Sext. △, fere] 42 48
- The first of the wing [Prima alæ] — by Portat. **47 5¼**
- of Pegasus [Pegaſi] — by Mural. **47 5¼**
- by Sext., very nearly [per Sext., fere] 47 6[911]

DIE 30 SEPTEMBRIS.

30 September.

- The bright star of the Vulture on the meridian [Lucida Vult. in merid.]

[909] in the 23 September entry and in each of the two last groups a printed left brace spans the two instrument lines. *non bona* stands at the right on the last line of the column, with no stop after it.

[910] a printed left brace spans the two instrument lines of the *Prima alæ Pe-gaſi* entry; *Pe-* ends the first line of the star words and *gaſi in merid.* begins the second.

[911] the *Lucida in collo Pegaſi* group has a printed left brace (point to the left) over its two first instrument lines; the *Prima alæ Pegaſi* group has a printed brace turned the other way (point to the right, toward the instrument words) over its two first instrument lines, and lists *per Portat.* above *per Mural.* In each group the third instrument line stands below the brace.

- by Mural. **41 56⅓**
- by Portat. **41 56½**
- by Sext. △ [per Sext.△] 41 56
- The right shoulder of ♒ [Dexter humerus ♒]
- by Mural. 31 48
- by Sext., with the ruler observed [per Sext. regula obſeruata] 31 49
- The head of Pegasus [Caput Pegaſi], by Mural. 38 18, very nearly [18fere]
- by Sext. Trigon. 38 17
- The bright star in the neck [Lucida in collo] — by Mural. 42 47
- of Pegasus [Pegaſi] — by Portat. **42 47⅓**
- by Sext. △ [per Sext.△] 42 47
- The first of the wing [Prima alæ] — by Mural. **47 5¼** — good [bo-næ]
- of Pegasus [Pegaſi] — by Portat. **47 5¼**
- by Sext. △ [per Sext.△] **47 4¾**[912]

DIE 4 OCTOBRIS.

4 October.

- The bright star of the neck of Pegasus on the meridian [Lucida colli Pegaſi in merid.]
- by Sext. △ 42 47
- The first of the wing of Pegasus [Prima alæ Pegaſi]
- by Sext. Trig. 47 5, very nearly [5fere]

DIE 10 OCTOBRIS.

10 October.

- The mouth of Pegasus on the meridian [Os Pegaſi in merid.]
- by Mural. **42 6¾**
- by Portat. 42 7
- The middle, or bright, star [Media ſeu lucida] — by Mural. [perMural.] **42 47½**
- of the neck of Pegasus [colli Pegaſi] — by Portat. [perPortat.] 42 47[1]
- by Sext. 42 47
- The first of the wing of Pegasus, by Mural. [Prima alæ Pegaſi perMural.] **47 5¼**
- by Portat. [perPortat.] **47 5¼**
- by Sext. 47 5

H. **9 27′30″** The breast of the southern ♓ on the meridian, by the lesser Q. [Pectus)(auſtralis in me-ridiano per Q. Minorem.]

[912] the *Lucida in collo Pegaſi* group carries a printed brace turned with its point to the right, over its first two instrument lines; the *Prima alæ Pegaſi* group a printed left brace over its first two instrument lines. To the right of the two values *47 5¼ / 47 5¼* stands a further printed left brace, and beyond it the word *bo-næ* in smaller type, divided over the two lines.

- The end of the wing [Extrema alæ] — by Mural. 46 58
- of Pegasus [Pegaſi] — by Portat. **46 57½**[913]

DIE 12 OCTOBRIS.

12 October.

- The bright star of the Vulture on the meridian [Lucida Vulturis in meridiano]
- H. **5 45′25″** — by the mural Q. [per Q. Muralem] **41 56⅓**
- 5 45 45 — by the lesser Q. [per Q. Minorem]
- by Q. Portat. **41 56½**
- by Sext. △ **41 56½**
- The maximum altitude of the Pole Star [Stellæ Polaris altitudo max.] **58 51½**

by Q. Portat. But this observation was made through clouds, the star barely showing [perQ.Portat. Sed hæc obſeruatio facta eſt per nubes, vix apparente ſtella.].[914]

DIE 14 OCTOBRIS.

14 October.

- The Pole Star had max. altitude [StellaPolarishabuitalt.max.] 58 51

Precisely [exquiſite].

DIE 15 OCTOBRIS.

15 October.

- H. 7 27 0 The mouth of Pegasus was on the meridian [Os Pegaſi fuit in mer.]
- by Q. Mur.
- 10 20 The Pole Star had max. altitude [Stella Polaris habuit Alt. max.] 58 51

The observation having been repeated three times around that time [ter iterata obſeruatione circa iſtud tempus].[915]

DIE 16 OCTOBRIS.

16 October.

- The Pole Star had max. altitude [StellaPolarishabuitAlt.max.] 58 51
- by the portable Q. [per Q. Portatilem.][2]

[913] A printed left brace spans the first two instrument lines of the *Media ſeu lucida colli Pegaſi* group and the two lines of the *Extrema alæ Pegaſi* group. After *47* on the *perPortat.* line of the first group stands a raised small numeral 1, the call of footnote 1; no fraction stands there. The entry at *H. 9 27′30″* prints no altitude.

[914] the two times stand at the left, one above the other, the second (*5 45 45*) set in and printed with no marks; the line *5 45 45 per Q. Minorem* prints no altitude.

[915] *10 20* stands in the time position under *7 27*, with no *H.* and no marks; *H. 7 27 0* carries no marks either. The entry for the mouth of Pegasus prints no altitude.

DIE 28 OCTOBRIS.

28 October.

- The leading one of the two in the tail of ♍ on the meridian, by Sext. △ [Præcedens duarum in cauda ♍ in me-rid. per Sext. △] 15 38
- by Portat., not good [per Portat., non bona,] 15 39
- The following and brighter [Sequens et lucidior] — by Port. 16 10
- of the same in the tail of ♍ [earundem in cauda ♍] — by Sext. △ **16 9¼**
- The jaw of Piscis Austrinus [Mandibula piſcis auſtralis]
- on the meridian, by Portat. [in merid. per Portat.] **35 42½**[916]

[1] Previously 45′ had been written. Struck through with lines. [Prius 45′ ſcriptum erat. Lineis inducta.]

[2] In codex V is added: "And at the time of this observation the sky was quite clear, though shortly afterwards it was obscured by clouds." [In codice V. adſcriptum eſt: »Et tempore huius obſeruationis erat Cœlum bene ſerenum, cum tamen paulo poſt nubibus obſcurabatur«.]

- The head, or the one that is in the neck of the same, the occiput ♓ [Caput vel quæ eſt in collo eiuſ-dem occiput)(], by Portat. 35 8
- The Pole Star had maximum altitude [Stella Polaris habuit Alt. max.] 58 51

Observed twice [bis obſeruata].

DIE 29 OCTOBRIS.

29 October.

- The more southern and brighter in the tail of ♍, on the merid., by Portat. [Auſtralior et lucidior in cauda ♍ in merid. per Portat.] 16 10
- The maximum altitude of the Pole Star [Stellæ Polaris Alt. max.] 58 51 10

DIE 30 OCTOBRIS.

30 October.

- The bright star in the tail of ♍ had merid. altitude by Sext. [Lucida in cauda ♍ habuit Alt. merid. per Sext.] **16 9½**
- Mandib. ♓ auſtr., by Sext. [Mandib.)(auſtr. per Sext.] 35 42
- The following one in the throat of ♓, by Sext. [Sequens in fauce)(per Sext.] **35 7⅔**
- The end of the wing of Pegasus [Extrema alæ pegaſi] — by Mural. 46 58
- had merid. altitude [habuit Alt. merid.] — by Portat. 46 58
- by Sext. Trig. **46 57½**[917]

[916] in the *Sequens et lucidior* group a single printed left brace spans four lines: *per Port.* / *16 10* / *per Sext.* △ / *16 9¼*, each value standing on the line below its instrument words.

[917] a printed left brace spans the three instrument lines of the *Extrema alæ pegaſi* group, the star words standing to its left over three lines (*Extrema alæ* / *pegaſi habuit* / *Alt. merid.*). *pegaſi* is printed with a lower-case initial.

DIE 8 NOUEMBRIS.

8 November.

- The Pole Star had maximum altitude by Portat. [Stella Polaris habuit Altitud. Maxim. per Portat.] 58 51

DIE 1 DECEMBRIS.

1 December.

- The maximum altitude of the Pole Star was observed [Altitudo maxima ſtellæ polaris obſeruata eſt] 58 51, three times [ter]
- The mer. altitude of the bright star of the head of ♈ [Alt. mer. lucidæ cap. ♈] 55 33
- by Mur.[1] [per Mur.[1]][918]

DIE 2 DECEMBRIS.[1]

2 December.[1]

- The mer. altitude of Spica [Spicæ] ♍, by Mur. [Alt. mer. Spicæ ♍ per Mur.] **25 9¼**
- The mer. altitude of Scheat Peg., by Mur. [Alt. mer. Scheat Peg. per Mur.] 59 57
- The left hum. of Hercules [Herculis], in azimuth from the north toward the west [Siniſter hum. Herculis in Azi-mutho a Septentrione ver-ſus occaſum] 62 0
- had altitude [habuit altitudinem] 12 6[919]

DIE 9 DECEMBRIS.

9 December.

- The maximum altitude of the Pole Star, by Port. [Alt. max. ſtellæ Pol. per Port.] 58 51

DIE 11 DECEMBRIS.

11 December.

- The maximum altitude of the Pole Star, by Port. [Alt. ſtell. Polar. max. per Port.] 58 51
- The first in the tail of Ursa Major [Vrſæ maioris] had altitude on the merid. by Portat. [Prima in cauda Vrſæ maioris habuit Alt. in merid. per Portat.] 24 9[1920]

DIE 14 DECEMBRIS.

14 December.

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[918] *polaris* is printed with a lower-case initial here.

[919] the rubric carries a raised small numeral 1 after its stop, a call of footnote 1.

[920] After *24 9* stands a raised small numeral 1 with no bar and no second figure, of the same form as the calls after *per Mur.* and the 2 December rubric; it is read as a call of footnote 1, not as a fraction.

- The maximum altitude of the Pole Star by Portat. [Alt. ſtellæ Polaris max. per Portat.] 58 51, three times [ter]
- The first in the tail of Ursa Major [Prima in cauda Vrſæ maioris]
- by Portat. **24 9¼**[1921]
- The middle one in the tail of Ursa Major [Media in cauda Vrſæ mai.]
- by Port. 23 2[1922]

DIE 15 DECEMBRIS.

15 December.

- The minimum altitude of the Pole Star [Alt. ſtellæ Pol. minima] — by Portat. 52 58
- by the ruler [per regulam]
- 120 450, reſp. 52 58
- The maximum altitude of the Pole Star [Alt. Polaris maxima] 58 51
- The minimum altitude of the Pole Star [Alt. polaris minima] 52 58
- The distance of the Pole Star from the pole [Diſtantia Polaris a polo] 2 56 30
- The altitude of the pole comes out [Prouenit Altitudo Poli] 55 54 30

on the basis of the fixed stars [ratione fixarum ſtellarum].[923]

DIE 20 DECEMBRIS.

20 December.

- The maximum altitude of the Pole Star [Alt. ſtellæ Polaris max.] 58 51

by Port., the observation having been made with the plumb-line [per Port., facta obſeruatione perpen-diculo].

DIE 22 DECEMBRIS.

22 December.

- The maximum altitude of the Pole Star [Alt. ſtellæ Polaris max.]
- by Portat. 58 51
- or at least [aut ad minimum] 58 50 50
- The middle one in the tail of Ursa Major [Media in cauda Vrſæ maioris]
- by Portat. 23 2[1]
- The last in the tail of Ursa Major [Vltima in cauda Vrſæ mai.] 17 22[1]

by Portat., not accurate enough [per Portat., non ſatis exquiſite].[924]

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[921] After *9¼* stands a raised small numeral 1, the call of footnote 1.

[922] After *23 2* stands a raised small numeral 1 with no bar and no second figure, read as a call of footnote 1, not as a fraction.

[923] a printed left brace spans the three lines *per Portat. 52 58 / per regulam / 120 450, reſp. 52 58*, the star words *Alt. ſtellæ Pol. / minima* standing to its left over two lines. *polaris* is printed with a lower-case initial in the fourth line.

[924] after *23 2* and after *17 22* stands a raised small numeral 1, each read as a call of footnote 1, not as a fraction.

DIE 25 DECEMBRIS.

25 December.

- The maximum altitude of the Pole Star by Port. [Alt. max. Polaris per Port.] 58 51, twice [bis]
- The minimum altitude[2] of the leading one in the tail of Ursa Major [Alt.[2] minima præcedentis in cauda Vrſæ maioris] 24 9
- The minimum altitude of the middle one in the tail of Ursa Major, not certain enough [Alt. min. mediæ in cauda Vrſæ mai., non ſatis certa] **23 2½**
- The first of ♈ on the mer., by Mural. [Prima ♈ in mer. per Mural.] 51 19
- The bright star in the infer. horn of ♈ [Lucida in infer. cornu ♈] 52 50

by Mural. It was not clear enough [per Mural. Non ſatis ſerenum].[925]

DIE 26 DECEMBRIS.

26 December.

- The bright star in the shin of Arcturus [Arcturi] had altitude on the merid. by Mural. [Lucida in tibia Arcturi in me-rid. habuit alt. per Mural.] 54 31
- Arcturus on the mer., by Mural. [Arcturus in mer. per Mural.] 55 29

DIE 27 DECEMBRIS, MANE.

27 December, morning.

- The minimum altitude of the Pole Star, by Port. [Stellæ Pol. alt. min. per Port.] 52 58
- The mer. altitude of Spica ♍, by Mur. [Spicæ ♍ alt. mer. per Mur.] 25 9

Towards evening [Ad veſperas].

- The first of ♈ on the mer., by Mural. [Prima ♈ in mer. per Mural.] 51 19
- The bright star in the infer. horn of ♈ [Lucida in infer. cornu ♈] **52 49¾**
- The bright star in the head of ♈ [Lucida in capite ♈] 55 33[926]

[1] From codex V; they are missing in codex C. [E codice V, deſunt in codice C.]

[2] What follows up to the end of December is from codex V. [Quæ ſequuntur uſque ad finem Decembris e codice V.]

SEQUUNTU ALTITUDINES PER TYCHONICUM ET SEXTANTEM.[1]

There follow the altitudes by the Tychonicum and the Sextant.[1927]

[925] The raised small numeral 2 after *Alt.* is the call of footnote 2.

[926] *Ad veſperas.* is centred on its own line within the entry, in the body fount, not as a rubric.

[927] the heading prints *SEQUUNTU* and then, before *ALTITUDINES*, a space wider than the heading's word spaces, in which only a faint small mark stands at mid-height; no letter is inked there. The first word does not construe as printed.

DIE 1 JANUARIJ.

1 January.

By the Tychonicum [Per Tychonicum].

- The altitude of the præc. in Arcturus [Alt. præc. in Arcturo] **54 36⅙** vet.
- 54 36 new [nouo]
- The Merid. altitude of Arcturus [Alt. Arcturi Merid.] 55 28 vet.
- **55 27¾**[928]

DIE 9 JANUARIJ.

9 January.

By the Tychonicum [Per Tychonicum].

- Canis Minor [Canis minor] on the merid. [in merid.] **40 18¾**
- The calf of Boötes [Sura Bootis] 54 36 vet.
- **54 35⅚** new pinn. [novo pinn.]
- Arcturus 55 28 vtroq. pinn.

By the Sextant, merid. altitude [Per Sextantem, alt. merid.].

- The tail of Vrſæ mai. [Cauda Vrſæ mai.] **22 56⅙** [recte: 22 55⅙ — Corrigenda, p. 430]
- The end in the tail [Extrema in cauda] **17 21¾**
- The bright star in the □ of Vrſæ min. [Luc. in □ Vrſæ min.] 41 45
- The following one in the □ of Vrſæ min. [Seq. in □ Vrſæ min.] 39 14
- The bright star of Lyra [Luc. Lyræ], altitude min. [alt. min.] **4 33½**
- The end of the Chair [Extr. Cathedræ] **22 49¼**
- Schedar [Schedir] of Cassiopeia [Caßiop.] **20 12⅙**
- The Bend [Flexura] **24 25⅙**
- The Knee of Cassiopeia [Genu Caßiop.] 24 0[929]

DIE 11 JANUARIJ.

11 January.

By the Sextant, merid. altitude [Per Sext., alt. merid.].

- Schedar of Cassiopeia [Schedir Caßiop.] **20 13¾**
- The Bend [Flexura] **24 24¾**
- The foot of Cassiopeia [Pes Caßiopeæ] **27 32⅔**
- The Præced. in the side of Perseus [Præced. in latere Perſei] **17 46¼**
- The bright star of the side of Perseus [Luc. lateris Perſei] **14 17⅙**

DIE 14 JANUARIJ.

14 January.

By the Sextant [Per Sextantem].

- The bright star in the □ of Vrſæ min. [Luc. in □ Vrſæ min.] 41 45

[928] *54 36 nouo* and *55 27¾* stand in the figure column on lines of their own, under the value above them; the line *55 27¾* carries no word after it.

[929] The four-sided open box after *in* (twice) is a printed square glyph (□).

• The following infer. □ [Sequens infer. □] **39 13¾**

By the Tychonicum [Per Tychonicum].

• Canis Minor [Canis min.] **40 18½**, vtroq.[930]

DIE 15 JANUARIJ.

15 January.

By the Sextant [Per Sextantem].

• The bright star of the Chair [Lucida cathedræ] **22 49½**
• Schedar [Schedir] 20 14
• The Bend [Flexura] **24 24⅓**

By the Tychonicum [Per Tychonicum]

• Arcturus **55 27½**

By the Tychonicum [Per Tychonicum].[931]

DIE 17 FEBRUARIJ.

17 February.

• Canis Minor [Can. minor] **48 18⅔** [recte: 40 18⅔ — Corrigenda, p. 430]

DIE 15 DECEMBRIS.

15 December.

• Cap. Androm. 60 55 vtroq.
• The end of the wing of Pegasus [Extrem. alæ Pegaſi] **46 59½** vet.
• **46 59¼** new [nov.]

DIE 16 DECEMBRIS.

16 December.

• Scheat of Pegasus [Scheat Pegaſi], uncertain [incertæ] 59 58
• Cap. Androm., ppr. nub. [Cap. Androm. ppr. nub.] 60 55 vtroq.
• The end of the wing of Pegasus [Extrem. alæ Peg.] **46 59⅔** vet.
• **46 59½** new [novo]
• The bright star of the belt of Androm. [Luc. balt. Androm.] 67 30 new pin. [novo pin.][932]

DIE 26 DECEMBRIS.

26 December.

• Canis Major [Canis maior] **17 53½**
• Canis Minor [Canis minor] **40 18⅔**
• Arcturus **55 29¾**

[930] *vtroq.* stands before the figures, in the space between *Canis min.* and *40 18½*.

[931] the first *Per Tychonicum* in this entry has no stop and stands at the left over *Arcturus*; the second, with its stop, is centred on a line of its own between the *Arcturus* line and the rubric *DIE 17 FEBRUARIJ.*, with a blank line above and below it. *cathedræ* is printed with a lower-case initial.

[932] *incertæ* stands in the space between *Scheat Pegaſi* and *59 58*.

DIE 27 DECEMBRIS.

27 December.

- Cap. Androm. 60 55 vet.
- 60 54¾
- The bright star of the belt [Luc. balthei] 67 30 new [nov.][933]

[1] We have taken the following observations from the *Historia Cœlestis* (p. 71), because they are found neither in the Copenhagen codex nor in the Vienna copy. Since, however, the editor of that work undoubtedly found them in some manuscript book that no longer exists, there could be no doubt that they had to be transcribed here in full, even though we could not verify them against the codices. [Sequentes obſeruationes ex Hiſtoria Cœleſti (p. 71) ſumpſimus, quia neque in codice Haunienſi neque in apographo Vindobonenſi reperiuntur. Quum autem editor illius operis eas ſine dubio in aliquo libro manu ſcripto, qui nunc non exſtat, invenißet, dubitari non poterat, quin hic integræ deſcıibendæ eßent, etſi eas per codices verificare non potuimus.][934]

OBSERUATIONES DISTANTIARUM AFFIXARUM.

Observations of the distances of the fixed stars.

DIE... JANUARIJ.[1]

January.[1]

- Between the lower head of II and the bright foot of Erichthonius [Erichtonij], with the astronomical Arc [Inter inferius caput II et lucid. pedem Erichtonij per Arcum Aſtronomicum] 30 33¾
- 30 34
- Between Canis Major [Canem maiorem] and the leading one in its upper foot [Inter Canem maiorem et præcedentem in ſuperiori pede eius] 5 31, twice [bis]
- 5 32, about [fere][935]

DIE 22 JANUARIJ.

22 January.

About the time when the bright foot of Orion [Orionis] was on the meridian, its distance from the small star in the knee of the same was observed with the

[933] *60 54¾* stands in the figure column on a line of its own with no word after it.

[934] in *deſcıibendæ* the sort after *ſc* shows a stem with no inked arm. *(p. 71)* is printed in parentheses.

[935] the day of the rubric is not printed: three spaced points stand in its place, and a raised small numeral 1 after the stop calls footnote 1. The words *Inter inferius caput* II *et lucid. pedem* fill the first line; *Erichtonij per* and *Arcum Aſtronomicum* stand on the next two, and a printed brace, point to the left, spans those two lines between the words and the figures *30 33¾ / 30 34*. In the second entry the words stand over three lines (*Inter Canem maiorem et / præcedentem in ſupe- / riori pede eius*) and a printed brace, point to the left, spans all three against the two figure lines; *bis* and *fere* are set in smaller roman after the figures.

Radius [Circa id tempus quo lucidus pes Orionis fuit in meridiano, obſeruata eſt diſtantia eius a parua ſtella in genu eiuſdem per Radium]:

- 1 27
- 1 26, twice [bis]

That small star was not conspicuous enough because of the brightness of the nearby ☾ [Non erat parua illa ſtella ſatis conſpicua propter vicinæ ☾ ſplendorem].

DIE 26 JANUARIJ.

26 January.

- With the Trigonic Sextant, between Aldeb. and the right shoulder of Orion [Per Sext. Trig. inter Aldeb. et dextrum humerum Orionis] 21 23, twice [bis]

DIE 8 FEBRUARIJ.

8 February.

- Between Aldeb. and the right shoulder of Orion, with the astronomical Arc[2] [Inter Aldeb. et dextrum humerum Orionis per Arcum Aſtronomicum[2]] 21 21
- 21 23
- **21 22½**
- Between the uppermost star of the Chair and Schedar [Schedir], with the astronomical Arc [Inter ſupremam Cathedræ et Schedir per Arcum Aſtronomicum] **4 55½**
- 4 56
- **4 57½**
- **4 57½**
- Between the uppermost star of the Chair of Cassiopeia [Caßiopeæ] and the Bend, with the astronomical Arc [Inter ſupremam Cathedræ Caßiopeæ et flexuram per Arcum Aſtronomicum] **6 11½**
- **6 11⅔**
- Between the Bend of Cassiopeia and Schedar, with the astronomical Arc [Inter flexuram Caßiopeæ et Schedir per Arcum Aſtronomicum] **4 22½**
- 4 29 [recte: 4 29¼ — Corrigenda, p. 430]
- 4 32

Uncertain because of the χάσματα [Greek: *chasmata*, "chasms"].[3] [Incerta propter χάσματα.[3]][936]

[936] in the first entry the words stand over three lines (*Inter Aldeb. et dextrum / humerum Orionis per / Arcum Aſtronomicum[2]*) and a printed brace, point to the left, spans them against the three figure lines; a raised small numeral 2 after *Aſtronomicum* calls footnote 2. The other three entries carry no brace: their words run down the lines beside the figures (*Inter ſupremam / Cathedræ et Schedir / per Arcum Aſtrono- / micum*; *Inter ſupremam Cathedræ / Caßiopeæ et flexuram per / Arcum Aſtronomicum*; *Inter flexuram Caßiopeæ / et Schedir per Arcum / Aſtronomicum*), each line carrying its own figure except *Inter ſupremam Cathedræ*, which carries none.

DIE 13 FEBRUARIJ.

13 February.

- *The distance between the bright star of the Chair of Cassiopeia and Schedar, with the astronomical Arc* [*Diſtantia inter lucidam cathedræ Caßiopeæ et Schedir per Arcum Aſtronomicum*] **4 58¼**
- **4 59½**
- 4 58
- 4 57
- *good* [*bonæ*] **4 57½**
- **4 57½**[937]
- *With the parall. Arc* [*Per Arc. parall.*] **5 1½**
- *Between the Bend and Schedar, with the astronomical Arc* [*Inter Flexuram et Schedir per Arcum Aſtronomicum*] **4 39½**
- 4 40
- **4 40½**
- 4 39
- **4 39½**
- *With the parall. Arc* [*Per arc. parall.*] 4 40
- *The distance between the Bend and the Chair, with the paral. Arc* [*Diſtantia inter Flexuram et Cathedram per Arcum paral.*] **6 17½**
- *Between the Bend and the bright star of the Chair, with the astronomical Arc* [*Inter flexuram et lucidam Cathedræ per Arcum Aſtronomicum*] **6 9½**
- 6 10
- 6 9[938]

DIE 19 FEBRUARIJ.

19 February.

- The distance between the head of ♈ and the bright star of the Chair of Cassiopeia [Diſtantia inter caput ♈ et lucidam Cathedræ Caßiopeæ] **41 20⅔**

DIE 7 MARTIJ.

7 March.

With the Trigonic Sextant [Per Sextantem Trigonicum]:

- The distance between the head of ♈ and Schedar [Diſt. inter caput ♈ et Schedir] **36 38½**, twice [bis]
- Between the head of ♈ and the Bend of Cassiopeia [Inter caput ♈ et flex. Caß.] 39 12, twice [bis]

With the astronomical Arc, after the sights had been corrected [PerArcum Aſtronomicum poſt emendata pinnacidia]:

[937] The word *bonæ* stands to the left of a printed brace, point to the left, which spans the last two figure lines *4 57½ / 4 57½*.

[938] The next entry is printed *Arcum paral.* with a single *l*, set close to its figure (*paral.6*); *Diſtantia inter Flexuram et* stands on the line above with no figure.

- Between the bright star of the Chair and Schedar [Inter lucid. cath. et Schedir] 4 58*
- 4 58½
- 4 57½
- *(these two more certain than the rest) [*(hæ duæ certiores reliquis)] 4 58*[939]

DIE 2 APRILIS P. M.

2 April, P. M.

- The distance between the heart of ♌ and the bright foot of Erichthonius, with the portable Q. [Diſt. inter cor ♌ et lucid. pedem Erichtonij per Q. portatilem] 67 20¾
- 67 20
- 67 20½
- 67 20¼
- 67 20½
- Between the heart of ♌ and Spica [Spicam] ♍, with the portable Q. [Inter cor ♌ et Spicam ♍ per Q. portatilem] 54 2
- 54 2
- 54 1½
- 54 2[940]

DIE 20 JUNIJ.

20 June.

Between Spica and the bright star of the Vulture [Vulturis], with the portable Q.: 97 40, repeated five times [Inter Spicam et lucidam Vulturis per Q. portat. 97 40 quinquies repetita].

Note. On 20 June, in the evening, between 10 and 11, we accurately observed the distance [Nota. Die 20 Junij veſperi inter 10 et 11 accurate obſeruauimus diſtantiam]

[1] The day is missing in the codex [Dies deeſt in codice].

[2] Thus in codex C [Sic in codice C]:

- 13 8 · 13 8½ · 12 55
- 8 13 · 8 14½ · 8 27½
- 21 21 · 21 23 · 21 22½

[3] That is, because of the Aurora Borealis [Id eſt, propter Auroram Borealem].[941]

[939] An asterisk stands after the first *4 58* and after the last *4 58*, and another before the printed opening parenthesis of *(hæ duæ certiores reliquis)*; the parentheses are printed.

[940] the words of each entry run down the lines beside the figures (*Diſt. inter cor ♌ / et lucid. pedem / Erichtonij per / Q. portatilem*, the fifth figure line carrying no words; *Inter cor ♌ / et Spicam ♍ / per Q. portatilem*, the fourth figure line carrying no words). No brace.

[941] in footnote 2 the word *in* is printed with its second letter as two separate minims with no arch between them, so that it reads *iu* on the leaf. Footnote 2 sets its figures in three short columns after *Sic in codice C.*; each column has a short printed rule between its second and third lines, the third line standing under the rule.

between Spica ♍ and the bright star of the Vulture, and five times it was found to be exactly p. 97 M. 40*, except that on other occasions, once and again, 49 minutes were found [inter Spicam ♍ et lucidam Vulturis, et quinquies inueniebatur p. 97 M. 40 exquiſite, niſi quod alias ſemel atque iterum 49 minuta reperiebantur]. But the five repeated ones were exact and certain; the observation was made with the portable Quadrant, which takes in a third part of the circle [Verum quinquies repetitæ erant exactæ et certæ; fiebat autem obſeruatio per Quadrantem portatilem, qui tertiam circuli partem capit].*

DIE 15 AUGUSTI.

15 August.

- The distance between the bright star of the Vulture and the head of Ophiuchus [Ophiuchi], with the Sextant △ [Diſtantia inter lucid. Vulturis et caput Ophiuchi per Sext. △] 33 31, three times [ter]
- Between the bright star of the Vulture and the head of Hercules [Herculis] [Inter lucid. Vulturis et caput Herculis] 38 32½

DIE 16 AUGUSTI.

16 August.

The greater clock was running slower than it should by 7 first minutes 0 seconds. That smallest clock was slower as well, 13½′. [Maius horologium tardius ibat iuſto 7 ſcrupulis primis 0 ſecundis. Minimum illud vna tardius 13½′.]

- The distance between the bright star of the Vulture and the head of Ophiuchus [Diſtantia inter lucidam Vulturis et caput Ophiuchi] 33 31, twice [bis]
- Between the bright star of the Vulture and the head of Hercules, also with the Sextant △ [Inter lucid. Vult. et caput Herculis, etiam per Sext. △] 38 33, twice [bis][942]

DIE 14 OCTOBRIS.

14 October.

- Between Arcturus [Arcturum] and the Vulture, with the portable Quadrant [Inter Arcturum et Vulturem per Q. Portat.] 81 3
- 81 3½, about [fere]
- 81 3½
- 81 3½

You will be able to trust these observations, for the sky was quite clear and calm [His obſeruationibus poteris fidere, erat namque cœlum bene ſerenum et tranquillum].

- Between Arcturus and Lyra [Lyram]: 58 48½, three times [ter], good, with the Portable [bonæ, per Portatilem]

[942] *13½′* carries a printed prime after the fraction.

- Between the bright star of the Vulture and the head of ♈ [Inter lucid. Vult. et caput ♈] 90 14, three times [ter], good, with the Portable [bonæ, per Portatilem][943]

DIE 15 OCTOBRIS.

15 October.

With the portable Quadrant [Per Q. Portatilem]:

- Between Arcturus and the bright star of the Vulture [Inter Arctur. et lucid. Vult.] **81 3½**, twice [bis]
- Between Arcturus and Lyra [Inter Arcturum et Lyram] **58 48⅔**
- **58 48½**
- **58 48½**
- Between the Vulture and the head of ♈ [Inter Vult. et caput ♈] 90 14, three times [ter][944]

DIE 28 OCTOBRIS.

28 October.

- Between the left shoulder of ♒ and the lower horn of ♑ [Inter ſiniſtrum humerum ♒ et inferius cornu ♑] **19 37¾**
- **19 37½**
- 19 37

with the Trigonic Sextant; but the star in the horn of ♑ was beginning to sink toward the horizon [per Sext. Trigon., cæpit autem ſtella in cornu ♑ inclinare verſus Horizontem].[945]

DIE 29 OCTOBRIS.

29 October.

- Between the left shoulder of ♒ and the lower horn of ♑, with the Trigonic Sextant [Inter ſiniſtrum humerum ♒ et infer. cornu ♑ per Sext. Trigon.] **19 37⅓**
- **19 37¼**
- **19 37¼**
- Between both shoulders of ♒, with the Sextant △ [Inter vtrumque humerum ♒ per Sext. △] **10 1½**
- 10 0 30
- 10 1 0
- So that the distance is probably [Vt ſit probabiliter diſt.] 10 1

[943] a printed brace, point to the left, stands between the five text lines of the first entry (*Inter Arcturum et Vulturem / per Q. Portat. His obſerua- / tionibus poteris fidere, erat / namque cælum bene ſere- / num et tranquillum.*) and the four figure lines *81 3* … *81 3½*; the remark on the sky is set inside the same run of lines, not below it.

[944] *Per Q. Portatilem* has no terminal stop.

[945] *cæpit* is printed with *æ*.

DIE 1 DECEMBRIS.[1]

1 December.[1]

With the Trigonic Sextant [Per Sext. Trigonicum]:

- Between the upper horn of ♍ and the left shoulder of ♒ [Inter ſuperius cornu ♍ et ſiniſtrum humerum ♒] 19 25, twice [bis]
- Between the bright star of the Vulture and the right shoulder of ♒ [Inter lucidam Vulturis et dextrum humerum ♒] 34 54, twice [bis]
- Between the mouth of Pegasus [Pegaſi] and the leading one in the jaw of ♓ [Inter os Pegaſi et præcedentem in mandibula)(] 20 41, twice [bis]
- Between the mouth of Pegasus and the more southern one in the neck of ♓ [Inter os Pegaſi et auſtraliorem in ceruice)(] 23 55, twice [bis]
- Between the mouth of Pegasus and the breast of ♓ auſtr. [Inter os Peg. et pectus)(auſtr.] 26 53, about [fere], twice [bis]
- Between Scheat of Pegasus and Lyra [Inter Scheat Pegaſi et Lyram] **55 30⅔**, twice [bis]
- Between the head of ♈ and Scheat [Inter caput ♈ et Scheat] 41 19, three times [ter]
- Between Scheat and the middle one of the three in the left wing of Cygnus [Cygni] [Inter Scheat et mediam trium in ſiniſtra ala Cygni] **46 1½**, twice [bis]
- Between Scheat and the head of Cygnus [Inter Scheat et caput Cygni] **46 36⅔**, twice [bis]
- Between Scheat and the breast of Cygnus [Inter Scheat et pectus Cygni] **35 12½**[946]

DIE 2 DECEMBRIS.

2 December.

With the Trigonic Sextant [Per Sextantem Trigonicum.]:

- Between the upper horn of ♍ and the left shoulder of ♒ [Inter ſuperius cornu ♍ et ſiniſtrum humerum ♒] 19 25, twice [bis]
- Between the lower horn of ♍ and the left shoulder of ♒ [Inter infer. cornu ♍ et ſiniſtrum humerum ♒] 19 37, twice [bis]
- Between the bright star of the Vulture and the left shoulder of Hercules [Inter lucidam Vulturis et ſiniſtr. humerum Herculis] 34 19, twice [bis]
- Between the hand of ♒ and the right shoulder of the same [Inter manum ♒ et dextrum humerum eiuſdem] **21 27½**, twice [bis]

DIE 3 DECEMBRIS.

3 December.

With the Trigonic Sextant [Per Sextantem Trigonicum.]:

[946] the rubric carries a raised small numeral 1 after its stop, the call of footnote 1. *Per Sext. Trigonicum* has no terminal stop. The sign after *mandibula*, *ceruice* and *pectus* is set as two outward-facing arcs touching at the middle.

- Between the Vulture and the upper horn of ♑ [Inter Vulturem et ſuperius cornu ♑] 22 25, twice [bis]
- Between the Vulture and the lower horn of ♑ [Inter Vult. et infer. cornu ♑] 24 45, twice [bis]
- Between the Vulture and the western one in the tail of ♑ [Inter Vulturem et occidentalem in cauda ♑] 37 3, not certain enough [non ſatis certa]
- Between the Vulture and the bright or following one in the tail of ♑ [Inter Vulturem et lucidam vel ſequentem in cauda ♑] 38 5, twice [bis]

[1] The rest from codex V [Reliqua e codice V][947]

- Between the Vulture and the leading one in the jaw of ♓, southern [Inter Vult. et præcedentem in mandibula)(auſtral.] **48 16½**, twice [bis]
- Between the Vulture and the lower one in the neck [Inter Vulturem et inferiorem in ceruice] 51 32
- **51 31½**
- 51 32
- Between the Vulture and the leading one in the back of ♓ [Inter Vulturem et præcedentem in dorſo)(] 53 55, twice [bis]
- Between the Vulture and the leading one in the belly of ♓ [Inter Vulturem et præcedentem in ventre)(] **54 21¾**
- **54 22¼**
- 54 17[948]

The third agrees in the calculation with that distance which was observed from the mouth of Pegasus [Pegaſi] two days before [Tertia conuenit in calculo cum illa diſtantia quæ ab ore Pegaſi obſeruata eſt ante biduum].

- Between the Vulture and the following one in the back of ♓ [Inter Vulturem et ſequentem in dorſo)(] 56 54, about [fere]
- Between the bright star of ♈ and the following one in the belly of ♓ [Inter lucidam ♈ et ſequentem in ventre)(] 41 15, twice [bis]
- Between the bright star of ♈ and the tail of the southern ♓ [Inter lucidam ♈ et caudam)(auſtralis] 34 55, about [fere]

OBSERUATIONES PRO STELLIS CASSIOPEÆ EXACTE PERUESTIGANDIS.[1]

Observations for investigating the stars of Cassiopeia exactly.[1949]

DIE 17 FEBRUARIJ.

17 February.

In the evening, about H. 7, the stars of Cassiopeia [Caßiopeæ] were observed from the bright star of ♈, in this way [Veſperi circa H. 7 obſeruabantur ſtellæ Caßiopeæ a Lucida ♈ hoc modo].

[947] footnote 1 has no terminal stop.

[948] The sign after *mandibula*, *dorſo* and *ventre* is set as two outward-facing arcs touching at the middle.

[949] the heading has its terminal stop, and a raised small numeral 1 after the stop calls footnote 1.

First, to test the instrument, **35° 32⅙′** was taken between the bright star of ♈ and Aldebaran [Aldeb.]; therefore the Sextant was in proper order [Primo pro examine inſtrumenti capiebatur inter Luc. ♈ et Aldeb. 35° 32⅙′, ergo recte ſe Sextans habuit].

- The bright star of ♈ and Schedar [Schedir] [Lucida ♈ et Schedir] **36 38¼**, twice [bis]
- The bright star of ♈ and the Bend [Lucid. ♈ et Flexura] 39 11, twice [bis]
- The bright star of ♈ and the bright star of the Chair [Luc. ♈ et Luc. Cathedræ] **41 20¾**, twice [bis]
- The bright star of ♈ and the ſin. elbow of Cassiopeia [Luc. ♈ et ſin. cubitus Caß.] **33 19⅙**
- **33 20¼**
- Take [Pone] 33 20
- The bright star of ♈ and vndec. of Cassiopeia [Luc. ♈ et vndec. Caß.] 42 28, twice [bis]
- **42 28¼**
- **42 28⅓**
- Use the distance [Vtere diſt.] **42 28¼**
- Between the bright star of ♈ and the side of Perseus [Perſei] [Inter luc. ♈ et latus Perſei] **30 22¼**
- **30 22⅓**
- **30 22½**

You can use the distance **30 22½** if perhaps Cap. ♈ caused some refraction. But the altitude of the bright star of ♈ about the last observation was 26 partium, so it introduced no perceptible refraction [Potes vti diſtantia 30 22½ ſi forte aliquam refractionem fecit Cap. ♈. Fuit autem altitudo Luc. ♈ circa vltimam obſeruationem 26 partium, ideo nullam ſenſibilem ingerebat refractionem].

- The bright star of ♈ and Cap. of Cassiopeia [Luc. ♈ et Cap. Caßiop.] **34 46¾**
- 34 48
- 34 48
- **34 47½**
- Use, as safer [Vtere tutius], **34 47½**
- The bright star of ♈ and Cing. of Cassiopeia [Luc. ♈ et Cing. Caß.] 37 12, twice [bis]
- The eye of ♈ and the Knee of Cassiopeia [Oculus ♈ et genu Caß.] **55 23½**, three times [ter]
- The bright star of ♈ and the Knee of Cassiopeia [Luc. ♈ et genu Caß.] 37 27, twice [bis]
- **37 28½**, once [ſemel]
- Between Aldebaran [Aldeboram] and the bright star of Perseus [Inter Aldeboram et Luc. Perſei] **36 18½**
- 36 19

- **36 19⅓**
- **36 19¼**

Take this distance, 36 19, and you will err imperceptibly [Pone hanc diſtantiam 36 19 et inſenſibiliter aberrabis].

On the following evening the stars of Cassiopeia were observed again, and first the Sextant was tested on the bright star of ♈ and Aldebaran, and it gave their distance as **35 32¼**. So the Sextant was in good order [Sequenti Veſperi rurſus obſeruabantur ſtellæ Caßiopeæ et primo experiebatur Sextans in Luc. ♈ et Aldeb., dabatque eorum diſtantiam 35 32¼. Ergo Sextans bene ſe habuit].[950]

- Between the bright star of ♈ and the bright star of Perseus [Inter Luc. ♈ et Luc. Perſei] **30 22¾**, twice [bis]
- **30 22⅚**

The altitude of the bright star of ♈ was 35 Gr. You can use the truer distance, 30 23; for what it gave yesterday evening, half a minute less, refraction caused, because it was lower [Altitudo Luc. ♈ 35 Gr. Potes vti diſtantia veriori 30 23, nam quod heri veſperi dabat dimidio ſcrupulo minus, effecit refractio, quia erat decliuior].

- The bright star of ♈ and the calf of Cassiopeia [Luc. ♈ et ſura Caßiop.] **40 13¾**
- **40 13⅔**
- The bright star of ♈ and the sole of the foot of Cassiopeia [Luc. ♈ et planta pedis Caß.] **44 2¼**
- 44 3
- **44 2⅓**
- Take here [Pone hic] **44 2⅙**
- The bright star of ♈ and the dext. elbow — of Cassiopeia, the nearest above the seat [Luc. ♈ et cubitus dext. Caß. ſupra ſellam proxima] **39 56½**
- **39 56⅚**
- Take **39 56¾** or 39 57 [Pone 39 56¾ vel 39 57]

Afterwards, noticing a small [Poſtea animaduertens paruam quan-]

[1] From the *Historia Cœlestis* [Hiſtoria Cœleſti] (pp. 67–70). We have not found them in the codices. Compare the note to p. 274, above. For the most part these observations are found in the book of the *Progymnasmata* [Progymnasmatum] (pp. 284–294; of our edition, T. II pp. 291–301). [E Hiſtoria Cœleſti (pp. 67—70). In codicibus eas non reperimus. Cfr. annotationem ad p. 274, ſupra. Maxima ex parte hæ obſervationes in libro Progymnasmatum (pp. 284—294, noſtræ editionis T. II pp. 291—301) inveniuntur.][951]

certain star in the head of Cassiopeia [Caßiop.], next to another, toward the bright star of the Chair, which we chose to call the hair of Cassiopeia, or

[950] *Sequenti Veſperi* stands centred on a line of its own, in lower-case roman with capital initials and no terminal stop; it is not a DIE rubric, and it is roman. The sentence runs on from it without a stop.

[951] Its two pairs of parentheses are printed.

the occiput; for it is not in the catalogue of the ancients [dam ſtellam in cap. Caßiop. iuxta alteram, verſus Luc. cathedræ, quam crines Caßiopeæ appellare libuit, vel occiput, non enim eſt in veterum catalogo].

- The bright star of ♈ from the hair or occiput of Cassiopeia [Luc. ♈ a crinibus vel occipite Caßiopeæ] **35 45½**
- **35 46½**
- Take [Pone] 35 46[952]

We also observed from the bright star of ♈ three stars in the upper part of the seat, which they have not recorded. Of these, I is in the right arm; its distance from the bright star of ♈ [Obſeruauimus et tres ſtellas in ſuperiore parte ſellæ, quas non annotarunt, a Luc. ♈, quarum I eſt in dextro brachio, eiuſdem diſt. a Luc. ♈]:

- **41 31⅔**
- **41 32⅙**
- Take the distance [Pone diſt.] 41 32
- The second or middle one, from the bright star of ♈ [Secunda ſeu media a luc. ♈] 43 3
- 43 3
- Take [Pone] 43 3
- 3 from the bright star of ♈ [3 a Luc. ♈] 44 44
- **44 43⅙**
- Take [Pone] **44 43½**[953]
- The bright star of ♈ and those of the footstool of the foot, on the sitting place [Luc. ♈ et ſcabelli pedis in ſede]:
- I **45 10½**, twice [bis]
- The middle [Media] 47 23
- **47 23½**
- The last [Vltima] **48 53¾**
- 48 54

N. B. These stars are numbered so that the first on the bench, or sitting place, of the seat is the one that is nearest the sole of the foot [N. B. Hæ ſtellæ ita numerantur, vt prima in ſcamno ſeu ſede ſellæ ſit ea quæ eſt plantæ pedis proxima].[954]

- The eye of ♉ and the bright star of Perseus [Perſej] [Oculus ♉ et Luc. Perſej] **36 19⅙**
- 36 19
- You can use, without perceptible error, the distance [Potes absque ſenſibili errore vti diſtantia] **36 19⅙**
- Between the bright star of Perseus and the heel of the foot of ♊ [Inter Luc. Perſej et calcem pedis ♊] **44 14¼**, once [ſemel]

[952] *cathedræ* has a lower-case initial.

[953] *I* after *quarum* is a capital I, a numeral label; *3* before *a Luc.* is an arabic figure.

[954] The five N. B. lines stand in smaller roman to the left of the figure lines from *Media 47 23* to *48 54*, beginning one line below *I 45 10½bis*.

DIE 21 FEBRUARIJ.

21 February.

Certain stars of Cassiopeia [Caßiopeæ] were found from the bright star of ♈. First the Sextant was tested from the bright star of ♈ on the eye of ♉, and the distance was found [Reperiebantur quædam ſtellæ Caßiopeæ a Lucida ♈. Experimentabatur primo Sextans a Luc. ♈ in oculum ♉, et inueniebatur diſtantia] **35 32⅙**.

- Between the bright star of ♈ and the bright star of the Chair [Inter Luc. ♈ et Luc. Cath.] **41 20¾**, twice [bis]
- Between the bright star of ♈ and Schedar [Schedir] of Cassiopeia [Inter Luc. ♈ et Schedir Caßiop.] **36 38⅓**
- **36 38¼**
- Between the bright star of ♈ and the Bend [Inter Luc. ♈ et Flexuram] **39 10½**, twice [bis]
- **39 10⅔**

But since in the preceding 39 11, twice, is set down, you can also, without perceptible error, use the distance **39 10¾** [Quia vero in antecedentibus ponitur 39 11 bis, etiam potes absque ſenſibili errore vti diſtantia 39 10¾].

- The bright star of ♈ and XI of Cassiopeia [Luc. ♈ et XI Caßiop.] **42 29½**
- **42 29¾**

About these times the alt. of the bright star of ♈ was 28 Gr. [Fuit circa hæc tempora alt. Luc. ♈ 28 Gr.]

- The bright star of ♈ and XI of Cassiopeia [Lucida ♈ et XI Caß.] 42 29; good, use this one [bona, vtere hac]
- The bright star of ♈ and the one intermediate between the base of the foot and XI, which is very small [Luc. ♈ et intermedia pedis fundamento et XI quæ eſt parua admodum] **45 6¾**
- 45 6
- **45 6⅔**
- The bright star of ♈ and XI, nearest to the knee, which is of the sixth magnitud. [Luc. ♈ et XI proxima ad genu quæ eſt ſextæ magnitud.] **36 15¾**
- 36 15
- **36 14½**
- Between the bright star of ♈ and the one that is 9 for Thaddeus [Thaddeo], which is intermediate to the one in the arm and the one in the knee, and is very small, of the sixth magn. [Inter Luc. ♈ et eam quæ eſt 9 Thaddeo, quæ eſt intermedia illi, quæ eſt in brachio, et quæ in genu, eſtque admodum parua ſextæ magn.] 35 44
- **35 45¾**
- 35 46
- **35 46¼**
- The bright star of ♈ and the very small one in the left elbow [Lucida ♈ et paruula in ſiniſtro cubito] **33 38⅔**

- 33 37
- 33 38
- Take here the distance [Pone hic diſt.] 33 38[955]

In these last observations the alt. of the bright star of the head of ♈ was nearly 21 Gr. [Fuit in his vltimis obſeruationibus alt. Luc. cap. ♈ 21 Gr. prope.]

- Between the side of Perseus and the heel of ♊ [Inter latus Perſej et calcem ♊] 44 14
- **44 13⅚**
- 44 14
- Take, imperceptibly [Pone inſenſibiliter], 44 14
- Between the bright star of Perseus and the lower head of ♊ [Inter Luc. Perſej et ınferius caput ♊] 53 23, twice [bis]
- **53 22⅚**

These are better than those that were taken on the other evening. This one must be repeated tomorrow, and the one which is the lower ♊ and Aldeb.; likewise between Aldeb. and the heel of ♊. [Hæ ſunt meliores quam illæ, quæ altero Veſpere accipiebantur. Oportet hanc cras repetere, et eam quæ eſt inferior ♊ et Aldeb.; item inter Aldeb. et calcem ♊.][956]

- Between Capella [Capellam] and the bright star of ♈ [Inter Capellam et Luc. ♈] **44 6⅔**
- **44 6¾**
- **44 6⅚**

The last was among thinner clouds; but you can use the distance **44 6¾** [Vltima erat inter tenuiores nubes, potes autem vti diſtantia 44 6¾].

- Between Capella and Aldeb. [Inter Capellam et Aldeb.] 30 42, three times [ter]
- **30 41¾**
- **30 41⅚**
- Capella and the lower head of ♊ [Capella et inferius caput ♊] **34 19½**
- **34 19⅙**

On the following evening the distance of Capella and the bright star of ♈ was repeated [Sequenti veſperi repetita diſtantia Capellæ et Luc. ♈]:

- **44 6⅔**, twice [bis]
- **44 6½**
- **44 6⅔**
- You will be able to use this distance without error [Poteris vti hac diſtantia absque errore] **44 6⅔**
- The bright star of ♈ and the right hum. of Erichthonius [Erichtonij] [Luc. ♈ et dext. hum. Erichtonij] **51 21¼**, twice [bis]

Distances of Capella [Capellæ] from the stars of Cassiopeia [Capellæ diſtantiæ a ſtellis Caßiopeæ]

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[955] *XI* is a Roman numeral each time.

[956] on the scan the first letter of *ınferi-* shows no dot, and it is transcribed dotless as it stands. *et calcem* ♊. ends with a stop after the sign.

- Between Capella and the head of Cassiopeia [Inter Capellam et caput Caßiop.] **43 45⅓**
- **43 43⅔**
- 43 44
- Capella and the small one at the hair of Cassiopeia [Capella et parua ad crines Caßiop.] 44 15
- **44 15⅓**
- Capella and the one in the right arm [Capella et ea quæ in brachio dextro] 48 9
- **48 9½**
- doubtful [dubia]
- The following one of those three, from Capella [Sequens earum trium a Capella] 48 3
- **48 3¾**
- **48 3½**
- Use [Vtere] **48 3½**
- The third of those three, from Capella [Tertia earum trium a Capella] 48 34
- 48 33
- **48 33½**
- Use [Vtere] **48 33½**
- Capella and the ſiniſt. elbow of Cassiopeia [Capella et cubitus ſiniſt. Caßiop.] 38 42
- **38 42¼**
- Capella and the small one in the ſiniſt. arm, VIII [Capella et parua in brachio ſiniſt. VIII] **39 29⅓**
- **39 28½**
- Take the distance [Pone diſt.] 39 29
- Capella and Schedar [Schedir] [Capella et Schedir] 42 28
- **42 28⅙**, twice [bis]
- Capella and the bright star of the Chair [Capella et Luc. cathedræ] **45 41⅓**
- 45 41
- Capella and the Bend [Capella et Flexura] 39 30, three times [ter]
- Capella and the cing. of Cassiopeia [Capella et cing. Caßiop.] 41 7
- 41 8 2/[?]
- 41 8, twice [bis]
- Take [Pone] **41 7 45″**
- Capella and XI of Cassiopeia [Capella et XI Caßiop.] **41 53½**
- **41 53¼**
- **41 53½**[957]

[957] *dubia* stands alone, right-aligned in the figure place, on the line below *48 9½*; no figure stands on its line. *Pone 41 7 45″* carries a printed double prime after *45*; no other mark stands in the group. *cathedræ* has a lower-case initial.

For the navel of Cassiopeia, where there are two very small stars of the sixth magnit., so joined that they cannot be distinguished, you will take the middle of them from XI of Cassiopeia and the bright star of the Chair. They are not yet in the number of the others; but call the ring of the navel XIV of Cassiopeia [Pro vmbilico Caßiopeæ, vbi ſunt duæ ſtellæ paruulæ ſextæ magnit. adeo coniunctæ, vt diſcerni nequeant, harum medium accipies ab XI Caßiopeæ et Lucida Cathedræ, non ſunt adhuc in numero ceterarum, voca autem gyrum vmbilici XIV Caßiopeæ].

If you wish to distinguish the distance of each of these small ones, take the one nearest the Chair as part. 5.59, the most remote as 6.4; the distance from XI, let it remain the same for both [Si vis vtramque harum paruarum diſtantiam diſcernere, pone proximam Cathedræ part. 5.59, remotißimam 6.4, diſt. ab XI, maneat vtrique eadem][958]

- XI of Cassiopeia and the hump of the navel [XI Caßiop. et gibbus vmbilici] **4 42½**
- **4 42⅔**
- The ring of the navel and the bright star of the Chair [Gyrus vmb. et Luc. Cathedræ] 5 59
- 6 5
- Take [Pone] 6 2
- Capella and the small one nearest the knee, number XVI [Capella et parua proxima genu num. XVI] **35 0⅔**
- **35 0½**
- 35 1
- Capella and the other one near the knee, XV [Capella et altera apud genu XV] **36 54¼**
- **36 53¾**
- Capella and XVII, which is in the footstool [Capella et XVII quæ eſt in ſcabello] 34 42
- 34 44
- **34 44¼**
- Capella and the middle one of the footstool [Capella et media ſcabelli] **36 15½**
- **36 15⅔**
- Capella and the outermost one in the footstool[1] [Capella et extrema in ſcabello[1]] **37 42¼**
- **37 42½**
- Capella and XX, which is in the infer part of the Chair [Capella et XX quæ eſt in Cathedræ parte infer] **37 29¾**
- **37 28¾**
- **37 29¼**
- Capella and the Knee of Cassiopeia, V [Capella et genu V] **36 1½**

[958] *5.59* and *6.4* are each set with a printed point between the two figures; *part.* stands before *5.59* only.

- **36 1½**
- Capella and the leg, VI [Capella et crus VI] **32 46¾**
- 32 46
- **32 46½**
- Capella and the sole of the foot, VII [Capella et planta pedis VII] **30 18⅓**
- **30 17¾**
- 30 18
- Between Capella and the northern horn of ♉ [Inter Capellam et boreale cornu ♉] **17 30¾**
- **17 31¼**
- **17 31½**
- **17 31½**
- **17 31⅔**
- **17 31⅔**
- **17 31½**
- Take the true distance [Pone diſtantiam veram] **17 31½**
- Between Aldeb. and the northern horn of ♉ [Inter Aldeb. et boreale cornu ♉] 16 42
- **16 44¼**
- **16 44½**
- **16 44¼**
- 16 43
- Take the true distance [Pone diſtantiam veram] 16 44
- Between Aldeb. and the southern horn of ♉ [Inter Aldeb. et auſtrale cornu ♉] 15 18
- **15 17⅚**
- 15 18
- Between Capella and the southern horn of ♉ [Inter Capellam et auſtrale cornu ♉] **25 15¼**
- 25 16[959]

[1] These three stars are Fl. 31, 36, 43, which the observer confused with three other stars, Fl. 50, 48, 46 (cfr. Argelander's [Argelandri] dißert. *De fide Uranometriæ Bayeri*, Bonn [Bonnæ] 1842 p. 12). From this it follows that the positions of stars 16, 17 18 of Tycho's catalogue are false. [Hæ tres ſtellæ ſunt Fl. 31, 36, 43, quas obſervator cum aliis tribus ſtellis, Fl. 50, 48, 46 confudit (cfr. Argelandri dißert. De fide Uranometriæ Bayeri, Bonnæ 1842 p. 12). Quo accedit, ut poſitiones ſtellarum 16, 17 18 catalogi Tychonis falſæ ſint.][960]

- 25 16
- 25 16

[959] *ſcabello*[1] carries a raised small numeral 1, which calls the footnote; it stands after the word and before the figures. *infer* is printed with no stop.

[960] Its one pair of parentheses is printed. No comma is printed between *17* and *18*, which stand at the end of one line and the start of the next. It writes *obſervator* with *v*, where the body writes *u* throughout.

- The southern horn of ♉ and the lower head of ♊ [Auſtrale cornu ♉ et inferius caput ♊] 29 50
- **29 49⅚**
- **29 49⅚**
- The northern horn of ♉ and the lower head of ♊ [Boreale cornu ♉ et inferius caput ♊] 30 35
- 30 35
- **30 35⅙**
- Between Capella [Capellam] and the outermost one at the top of the seat, number XXI [Inter Capellam et extremam in ſummitate ſellæ num. XXI] **50 34¼**
- **50 33⅓**
- 50 34
- Between Capella and the very small one near the Bend [Inter Capellam et paruulam apud flexuram] 39 54
- 39 53
- 39 54
- Between Luc. Cathedræ and the Bend, XII and IIII [Inter Luc. Cathedræ et flexuram, XII et IIII] **6 11¾**
- **6 11½**
- **6 11⅔**
- **6 11½**
- Between Luc. Cathedræ and the Knee of Cassiopeia, XII and V [Inter Luc. Cathedræ et genu, XII et V] 9 42
- 9 42
- **9 42⅓**
- Between Luc. Cathedræ and Schedar [Schedir], XII and II [Inter Luc. Cathedræ et Schedir, XII et II] 4 57
- **4 57⅓**
- 4 57
- Between Luc. Cathedræ and the head, XII and I [Inter Luc. Cathedræ et caput, XII et I] **6 32⅓**
- **6 32½**
- Between Luc. Cathedræ and the hair, XII and XIV [Inter Luc. Cathedræ et crines, XII et XIV] 5 49[1]
- 5 39
- Between Luc. Cath. and the right arm, XII and IX [Inter Luc. Cath. et dextrum brachium, XII et IX] 9 18
- 9 17
- **9 17¾**
- Between Luc. Cath. and the Girdle, XII and III [Inter Luc. Cath. et cingulum, XII et III] **5 19½**
- 5 19
- Between Luc. Cath. and the navel [Inter Luc. Cath. et vmbilicum] 5 59

- **5 58½**
- Between Luc. Cath. and the topmost one in the knee, number XV [Inter Luc. Cath. et ſupremam in genu, num. XV] **9 15¼**
- 9 15
- Between Luc. Cath. and the calf, VI, number [Inter Luc. Cath. et ſuram, VI num.] 13 18
- 13 18
- Between Luc. Cath. and the sole of the foot, XII and VII [Inter Luc. Cath. et plantam pedis, XII et VII] 17 29
- **17 28⅓**
- Luc. Cath. and the outermost one of the footstool, XII and XVI [Luc. Cath. et extrema ſcabelli, XII et XVI] **17 22¼**
- **17 22¼**
- Luc. Cathedræ and the middle one of the footstool, XVIII [Luc. Cathedræ et media ſcabelli, XVIII] **16 27¼**
- 16 27
- Luc. Cath. and the lowest one, I, of the footstool [Luc. Cath. et infima I ſcabelli] 14 55
- **14 54⅔**
- Luc. Cath. and the middle one between XI and I at the bottom of the seat, XX [Luc. Cath. et med. inter XI et I in imo ſellæ XX] 12 16
- **12 16½**[961]
- Between the eleventh and Luc. Cath. [Inter vndecimam et Luc. Cath.] 4 47
- 4 47
- Between the eleventh and Schedar [Schedir] [Inter vndecimam et Schedir] 6 26, good [bona]
- **6 24¾**
- **6 24⅓**
- Between the eleventh and the Bend [Inter vndecimam et flexuram] **3 32⅓**
- **3 32⅓**
- Between Schedar and the Knee of Cassiopeia [Inter Schedir et genu] **6 57⅓**
- **6 57⅓**
- Between Schedar and the Bend [Inter Schedir et flexuram] **4 36⅚**
- 4 37
- **4 36½**
- Between the Bend and the Knee of Cassiopeia [Inter flexuram et genu] **3 34⅔**
- Afterwards the same diſt. was observed [Poſtea eadem diſt. obſeruabatur] **3 34⅔**

[961] *5 49* is followed by a raised small numeral 1, which calls the footnote; it is not a fraction.

- 3 36[962]

DIE 5 MARTIJ.

5 March.

- Between the eleventh and the Girdle [Inter vndecimam et cingulum] 5 24
- 5 23
- Between Schedar and the Girdle [Inter Schedir et cingulum] **1 39½**
- **1 39½**
- Between Schedar and the head [Inter Schedir et caput] 2 35
- 2 36
- 2 35

DIE 10 MARTIJ.

10 March.

- Between Capella and the lower head of Ⅱ, for the test of the Sext. [Inter Capellam et inferius Caput Ⅱ pro exam. Sext.] **34 19⅓**
- **34 19⅓**
- Between Luc. Cath. and the Bend [Inter Luc. Cath. et flexuram] 6 12
- 6 12
- 6 12
- Between Luc. Cath. and Schedar [Inter Luc. Cath. et Schedir] 4 59
- once [ſemel]

DIE 17 MARTIJ.

17 March.

- Between Capella and the lower head of Ⅱ, for the test of the Sext. [Inter-Capellam et infer. caput Ⅱ pro examine Sext.] 34 19
- 34 19
- Between Luc. Cath. and the Bend [Inter Luc. Cath. et flexuram] **6 11⅚**
- 6 12
- **6 11⅚**
- Between Luc. Cath. and Schedar [Inter Luc. Cath. et Schedir] **4 59⅓**
- **4 59⅓**
- **4 59¼**
- Between the Bend and Schedar [Inter flexuram et Schedir] **4 37⅔**
- **4 37⅔**
- Between Schedar and the eleventh [Inter Schedir et vndecimam] 4 24
- **4 24¼**
- 4 24
- Schedar from Luc. Cath. [Schedir a Luc. Cath.] **4 58⅓**, twice [bis]
- by two centres [per bina centra] 4 59, twice [bis]

[962] *flexuram* is set in lower case throughout this side.

• by a single centre [vnico centro] 4 59$\frac{1}{12}$[963]

[1] Thus in the *Historia Cœlestis* [Hiſtoria Cœleſti]. The number of the second star ought to be XXII. [Sic in *Hiſtoria Cœleſti*. Numerus ſecundæ ſtellæ debet eße XXII.]

• Between XI and Schedar [Schedir] [Inter XI et Schedir] 6 27
• **6 26½**
• **6 27⅙**
• Between XI and the Girdle [Inter XI et cingulum] 5 23
• **5 23½**
• 5 23
• Between XI of Caßiop. and the Pole Star [Polarem] [Inter XI Caßiop. et Polarem] 26 25
• **26 25¾**
• **26 25½**
• 26 25
• Between the Bend and the Pole Star [Inter flexuram et Polarem] **28 35⅚**
• **28 35⅚**
• **28 35¾**
• Between the Bend and the leg of Caßiop. [Inter flex. et crus Caßiop.] 7 20
• 7 20
• **7 19¾**
• Between Luc. Cath. and the Knee of Cassiopeia [Inter Luc. Cath. et genu] **9 42¼**
• 9 42
• **9 42⅓**

DIE 22 MARTIJ, VESPERI.

22 March, in the evening.

• Between Luc. Cath. and the Bend [Inter Luc. Cath. et Flexuram] **6 11½**
• **6 11⅔**
• Between Luc. Cath. and Schedar [Inter Luc. Cath. et Schedir] **4 58⅓**
• **4 58¼**
• Between Luc. Cath. and the Knee of Cassiopeia [Inter Luc. Cath. et genu] **9 42¼**
• **9 42⅓**
• Between vndec. and Schedar [Inter vndec. et Schedir] 6 26
• **6 25½**
• **6 25¾**
• 6 26

[963] *ſemel* stands alone on the line below *4 59*, right-aligned beyond the figures, with no figure on its line.

- **6 25⅔**[964]

DIE 1 APRILIS, VESPERI.

1 April, in the evening.

- Between the Bend and the Knee of Cassiopeia [Inter flexuram et genu] 3 36
- **3 36⅙**
- **3 35¾**
- Take everywhere [Pone vbique] 3 36
- Between the Bend and the Pole Star [Inter flexuram et Polarem] **28 35½**
- **28 35⅙**
- Between the Bend and the Girdle [Inter flexuram et cing.] **3 2⅓**
- **3 2⅓**
- **3 2½**
- Between the Knee of Cassiopeia and the leg [Inter genu et crus] 4 50, twice [bis]

DIE 29 APRILIS.

29 April.

- Between vndec. and the Girdle of Caßiop. [Inter vndec. et cing. Caßiop.] 5 23
- **5 22½**
- 5 23
- Between vndec. and the Bend [Inter vndec. et flexuram] 3 32
- **3 31⅔**
- Between vndec. and Luc. Cath. [Inter vndec. et Luc. Cath.] 4 46
- 4 47
- 4 46
- Between Schedar and the head [Inter Schedir et caput] 2 34
- **2 33½**
- Between Luc. Cath. and the Girdle [Inter Luc. Cath. et cing.] 5 17, once [ſemel]

DIE 10 DECEMBRIS.

10 December.

- Between Luc. ♈ and the sole of the foot of Caßiop. [Inter Luc. ♈ et plantam pedis Caßiop.] **44 2½**
- or [vel] **2¾**
- **44 2⅔**
- Between Luc. ♈ and the outermost one of the foot of Caßiop. [Inter Luc. ♈ et extrem. pedis Caßiop.] **41 30⅓**
- 41 31

[964] *Flexu- / ram* is set with a capital *F* here, where the side elsewhere prints *flexuram* in lower case.

- Luc. ♈ and the dext. elbow of Caß. [Luc. ♈ et dext. cub. Caß.] 39 56
- **39 56⅓**
- Luc. ♈ and the left elbow [Luc. ♈ et ſiniſt. cub.] 33 22
- **33 21½**
- Luc. ♈ and the very small one in the left arm [Luc. ♈ et paruula in ſiniſtro brachio] **33 37¾**
- 33 38
- Between Capella [Capellam] and the outermost one of the seat [Inter Capellam et extremam ſellæ] 48 3
- Between Capella and the dext. elbow [Inter Capellam et dext. cubitum] **48 9½**
- **48 9½**
- Between Capella and the left elbow [Inter Capellam et ſin. cub.] **38 41½**
- Between Capella and the left arm [Inter Capell. et ſin. brach.] 39 27[965]

DIE 19 DECEMBRIS.

19 December.

- Between Capella and the upper one of the two small ones in the knee [Inter Capellam et ſuperiorem ex duabus paruis in genu] 34 59
- Between Capella and [Inter Capellam et]
- the Præced. of the two in the knee [Præced. duarum in genu] 36 56
- the Luc. in the left arm [Luc. in ſin. brachio] 38 40
- Alt., the less bright one [Alt. minus lucidam] 39 25
- XIII of Caßiop. [XIII Caßiop.] **48 29½**
- the middle one of the footstool [Mediam Scabelli] **36 14½**, twice [bis]
- the northern Seq. of the two in the rod [Seq. duar. borea in virga] **43 2¾**
- 43 3
- the Præced. of the two in the rod [Præced. ex duabus in virga] 44 15
- 44 15
- the Seq. of the two, the outermost one in the rod [Seq. duarum extrem. in virga] 44 43
- 44 43
- the outermost one in the rod [Extrem. in virga] 45 24
- 45 25
- Between Luc. ♈ and the small one in a straight line with XI and the middle one of the footstool [Inter Luc. ♈ et paruam in recta linea cum XI et med. ſcab.] 45 5
- 45 5[966]
- Between Luc. ♈ and the ſeq. one in the knee [Inter Luc. ♈ et ſeq. in genu] 36 14
- **36 14½**

[965] *vel* stands on the second line of the first entry (*pedis Caßiop. vel*), in the degree place, and no degree figure is printed on that line; the minute group *2¾* stands in the minute place.
[966] *Scabelli* has a capital initial, *ſcab.* a lower-case long ſ.

- Between Luc. ♈ and the præced. one in the knee [Inter Luc. ♈ et præced. in genu] 35 47
- 35 47
- Between Luc. ♈ and the bright one in the left arm [Inter Luc. ♈ et lucidam in ſiniſtro brachio] 33 22
- Between Luc. ♈ and the less luc. one of the same arm [Inter Luc. ♈ et minus luc. eiuſdem brachij] 33 39
- Between Luc. ♈ and the very small one, inf., the outermost of the seat [Inter Luc. ♈ et paruulam inf. extre. ſellæ] **43 0½**
- 43 1
- Luc. ♈ and the ſeq. of the two boreal. in the rod [Luc. ♈ et ſeq. duarum boreal. in virga] 31 23
- 31 23
- Luc. ♈ and the præced. of the two boreal. in the rod [Luc. ♈ et præced. duarum boreal. in virga] **31 41¼**
- 31 41
- Between Luc. ♈ and the ſup. of the two, outermost in the rod [Inter Luc. ♈ et ſup. duarum extre. in virga] **29 39½**
- 29 40
- Between Luc. ♈ and the outermost one in the rod [Inter Luc. ♈ et extremam in virga] 28 55
- 28 54

APPENDIX AD OBSERUATIONES ANNI 1583.

DE DISTANTIA MARTIS A TERRA CIRCA OPPOSITIONEM IUXTA COPERNICUM.[1]

Appendix to the observations of the year 1583. On the distance of Mars from the Earth around the opposition, according to Copernicus.[1]

Let a test be made by computing the triangles under each eccentricity, the Copernican and the Ptolemaic, so that by comparing them the truth can be tracked down. Copernicus assumes the eccentricity of ♂ to be 1460, and the semidiameter of the epicycle 500, in units of which the semidiameter of the eccentric is presupposed to be 10 000.

Ptolemy [Ptolomæus], on the other hand, if his tenets are adapted to this Copernican hypothesis, found an eccentricity of 1500 and a semidiameter of the epicycle of 500. For his whole eccentricity is as 20 to 100, or 2 to 10; from this it can come about...[2]

There follows the investigation of the distance of ♂ from the Earth for the day 1583 January 17.[3]

Diagram. A long, narrow triangle standing at the left of the text. From a vertex at the upper right, two straight lines run down to the left, one to an upper-left vertex and one to a lower-left vertex; a short vertical line joins those two left vertices. To the left of the vertical side a third point stands, joined to the upper-left vertex and to the lower-left vertex by dotted lines. The four labels are drawn letters, upright and not in the text's italic type:

- B (upper right vertex): B — cited in the prose.

- D [?] (upper left vertex): D [?][967] — the prose cites D (*DE*, *BD*, *EDB*, *C′ DE*).
- C′ (left, outside the vertical side, at the meeting of the two dotted lines): C′ — cited in the prose.
- E (lower left vertex): E — cited in the prose.

First, in triangle BDE, two sides are given, DE 1460 and BD 10 000, and the angle EDB is 141 37*, which arises from the anomaly of the eccentric once a semicircle has been cast off; so the side BE will be found in this way. First, having drawn the perpendicular EC′*[4] *onto DB produced, the angle C′ DE will be* 38 23*, the acute complement of the former to a semicircle, and DE is 1460. By 29 of Regiomontanus, book I,* de planis*, C′ E is found (putting the whole sine in the first place, the sine of angle C′ DE in the second, and DE in the third place) in this way:*

- 100 000 | 62092 | 1460
- 1460
- 3725520
- 248368
- 62092
- 9065[968]

So the side C′ E is 906½.

In the same way, for the side C′ D: the angle at E is 51 37*, its sine 78 387, the side C′ D 1144½, the side C′ B 11144½. Now since in the right triangle the two sides about the right angle are given, the side EB will be found by 9 of Reinhold, and first the angle DBE, in this way:*

- *C′ B — C′ E — totus*
- *11144½ — 906½ — 100 000 (8134.*

The corresponding angle C′ BE, or DBE, is **4**^{g} ***39′****, sine 8 107.*

For the side EB:

- *sin C′ BE — latus C′ E — totus*
- *8 107 — 906½ — 100000.*

The corresponding side EB is 11 181½, and the angle DBE 4 39*.*[969]

Diagram. A second long, narrow triangle at the right of the lower prose. From a vertex at the lower left, two long lines run up to the right, one to an upper vertex and one to a vertex at the right; a short line joins those two. From the upper vertex a dotted line runs down to a point on the lower-left-to-right

[967] The mark at this vertex is an arch-shaped letter that does not show a D clearly; the prose names this vertex D.

[968] in the printed multiplication the first line carries the three terms divided by two printed vertical strokes; *1460* stands below *62092*; a short sum-rule runs under *1460*; the three partial products *3725520*, *248368*, *62092* stand below it, each set further to the left; a second short sum-rule runs under *62092*; the result *9065* stands below the second rule. No brace. The first term is printed *100 000* with a gap between *100* and *000*.

[969] in both proportions the term names stand on an upper line and the numbers below them, with short printed rules (set here as dashes) between the terms. In the first, the opening parenthesis before *8134.* is printed and has no closing partner; *100 000* is printed with a gap.

side, near the right vertex. The four labels are drawn letters, upright, not in the text's italic type:

- F (upper vertex): F — cited in the prose (*DBF*, *EBF*, *BEF*, *FB*, *FBE*, *EF*).
- B (right vertex): B — cited in the prose.
- C″ (foot of the dotted line on the side toward B): C″ — not cited in the prose on this side (footnote 4 cites it).
- E (lower left vertex): E — cited in the prose.

And since the angle DBF is equal to the angle ADB by construction, it too will be 38 23*; if DBE is added to it, the whole EBF comes to* 43 2*. Now proceed to triangle BEF.*

Since the side FB is given by hypothesis as 500, and BE as 11181½, and the included angle FBE is 43 2*, sine 68242, the side EF will therefore be given, together with*[970]

[1] From the Latin codex Vindob. 10686[84], ff 12r and 21r seq. Kepler [Keplerus], to whom this codex was unknown, used a shorter copy transcribed in another hand in the codex of observations which we have designated by the letter V (f 107r); cf. *De motibus ſtellæ Martis* cap. XI (Op. III pp. 219 and 474) and Vol. I p. XL of this edition of Tycho's Works.

[2] Nothing more. In codex V these prolegomena are not found.

[3] Tycho added: *Figura eſt in alio papiro* ("The figure is on another sheet"). But this leaf is missing in codex 10686[84] and is found only in codex V (f 106 v).

[4] For C′ Tycho wrote the letter C with dots. Likewise later for C″.

36*[971]

angle FEB. For, having drawn the perpendicular C″ F′,

- [blank] — *ang. FBC″* — *FB*
- *100000* — *68242* — *500*,

the side FC″ comes out 341. For the side C″ B: the angle C″ FB is 46 58*, resp. 73096, the side C″ B 365½. So if you subtract C″ B from EB, given earlier, EC″ will not remain unknown: 10816.*

In triangle EFC″, since both sides about the right angle are given, FC″ 341 and EC″ 10816, the angle FEC″ will be given.[972]

Diagram. Two large circles, one inside the other, the inner one standing lower within the outer. A vertical straight line runs from A at the top of the outer circle down to C at its foot, crossing the inner circle. On the vertical line, below the middle, stand D and, lower, E; a point C′ stands to the left of the vertical line, joined to D and to E by dotted lines. A small circle sits on the outer circle at the upper right, around the point B on it. From E, straight

[970] the prose cites A (in *ADB*); no A stands on either figure on this side — a citation without a referent here. D stands on the first figure only (there flagged [?]), not on the second.

[971] *10686[84]* is printed with a raised *84* after *10686*, twice (notes 1 and 3). The foot figure is printed *36* followed by an asterisk.

[972] in the proportion the upper line carries only two term names: *ang. FBC″* stands over *68242* and *FB* over *500*; nothing stands over *100000*. Short printed rules stand between the numbers. The mark after *500* is printed, a raised comma.

lines rise to the upper right: to S on the inner circle, to F on the small circle, to B, and to T on the inner circle; a line from D rises to the upper right and crosses the line E–F at X. S is joined to F and to B by straight lines, and F to B; a dotted line runs from F to C″ on the line E–B, and a dotted arc-like line runs from S down to P′ near P, where the line E–F crosses the inner circle. From E two further straight lines run down to the left, to R and to V on the inner circle. On the outer circle at the right a small cross marks a point labelled G, with *ı*ª ♈ written to its left. Seventeen labels, set in upright roman capitals with serifs, not the text's italic:

- A (top of the vertical line, outside the outer circle): A — not cited in the prose on this side.
- F′ [?] (on the small circle, upper left of B): F′ [?][973] — the prose cites *C″ F′*, *FB*, *FC″*, *FEC″*, *FEB*, *BEF*, *EF*.
- B (centre of the small circle, on the outer circle): B — cited.
- C″ (on the line E–B, at the foot of the dotted line from F′): C″ — cited.
- S (on the inner circle, upper middle): S — not cited on this side.
- P (where a line from E crosses the inner circle, below S to the right): P — not cited.
- P′ (just below P, at the end of the dotted line from S): P′ — not cited.
- T (on the inner circle, right): T — not cited.
- X (crossing of two lines, below S): X — cited (*DXE*).
- D (on the vertical line, above E): D — cited (*DBE*, *DXE*).
- C′ (left of the vertical line, between D and E): C′ — not cited on this side.
- E (on the vertical line, where the lines meet): E — cited.
- G (on the outer circle at the right, beside the small cross): G — not cited.
- *ı*ª ♈ (to the left of the cross at G): a *ı* with a raised *a*, and the sign ♈ — not cited.
- R (lower left, on the inner circle): R — not cited.
- V (lower left, on the inner circle, below R): V — not cited.
- C (foot of the vertical line, outside the outer circle): C — not cited.

Caption: For finding the distance of Mars from the Earth according to Copernicus, for the day 17 January completed, A° 1583.

- *EC″ — FC″ — totus*
- *10816 — 341 — 100000 (3153 corresponds to* ***1 48⅓****, the angle FEB.*

For the side EF:

- *ſinus FEC″ — FC″ — totus*
- *3150 — 341 — 100000,*

the side EF comes out 10825½.

For the angle DXE:

- *angle DBE was* `4 39 0`
- *angle BEF* `1 48 20`

[973] The prime after F on the figure is faint; it may be a stain rather than a printed prime.

- *angle DXE* `6 27 20`[974]

For these two are interior and opposite, while the one at X is exterior; therefore these two are equivalent to that one, by Euclid.[1]

*The prosthaphaeresis [*προσταφ*ereſis] of the eccentric is therefore p. 6 M. 27, such as Copernicus's own tables also give; for this prosthaphaeresis [*προσταφ*ereſis] is represented by the angle DXE. If you add it to the longitude of ♂ at B, which is 82 1 from 1ª ♈, there comes out a place of ♂ from the 1ª star, with respect to the centre of the Earth's orb, of p. 88 M. 28. But to us, placed at S, that place appeared quite different, because of the size of the Earth's annual orb, which induces a parallax — and this according to the size of the angle SFE, which we shall investigate in the following way. Since RT was parallel to BD by hypothesis, it is established from Euclid's elements*[2] *that the angle REV will also be p. 6.27; it measures the arc RV, the prosthaphaeresis [*προσταφ*ereſin] of the commutation. Therefore, if it is taken away from the equal anomaly of the commutation RTS, which was 196 18, that anomaly comes out equated as 189 51 parts [partium 189 51].*[975]

Now from V to the place where FE intersects the great orb there are 180 parts [180 partes], that is, a semicircle, since FV passes through the centre E and intersects the circumference at P. Therefore, since VTS is 189 51, SP will be the excess, p. 9 M. 51. And SP measures the size of the angle SEP, which is common with SEF. Therefore, in the triangle SEF, since two sides are given — SE, 10 000, taken as the semidiameter of the Earth's great orb, and EF, given earlier as 10825½ — the angle SEP is 9.51. Therefore, since according to Copernicus (IX Cap. Lib. V) ES is 6580 of the parts of which BD was 10 000, and the angle SEP′ is established as 9 51, sine 17107, the perpendicular SP′ and the side EP′ will be found in this way: 100000—17107—6580; the side SP′ comes out 1125½.

Diagram. A long, narrow triangle standing to the right of the narrowed lines of the paragraph above. A horizontal line runs from the top vertex to the right-hand vertex; a long side runs from the lower-left vertex up to the top vertex, and another from the lower-left vertex to the right-hand vertex. A dotted line drops from the top vertex to the lower side. The labels are single capitals drawn with a thin, even, upright stroke, unlike the body's italic type; the top one is a hooked *S*-form.

- S (top vertex, at the left end of the horizontal line): S — cited in the prose.
- F (right-hand vertex): F — cited.

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[974] in both proportions the term names stand above the numbers, with short printed rules between the numbers. In the first, the opening parenthesis before *3153* is printed and has no closing partner. The mark after the second proportion's *100000* is printed, a raised comma. In the addition, a sum-rule runs above *angulus DXE 6 27 20*; the three angles stand one below the other, the figures aligned in three places. The same angle is named *FEB* in the first line and *BEF* in the addition.

[975] the word for "prosthaphaeresis" is set three times on this page, twice as προσταφ*ereſis* and once, in the accusative, as προσταφ*ereſin*: its first seven letters are Greek type (π, ρ with a curled tail, ο, σ, τ, α, φ) and the rest italic Latin type. The fourth Greek letter is τ, not θ. In *inducentem* ("which induces") the final *m* stands inside square brackets printed on the page.

- P′ (on the lower side, below the foot of the dotted line; a *P* with a raised stroke): P′ — cited.
- E (lower-left vertex): E — cited.

For the side EP′: angle ESP′ 80 9, sine 98526, 100000—98526—6580; the side EP′ therefore comes out 6483. If you take this away from EF found earlier, the side P′F will remain, 4342½.

Hence in the triangle SP′F two sides about the right angle are given, SP′ 1125½ and P′F 4342½; therefore by the ninth of Reinhold[3] the angle SFP′ will be given.

- *P′F — SP′ — totus*
- *4342½ — 1125½ — 100 000*

(25918, corresponds to 14 32. The angle SFE therefore comes out — which is the angle of parallax — p. 14 M. 32, and it discloses the difference by which the place of ♂ seen from S, the Earth, is ahead of the place appearing from E, the centre of the great orb. Therefore, if this is taken away from the place seen from E, which was earlier 88 28, the longitude of Mars as it appears to us at S comes out p. 73 M. 56, and that from the first star of ♈. If we add to this the precession of the vernal equinox, which according to Copernicus is now 27 55, the longitude of Mars from the vernal equinox comes out p. 101.51. And according to Copernicus the place of ♂ is at 11ᵍ 51′ ♋.[4976]

Now again, in the same triangle SP′F, we shall investigate the side SF, the distance of ♂ from the Earth, in the following way. Angle SFP′ 14 32, sine 25094, side SP′ 1125½.

25094—1125½—100000. The side SF comes out, the distance of Mars from the Earth, 4485, of the parts of which EB, the semidiameter of the eccentric of ♂, was 10000, and of which ES

[1] Euclid [Euclidis], *Elem.* I, 32.

[2] I, 29.

[3] *Primus liber tabularum directionum*... by Erasmus Reinhold [Erasmo Rheinholdo]. Tübingen [Tubingæ] 1554.

[4] Tycho added in writing [Adſcripſit Tycho]: »*Note. The calculation of the tables gives the place of ♂ at 11 43 ♋, smaller by 8 minutes [8 ſcrupulis]. But make a trial by another dist...* [the leaf has been cut away].[977]

— the semidiameter of the annual orb [ſemid. orbis annuj] — was 6580. Therefore, since according to Copernicus ES is 1142 semidiameters of the Earth, SF, the distance of ♂ from the Earth, will be 778 in the same semidiameters — which was what was sought.[1]

[976] in the proportion the three term names stand above the numbers; between the numbers stand short rules set high, at the level of the tops of the figures. The number row runs straight on, after an opening parenthesis, into *(25918, reſpondet 14 32.*; no closing parenthesis is printed.

[977] note 4 — the words from *Nota.* to *diſt.* are italic, the rest of the note roman; the closing words, *folium refectum eſt* ("the leaf has been cut away"), stand inside square brackets printed on the page, in roman. The opening guillemet before *Nota* has no closing partner. The three spaced points in note 3 and in note 4 are printed.

PRO INUESTIGATIONE PARALLAXIUM ♂.[2]

For the investigation of the parallaxes of ♂.[2]

In the year 1583, on 17 January [die 17 Januarij], ♂ was, according to Copernicus, 778 semidiameters distant from the Earth. If, therefore, the sine of the complement of the altitude is divided by this distance, the sine of the parallax results.

- In the evening, H. 5½, the distance of ♂ from the bright foot of Auriga [Erichtonij] 23 16
- Altitude of ♂ 33½ ᵖ, parallax of altitude 3′ 41″.
- H. 7½, the distance of ♂ from the heart of ♌ 44 6½
- Altitude of ♂ 49½ᵖ, parallax of altitude 2′ 52″
- About the same time, from the shoulder of the lower ♊ 7 51.
- H. 10.3, the meridian altitude of ♂ 61 16½
- In the morning, H. 3¼, the distance of ♂ from the bright foot of Auriga 23 9
- Altitude of ♂ 28½ᵖ, parallax of altitude 3′ 53″.
- H. 5.0, the distance of ♂ from the heart of ♌ 44 14
- About the same time, from the armpit of the lower ♊ 7 59
- Altitude of ♂ 15ᵖ.0, parallax of altitude 4′ 16″.

Now on that day ♂ was seen on a straight line drawn from the bright foot of Auriga to the heart of ♌. So one would like to know what angle this line makes with the Equator if it is produced that far, and how great it is when continued from the foot of Auriga to the Equator; and this very thing is investigated according to the figure drawn on the following page.

Note. It should be carefully investigated whether the fixed stars, in a like position, cause any refraction, and how much, and this should be compared with the apparent motion, etc.

Diagram. A spherical triangle at the left of the page, beside the paragraph that follows. From a vertex at the top, one line runs down the left through a point to a lower-left corner; a second, curved, runs down the right through a point to a lower point. An arc crosses from the left-hand point through the right-hand point to a point at the far right; a lower arc runs from the lower-left corner through the lower point to the same far-right point. A short stroke crosses the right-hand line about a third of the way down from the top; it carries no letter. The labels are single capitals drawn with a thin stroke, some upright (P, D) and some slanting (B, C, E, F), unlike the body's roman type.

- P (top vertex): P — cited in the prose.
- B (on the left-hand line, where the upper arc begins): B — cited.
- C (on the right-hand line, where the upper arc crosses it): C — cited.
- D (lower-left corner): D — cited.
- E (on the lower arc, below C): E — cited.
- F (far right, where the two arcs meet): F — cited.

Let DEF be a portion of the Equator; P the pole; B the foot of Auriga, BD 28 9½; C the heart of ♌, CE 13 58½. The complements of BD and CE form the

sides PB and PC. The side BC is 67 20½; therefore the angle CPB is 71 30 51, which measures the arc DE, and the angle BCP is 64 58 13.

Triangle CEF [Triang. CEF.]

- side CE 13 58½
- angle ECF 64 58⅕
- therefore angle CFE 28 27
- side EF 27 21 addend. to
- side DE 71 31 gives
- side DF 98 52
- side CF 30 28 add. to
- side BC 67 20½ gives
- side BF 97 48½[978]

For the angle which the vertical makes with the said great circle passing through the place of Regulus [Reguli] and of the foot of Auriga, and reaching to the Equator.

In the figure assigned, let BAEF be the meridian, FKI a portion of the equator, EKH a portion of the circle of ♂, GNHI the horizon. From this we shall investigate ELA. Since in the triangle ALB three sides are given — AB, the distance of the poles of the horizon and of the equator; BL, the complement of the declination of ♂; and AL, the complement of its altitude — the angle ALB will be given by dogma 9. Next, since in the triangle LKM, LK is the distance

[1] In codex 10686[84], f 25 r seq., there follows another calculation of the same distance, without indication of the day; but the eccentric anomaly = 333° 9′ indicates that the day was Feb. 9. The distance found is = 937 semidiameters of the Earth, but for an unknown reason Tycho rejected this number and, using a distance of the Sun = 1442, found a distance of Mars = 1183.

[2] From codex V (1583), ff 108—110.

of ♂ from the intersection of its circle and the equator, and ML is the declination of Mars, the side MK is given by 25 of the 4th [25 4^{ti}] of Regiomontanus, and by the same the angle MLK. When from this the angle MLO — being equal to the angle ALB found earlier — is taken away, there remains the angle KLO, which is the angle of inclination of the vertical to the previously mentioned circle of the heart of ♌ and of the foot of Auriga [Erichtonij].

Finally, in the triangle STL, since the angle TLS has become known and the side LS represents the parallax of altitude of ♂, its parallax of latitude, TS, and its parallax of longitude, TL, will not remain hidden.

Diagram. A large arc of a circle, open at the bottom, standing to the right of the opening paragraph. Two curved lines run down to the left from A and B on the top of the arc and meet near L and T. A straight line runs down to the right from E on the upper left of the arc, past L, towards the long lower curves. A line runs down to the right from F on the left of the arc, past o, to K. A long curve runs from G on the left of the arc across past N and H to the

[978] the three groups of lines stand side by side on the page, left to right in the order given, divided by two printed vertical rules; each group is three lines deep.

right-hand side of the arc, and a second long curve crosses it at I and runs to the right-hand side lower down. A curve runs down from T past S and o to N. A short dotted line runs from T down to S. The labels are single letters, most drawn slanting with a thin stroke (A, B, E, F, L, T, S, M, K, N, H, I); G is upright; o is small and has the form of a lower-case letter.

- A (top of the arc, left): A — cited on this page.
- B (top of the arc, right): B — cited.
- E (upper left of the arc): E — not cited on this page.
- F (left of the arc): F — cited (in *BCF*).
- L (on the line from E, above T): L — cited.
- T (right of L, where the curves from A and B come together): T — cited.
- S (below T, beside the dotted line): S — cited.
- M (left of the curve through S, below F's line): M — cited.
- o (just below M): o — cited, as *O* in *MLO* and *KLO*.
- G (left of the arc, at the start of the long lower curve): G — not cited on this page.
- K (lower middle, on the line from F): K — cited.
- N (on the long lower curve, below o): N — not cited on this page.
- H (on the long lower curve, right of K): H — not cited on this page.
- I (right of H, below the crossing of the two long curves): I — not cited on this page.
- H. 5½. Altitude of ♂ 33½. Its distance from the bright foot of Auriga 23 16.

Triangle ABL [Triang. ABL]

- side AB 34 5½
- AL 56 30
- BL 62 49
- angle BLA 39 3½

In the first figure

- side BCF 97 48½
- distance 23 16
- KL 74 32½

Triangle KLM

- side KL 74 32½
- side ML 27 11
- side KM 72 34
- angle KLM 81 50½, from which is taken away
- angle MLO 39 3½; there remains
- angle KLO 42 47 0

Triangle TLS

- angle TLS 42 47 0
- side LS 0 3 41 parallax of altitude [par. alt.]
- side ST 0 2 30 parallax of latitude [par. latit.]

- side TL 0 2 42 parallax of longitude [par. long.][979]
- H. 7½. Altitude of ♂ 49 30. Distance of ♂ from the heart of ☋ 44 6½.

Triangle ABL
- side AB 34 5½
- side AL 40 30
- side BL 62 49
- angle BLA 33 40⅔

In the first figure
- CF 30 28
- distance 44 6½
- KL 74 34½

Triangle KLM
- side KL 74 34½
- side ML 27 11
- side MK 72 36
- angle KLM 81 50 45
- angle MLO 33 40 40
- angle KLO 48 10 0

Triangle STL
- angle TLS 48 10 0
- side LS 0 2 52 parallax of altitude
- side ST 0 2 10 parallax of latitude
- side TL 0 1 55 parallax of longitude[980]

Diagram. A large arc of a circle, open at the bottom, at the left of the page beside the opening paragraph. Two lines run down from A and B on the top of the arc and come together near C. A line runs from the left of the arc down to the right past D towards the foot of the figure; a second line runs from the left of the arc past D and K towards C and on past H; a long lower curve runs across the arc past E and Q to the right-hand side. A short curve runs down from C past E. A short dotted line runs down from G, beside F, towards Q. At K a small star-shaped mark (an asterisk) stands on the line. The labels are single capitals drawn with a thin stroke, most slanting (A, B, K, H, F, E, Q); D, C and G are more upright.

- A (top of the arc, left): A — cited on this page.
- B (top of the arc, right): B — cited.
- D (upper left, on the lines from the left of the arc): D — cited.
- K (right of D, beside the star-shaped mark): K — cited; the prose names it: *K cor* ☋.
- C (middle, where the lines from A and B come together): C — cited; the prose names it: *C Mars*.
- G (just right of C): G — cited.

[979] A short rule stands under *23 16* and over *KL 74 32½*.
[980] A short rule stands under *44 6½* and over *KL 74 34½*.

- H (right of G, on the line from K): H — cited; the prose names it: *H lucidus pes Erichtonij*.
- F (below G, beside the dotted line): F — cited.
- E (lower left of F, on the lower curve): E — cited.
- Q (right of E, on the lower curve): Q — cited.

Another figure, with Mars having passed the meridian and standing in the western region of the sky.

H. 3¼ Altit. ♂ 28½. Distance of ♂ from the bright foot of Auriga [Erichtonij] 23 9. K the heart of ♌, C Mars, H the bright foot of Auriga.

Triang. ABC
- side AB 34 5½
- side BC 62 49
- side AC 61 30
- angle ACB 38 44⅔ [recte: 38 41⅔ — Corrigenda, p. 430]
- side DH 97 48½
- CH 23 9
- DC 74 39½[981]

Triang. CDE
- side DC 74 39½
- side CE 27 11
- side DE 72 42
- angle DCE 81 54½
- angle QCE 38 41⅔
- angle DCQ 120 36
- angle FCG 59 24

Triang. GFC
- angle GCF 59 24
- angle CFG 30 36
- side CF 0 3 53 par. altit.
- side FG 0 3 21 par. latit.
- side CG 0 1 59 par. long.
- H. 5. Altit. ♂ 15 0. Distance of ♂ from the heart of ♌ 44° 14′.

Triang. ABC
- side AB 34 5½
- side BC 62 49
- side AC 75 0
- angle ACB 34 17⅓
- DK 30 28
- KC 44 14
- DC 74 42

Triang. CDE
- side DC 74 42

[981] A short rule stands under *CH 23 9* and over *DC 74 39½*.

- side CE 27 11
- side DE 72 44⅔
- angle DCE 81 55½
- angle ECQ 34 17½
- angle DCQ 116 13
- angle FCG 63 47

Triang. GFC

- side CF 0°4′16″ par. altit.
- side FG 0 3 50 par. latit.
- side CG 0 1 53 par. long.[982]

OBSERUATIONES ANNI 1584.

OBSERUATIONES SOLIS.

DIE 4 JANUARIJ.

Meridian altitude of ⊙ [Altitudo ⊙ meridiana].

- By the Tychonic Q. [Per Q. Tichon.] 12°43⅓′ [recte: 12°43¼′ — Corrigenda, p. 430]
- By the Q. Portat. [Per Q. Portat.] 12 42⅓
- By the Sextant Trig. [Per Sext. Trig.] 12 42⅓

uncertain [incertæ][983]

DIE 5 JANUARIJ.

- By the Tychonic Q. 12 54
- By the Q. Portat. 12 54
- By the Sextant Trig. 12 53½

It was perfectly clear.

DIE 6 JANUARIJ.

- By the Q. Mural. [Per Q. Mural.] 13 5
- By the Q. Portat. 13 5 10

DIE 9 JANUARIJ.

- By the Q. Mural. 13 40 30

DIE 3 FEBRUARIJ.

- *By the Tychonic Q. 20 34⅙*
- *By the Q. Portat. 20 34⅙*
- By the Sextant Trig. 20 33⅔

[982] A short rule stands under *KC 44 14* and over *DC 74 42*. In *0°4′16″* the degree, minute and second marks are printed and the group is set close, with no space before *par.*

[983] a brace printed to the right of *12 42⅓* and *12 42⅓* gathers the second and third value lines only; *incertæ* stands once, in smaller type, beyond it. The first value line stands outside the brace.

The discrepancy is to be put down to the other [recte: *alia* (sc. *obſeruatione*) for the printed *alio*, "the other observation" — Corrigenda, p. 430] sight [pinnacidio], which had not been adjusted accurately enough.

DIE 4 FEBRUARIJ.

- By the Tychonic Q. 20 54½
- By the Q. Portat. 20 54½

DIE 5 FEBRUARIJ.

- By the Tychonic Q. 21 15
- By the Q. Portat. 21 15

In both cases it was a very little less, but such that it could hardly be made out.

DIE 13 FEBRUARIJ.

- By the Tychonic Q. 24 4¾
- By the Q. Portat. 24 5

The observation made with the Tychonic one [per Tichonicum] was not accurate enough, for it was not very clear.

DIE 21 FEBRUARIJ.

- By the Tychonic Q. 27 3½
- By the Q. Portat. 27 4

It was not clear enough.

DIE 29 FEBRUARIJ.

- By the Tychonic Q. 30 10 nearly [fere]
- By the Portat. [Per Portat.] 30 9 50
- The first observation made with the new Sextant [Obſervatio prima facta per Sextantem novum] 30 10

DIE 1 MARTIJ.

- By the Tychonic Q. 30 33 10
- By the Portat. 30 33 30
- By the Sextant [Per Sextantem] 30 33 15

It was not perfectly clear.

DIE 5 MARTIJ.

- By the Tychonic Q. 32 7 40
- By the Portat. 32 7 38
- By the new Sextant [Per Sext. nouum] 32 7 45

DIE 11 MARTIJ.

- By the Tychonic Q. 34 29 50

- By the Q. Portat. 34 29 50
- By the smallest Q. [Per Q. minimum] 34 30
- By the new Sextant 34 30

It was exceedingly clear, so you can rely on these observations.

We also observed with the Rulers [Per Regulas] on the same day, and found the number indicated to be 164874; to this there corresponds, from the table of sines, half of that number, 82437, 34 28½. But the rulers were not yet adjusted accurately enough, because on this very day they had been set up toward the south [verſus meridiem] for the first time.

DIE 14 MARTIJ.

- By the Tychonic Q. 35 40 10
- By the Portat. 35 40 5
- By the Smallest [Per Minimum] 35 40
- By the new Sextant 35 41

not accurate [non exquiſita]

- By the Rulers 162475, corresponding to [reſp.] 35 40 18

It was moderately clear, for ☉ was being observed between recurring clouds.

DIE 22 MARTIJ.

- By the Tychonic Q. 38 46 50
- By the new Sextant 38 46¾

It was observed between recurring clouds.[984]

DIE 23 MARTIJ.

- By the Quadrant Portat. [Per Q. Portat.] 39 10
- By the Quadrant Tichon. [Per Q. Tichon.] 39 9¾

Roughly [Greek: ἐν πλάτει (en platei, "in breadth" — i.e. broadly, roughly)], because of the clouds.

DIE 26 MARTIJ.

- By the Quadrant Tichon. 40 18 50
- By the Portat. [Per Portat.] 40 18 50
- By the Smallest [Per Minimum] 40 19
- By the new Sext. [Per Sext. nouum] 40 19

DIE 27 MARTIJ.

- By the Quadrant Tichon. 40 41 20
- By the Portat. 40 41 30
- By the new Sext. 40 41 30

[984] *non exquiſita*, in smaller type, stands on a line of its own at the right, between *Per Sext. nouum 35 41* and *Per Regulas 162475, reſp. 35 40 18*; the setting does not determine which line it qualifies.

- Reg., not accurately, 151660, reſp. [Reg. non exquiſite 151660, reſp.] 40 41

It was moderately clear.

DIE 29 MARTIJ.

- By the Quadrant Tichon. 41 26¾
- By the Portat. 41 27

It was not clear enough.

DIE 7 APRILIS.

- By the Quadrant Tichon. 44 41¾
- By the Quadrant Portat. 44 41⅔

DIE 9 APRILIS.

- By the Quadrant Tichon. 45 23½
- By the Quadrant Portat. 45 23⅙
- By the lesser Quadrant [Per Q. Minorem] 45 23

The instrument was being shaken by the wind.

DIE 10 APRILIS.

- By the Quadrant Tichon. 45 43 45
- or with the new sight [vel cum nouo pinnacidio] 45 44 10
- By the Portat. 45 43 45
- By the Greatest Quadrant [Per Q. Max.] 45 44⅓

This greatest quadrant was not corrected well enough.

DIE 11 APRILIS.

- By the Quadrant Tichon. 46 4 15
- By the Portat. 46 3 30
- By the Lesser [Per Minorem] 46 4 0
- By the new Sext. 46 3 40

DIE 16 APRILIS.

- By the Quadrant Tichon. 47 43 10
- By the Greatest Quadrant 47 43 10
- By the Quadrant Portat. 47 43
- By the Quadrant Min. [Per Q. Min.] 47 44
- By the new Sext. 47 43

DIE 17 APRILIS.

- By the Quadrant Tichon. 48 2
- By the Quadrant Portat. 48 2
- By the new Sext. 48 2⅓

DIE 18 APRILIS.

- By the Quadrant Tichon. 48 21
- By the Quadrant Portat. 48 20⅔
- By the new Sext. 48 20⅓

DIE 19 APRILIS.

- By the Quadrant Tichon. 48 39 25
- By the Quadrant Portat. 48 39 30
- By the new Sext. 48 39

DIE 20 APRILIS.

- By the Quadrant Tichon. 48 58
- By the Quadrant Portat. 48 57 50
- By the new Sext. 48 57 40

DIE 22 APRILIS.

- By the Quadrant Tichon. 49 34 10
- By the Quadrant Portat. 49 34
- By the new Sext. 49 34

DIE 23 APRILIS.

- By the Quadrant Tichon. 49 52 nearly [fere]
- By the Quadrant Portat. 49 51⅔
- By the new Sext. 49 51 50
- By the old Sext. [Per Sext. veterem] 49 51 55

DIE 24 APRILIS.

- By the Quadrant Tichon. 50 9½
- By the Quadrant Portat. 50 9
- By the new Sext. 50 9 nearly
- By the old Sext. 50 9 10

It was not clear enough.

DIE 26 APRILIS.

- By the Quadrant Tichon. 50 43¼
- By the Quadrant Portat. 50 43 35

Between clouds.

DIE 29 APRILIS.

- By the Quadrant Tich., with both sights [Per Q. Tich., vtroque pinn.] 51 32 40
- By the Quadrant Portat. 51 32
- By the old Sext. 51 32

DIE 30 APRILIS.

- H. 4 10½ according to the greater horol. [ſecundum maius horol.], 3 54 according to the lesser horol. [ſecundum minus horol.], the middle of ⊙ was seen to rise [⊙ medius viſus eſt oriri].
- 4 12½ acc. to the greater [ſec. maius], 3 56 acc. to the lesser [ſec. minus]: the whole ⊙ was seen to rise [totus ⊙ viſus eſt oriri].
- Alt. mer. by the Q. Tich. [Alt. mer. per Q. Tich.] 51 48⅓
- By the Q. Portat. [Per Q. Portat.] 51 48¼
- By the Sext. Trigon. [Per Sext. Trigon.] 51 48
- By the greatest Q. [Per Q. Maximum] 51 48¾[985]

DIE 2 MAIJ.

- By the Q. Tichon. [Per Q. Tichon.] 52 19⅓
- By the Q. Portat. 52 19 nearly [fere]
- By the Sext. Trigon. 52 19 nearly

DIE 3 MAIJ.

- By the Q. Tichon. 52 33⅔
- By the Q. Portat. 52 33⅔
- By the Sext. Trigon. veter. [Per Sext. Trigon. veter.] 52 33

DIE 4 MAIJ.

- By the Q. Tichon. 52 48½
- By the Q. Portat. 52 48 25
- By the Sext. Trigon. 52 48

DIE 5 MAIJ.

- By the Q. Tichon. 53 2 10
- By the Q. Portat. 53 2

It was not properly clear.

DIE 10 MAIJ.

- By the Q. Tichon. 54 8 50
- By the Q. Portat. 54 8 40

DIE 13 MAIJ

- By the Q. Tichon. 54 44 50
- By the Q. Portat. 54 44 40

DIE 14 MAIJ.

- By the Q. Tichon. 54 56

[985] *4 12½ ſec. maius* and *3 56 ſec. minus* stand on two lines closed on the right by one printed brace; *totus ⊙ viſus eſt / oriri.* stands beyond the brace on the same two lines.

- By the Q. Portat. 54 56
- By the greater Q. [Per Q. Maiorem] 54 56¼

DIE 18. MAIJ.

- By the mural Q. [Per Q. Muralem] 55 37⅓

DIE 19 MAIJ.

- By the Q. Tichon. 55 46 55
- By the Q. Portat. 55 46 55

DIE 20 MAIJ.

- By the Q. Tichon. as well as by the Portat. Q. [Per Q. Tichon. tam per Portat. Q.] 55 56

DIE 21 MAIJ.

- By the Q. Portat. 56 3⅔

DIE 22 MAIJ[1].

- By the Q. Tichon. 56 12½
- By the Q. Portat. 56 13 nearly

DIE 29 MAIJ.

- By the Q. Tichon. 56 59 50

DIE 31 MAIJ.

- By the Q. Tichon. 57 10
- By the Q. Portat. 57 10
- By the greatest Q. 57 10

DIE 1 JUNIJ.

- By the Q. Tichon. 57 14
- By the Q. Portat. 57 14
- By the greatest Q. 57 15 30

DIE 3 JUNIJ.

- By the Q. Tichon. 57 21 30
- By the Q. Portat. 57 21 15

DIE 4 JUNIJ.

- By the Q. Tichon. 57 24 50
- By the Q. Portat. 57 24¾
- By the greatest Q. [Per Q. Max.] 57 25

DIE 5 JUNIJ.

- By the Q. Tichon. 57 27 40
- By the Q. Portat. 57 27⅔
- *Resp. greatest altit. [Reſp. altit. maxima] 57 35¼*

DIE 6. JUNIJ.

- By the Q. Tichon. 57 30
- By the Q. Portat. 57 30⅓
- By the greatest Q. 57 30
- *Resp. greatest altit. 57 35¼*

[1] Added in writing [Adſcriptum eſt] in codex V.: »Perhaps this observation was made on 23 May. For in the other Protocols [Protocollis] I do not see this observation fitting 22 May«.

DIE 7 JUNIJ.

- By the Quadrant Tichon. [Per Q. Tichon.] 57 32 10
- By the portable Quadrant [Per Q. Portat.] 57 31½
- By the greatest Quadrant [Per Q. Maximum] 57 32
- By the Rulers 107490, resp. [Per Regulas 107490, reſp.] 57 30
- By the Armillae, declination [Per Armillas, Decl.] 23 28
- The altitude 57 32 10 gives the declination [Altitudo 57 32 10 dat declinationem] 23 26⅔
- *Resp. Mural greatest altitude [Reſp. Muralj alt. max.] 57 35 35*

DIE 8 JUNIJ.

- By the Quadrant Tichon. 57 33½
- By the portable Quadrant 57 33
- By the greatest Quadrant [Per Q. Max.] 57 33
- Declination by the new Armillae [Decl. per Arm. nouas] 23 30
- *Resp. Mural greatest altitude 57 35 26*

DIE 9 JUNIJ.

- By the mural Quadrant [Per Q. Muralem] 57 34¾
- Declination by the new Armillae 23 30
- *Resp. greatest altit. [Reſp. altit. max.] 57 35 38*

DIE 10 JUNIJ.

- By the Quadrant Tichon. 57 35 10
- By the portable Quadrant 57 35 15
- By the greatest Quadrant 57 35 15
- By the Rulers 107300, resp. [Per Reg. 107300, reſp.] 57 33 15
- *Resp. greatest altitude [Reſp. alt. max.] 57 35½*
- Declination by the new Armillae 23 31

It was clear enough here. [recte: delete *hic*, "here" — Corrigenda, p. 430]

DIE 11 JUNIJ.

- By the Quadrant Tichon. 57 35 30
- By the portable Quadrant 57 35
- By the greatest Quadrant 57 35

On this day it was not as clear as on the previous one; rather, scattered clouds kept intercepting the Sun. So it may happen that the portable and the greatest quadrant do not agree as closely as on the previous day. For, taking account of the previous day — since in the meantime the Sun, over a whole degree, has changed its declination by ¼ — it necessarily follows that the altitude of this day, which is almost at the solstice itself, was 57 35½ by the portable and the greatest quadrant as well; but the following days will examine this more closely too. Thus the greatest altitude of the Sun that appears here is 57ᵖ 35′ 30″; since the parallax is 1′ 30″, the true altitude of the Sun's centre is 57ᵖ 37′ 0″[1].

And since the exact elevation of the equator at this place is established from the pole star [e polari ſtella] as 34ᵖ 5′ 30″, the greatest declination of the Ecliptic will be 23ᵖ 31′ 30″. This exceeds the records of others by scrup. 3½, because they took no account of the refraction of the rays that occurs at the least altitude of ☉.

DIE 12 JUNIJ.

- By the Quadrant Tichon. 57 35 20
- By the portable Quadrant 57 35
- By the greatest Quadrant 57 35½

DIE 14 JUNIJ.

- By the Quadrant Tichon. 57 33 40
- By the portable Quadrant 57 33 40
- By the greatest Quadrant 57 34

So the declination has changed, up to this day, from the point of the Solstice by 1′ 45″. Added [recte: *addita* for the printed *additæ* — Corrigenda, p. 430] *to the altitude observed with the Portable and the Mural [per Portatilem & Muralem], these give the greatest altitude 57ᵖ 35′ 25″, which nearly [ſeıe [recte: fere]]*[986] *agrees with the earlier ones obtained with the Mural; so the apparent greatest altitude can be set, without any perceptible error, at p. 57 M. 35½ — the portable quadrant itself now agreeing, and the sights [pinnacidijs] having been adjusted on both. But we must also see what the following day brings.*

DIE 15 JUNIJ.

- By the Quadrant Tichon. 57 32
- By the portable Quadrant 57 32
- By the greatest Quadrant 57 31 nearly [fere]

By the greatest Quadrant [Per Quadr. Max.] at times more

[1] In codex V. Tycho later added:

[986] So printed, a misprint for fere, "nearly" (a dotless i where the r belongs).

- *True greatest altitude [Altitudo vera maxima] 57 37 0*
- *True least altitude [Altitudo vera minima] 10 42 30*
- *Interval between the Tropics [Interſtitium Tropicorum] 46 54 30*
- *23 27 15*[987]

but sometimes we observe less [nonnunquam vero minus obſeruamus], because the shadow cannot be made out as precisely on it as on the other instruments.

DIE 16 JUNIJ.

- By the Quadrant Tichon. [Per Q. Tichon.] 57 30 10
- By the Portable [Per Portat.] 57 30 10

The declination has changed by exactly 5 minutes [5 ſcrupulis]; so here too the greatest is found to be 57ᵖ 35⅙′. It is therefore clear that, with respect to both quadrants, the highest altitude of the sun at the solstice was 57 35¼ at most — which you can rely on with sufficient certainty, without any perceptible error. For the fact that the Mural [Muralis] gave at most 57 35½ around the day of the solstice could have come about from the sights [pinnacidijs] not being so well corrected, or perhaps from the division itself. But if you assume the greatest altitude to be 57 35⅓, you will not stray from the mark by more than 10″ at most, beyond it or short of it.

DIE 17 JUNIJ.

- By the Quadrant Tichon. 57 28
- By the Portable [Per Portatilem] 57 28
- By the greatest Quadrant [Per Q. Max.] 57 28

The place of ☉ was in 5 38¾ ♋¹. So the declination has changed from the solstice by 7¼ minutes [ſcrupulis 7¼]; therefore the apparent greatest altitude corresponds to 57ᵖ 35′ 15″, and if the parallax of the Sun, 1′ 35″, is added to it, the greatest altitude comes out as 57 36 50, which you can trust with sufficient certainty. For it cannot be greater or smaller by a sixth part of a minute [ſexta parte ſcrupuli], so that we keep, as it were, a mean between the observations repeated with each instrument. And since from the greatest and least altitude of the pole star [ſtellæ polaris] the height of the pole [poli ſublimitas] is gathered as exactly 55 54½, and hence the altitude of the equator as 34 5½, the true greatest declination of the ecliptic will be 23 31½. You can trust this without doubt and without any perceptible error. In the table, however, we have deliberately assumed exactly 23 31, departing from the observation by a third part of one minute [tertiam partem vnius minuti] — on purpose, and without any perceptible inconvenience.

Note. So that the account [ratio] of the refraction of the solar rays might be established, I observed with our Armillae [Armillas noſtras], on 16 June in the afternoon until the setting of the Sun, and on the following day from the rising of the Sun up to an altitude of 40 degrees [partium 40], what declination it had; and I found it roughly as follows.

[987] the last line of the note carries only the figures *23 27 15*, set under the figures above it; no word stands on that line, and no rule is printed above it.

DIE 16, P. M.

- *Altitude [Alt.] 25 — Declination [Decl.] 23 26*
- *17 — 23 27*
- *14 — 23 27½*
- *12 — 23 29*
- *good [bona] 10 — 23 29½*
- *8 — 23 30*
- *5 — 23 33*
- *good 3 — 23 37¼*
- *2 — 23 41*
- *1½ — 23 44*
- *1 — 23 48½*[988]

When the lower limb of the sun touched the horizon, the declination was 23 52½.

DIE 17, A. M.

When the lower limb of the sun touched the horizon — Declination 23 46½

- *Altitude 1 — 23 42½*
- *2 — 23 38*
- *2⅓ — 23 37*
- *3 — 23 34½*
- *3¼ — 23 33½*
- *5 — 23 30*
- *5⅓ — 23 29¼*
- *8 — 23 26½*
- *9½ — 23 26*
- *10⅔ — 23 25½*
- *11¼ — 23 25½*
- *12 — 23 24¾*
- *13 — 23 24⅓*
- *14 — 23 24*
- *17 — 23 23½*
- *19½ — 23 23*
- *25½ — 23 22½*
- *30 — 23 22½*

Likewise at an altitude of 40 degrees [Sic etiam in altitudine 40 partium]

[1] From here up to 7 July, from codex V. [Hinc usque ad diem 7 Julii e codice V.]

…the declination was 23 22½ [fuit declinatio 23 22½], as it is at midday without any refraction.

From these it can be gathered that near an altitude of 11 degrees [11 partium], such as there is here at the winter solstice [in ſolſtitio hyberno], the declination was increased

[988] in these lines and in the 17 June lines below, the dash separates two columns of figures; no dash is printed.

by the refraction by 3½ minutes [ſcrupulis 3½] — comparing the observation of each day, the declination having meanwhile actually changed. But if it is reduced to altitude, the refraction rises still higher; so it is no wonder that the sun at the winter solstice [in ſolſtitio hiberno] appears 5 or 6 minutes [ſcrupulis] higher than it really is.

At an altitude of 17 degrees [17 partium] there still corresponds a refraction of the declination of 1′ 45″; and this is the least altitude in Upper Germany [in ſuperiori Germania], where Regiomontanus and Werner [Vernerus] observed the sun.

At an altitude of 25 the declination still appears greater than it should be, through the refraction, by ¾ of one minute [¾ vnius ſcrupuli].

DIE 19 JUNIJ.

- Altitude [Alt.] ⊙ Merid. by the Q. Tich. [per Q. Tich.] 57 22 10
- By the Q. Portat. [Per Q. Portat.] 57 22 0
- By the Q. Max. [Per Q. Max.] 57 22 15

DIE 20 JUNIJ.

- By the Q. Tichon. [Per Q. Tichon.] 57 18¾
- By the Q. Portat. 57 18⅔
- By the Q. Max. 57 19 nearly [fere]

DIE 22 JUNI J.

- By the Q. Tichon. 57 10½

It was not properly clear.

DIE 23 JUNIJ.

- By the Q. Tichon. 57 5½

Roughly [Greek: ἐν πλάτει (en platei, "in breadth" — i.e. only approximately)], because of passing clouds.

DIE 24 JUNIJ.

- By the Q. Tichon. 57 0 40
- By the Portat. [Per Portat.] 57 1 20
- By the Q. Max. 57 1 15

DIE 25 JUNIJ.

- By the Q. Portat. 56 55¾
- By the Q. Max. 56 55⅔

It was not clear enough.

DIE 27 JUNIJ.

- By the Q. Tichon. 56 43¼
- By the Q. Portat. 56 43

DIE 28 JUNIJ.

- By the Q. Tichon. 56 36⅔
- By the Q. Portat. 56 36½

DIE 29 JUNIJ.

- By the Q. Tichon. 56 29 30
- By the Portat. 56 29 30
- By the Q. Max. 56 29

DIE 30 JUNIJ.

- By the Q. Tichon. 56 22 0
- By the Q. Portat. 56 22 0
- By the Q. Max. 56 22 0

DIE 1 JULIJ.

- By the Q. Tichon. 56 14 20
- By the Q. Portat. 56 14 20
- By the Q. Max. 56 14 30

DIE 2 JULIJ.

- By the Q. Tichon. 56 5 45
- By the Q. Portat. 56 6 nearly
- By the Q. Max. 56 6 0

DIE 3 JULIJ.

- By the Q. Tichon. 55 57½
- By the Q. Portat. 55 57⅔
- By the Q. Max. 55 57½

DIE 7 JULIJ.

- By the Q. Tichon. 55 19
- By the Q. Portat. 55 19

DIE 11 JULIJ.

- By the Q. Tich. and the Q. Port. [Per Q. Tich. & Q. Port.] 54 35¾
- By the Q. Max. 54 35½

It was not perfectly clear.

DIE 13 JULIJ.

- By the Q. Tichon. 54 12 0
- By the Q. Portat. 54 12 0

DIE 14 JULIJ.

- By the Q. Tichon. 53 59 0

- By the Q. Portat. 53 59 0
- By the Q. Max. 53 59½

DIE 15 JULIJ.

- By the Q. Tichon. [Per Q. Tichon.] 53 46⅔
- By the Q. Portat. [Per Q. Portat.] 53 47 nearly [fere]

DIE 17 JULIJ.

- By the Q. Tichon. 53 20 0
- By the Q. Portat. 53 20 0

DIE 18 JULIJ.

- By the Q. Tichon. 53 6 10
- By the Q. Portat. 53 6⅓
- By the Q. Minim. [Per Q. Minim.] 53 6 0

DIE 28 JULIJ.

- By the Q. Tichon. 50 31 10
- By the Q. Portat. 50 31 10
- By the Q. Max. [Per Q. Max.] 50 31½
- By the new Sextant [Per Sext. nouum] 50 31 10

The sky was quite clear.

DIE 30 JULIJ.

- By the Q. Tichon. 49 56⅔
- By the Q. Portat. 49 56⅚
- By the new Sextant 49 56½

It was not clear enough.

DIE 10 AUGUSTI.

- By the Q. Tichon. 46 31 10
- By the Q. Portat. 46 31¼
- By the new Sextant 46 31½

It was not perfectly clear.

DIE 13 AUGUSTI.

- By the Q. Tichon. 45 30 30
- By the Q. Portat. 45 30 40
- By the new Sextant 45 30 30

DIE 14 AUGUSTI.

- By the Q. Tichon. 45 10 10
- By the Q. Portat. 45 10¼
- By the new Sextant 45 10 10

DIE 15 AUGUSTI.

- By the Q. Tichon. 44 49½
- By the Q. Portat. 44 49¼
- By the new Sextant 44 49⅓

DIE 16 AUGUSTI.

- By the Q. Tichon. 44 28½
- By the Portat. [Per Portat.] 44 28 10
- By the new Sextant 44 28¾

They were shaken by the wind [Vento commovebantur].[989]

DIE 17 AUGUSTI.

- By the Q. Tichon. 44 7 10
- By the Q. Portat. 44 7 20
- By the new Sextant 44 7¼

It was not clear enough.

DIE 18 AUGUSTI.

- By the Q. Tichon. 43 46½
- By the Q. Portat. 43 47 0
- By the new Sextant 43 46⅔

Nor was it clear enough on this day.

DIE 19 AUGUSTI.

- By the Q. Tichon. 43 24 30
- By the Q. Portat. 43 24¾
- By the new Sextant 43 24⅔

DIE 20 AUGUSTI.

- By the Q. Tichon. 43 3 0
- By the Q. Portat. 43 3 10
- By the new Sextant 43 3 0
- By the Q. Max. 43 2 50
- By the Q. Minim. 43 3 45

DIE 21 AUGUSTI.

- By the Q. Tichon. 42 41 25
- By the Q. Portat. 42 41⅓
- By the new Sextant 42 41 30
- By the Q. Max. 42 42¼ — not good [non bonum]

[989] the words *Vento commo-vebantur* stand to the left of a printed brace that spans the lines of the Portat. and of the new Sextant only; the line of the Q. Tichon. above stands outside it.

DIE 22 AUGUSTI.

- By the Q. Tichon. 42 19 20
- By the Q. Portat. 42 19 25
- By the new Sextant 42 19 20

DIE 23 AUGUSTI.

- By the Q. Tichon. 41 57 30
- By the Q. Portat. 41 57⅔
- By the Sextant Trig. [Per Sext. Trig.] 41 57⅔

DIE 25 AUGUSTI.

- By the Q. Tichon. 41 13 10
- By the Q. Portat. 41 13 15
- By the Sextant Trig. 41 13⅓

DIE 11 SEPTEMBRIS.

- By the Q. Tichon. 34 42½
- By the Q. Portat. 34 42½
- By the Sextant [Per Sextantem] 34 42⅔

DIE 12 SEPTEMBRIS.

- By the Q. Tichon. [Per Q. Tichon.] 34 18¾
- By the Q Portat. [Per Q Portat.] 34 19
- By the Sextant [Per Sextantem] 34 19

It was quite clear.

DIE 13 SEPTEMBRIS.

- By the Q. Tichon. 33 55⅓
- By the Q. Portat. [Per Q. Portat.] 33 56 nearly [fere]
- By the new Sextant [Per Sext. nouum] 33 56 better than the preceding [priori melior]

It was not clear enough.

DIE 14 SEPTEMBRIS.

- By the Q. Tichon. 33 31⅔
- By the Q. Portat. 33 32
- By the new Sextant 33 31½

Not clear enough.

DIE 19 SEPTEMBRIS.

- By the Q. Tichon. 31 34½
- By the Q. Portat. 31 34¾
- By the Sextant 31 34¾

It was not clear enough.

DIE 22 SEPTEMBRIS.

- By the Q. Tichon. 30 24 10 at most [ad ſummum]
- By the Q. Portat. 30 25
- By the new Sextant 30 24⅔

Between clouds.

DIE 2 OCTOBRIS.

- By the Q. Tichon. 26 34
- By the Q. Portat. 26 34½ — not certain enough [non ſatis certa]

DIE 3 OCTOBRIS.

- By the Q. Tichon. 26 11
- By the Q. Portat. 26 12
- By the Sextant Trig. [Per Sext. Trig.] 26 11⅓

It was not clear enough.

DIE 4 OCTOBRIS.

- By the Q. Tichon. 25 49 10
- By the Q. Portat. 25 49 0
- By the Sextant △ [Per Sext. △] 25 49 5

It was quite clear.

DIE 6 OCTOBRIS.

- By the Q. Tichon. 25 4½

Between clouds.

DIE 7 OCTOBRIS.

- By the Q. Tichon. 24 42 30
- By the Portat. [Per Portat.] 24 42 40
- By the new Sextant 24 42 40

It was exceptionally clear.

DIE 18 OCTOBRIS.

- By the Q. Tichon. 20 50
- By the Q. Portat. 20 50½

DIE 20 OCTOBRIS.

- By the Q. Tichon. 20 10 0
- By the Portat. 20 10 45
- By the Sextant 20 10¼

DIE 22 OCTOBRIS.

- By the Q. Tichon. 19 31½
- By the Portat. 19 31⅓

- By the Sextant 19 32

DIE 23 OCTOBRIS.

- By the Q. Portat. 19 12⅓
- By the Sextant 19 13

The instruments were moved by a strong storm.

DIE 5 NOUEMBRIS.

- By the Q. Portat. 15 30½
- By the Sextant 15 29¾

DIE 8 NOUEMBRIS.

- By the Q. Tichon. 14 44⅔
- By the Portat. 14 45⅙
- By the new Sextant 14 45¾

DIE 11 NOUEMBRIS.

- By the Q. Tichon. 14 4⅓
- By the Portat. 14 4¼
- By the new Sextant 14 4⅙

DIE 12 NOUEMBRIS.

- By the Q. Tichon. 13 51½
- By the Portat. 13 51½
- By the new Sextant 13 51½

DIE 16 NOUEMBRIS.

- By the Q. Tichon. 13 4
- By the Portat. 13 4
- By the new Sextant 13 4

DIE 17 NOUEMBRIS.

- By the Q. Tichon. [Per Q. Tichon.] 12 53 0
- By the Q. Portat. [Per Q. Portat.] 12 52 50
- By the new Sextant [Per Sext. nouum] 12 53 0

DIE 20 NOUEMBRIS.

- By the Q. Tichon. 12 22⅙
- By the Portat. [Per Portat.] 12 22½
- By the Sextant [Per Sextantem] 12 22½

DIE 23 NOUEMBRIS.

- By the Q. Tichon. 11 55½
- By the Portat. 11 55½

- By the new Sextant 11 55⅓

DIE 8 DECEMBRIS.

- By the Q. Portat. 10 42¼
- By the Sextant 10 42½

It was not clear enough.

DIE 14 DECEMBRIS.

- By the Q. Tichon. 10 41⅙
- By the Q. Portat. 10 41⅔
- By the Sextant 10 41⅓

The declination of ⊙ verified by the armillae [Decl. ⊙ verificata per armillas], 23 20, not certain enough.

DIE 15 DECEMBRIS.

- By the Q. Tichon. 10 43 10
- By the Portat. 10 43¼
- By the new Sextant △ [Per Sext. nouum △] 10 43 10
- Declination of ⊙ merid. by the Armillae [Decl. ⊙ merid. per Armill.] 23 21½
- *Altitude 10 43 10*
- *3 35*
- *Least altitude of ⊙ [Altitudo ⊙ minima] 10 39 35*
- *Parallax 2 55*
- *True least altitude of ⊙ [Vera Altit. ⊙ min.] 10 42 30*
- *The greatest true altitude was [Maxima Altit. vera fuit] 57 37*[990]

From this, therefore, the greatest declination comes out as 23 27¼. But the refraction of the Sun's rays makes[1].

DIE 18 DECEMBRIS.

- By the Q. Tichon. 10 49⅓
- By the Portat. 10 50 0
- By the new Sextant 10 50¼

It was not clear enough.

DIE 20 DECEMBRIS.

- By the Q. Tichon. 10 56 nearly [fere]
- By the new Sextant △ 10 56

It was not clear enough.

DIE 30 DECEMBRIS[2].

- By the Q. Tichon. 12 2 40 — perfectly [exquisite]

[990] the line *3 35* carries no words; its figures stand under the minutes and seconds of the altitude on the line above. No rule is printed under it.

Note[2]. At the end of this year and the beginning of the next, from the greatest and least altitude of the pole star [ſtellæ polaris], and also from both of those that are in the fore parts of Ursa Minor [vrſæ minoris], I found the altitude of the pole at this place to be

- *55ᵖ54′ 45*
- *hence æquat. [vnde æquat.] 34 5 15*

And since the Sun's greatest true altitude is

- *57 36 50*
- *34 5 15*
- *the greatest declination [declinatio … maxima] 23 31 35.*[991]

It is therefore concluded that the greatest declination at this time is exactly 23 31½, and you can rely on this quite safely.

And when the individual observations are compared, it is concluded that the greatest and the least altitude of the pole star this year were as follows.

The pole star [Stella polaris]:

- *Greatest altitude of the pole star 58ᵖ50′ 50″*
- *Least altitude of the same star [Minima eiuſdem ſtellæ] 52 58 10*
- *Diameter of the circle about the pole 5 52 40*
- *Distance from the pole this year 2 56 20*
- *Therefore the altitude of the pole is given as 55 54 30*[992]

[1] Nothing more. [Nihil amplius.]

[2] From codex V. [E codice V.]

The preceding one in the square of Ursa Minor [in quadrato vrſæ minoris]:

- *Greatest altitude observed 70ᵖ 4′ 15″*
- *Least altitude of the same 41 45 15*
- *Diameter of the circle about the pole 28 19 0*
- *Distance of the star from the pole 14 9 30*
- *From this the altitude of the pole is given as 55 54 45*

Of the following one in Ursa Minor, which is in its wheels [Sequentis in vrſa minore quæ eſt in rotis eiuſdem]:

- *Greatest altitude 72 36 45*
- *Least 39 12 30*
- *Diameter of the circle 33 24 15*
- *Distance from the pole 16 42 7*
- *The altitude of the pole comes out as 55 54 37*[993]

[991] a short printed rule stands under the two value lines *57 36 50 / 34 5 15*, above the line of the declination; in that line the word *declinatio* precedes the figures and *maxima.* follows them.

[992] the words *Stella polaris* stand to the left of a printed brace spanning all five lines; a short printed rule stands under the last value, *55 54 30*.

[993] each label stands to the left of a printed brace spanning its five lines; a short printed rule stands under the last value of each group, *55 54 45* and *55 54 37*. The first label opens *Præcedens* (nominative), the second *Sequentis* (genitive), as printed.

If, then, comparing the individual results, we take the altitude of the pole as 55 54⅔, we shall err infallibly as far as the senses can tell [infallibiliter quo ad ſenſum aberrabimus].[994]

Places of the Sun [LOCA SOLIS.]

Day [Die]	Observed merid. altitude [Alt. merid. obſeruata]	Par-all.	Alti-tude æquat. 34 5 30 — Declin.	Alti-tude æquat. 34 5 30 — Longit.	Altitude æquat. 34 5 30 — our modern Ephem.[1] [Ephem. noſtræ neothericæ[1]]	Alti-tude æquat. 34 9 50 — Declin.	Alti-tude æquat. 34 9 50 — Longit.	Altitude æquat. 34 9 50 — Ephem. of this eccentricity[2] [Ephem. huius eccentricitatis[2]]
21 Feb.	27° 4′ 0″	2′39″				7° 3′11″	12° 1′40″	
	27 3 30					7 3 41	12 0⅓	
5 Mart.	32 7 40	2 30	1 55 20	25 10 40	25 9 16 ♓	1 59 40	24 59	
11 —	34 29 50	2 27	0 26 47	1 7 9	1 6 26 ♈	0 22 27	0 56 28	0 55⅛ ♈
14 —	35 40 10	2 24	1 37 4	4 3 27	4 3 34 ♈	1 32 44	3 53 10	3 52 55 ♈
22 —	38 46 50	2 18	4 43 38	11 55 12	11 56 2 ♈	4 39 18	11 46 0	11 45 30 ♈
26 —	40 18 50	2 16	6 15 36	15 51 17	15 51 24 ♈	6 11 16	15 42 55	15 41 2 ♈
27 —	40 41 30	2 14	6 38 14	16 50 18	16 50 9 ♈	6 33 54	16 41 47	16 39 49 ♈
10Apr.	45 43 45	2 4	11 40 19	0 28 1	0 29 5 ♉	11 35 59	0 20 57	0 19 42 ♉
11 —	46 4 15	2 4	12 0 49	1 26 39	1 27 20 ♉	11 56 29	1 19 42	1 18 3 ♉
16 —	47 43 10	1 59	13 39 39	6 17 34	6 18 9 ♉	13 35 19	6 11 6	6 9 17 ♉
17 —	48 2 0	1 59	13 58 29	7 14 45½	7 16 14 ♉	13 54 9	7 8 26	7 7 26 ♉
20 —	48 58 0	1 57	14 54 27	10 8 48	10 10 15 ♉	14 50 7	10 2 44	10 1 47 ♉
23 —	49 51 55	1 54	15 48 19	13 2 53	13 4 0 ♉	15 43 59	12 57 7	12 55 55 ♉
29 —	51 32 0	1 51	17 28 21	18 48 23	18 50 48 ♉	17 24 1	18 43 0	18 43 25 ♉
30 —	51 48 20	1 50	17 44 40			17 40 20		
13 Maij	54 44 50	1 42	20 41 2	2 16 50	2 16 43 ♊	20 36 42	2 12 15	2 11 15 ♊
14 —	54 56 0	1 42	20 52 12	3 13 58	3 14 8 ♊	20 47 52	3 9 30	3 8 49 ♊
29 —	56 59 50	1 37	22 55 57	17 33 34	17 33 25 ♊	22 51 37	17 28 40	17 30 28 ♊
11 Julij	54 35 45	1 43	20 31 58	28 27 49	28 30 8 ♋	20 27 38	28 32 55	28 34 20 ♋
28 —	50 31 10	1 53	16 27 33	14 45 33	14 45 31 ♌	16 23 13	14 51 7	14 52 12 ♌
14 Aug.	45 10 10	2 6	11 6 46	1 6 54	1 6 56 ♍	11 2 26	1 14 3	1 15 40 ♍

[994] So printed, with no negative: *aberrabimus*, "we shall err". The sense of the sentence requires "we shall not err, as far as the senses can tell" (*non aberrabimus*); the printed form is kept.

Day [Die]	Observed merid. altitude [Alt. merid. obſeruata]	Parall.	Altitude æquat. 34 5 30 — Declin.	Altitude æquat. 34 5 30 — Longit.	Altitude æquat. 34 5 30 — our modern Ephem.[1] [Ephem. noſtræ neothericæ[1]]	Altitude æquat. 34 9 50 — Declin.	Altitude æquat. 34 9 50 — Longit.	Altitude æquat. 34 9 50 — Ephem. of this eccentricity[2] [Ephem. huius eccentricitatis[2]]
15 —	44 49 30	2 6	10 46 6	2 4 50	2 4 54 ♍	10 41 46	2 12 3	2 13 44 ♍
16 —	44 28 30	2 7	10 25 7	3 3 0	3 2 54 ♍	10 20 47	3 10 24	3 11 49 ♍
17 —	44 7 10	2 8	10 3 48	4 2 16	4 0 56 ♍	9 59 28	4 9 11	4 9 55 ♍
19 —	43 24 30	2 10	9 21 10	5 57 55	5 57 4 ♍	9 16 50	6 5 38	6 6 13 ♍
20 —	43 3 0	2 10	8 59 40	6 56 0	6 55 11 ♍	8 55 20	7 3 44	7 4 26 ♍
21 —	42 41 25	2 11	8 38 6	7 53 50	7 53 20 ♍	8 33 46	8 2 19	8 2 41 ♍

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[1] Written in several times: »Major. Ecc.«. [Adſcriptum eſt aliquoties: »Major. Ecc.«.]

[2] Written in several times: »Minor. Ecc.«. [Adſcriptum eſt aliquoties: »Minor. Ecc.«.]

Day [Die]	Observed merid. altitude [Alt. merid. obſeruata]	Parall.	True altitude [Alt. vera]	Declination [Declin.]	Longitude [Longitudo]	Our Ephemerides [Ephem. noſtræ]	Prutenic calculation [Calculus Prutenicus]	Alphonſ. calculation [Calculus Alphonſ.]
14 Aug.							1 5 0	1 4 52
15 —							2 3 0	2 2 53
16 —							3 1 0	3 0 57
19 —							5 55 0	5 55 18
20 —							6 53 0	6 53 35
21 —							7 51 0	7 51 53
23 —	41 57 40	2 12	41 59 52	7 54 22	9 50 5 ♍	9 49 44	9 47 0	9 48 34
25 —	41 13 20	2 14	41 15 34	7 10 4	11 46 40 ♍	11 46 14		
11Sept.	34 42 30	2 26	34 44 56	0 39 26	28 21 10 ♍	28 21 51		
12 —	34 18 45	2 28	34 21 13	0 15 43	29 20 38 ♍	29 20 44		
13 —	33 55 20	2 28	33 57 48	0 7 42	0 19 18 ♎	0 19 39		

[995] the head is set in two tiers: *Die*, *Alt. merid. obſeruata* and *Parall.* span both; *Alt. æquat. 34 5 30* stands over the fourth to sixth columns and *Alt. æquat. 34 9 50* over the seventh to ninth, each above its own row of three column heads.

Note. If you subtract half a minute from the longitude of the Sun in our Ephemerides, you will err imperceptibly, so that on day 12 Sept. it is 29 20¼, on day 13 0 19⅙ ♎.

14 —	33 31 40	2 29	33 34 9	0 31 21	1 18 35 ♎	1 18 36	1 15 0	1 20 3
19 —	31 34 30	2 32	31 37 2	2 28 28	6 12 40 ♎	6 13 54[1]		
22 —	30 24 10	2 34	30 26 44	3 38 46	9 10 15 ♎	9 11 31		
2 Oct.	26 34 0	2 40	26 36 40	7 28 50	19 2 36 ♎	19 5 57		
3 —	26 11 0	2 40	26 13 40	7 51 50	20 3 13 ♎	20 5 35	19 59	20 9 45
7 —	24 42 30	2 42	24 45 12	9 20 18	23 59 44 ♎	24 4 36	23 57	24 9 39

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OBSERUATIO ECLIPSIS SOLARIS ANNO 1584 DIE 30 APRILIS[2].

Observation of the eclipse of the Sun in the year 1584, on day 30 April.

We reckon that this eclipse [Eclipſationem] first began at H. 5 M. 0, and this from the following observation, made at H. 5 [recte: H. 5 M. 4 — Corrigenda, p. 430]. At the very beginning of the defect [deliquij] the altitude of ☉ was about 7g., from which the corrected time is given as H. 5 3′56″.

At hour 5 4′ of the clock [Hora horologij 5 4′] the face of ☉ was like this; and its azimuth then, from Septent. towards the east [a Septent. verſus ortum], as all the others are counted, was 69g 10′, altitude 7½. From this the time is given as hour 5 7′¾. And this by means of the true declination of ☉ — which is to be understood as well for the remaining times corrected in this way.

At hour 5 7′ of the clock the Sun was seen like this.

H. 5 9′ of the clock [horolog.], azimuth of ☉ 70g., altitude 8g.

At hour 5 12′ of the clock, azimuth of ☉ 70 40, altitude 8½.

Diagram. A column of four drawn circles of equal size, set one above another at the right of the eclipse entries, unlettered and uncaptioned. The first circle, level with the first paragraph, is a plain outline with nothing inside it. The second, level with the second paragraph, has a small dark segment cut off inside its rim at the upper right. The third, level with the line *Hora horologij 5 7′ …* and the line below it, has a somewhat larger hatched segment at the upper right. The fourth, level with the line *Hora horologij 5 12′ …* and reaching down beside the footnotes, has a still larger hatched, lens-shaped segment at the upper right. No letters, numerals or words stand in or beside any circle; the figure *38** stands below the fourth.

[1] The calculation was also made for the altitude of the equator 34° 9′ 50″. To the declination 2° 32′ 48″ M. there corresponds the longitude 6° 24′ 38″ ♎.

[996] this is one framed table on the leaf. The note *Nota. Si dimidium …* is set inside the frame across its full width, between the lines for 13 and 14 September, and the column rules break for it; the lines below it stand in the same nine columns under the same printed head, which is not repeated. In the lines for 3 and 7 October the Prutenic value carries no seconds figure, as printed.

The Ephemeris of the lesser eccentricity gives 6⁰ 24′ 32″. [Etiam ad altitudinem æquatoris 34⁰ 9′ 50″ factus eſt calculus. Declinationi 2⁰ 32′ 48″ M. reſpondet longitudo 6⁰ 24′ 38″ ♎. Ephemeris minoris eccentricitatis dat 6⁰ 24′ 32″.]

[2] From codex V. [E codice V.]

Diagram. A column of nine drawn circles of equal size, set one above another at the left of the entries, unlettered and uncaptioned. Each has a hatched segment cut off inside its rim; in order from the top: (1) level with the first two entries, a lens-shaped hatched segment at the upper right; (2) level with the third and fourth entries, a broader one at the upper right; (3) level with the fifth and sixth entries, one at the top, about the centre; (4) level with the seventh to ninth entries, one at the top, left of centre; (5) level with the tenth entry, one at the upper left; (6) level with *Horologij H. 6 6⅕.*, a smaller one at the upper left; (7) level with *Horologij H. 6 9⅙.*, smaller again, at the upper left; (8) level with *Horologij H. 6 13⅔.*, a thin sliver at the upper left; (9) level with *Horologij H. 6 15½.*, a very thin sliver at the upper left. No letters, numerals or words stand in or beside any circle.

Clock, hour 5 18⅙ [Horologij Hora 5 18⅙], Azim. ☉ 71 50, Altit. 9 15; from which the true time is given as H. 5 20′ 52″.

Clock, H. 5 23′ 15″, Azim. ☉ 72 50, Altit. 10 0; from which, as before, the true time of the observation is given as H. 5 26′½. [The Sun like this].

Clock, H. 5 27′ 0″, Azim. ☉ 73 35, Altit. 10 22.

Clock, H. 5 30′½, Azim. ☉ 74 20, Altit. 10 54; from these the true time is given as H. 5 33′ 12″. [The Sun like this].

Clock [Horol.], H. 5 36′, Azim. ☉ 75 25, Altit. 11 36.

Clock, hour 5 40, Azim. ☉ 76 12 [recte: 76 6 — Corrigenda, p. 430], Altit. 12 2 [recte: 12 6 — Corrigenda, p. 430]. From this there comes out the true time of the observation, H. 5 42′. [The Sun like this].

Clock, H. 5 43½, Azim. ☉ 76 47, Altit. 12 34.

Clock, H. 5 47⅔, Azim. ☉ 77 42, Altit. 13 10. [The Sun like this].

Clock, H. 5 50⅚, Azim. ☉ 78 20, Altit. 13 36; from this there comes out the true time of the observation, H. 5 53.

Clock, H. 5 54⅓, Azim. ☉ 79 8, Altit. 14 5½.

Clock, H. 6 6⅕.

Clock, H. 6 9⅙.

Clock, H. 6 13⅔.

Clock, H. 6 15½.[997]

Clock, hour 6 20′, Azim. ☉ 84 15, altitude 17 38. From this the true time is given as H. 6 22′, at which time the eclipse [Ecclipſis] had entirely ended, and the whole Sun was lit.

Note that the calculation from the altitude of ☉ gives 4 scrup. more than it should at the beginning of the eclipse, and 2′ at the end. I think this happened not because the

[997] the square brackets around the words *Sol talis* ("The Sun like this") are printed on the leaf, four times (after *26′½*, *33′ 12″*, *42′* and *Altit. 13 10*). After *H. 5 30′½*, the line leaves a wide blank space before *Azim.*; nothing is printed in it.

clock erred by so much, but because ☉ appeared higher than it was. Therefore, if we take the mean between the clock time and the computation from the altitudes of ☉, we shall err imperceptibly, so that it is:

- *Eclipse, beginning: hour 5 2′*
- *Middle: hour 5 40′*
- *End: hour 6 21′.*

CALCULUS NOUILUNIJ ECLIPTICI ANNI 1584

Calculation of the ecliptic new moon of the year 1584, from our own restitution.[1]

Equal time of the true conjunction, April, day 30, H. 5 52′20″.

- Place of ☉: 19 25 52
- Place of ☾: 19 25 52[998]
- Time of the visible defect [deliquij] assumed:
- H. 5 18′, æquat. 10½
- Apparent time: H. 5 28 30
- Place of ☉: 19 24 30
- Place of ☾: 19 5 10[999]
- Difference: 19 20

Diagram. A circle set in the left column below *Differentia 19 20*, uncaptioned, with nine capital letters. A horizontal chord runs across the circle from G on the left rim through H and I to the right rim. A straight line runs from F on the upper-left rim down to the right through a point between B and C, crosses the horizontal chord at I and reaches the lower-right rim. A line runs from D at the top of the rim down to H on the horizontal chord, passing A and B. A line runs from E on the upper-right rim down to the left, meeting the D–H line at about C/B. Letters in their positions:

- D (top, above the rim): the upper end of the line to H
- E (upper right, outside the rim): the upper end of the line running down to the left
- F (upper left, outside the rim): the upper end of the line through to I
- A (inside, left of the D–H line, above B)
- C (inside, right of the D–H line, where the line from E meets it)
- B (inside, left of the D–H line, just above the horizontal chord)
- G (left, outside the rim): the left end of the horizontal chord
- H (below the chord, at the foot of the D–H line)
- I (above the chord, at its crossing with the line from F)
- Ascension R. of ☉: 46 57
- For H. 17 28′½: 262 7[1000]
- Asc. R. M. C.: 309 4
- Point Culm.: 6 40 ♒

[998] a printed brace joins these two lines, with the sign ♉ at its point.

[999] a printed brace joins these two lines, with the sign ♉ at its point; a short rule stands below them.

[1000] a short rule stands below this line.

- Its Declin.: 18 37 Mer.
- Altitude of the Æquat.: 34 0[1001]
- Side FG: 15 23
- Ascension Obl. Aſcen.: 39 4
- Point Aſcen.: 19 8 ♊
- Point Culm.: 6 40 ♒[1002]
- Side FI: 132 28
- Angle GIF: 21 5
- Side AI: 30 3
- Side AH: 10 22, altitude of ☾
- Side HI: 28 22
- Angle HAI: 71 35
- Side AB, parallax of altitude of ☉: 2′55″
- Parallax of longitude of ☉: 0 56
- Parallax of latitude of ☉: 2 48
- Side AB, parallax of altitude of ☾: 1° 1′ 0″
- Parallax of longitude of ☾: 0 19 15
- Parallax of latitude of ☾: 0 57 52
- Parallax of latitude of ☾ from ☉: 55 4
- Parallax of longitude of ☾ from ☉: 18 20

Since the difference of longitude of ☉ and ☾ is greater by one minute than the parallax of longitude of ☾ from ☉, add instead two minutes of time to the assumed time of the visible conjunction, so that the equal time of the visible synod comes out as

- H. 5 M. 20
- Apparent: H. 5 M. 30
- Visible place of ☉: 19 25½
- Visible place of ☾: 19 25½[1003]
- At the time of the visible conjunction:
- Latitude of ☾, Bor.: 1°17′45″
- Parallax of ☾ from ☉, Mer.: 55 4[1004]
- Apparent latitude of ☾: 22 41 B.
- Semidiameter of ☉: 16 0
- Semidiameter of ☾: 17 29[1005]
- Sum of the semidiameters: 33 29
- Apparent latitude of ☾: 22 41[1006]
- Remainder: 10 48
- Diameter of ☉: 32 0

[1001]a short rule stands below this line.
[1002]a short rule stands below this line.
[1003]a printed brace joins these two lines, with the sign ♉ at its point.
[1004]a short rule stands below this line.
[1005]a short rule stands below this line.
[1006]a short rule stands below this line.

[1] E codice V. [From codex V.]

- Digiti Ecliptici [the digits of the eclipse]: 3° 45′
- Scrup. incidentiæ: 24 37
- Tempus incidentiæ: 44
- Beginning of the defect: H. 4 46′
- Visible ☌: H. 5 30
- End of the defect: H. 6 14

But according to the Prutenic calculation the magnitude of this eclipse is the same, and the time only 2 minutes earlier.

But the place of the Sun, restored differently by us afterwards, exceeds by 8 minutes, so the eclipse will be a little later.

CALCULUS ECLIPTICI NOUILUNIJ ANNI 1584

Calculation of the ecliptic new moon of the year 1584, from the Prutenic Tables[1].

- Time of the mean ☌: April, day 28, H. 21 30′34″ completed.
- Difference of the true and the mean syzygy: H. 8 59′16″
- Place of ☉ in ♉: 19 11 5
- Place of ☾ in ♉: 19 11 38

But since the place of ☾ exceeds the place of the Sun by 33 seconds, for these I take away 1′ 6″ of time from the difference of time found before, so that the true difference is 8ʰ 58′ 10″. From this comes out the equal time under the Equator of Regij Montis, completed:

- D. 29 H. 6 M. 28 S. 44
- Æquat. ad.: 10 34[1007]
- Apparent time: 29 6 39 18
- Reduction: 38[1008]
- 29 6 1 18
- Time under our meridian.
- Interval between the true and the visible synod, to be subtracted from the time of the true syzygy: 32′49″
- Apparent time of the visible synod under our meridian: H. 5 28′30″
- Diameter of ☉: 32 0
- Digiti Ecliptici: 3°33′
- Scrupula incidentiæ: 23 25
- Tempus incidentiæ: H. 0 42′14″
- Beginning of the defect: 4 46 16
- End of the defect: 6 10 44

In this year, on 27 November, at 10¼ʰ A. M., ☉ exactly in 15½ ♐ and ☾ in 12 ♒, I myself, in my printing house here at Uraniborg [Vraniburgi], printed with new type the very first piece of all: a poem to my friend Erik Lange [Ericum Lange], D. F.

[1007] a short rule stands below this line.
[1008] a short rule stands below this line.

In this same year, on 11 December, at noon itself, when the Sun was just about to enter the winter solstice and ☾ was in 25 ♌ in △ of stationary ♄, I laid the first stone for the foundation of the Greater underground Armillae, a stone on which a wooden column carrying the axis and, so to speak, the whole instrument was to rest securely[1].

OBSERUATIONES LUNÆ.

Observations of the Moon.

DIE 25 FEBRUARIJ.

H. 5 M. 52 in the morning, the distance between the eastern limb of ☾ and ♀ was

- 12 58⅔
- 12 58½[1009]

DIE 16 MARTIJ.

H. 9. 0: between Spica [Spicam] ♍ and the eastern limb of ☾, 5° 1′ ἐν πλάτει [Greek: *en platei*, "in breadth"], because of clouds, with the Radius.

[1] E codice V. [From codex V.]

DIE 3 APRILIS[1].

In the evening, at about hour 9¾, when the tail of ♌ was exactly on the meridian as regards the Mural, I saw that the Moon was visually in conjunction with Aldebaran [Aldeboram]; for a line drawn from each horn fell exactly on Aldebaran and was also extended to two small stars of Draco [Draconis] near the pole of the ecliptic, which was an indication that the conjunction was then visual. The lower horn was distant from Aldebaran toward the north by p.4 M.20 with the Tychonic Sextant, and the lower horn then had an altitude of 6½. From this the parallaxes of the Moon can be examined[2].

- H. 9 26½′ — azimuth of ☾ 65 0 — altitude 7 56
- 9 35 — 63 10 — 6 50
- 9 42 — 62 10 — 6 9

The azimuths are counted from the north toward the west.

Between the lower horn of ☾ and the eye of ♉:

- 4 27½
- 4 26
- 4 25
- 4 23
- 4 20

These observations were made from the transit of the stars in the hind haunch of ♌ until the transit of the tail across the meridian; Aldebaran, moreover, was very low toward the horizon.

DIE 7 APRILIS.

[1009] a printed brace joins these two values to the words *per portatilem*, "with the portable one".

	Azimuth of the occid. limb of ☾	Altitude
6ʰ48′30″	13 0	49 8
6 56 25	16 0	48 53
7 2 0	18 0	48 40½

The azimuths are counted from the south toward the west, and the altitudes are those of the upper horn; and when this last azimuth was taken, half the body of the Sun was below the horizon and half above it [recte: *terram* for the printed *eam*, "above the earth" — Corrigenda, p. 430].

- 7 52 15 — 35 50 — 45 21
- 8 5 45 — 36 55 — 45 4
- 8 11 40 — 38 0 — 44 46
- 8 15 5 — 39 40 — 44 17[1010]

Between the occ. limb of ☾ and Spica [Spicam]:

- H.7 49 — 77 36
- 7 54 — 77 35
- 7 56½ — 77 34
- 8 0½ — 77 32½

Between the occid. limb of ☾ and the heart of ♌:

- 8 3⅓ — 24 15¾, is not certain[1011]
- 8 7½ — 24 13¾
- 8 9 — 24 13⅔
- 8 10 — 24 13⅔
- 8 11 — 24 12½

DIE 8 APRILIS.

At H. 7 20′ the more westerly limb of ☾ was on the meridian, and the upper horn had altitude:

- with the Tychonic: 45 37
- with Portat.: 45 36½

At H.8 54′ 0″ ☾ was in 90° from the aſcend.

	Azimuth of the occid. limb of ☾	Altitude of the upper horn
9 0 25	32 47	41 46
9 4 15	33 53	41 27
9 8 37	35 17	41 3
9 14 0	36 45	40 38

The azimuths are counted from the south toward the west.

Between the occid. limb of ☾ and Spica ♍:

[1010] these four lines stand in the same three figure columns as the lines under the head row above, but carry no head row of their own.

[1011] the words *non eſt certa* stand in smaller type on the line below this value, with no time of their own, and a printed brace joins the two lines.

- 8 48½ — 63 15½
- 8 52 — 63 14½
- 8 53 — 63 14
- 8 54 — 63 13
- 8 56 — 63 12⅔

Between the occid. limb of ☾ and the tail of ☋:

- 9 5 0 — 35 45
- 9 8 0 — 35 44¼
- 9 12 0 — 35 42¼

By the next noon, the clock we used in the observations of ☾ had advanced 15′50″ faster than it should from the immediately preceding noon, which perhaps happened because of the frost and the storm.

DIE 9 APRILIS.

At H. 7 50′51″ the occid. limb of ☾ was on the meridian, and the upper horn had altitude, with the Tychonic: 40 52.

At 9 23 20 the tail of ☋ transited the meridian; altitude with the Tychonic: 50 59⅔.

[1] E codice V. [From codex V.]

[2] Sequentia e codice C. [What follows is from codex C.]

	Azimuth of the occid. limb of ☾	Alt. of the upper horn
H.10 16½	44 32	32 49
10 21	46 0	32 17
10 24	46 42	32 0⅔
10 28	48 0	31 29½

The azimuths are counted from the south toward the west.

Between the occid. limb of ☾ and Spica [Spicam] ♍:

- 10 13 — 48 40
- 10 14½ — 48 39¾
- 10 17½ — 48 39⅓
- 10 18½ — 48 39

Between the same limb of ☾ and Arcturus [Arcturum]:

- 10 31 — 59 38¾
- 10 33½ — 59 38⅓
- 10 34⅔ — 59 38

DIE 10 APRILIS.

	Azimuth of the occid. limb of ☾	Alt. of the upper horn
H.11 13′	42 0	28 16
11 20½	44 0	27 30
11 23	44 42	27 10

	Azimuth of the occid. limb of ☾	Alt. of the upper horn
11 27½	45 30	26 59

Between the occid. limb of ☾ and Spica ♍, with the Q. Portat.:

- 11 13 — 34 46½
- 11 15½ — 34 45½
- 11 17 — 34 44¾
- 11 29 — 34 40
- 11 30 45 — 34 38⅔
- 11 33 — 34 37
- 11 35 — 34 36

Between the occid. limb of ☾ and Arcturus, with the Q. Portat.:

- 11 38 30 — 49 50¼
- 11 40 — 49 50
- 11 41 — 49 49¾
- 11 42 30 — 49 49

At 11 34 ☾ was in degree 90 from the Ascendant.

At 11 57 20 Arcturus was on the meridian; with the Tychonic Q.: 55 29.

At the next noon the clock could not be corrected exactly. Afterwards, however, it seemed to run somewhat slower than it should.

DIE 12 APRILIS.

When the tail of ♌ was transiting the meridian, the clock was corrected by setting the hand to hour 9 Minut. 24.

At H. 10 22′15″ the occid. limb of ☾ transited the meridian, and the upper horn had Alt., with the Tychonic: 25 52½.

Between the occid. limb of ☾ and Spica ♍:

- H.10 43 — 8 49½
- 10 45 — 8 48⅔
- 10 48 — 8 47

At 10 57 23″ Spica ♍ transited the meridian, with the Tychonic.

DIE 13 APRILIS.

Between the occid. limb of ☾ and Spica ♍, with the new Sext.:

- H.1 16½′ — 7 51
- 1 18 — 7 50½
- 1 20 — 7 50
- 1 22 — 7 49
- 1 24 — 7 48

With the lesser Q.:

	Azimuth of the occ. limb of ☾, from the south to the west	Alt. of the upper horn
1 32	46 10	15 47
1 38	47 35	15 12

	Azimuth of the occ. limb of ☾, from the south to the west	Alt. of the upper horn
1 43	48 25	14 47

At 1 25 ☾ was in 90 G. from the ascendant.

Nothing has been added to or subtracted from these azimuths. For several days after this, the clock could not be corrected because of the darkness.

DIE 14 APRILIS.

The upper horn of ☾ on the meridian:

- with the Tychonic: 17 44½
- with the new Sext.: 17 45¼

DIE 17 APRILIS.

At H. 1 37′ 40″ A. M. the occid. limb of ☾ on the meridian; Alt. of the upper horn, with the Tychonic: 12 53½.

At 1 47 20 the heart of ♏, on the meridian; Alt., with the Tychonic: 8 45.

The clock we used for the transit of ☾ was corrected at the setting of ☉ on the following day; ἐν πλάτει [Greek: *en platei*, "in breadth"] it was running 14 M. faster than it should.

DIE 3 JUNIJ.

At H. 4 43′ the Moon transited the meridian, having an Alt. of the upper horn, with the Tychonic Q., of 38 59½.

DIE 12 JUNIJ.

At H. 11 38′ after noon, as the greater Clock showed — 11 51½ by the lesser clock — the Moon transited the meridian, having an Alt. of the upper limb:

- with the Tychonic: 12 22, very nearly
- with the Sext.: 12 22½

The Moon, moreover, was then full and at the beginning of ♍, *and from this the parallax of ☾ can be gathered.*

At the next noon the greater clock was running slower by 19 minutes [19 ſcrupulis], while the lesser ran ahead of noon by only a single minute[1].

DIE 14 JUNIJ, MANE.

At H. 0 36′ the occid. limb of ☾ transited the meridian, and the altitude of the upper limb was then:

- with Tichon.: 13 51
- with Portat.: 13 52

At the following noon of the same day, the lesser clock, which we used in observing the transit of ☾, was running 6 minutes slower than it should.

So[2] the time of this transit and observation was H. 0 39′ p.M.N., or rather hour 0⅔. And from this, again, the parallax of ☾[1012] can be gathered in the circle of altitude, for

[1012]a raised *æ* stands after the sign.

☾ was still near the first decade [primam decuriam] of ♍. Nor was it changing its declination much. Account must, however, be taken of refraction in both cases, which can arise at so small an altitude.

DIE 10 JULIJ.

At H. 10 29′ 45″ by the lesser clock the occid. limb of ☾ was on the meridian, and the upper cusp had altitude:

- with Tichon.: 13 17½
- with the Q. Portat.: 13 17½
- The lower limb: 12 42

☾ was again near the limits of its lowest altitude.

Therefore the semidiameter of ☾ is 17½, and so the true altitude of the centre, in degrees [partium], is exactly 13 0.

At the next noon the clock was running slower by 4′ 20″. *Now ☾ was near its greatest distance from the Earth [a terris], because it was apogean near the full moon.*

DIE 8 AUGUSTI.

- Meridian altitude of the upper cusp of ☾: 17 9¼
- lower: 16 37¾
- Diameter of ☾: 0 31½

The wind was strong.

DIE 8 SEPTEMBRIS.

At H. 8 30′ ☾ was in 90 G. from the ascendant.

Between the occid. limb of ☾ and the bright star of ♈ [lucidam ♈]:

- 10 4 — 49 0
- 10 8 — 48 59
- 10 10 — 48 57
- Meridian altitude of the upper cusp: 31 42
- Lower cusp, with the Q. Port.: 31 11
- Likewise, upper cusp: 31 41⅓
- Lower, with the Sext.: 31 10¼

DIE 9 SEPTEMBRIS.

☾ in 90 Gr. from the ascendant at hour 9 14′.

- H.7 46′
- 7 42½ corrected

the bright star of the Vulture [lucida Vulturis] transited the meridian.[1013]

Between the occid. limb of ☾ and the head of ♈ [caput ♈], with the new Sext.:

- 9 10 — 36 42½
- 9 12½ — 36 41

[1013]a printed brace joins the two times to these words.

- not good [non bona][1014]
- 9 15 — 36 42
- 9 17 — 36 41½
- 9 24 — 36 38
- 9 30 — 36 37

These times were corrected from the transit of the Vulture across the meridian, and observed successively with the Armillae [Armillas].[1015]

Meridian altitude of the upper cusp of ☾:[1016]

- with the Port.: 36 27½
- with the Sext.: 36 26

It was not clear enough.

DIE 4 OCTOBRIS.

- Meridian altitude of the upper cusp of ☾: 25 22
- lower, with Portat.: 24 52
- upper, with the Sext.: 25 21½

DIE 6 OCTOBRIS.

Meridian altitude of the upper cusp of ☾:

- with Tichon.: 33 40¼

It was not clear enough.

[1] Adſcriptum eſt in codice V.: »Fuit itaque verum tempus huius obſeruationis Hora 11 50′«. [Added in codex V: "So the true time of this observation was hour 11 50′".]

[2] Sequens annotatio in codice V. ſolo manu Tychonis addita eſt. [The following annotation is added in codex V alone, in Tycho's hand.]

LOCA LUNÆ[1]

CALCULUS LOCI ☾ AD DIEM 7 APRILIS.

According to computation, ☾ was in fact in the ninetieth degree of the ecliptic at H. 7 M. 23.

For the declination of ☾: at H. 8 M. 7, the time corrected, altitude of the centre of ☾ 44 48½, by subtracting 15½ from the altitude of the upper limb.

Azimuth of the centre of ☾ (subtracting 22 M. from the occid. limb): 36 33

Diagram. A half-circle standing on a straight horizontal base, set at the left of the page beside the lines that begin "From this the declination of ☾ was found …" and end "And CAB …". Inside it: a curve running from the circumference at *A* to the right and downward to the point *C*; a second curve running from the circumference at *B* downward and to the right through *C* and on toward

[1014] set in smaller, heavier type at the right of a line that carries no time and no figures; no brace or other mark ties it to the line above or the line below.

[1015] the verb is printed *lunt*: its first letter shows neither the top hook nor the left nub of a long *ſ*, and "were" construes it as *ſunt*.

[1016] a printed brace joins this two-line label to the two instrument lines below.

the base; a third curve descending from near *C* to the base, right of centre; and a straight line rising from the base, right of centre, to meet the circumference on the right. Three letters, set in italic capitals:

- A (upper left, at the circumference): A
- B (top, at the circumference): B
- C (inside, right of centre, where the curves from A and B meet): C

From this the declination of ☾ was found by triangular computation, in this way. In triangle ABC there is given:

- AB 34 5½ — elevation of the equator.
- BC 45 11½ — complement of the altitude.
- ABC 143 27 — complement of the azimuth to 180°.
- Therefore CA 74 41 — complement of the declination of ☾.
- And CAB 25 56 — distance of ☾ from the M. C.

Take, therefore, the declination of ☾ at about H. 8 as 15° 20′, just as I also found very nearly by making trials from the remaining altitudes and azimuths.

- H. 8 M. 0½ — distance of the centre of ☾ from Spica: 77 17
- declination of the centre of ☾: 15 20 B
- declination of Spica [Spicæ]: 8 56 A
- right ascension of Spica: 195 50⅔
- angle of the difference of ascension, ſupp.: 74 5 17
- therefore right ascension of ☾: 121 45 23
- H. 8 M. 3⅐ — distance of the centre of ☾ from the heart of ♌ [corde ♌]: 24 0
- declination of ☾: 15 20
- declination of the heart of ♌: 13 58
- right ascension of the heart of ♌: 146 31¼
- angle of the difference of ascension, ſupput.: 24 46 48
- therefore right ascension of ☾: 121 44 27
- H. 8 M. 2 — right ascension of ☾, *limitata*: 121 45 0
- declination B. of ☾: 15 20 0
- Reſp. longitude: 0 37¼ ♌
- latitude: 4 51½
- parallax of longitude, add.: 4 0
- arc of inclination, add.: 6 40
- therefore the true longitude of ☾ in its own circle: 0 48 0 ♌

Everything was worked through twice by calculation, and so is reliable enough.

SUPPUTATIO LOCI LUNÆ AD 10 APRILIS.

- H. 11 M. 39 — distance of the centre of ☾ from Spica: 34 21
- from Arcturus [ab Arcturo]: 49 37
- Spica: longitude 18 1½ ♎ — latitude 1 59 M.
- Arcturus: 18 25⅙ ♎ — 31 2½ B.
- Reſp. longitude of ☾: 13 48 0 ♍, latitude 5 48 0 M.

Here the place of ☾ has been investigated both ways: both from the bare distances from the stars, which you see, taken as given, and from the declination found from the azimuth and altitude, 1° 2′ S, using the distance of Spica ♍.

☾ in degree 90 at H. 11 M. 36. — Arc of latitude, ſubt.: M. 2

At H. 11 M. 40 take the longitude of ☾ as 13 47 ♍, as nearly as can be.

[1] E codice V. [From codex V.]

PRO LOCO ☾ AD DIEM 9 SEPTEMBRIS.

For the place of ☾ on day 9 of September.

- H. 9 M. 12 — distance of the centre of ☾ from the bright star of ♈ [lucida ♈]: 36° 26′
- declination of the centre of ☾: 1 53 0
- declination of the bright star of ♈: 21 28
- right ascension of the bright star of ♈: 26 0⅙
- therefore the right ascension of ☾: 354 26⅓
- Reſp. longitude: 25 38 30 ♓
- latitude: 4 13 30 B.[1017]
- BA 88 7
- CA 68 32
- BC 36 26
- BAC 31 33⅚

This place of ☾ is uncertain because of the uncertain declination of ☾.

CALCULUS PLENILUNIJ ECLIPTICI ANNI 1584[1]

Calculation of the ecliptic full moon of the year 1584.

TEMPUS MEDIÆ ☍ DIE 6 NOUEMBRIS H. 20 M. 16 S. 55 P. M.

Time of the mean ☍: day 6 of November, H. 20 M. 16 S. 55 P. M.

Simple motions corresponding to the mean ☍:

- Precession of the Æquinoct.: 0^{ſ}e^{x}27° 38′ 31″
- Anomaly of the Æquinoct.: 2 52 49 45
- Simple ☉: 3 28 39 36
- Anomaly of ☉: 2 16 33 46
- Anomaly of ☾: 2 4 11 13
- Longitude of ☾ from ☉: 3 0 0 0
- Latitude of ☾: 1 32 50 54

Investigation of the interval between the true and the mean ☍:

- Corrected proſt. of the centre of ☉, add.: 1° 3′ 9″
- Proportional minutes [Scrupula proportionalia]: 0 16
- Equated anomaly of ☉: 2 17 36 55
- Absolute proſt. of the orb of ☉, ſubt.: 1 16 30
- Equated anomaly of ☾, or æq.: 2 4 11 13

[1017] the following four lettered lines stand at the left, beside the lines from the declination of the bright star of ♈ to the longitude; no figure is printed on this page.

- Absolute proſt. of the I epic.: 4 16 47
- Diff. of the proſt., ſubtr.: 3 0 17
- Time assumed: H. 4 M. 0
- Evection of ☾, H. 4: 2 11 2
- Hourly motion of ☾ from ☉: 32 49
- Excess of the diff^{ae} of the proſt. over the evection: 49 15
- Corresponding time: H. 1 30′ 3″
- Diff. of the true and the mean syzygy [Syzygiæ]: H. 5 30 3

Particles of the mean motions corresponding to this interval of time:

- Simple ☉: 0° 13′ 33″
- Anomaly of ☉: 0 13 33
- Longitude of ☾ from ☉: 2 47 39
- Anomaly of ☾: 2 59 40
- Latitude of ☾: 3 1 56

Calculation of the true motions:

- Double anomaly of the æquin.: 5^{s}e^{x}45° 39′ 30″
- Corrected proſt. of the æquin., add.: 17 38
- True precession of the æquin.: 0 27 56 9
- Simple anomaly of the æquin.: 2 52 49 45
- Corrected proſt. of the centre of ☉, add.: 1 3 18
- Proportional minutes: 0 16
- Equated anomaly of ☉: 2 17 50 37
- Absolute proſt. of the orb of ☉, ſub.: 1 16 10
- Simple ☉ from I. ♈: 3 28 53 9
- Longitude of ☉ from I. ♈: 3 27 36 59
- True longitude of ☉: 25 33 8 ♏
- Double longitude of ☾ from ☉: 5 35 18
- Corrected proſt. of the II Epic., add.: 1 31 51
- Proportional minutes: 0 11
- Equated anomaly of ☾: 2 8 42 44
- Absolute proſt. of the I Epic., ſub.: 4 4 6
- Simple longitude of ☾ from ☉: 3 2 47 39
- Longitude of ☾ from the mean place of ☉: 2 58 43 33
- Longitude of ☾: 0 55 32 51
- or ☾: 25 32 51 ♉

Let 34″ be added to the time found before, for the 17 S. by which ☉ exceeds the place of ☾. So that the true time under the meridian of Regij Montis comes out

- November, day 7, H. 13 47′ 32″ P. M.
- Equation to be added: 20 50[1018]
- Time æqu., day 7: H. 14 8 22
- Reduction, ſub.: 38 0[1019]

[1018] a short rule stands below this line.
[1019] a short rule stands below this line.

- Apparent time:
- D. 7 H. 13 30 22
- under our meridian.

[1] E codice V. [From codex V.]

DIE 7 IX$^{BRI^{s}}$ *H. 13½ P. M.*

Day 7 of IX$^{BRI^{s}}$, H. 13½ P. M.

- Equal motion of latitude of ☾: 1^{s}e^{x}35° 52′ 50″
- Proſtaph. of the I Epic., ſub.: 4 4 6
- True motion of latitude of ☾: 1 31 48 44
- True latitude of ☾, Mer.: 0 9 28
- Least eccentricity of ☉: 32234
- Apparent semidiameter of ☾: 17 11
- Semidiameter of the shadow: 47 29
- Variation of the shadow, ſub.: 0 47
- True semidiameter of the shadow: 46 42
- Sum of the semidiameters: 63 53
- True latitude of ☾, merid.: 9 28
- Minutes remaining from the sum [Scrupula reliqua de ſumma]: 54 25
- Diameter of ☾: 34 22
- Digiti Ecliptici [the digits of the eclipse]: 19 0
- Diff. of the semidiameters of ☾ and of the shadow: 29 31
- Scrupula incidentiæ & moræ dim.: 63 9
- Scrupula moræ dimid. ſola: 27 56
- Scrupula incid. ſola: 35 13
- Hourly motion of ☾: 32 49
- Tempus incidentiæ: H. 1 4′ 23″
- Tempus moræ dimid.: H. 0 51 4
- Time from the beginning to the middle: H. 1 55 27
- Tota duratio defectus: 3 50 54
- Beginning under our meridian: H. 11 34 33
- End under our merid.: H. 15 25 27
- The Sun for us [Sol nobis]: 25 52
- The Sun, Prutenic: 25 34[1020]

Ours exceeds it by 18.

- 1^{H} 30^{M} apparent:
- Place of ☉: 25 52
- Place of ☾: 25 47[1021]
- Difference: 5

Reſp. in time 10 minutes [ſcrupula].

Therefore, according to my account of the motions, the middle of the defect [deliquij] is H. 1 M. 40.

[1020] a short rule stands below this line.
[1021] a short rule stands below this line.

- Beginning: H. 11 45′
- In. obſc.: H. 12 50
- Middle: H. 1 40
- Egress: H. 2 30
- End: H. 3 35

Otherwise:

- *The Sun for Copernicus: 25 33* ♏
- *The Sun for us: 25 48*[1022]
- *Difference: 15*
- H. 1 M. 30 apparent:
- Place of ☉: 25 48 ♏
- Place of ☾, add. 16′: 25 49 ♉[1023]
- Difference: 1

Reſp. in time 2 minutes. Therefore, according to my account of the motions, the middle of the defect is H. 13 28 P. M., anticipating the Prutenic time by 2 minutes [Minutis]. Beginning: H. 11 33 P. M.

Apparent time:[1024]

- End: H. 15 23
- Total obſcur.: 12 37
- First recession: 14 19

Note. The observation gave the middle of this defect as 1^{H} 10^{M} *p. M. N., or at most* 1^{H} 11^{M}.

According to the calcul. of the Ephemerides of Cyprian [Cypriani]:

- Dimidia duratio: 1^{H} 50^{M}
- Time of the middle of the defect, equated and reduced to our meridian: 7^{D} 14^{H} 49^{M} P. M.
- Beginning: 12 59
- End: 16 39
- Digiti Eccliptici: 17° 25′
- The equation, moreover, was: 29^{M} add.
- Reduction: 26 add.
- Alphonsines [Alphonſinis][1025]
- Tempus incidentiæ: 1^{H} 6^{M}
- Tempus moræ dimid.: 0 44
- Entry into the shadow: 12 59
- Beginning of total obſcura.: 14 5
- Middle of the defect: 14 49
- First egress from the shadow: 15 33
- End of the whole Ecclip.: 16 39

[1022] a short rule stands below this line.

[1023] a short rule stands below this line.

[1024] a printed brace joins these two roman words to the three italic lines that follow.

[1025] this word stands alone on its line, indented to the measure of the line above it; no value stands beside it.

According to the own calculation of Michael Mästlin [Mæſthlini]:

- Dimidia duratio: 1^{H} 52^{M}
- Time of the middle of the defect, equated and reduced to our meridian: 7^{D} 15^{H} 6^{M}
- Beginning: 13 14
- End: 16 58

Digiti Eccliptici 17° 2′. For the equation and reduction 51 minutes of an hour [51 Min. horæ] were added. Michael Mästlin [Mæſtlino][1026]

- Tempus incidentiæ: 1^{H} 7^{M}
- Tempus moræ dim.: 0 45
- First entry into the shadow: 13 14
- Beginning of total obſcurat.: 14 21
- Middle of the defect: 15 6
- First emersion from the shadow: 15 51
- Total emersion: 16 58

Calculus [Calculation]	Alphonsine [Alphonſinus]	Peurbach's [Purbachij]	Prutenic [Prutenicus]	Michael Mästlin's [Mæſtlini]	Ours [Noſter]
	H. M.	H. M.	H. M.	H. M.	H. M.
Entry [Ingreßus]	12 59	12 31	11 35	13 14	11 33
T. obscuration [T. obſcuratio]	14 5	13 37	12 39	14 21	12 37
Middle [Medium]	14 49	14 21	13 30	15 6	13 28
Egress T. [Egreßio T.]	15 33	15 5	14 21	15 51	14 19
End [Finis]	16 39	16 11	15 25	16 58	15 23

Note. According to the observation in the sky, with each item weighed and examined, the middle of this defect [deliquij] appeared — taking into account also that the Moon lingered about 4 minutes of an hour [4 quaſi ſcrupulis horæ] longer in the entry to the middle than from the middle to the final end — it was, I say, by this reckoning, through a sufficiently exact observation from the Moon itself and from Aldebaran [Aldebora], according to their distance from the meridian

The middle of this defect: 1^{H} 10^{M} P. M. N., or 11^{M} at most.

- *From the beginning to the middle: 1 56*
- *From the middle to the end: 1 52*
- *Total duration: 3 48*

But that our reckoning exceeds by about a third part of an hour is caused by the equation added in minutes.

You will understand the certainty of these from the report and examination of the observations that follow.

[1026] this word stands at the right end of the line that closes with *horæ.*, after a wide gap and after the full point.

OBSERUATIO ET EXAMINATIO ECLIPSIS LUNARIS QUÆ APPARUIT CIRCA MEDIAM NOCTEM INTER 7 ET 8 DIEM NOUEMBRIS 1584[1].

Observation and examination of the lunar eclipse which appeared about midnight between the 7th and 8th day of November 1584.

As this lunar defect came on, the sky was covered with clouds, and there was a violent storm with recurring showers. At times, however, a strong force of winds so thinned or somewhat scattered the clouds that the Moon itself could be seen through the thinner clouds; at times, too, it could be seen more clearly between the torn clouds, and this happened especially at the end, when the clouds had been driven off and pulled apart by the winds. Since, however, no stars could be seen because of the intervening clouds, while the Moon itself showed through the clouds, we obtained the distance of ☾ itself from the meridian by our equatorial armillae [Armillas noſtras æquatoreas] in this way.

As soon as we could notice through the clouds that something of the Moon was missing, about the middle of the Moon was 38 minutes of one hour [ſcrupulis 38 vnius horæ] from the meridian towards the east; and from this, from the apparent place of ☾ and the place of the Sun, it is gathered that it was hour 11 17½. But since the eclipse must have begun a little before, we shall err — infallibly, as far as the senses go [infallibiliter quo ad ſenſum aberrabimus] — if we set the beginning of this defect at hour 11 M. 15 p. m.

When a quarter of ☾ was missing in the shadow, the middle of ☾ was 0ʰ 29ᵐ from the meridian by the equatorial armillae; the corresponding time is 11ʰ 26½ᵐ. By the corrected clock, 11ʰ 35ᵐ. About half of ☾ was missing, but not corrected [recte: *certum* for the printed *correctum*, "not certain enough" — Corrigenda, p. 430] *well enough because of the clouds.*

[1] E codice V, deſunt in codice C. [From codex V; they are lacking in codex C.]

When about a third of the Moon remained illuminated, the western limb of ☾ was 0ʰ 8½ᵐ from the meridian; in time this makes 11ʰ 46½ᵐ p. m.

When, broadly [Greek: ἐν πλάτει (en platei, "in breadth" — i.e. roughly, in round terms)], nothing of ☾ could be seen, the corrected clock showed 12ʰ 12ᵐ, but this is not certain enough.

Note: when ☾ⁿᵃ was crossing the meridian and it was nearly midnight — a little before, ☾ had crossed the meridian by its western limb — about a quarter of the Moon was still illuminated, which should be noted. Therefore, since it was then, on account of the true motion of ☾, about one minute of time before midnight, and 8½ minutes [ſcrupula] of ☾ were illuminated, it was consistent that the total entry into the shadow should occur 16 minutes later, or a quarter of an hour after midnight. This, however, is not so very exact, since ☾ was labouring in the clouds. Yet this time fits better than the one taken earlier by the clock ἐν πλάτει.

Remember, however, that up to this point the Moon was always in thinner clouds, so that it could not be made out so exactly, except in so far as it showed through them in some way.

Diagram. A circle set at the left of the paragraph that begins *Cum ☾ eßet vltra meridianum*, the paragraph's lines running round it at the right. Nearly the whole disc is filled with short horizontal hatching strokes; a narrow unhatched crescent runs along its left edge, bounded by an inner arc. No lettering, no text and no figures inside or beside it (looked).

When ☾ was beyond the meridian by hour 1 59⅓ by the armillae, it had itself regained a little light, so that about an eighth part of the semidiameter was seen illuminated, as you see drawn here, so that about two minutes of ☾ appeared. In time this corresponds to hours [Horæ] 14 M. 1. If from this you subtract about four minutes [quaterna ſcrupula], you will have, broadly [ἐν πλάτει], the first egress at hour 13 M. 57. And this fits well enough. For if the entry was 12ᴴ 15ᴹ and the first egress hour 13 M. 57, the whole stay in darkness was H. 1 M. 42, and half of it 51′, which fits well enough with the reckonings of Copernicus [Copernici]. But since the entry was slower than the egress, relative to the middle of the defect [deliquij], by about 4 minutes, the preceding stay was of 53 minutes and the following only 49; from this it is gathered that the middle of the defect was at hour 1 M. 8 p. M. N., which falls short of the time noted above by only two almost imperceptible minutes.

When about a quarter of ☾ was illuminated, or perhaps a little more, the eastern limb of ☾ was, in the armillae, 2ᴴ 19½ᴹ from the meridian; from this the time comes out as 14 19½. And at the same instant we observed the eye of ♉ at a distance of 1ᴴ 42½ᴹ from the meridian towards the west; and from this, from its right ascension in this year, 63 4, and the right ascension of ☉, the time comes out as 14ᴴ 21ᴹ, exceeding the preceding one by one and a half minutes [ſeſquialtero ſcrupulo] — perhaps because it had been taken a little too far[1].

Diagram. A circle set at the left of the paragraph that begins *Quando paulo plus quam duæ tertiæ*. An arc bulging to the left cuts off a lens-shaped part at the right of the disc, which is densely cross-hatched; the rest of the disc, at the left, is left blank. No lettering, no text and no figures (looked).

Diagram. A circle set below the preceding one, at the left of the paragraphs that begin *Quando quaſi quarta pars* and *Cum quinta quaſi pars*. An arc cuts off a narrower lens-shaped part at the right of the disc, densely cross-hatched; the rest of the disc is blank. No lettering, no text and no figures (looked).

When a little more than two-thirds were illuminated, the eastern limb of ☾ was H. 2 M. 26¼ from the meridian; in time this corresponds to H. 14 M. 29. At the same instant the eye of ♉ was 1ᴴ 52⅓ᴹ from the meridian; the corresponding time is 14 · 31, exceeding the former by about two minutes, which is almost imperceptible.

When about a quarter of ☾ remained unilluminated, the eastern limb of ☾ was 2ᴴ 28⅙ᴹ from the meridian; to this there corresponds in time 14 31 from noon. But the star Aldebaran [Aldeboran ſtella] at the same instant was H. 1 M. 53⅔ from the meridian; to this corresponds the time H. 14 M. 32⅙, very slightly exceeding the preceding one.

When about a fifth part of the Moon remained darkened, the eastern limb of ☾ was 2ᴴ 31¾ᴹ distant from the meridian, and there correspond in

[1] In Hiſtoria Cœleſti (p. 83) editor addit hanc annotationem: »Sic habet exemplum, ſed inſerta aliena manu, et haud dubie vitioſum«. Tota hæc obſeruatio eſt in codice V. manu ipſius Tychonis ſcripta, neque quicquam alia manu ibi adſcriptum eſt. [In the *Historia Cœlestis* (p. 83) the editor adds this note: "So the copy has it, but inserted by another hand, and without doubt faulty." This whole observation is written in codex V in the hand of Tycho himself, and nothing there is written in by another hand.]

time 14 34½; but by the eye of Taurus [oculum tauri], which at the same instant was 1ʰ 57½ᵐ away, the time was H. 14 M. 36, exceeding the former by about one and a half minutes [ſeſquialtero minuto].

Diagram. A circle set at the right of the first six lines of the page, the lines running short of it at the left. A narrow lens-shaped part along the right edge of the disc, bounded by an inner arc, is filled with short horizontal hatching strokes; the rest of the disc is left blank. No lettering, no text and no figures inside or beside it (looked).

*When the eastern limb of ☾ was H. 2 M. 56 from the meridian, it seemed almost to have stopped being eclipsed. The corresponding time is H.14M.59½. But the eye of ♉ was then H. 2 M. 22½ from the meridian, to which there corresponds in time H. 15 M. 1 — almost two minutes more than before. Then immediately, at almost the same instant, when the eastern limb of ☾ was 2ʰ 57½ᵐ away, the whole Moon appeared quite clearly on every side; and this was, in time, at hour 15 with the first minute elapsed [hora 15 Minuto primo elapſo], and then the Moon stopped being eclipsed. If we took the eye of Taurus into account [in conſilium adhiberemus], it would then have been at most hour 15 M. 3 when the Moon ceased. For two minutes of time later, ☾ was shining very brightly all round [circum circa] all its edges. So there can be no doubt that it was entirely freed from the shadow of the Earth two or at most three minutes after the third hour after midnight; and from this, conterendo [?][1027] * *the first entry, we shall investigate the middle of the defect [deliquij] in the way that follows, taking account at the same time [habentes vna rationem] that the Moon laboured more slowly in the entry than in the exit.*

- *Final end of the defect [Finis vltimus deliquij] 15ʰ 3ᵐ*
- *First beginning of the defect [Initium primum deliquij] 11 15*
- *Total duration 3 48*
- *Half duration 1 54*

But since the line of the entry of ☾ to the middle of the shadow is longer than the line of the egress by almost 2½ minutes of a degree [ſcrupula gradus], to which there correspond in time, according to the motion of ☾, about four minutes, there will be

- *the first half duration [prior dimidia duratio] 1ʰ 56ᵐ*
- *the following half duration [ſequens dimidia duratio] 1 52*

And when these are added to the beginning or subtracted from the end, the middle of the defect comes out in this way:

[1027] The fourth letter prints with the top of a t and the foot of an f; conferendo, "comparing", is the likely reading (an f whose hook did not print).

- *Beginning 11ᴴ 15ᴹ*
- *I. Stay [Mora], add 1 56*
- *Middle of the defect 13 11*
- *End 15ᴴ 3ᴹ*
- *1 52*
- *Middle of the defect 13 11*[1028]

By this reckoning the middle of the defect is gathered to have been at hour 1 and 11 minutes [hora 1 ſcrupulis 11] P.M.N. But since the observations [obſeruatio] of ☾ always gave 2 minutes before Aldebaran [Aldeboran], and since from the beginning of the total entry and of the first egress we found above H. 1 M. 8, we shall have acted reasonably and shall err imperceptibly if we set the middle of the defect at 1ᴴ 10ᴹ, or rather 1ᴴ 8ᴹ. You will do most correctly if you use 1ᴴ 8ᴹ.

But lest we seem to have found these times from the observations of the Moon and of Aldebaran without reason, sure demonstration and arithmetical practice, we shall append the demonstration and computation of the principal ones.

- Time of the first appearance, presupposed [Tempus primæ apparitionis præſuppoſitum], H. 11 M. 17.
- Longitude [Longitudo] ☾ 24°32′ ♉
- Latitude Mer. 0 3[1029]
- C Pole of the Equator [Polus Æquatoris],
- B Pole of the Horizon [Polus Horizontis],
- A Place of ☾ [Locus ☾].
- BC Distance of the poles [Diſtantia polorum] 34° 5½
- CA Comp. Declin. ☾ 71 1
- Ang. BCA Diff. Asc. ☾ & M. C. 9 32
- Side [Latus] BA 37 40
- Altitude ☾ 52 20
- For the parallax of the altitude of ☾ [Pro parallaxi Altitudinis ☾].
- Distance of ☾ from the zenith [a vertice] 37 40
- Double distance 75 20
- Limits I & II diffª sub. 1′23″
- Parallax of limit II [II limitis Parallaxis] 32 49
- Parallax of limit III 39 1[1030]
- III & IV lim. diffª A. 2 10
- First proport. minutes [Scrupula proport. priora] 0 8
- II lim. Parallax corr. 32 49
- III lim. Parallax corr. 39 1

[1028] the two groups of three lines stand side by side on the leaf, the first at the left and the second at the right, with no rule between them; the second line of the right-hand group carries figures only, with no label.

[1029] a printed brace at the right joins the two preceding lines to the word *vera*, "true".

[1030] these two lists are the two columns of a setting divided by a printed vertical rule, the first list at its left and the second at its right. The letters C, B, A, BC, CA and BCA cite a figure; no lettered figure stands on this page.

- Differ. of the parallaxes 6 12
- Equated anomaly of ☾ [Anomalia ☾ coæquata] 129 43
- Second proport. minutes [Scrupula proport. poſteriora] 47 46
- Parallax of altitude 38 0
- For the parallaxes of longitude and latitude of ☾.

Diagram. A circle at the left of the column. A horizontal straight line runs across it from G at its left edge to K at its right edge; H stands just below this line near its left end, and I just below it left of the centre. A straight line runs from F on the upper left of the circle down through I to L on the lower right. A curved arc runs from D at the top of the circle down to the horizontal line at H; along it B stands above and A below the point where the straight line from F crosses it. A second arc runs from E on the upper right of the circle down and to the left, ending at C, which stands just right of B on the straight line from F. The legend at the right of the figure:

- D pole of the horizon [polus horizontis]
- E pole of the ecliptic [polus eclipticæ]
- A apparent place of ☾ [locus ☾ viſus]
- B true place of ☾ [locus ☾ verus]
- F MC, 15° 6′ ♉
- I Ascendant [Aſcendens] 28° 45′ ♌
- Side BI 94 13, diff. of the place and the ascendant
- Side BH 52 20, altitude of ☾
- Side HI 83 5, by 25 IV Regiomont.
- Angle HBI 84 31
- Triangle ABC
- The angle at C right,
- The angle at B known
- Side BA 0°38′
- Angle BAC 5 29
- Side AC 0 37 47″, parallax of latitude of ☾, add.
- Side BC 0 3 37, parallax of longitude of ☾, sub.
- True place of ☾ 24°32′ ♉
- Parallax sub. 4
- Apparent longitude [Longitudo viſa] 24 28 ♉
- True latitude of ☾ 0 3 M.
- Parallax add. 0 38
- Apparent latitude 0 41
- Ascension R. ☾ 52 16
- Therefore ☾ crossed the meridian at H. 11 55′½.
- H. 2 0′ P.M.N.
- For the parallaxes of ☾ from the Prutenic Tables [ex tabulis Prutenicis]
- At the beginning of ♉ [Ad initium ♉]
- Distance from the zenith [a vertice] 50°55′
- Side of longitude [Latus longitudinis] 39 37

- Side of latitude 45 4
- At the beginning of ♊
- Distance from the zenith 42 48
- Side of longitude 35 16
- Side of latitude 48 33
- Place of ☾ 26°10′ ♉
- True distance from the zenith 43 50
- True side of longitude 35 50
- True side of latitude 48 6
- Equated anomaly of ☾ 4ˢ 9°
- Parallax of altitude 42′39″
- Parallax of longitude of ☾ 25 Sub.
- Parallax of latitude of ☾ 34 ad.
- Longitude of ☾ 25°45′ ♉
- Latitude of ☾ 0 44 M.[1031]

Hence, since it was the eastern limb of ☾ that was being observed, when its semidiameter of 17′ is added there results

- Ascension R. ☾ 53°53′
- Ascension R. ☉ 233 30

And so ☾ crossed the meridian at H. 12 1½.

- H. 3 M. 2 P. M. N.
- Altitude of ☾ 40°37′
- Equated anomaly of ☾ 129 0
- Parallax of altitude 46′47″
- Parallax of longitude 33 sub.
- Parallax of latitude 34 add.
- True longitude of ☾ 26 44 ♉
- True latitude of ☾ 0 14 M.
- Longitude 26 11 ♉
- Latitude 0 48 M.[1032]
- Ascension R. ☾ 54 21
- Ascension R. ☉ 233 32

From which ☾ would cross the meridian at H. 12 3′¼.

Taking account, therefore, of the parallaxes of ☾, the times of the eclipse [Eclipſeos] were derived from the observation as follows.[1033]

[1031] a printed brace joins the two preceding lines to the word *viſa*, "apparent", which stands between the labels and the figures.

[1032] a printed brace joins the two preceding lines to the word *viſa*, "apparent".

[1033] the lists from *III & IV lim.* to *H. 11 55′½* are the left column, and those from *H. 2 0′ P.M.N.* to the sentence above the right column, of a setting divided by a printed vertical rule.

	The middle of the body was distant from the meridian by the Armill. [Medium corpus a Meridiano diſtabat per Armill.]	Times derived from this [Tempora inde deducta]
First appearance seen by us [Prima apparentia nobis conſpecta]	$0^{H}\ 38^{M}$	$11^{H}\ 17^{M}½$
One quarter of ☾ was missing [Vna quarta ☾ abfuit]	0 29	11 26½
A little beyond half [Parum vltra dimidium]	0 16⅝	11 39

At the corrected clock hour [Hora Horologij· correcta] 11 34, about half was missing, but because of [clouds] this is not certain enough.[1034]

- (head) Western limb [Occidentalis limbus] ☾; Temp.
- No more than a third part remained 0 8½; 11 46½
- At the corrected clock hour 12 12, en plati [in the rough], nothing was seen of ☾.
- After the passage of ☾ through the meridian [Poſt tranſitum ☾ per Meridianum].
- The small part [Particula] of ☾ which appeared restored was distant, in the armillae, from the meridian
- 1 59⅓; 14 1⅔
- (head) Eastern limb [Orientalis limb.] ☾; Temp.
- About a fourth part had been illuminated $2^{H}\ 9½^{M}$; $14^{H}12^{M}$
- About half was beginning to leave the shadow 2 17⅙; 14 19½
- Somewhat more than ⅔ were illuminated [illum.] 2 26¼; 14 29
- A fourth part remained not illuminated 2 28⅙; 14 31
- About a fifth part remained 2 31¾; 14 34½
- It seemed to have ceased 2 56; 14 59¼
- It appeared quite whole 2 57½; 15 1
- Very bright all round
- it appeared [app.] at the limb 2 59½; 15 3[1035]

From the observation of the eye of ♉ [Oculi ♉], which crossed the meridian that day at H. 12 38′36″.

[1034] the square brackets around the word *nubes*, "clouds", are printed on the leaf.

[1035] the two lines marked "(head)" are head lines in smaller type standing over the two figure columns. The line on 12 12 and the centred line on the passage through the meridian carry no figures. The figures belonging to the *Particula* line stand on the line below it. The last entry is set on two lines, *Admodum clara vndiquaque / in limbo app.*, the second set to the right and carrying the figures.

	Aldebaran [Aldeboram] was distant toward the west from the meridian	Corresponding times [Tempora correſpondentia]
☾ about half was beginning to leave the shadow	1ᴴ42′½	14ᴴ21′
Somewhat more than ⅔ were illuminated	1 52⅓	14 31
About a fourth part remained not illuminated	1 53⅔	14 32¼
About a fifth part remained	1 57½	14 36
It seemed to have ceased	2 22½	15 1

1036

NB. You may note that two thirds of one minute must be added to the times sought from the observation of ☾, because, in order to find the right ascensions [Aſcenſiones Rectas] of ☾, its place was derived from the time of the middle of the defect [medij deliquij] given by our calculation (13ᴴ 28ᴹ), at which ☾ would have been in 25° 48′ ♉. But the observation proves that the middle of the eclipse was 18 M. earlier in time.

OBSERUATIO EIUSDEM ECLIPSIS LUNARIS

Observation of the same lunar eclipse, made by D. Heinrich Brucaeus [Henrico Brucæo] at Rostock [Roſtochij].

- When ☾ seemed to be wholly darkened, the altitude of Procyon [Procyonis] was 26°
- As soon as it began to emerge from the shadow, the altitude of the same 37
- When it seemed to emerge wholly from the shadow, altitude [Alt.] of Procyon 41.

From these he derived the times as follows.

- The beginning of the eclipse fell at the hour 11 8′32″
- The beginning of the total occultation, however, at H. 12 11 44
- The middle of the total darkening at the hour 1 1 48
- The end of the total occultation at the hour 1 51 52
- It emerged wholly from the shadow at hour 2 55 4

Our calculation [Noſter Calculus]

- Altitude of Canis Minor [Altitudo Canis Minoris]: 26ᴾ, 27, 37, 40, 41
- For these altitudes the time was computed in order, at an elevation of the pole of 54° 0′, in the way that follows.[1037]

Time from altitude [Tempus ex Alt.] 26°

- 36° 0′ Compl. altitude of the pole [Compl. Alt. poli]

[1036] the head over the labels is blank on the leaf; the two figure heads are set in smaller type, each on two lines (*Aldeboram diſtabat / verſus occaſum a meridiano*; *Tempora corre- / ſpondentia*).

[1037] the label *Altitudo Canis Minoris* is set in five divided lines at the left (*Alti- / tudo / Canis / Mino- / ris*), a printed brace joins it to the five figures, one to a line, and the sentence *Ad has Altitudines … modum vt ſequitur.* stands at the right of the figures in five centred lines.

- 83 46½ Compl. of the declination
- 64 0 Compl. of the altitude
- 53 7⅓ Angle Dist. from the meridian [Angulus Diſt. a Meridiano]
- Ascension R. of Procyon [Aſcenſio R. Procyonis] 109°23′[1038]
- Ascension R. of the mid-heaven [Aſcenſio R. Medij Cæli] 56°15′40″
- Ascension R. ☉ 232 54
- Time [Tempus] H. 12 11′25″.
- Altitude 27ᴾ.
- Angle dist. from the Merid. [Angulus diſt. a Merid.] 51°11′
- Ascension R. M. C. 58 12
- Time H. 12 19′10″.
- Altitude 37ᴾ.
- Angle dist. from the Mer. 28 23
- Ascension R. M. C. 81 0
- Time H. 13 50′5″.
- Altitude 40ᴾ.
- Dist. of Procyon [Procyonis] from the Mer. 18 12
- Ascension R. M. C. 91 11
- Time H. 14 30′40″.
- Altitude 41ᴾ.
- Angle dist. from the Mer. 13 26
- Ascension R. M. C. 95 57
- Time H. 14 49′45″.[1039]

But these observations are not to be relied on with certainty as regards an exact reckoning, because it was taken roughly [groſſo modo] with a small instrument, and the altitudes, especially those near the meridian, do not give certain times precisely enough.

Note. According to Heinrich Brucaeus's [Brucæi] record, the middle of this defect comes out at 1ᴴ 4ᴹ P. M. N., if the inequality of the passage of ☾ through the shadow is taken into account; and so it falls short of our observation by at least 4 or 5 minutes of an hour [ſcrupulis horæ] — and rightly, since we are that much further east.

OBSERUATIONES RELIQUORUM QUINQUE PLANETARUM.

Observations of the remaining five planets.

DIE 6 JANUARIJ.

- At hour [Hora] 5¾, between ♄ and the first of the wing of Pegasus [primam alæ Pegaſi] 21 37

[1038] the passage from *Our calculation* to here is set as two columns divided by a printed vertical rule — the brace, figures and sentence at the left, the computation headed *Tempus ex Alt. 26°* at the right.

[1039] these two lists are the two columns of a setting divided by a printed vertical rule, the first list at its left and the second at its right; the *Tempus* and *Altitudo* lines are centred in their columns.

- 21 35
- 21 35
- At hour 6¼, between ♃ and the first of the wing of Pegasus 21 48
- 21 47¼
- 21 49
- At hour 6¾, between ♄ and the bright one of ♈ [lucidam ♈] 44 0
- 44 1½
- 44 0
- At hour 7¼, between ♃ and the bright one of ♈ 38 26
- 38 27[1040]

These distances above were taken with the Trigonic Sextant [Sextantem Trigonicum].

DIE 3 FEBRUARIJ, MANE.

- *About H. 6½.* Between ♀ and Spica [Spicam] ♍ 80 37
- *This difference arose* 80 40
- *because of the dawning day* 80 34
- H. 6½ and after [& deinceps]. ♀ azimuth from the south [a meridie] toward the east [verſus ortum] 36 0, altitude 8 47
- After the rectified Quadrant [Poſt rectificatum Quadrantem]: 34 0, 9 30½
- 33 0, 9 51
- 32 0, 10 11
- 31 0, 10 30[1041]

And in all these azimuths account was taken of 10 minutes [Minutorum], by which the circle of azimuths [circulus Azimuthorum] is not set correctly to the meridian line.

DIE 3 FEBRUARIJ, VESPERI.

With the Trigonic Sextant.

- At hour 6, between ♄ and the bright one of ♈ [lucidam ♈] 41 13½ twice [bis]
- At hour 6⅓, between ♃ and the first 21 56½
- of the wing of Pegasus 21 56½
- At hour 6½, between ♃ and the first 24 4⅔
- of the wing of Pegasus 24 4⅔
- At hour 6⅔, between ♃ and the bright one of ♈ 35 5 40

[1040] a small printed brace at the right joins the two lines *21 35* to the word *bonæ*, "good", set small and divided *bo- / næ*. The first two entries are each set on two lines, *Hora … & primam / alæ Pegaſi* with the figures on the second.

[1041] the label *Poſt rectificatum Quadrantem* is set in four divided lines at the left (*Poſt recti- / ficatum / Quadran- / tem*) and a printed brace joins it to the four lines of figures; in each of these lines the first group stands under the azimuth figures above and the second under the altitude figures.

- twice[1042]

DIE 4 FEBRUARIJ, MANE.

- About the middle of the seventh hour, between ♀ and Spica [Spicam] ♍ 81 27⅓ twice
- Not exact enough because of the dawning day. Azimuth ♀ 36 0, altitude 8 47
- 35 0, 9 10
- 34 0, 9 30
- 33 0, 9 50

(Account was also taken here of those 10 minutes [Minutorum]. The azimuths, however, are counted from the south toward the east)[1].

- At H. 9 11′45″ ♀ on the Merid. had an altitude, by the Q. Tichon., of 15 20

[1] From codex V. [E codice V.][1043]

Soon afterwards, at noon, the clock [Horologium] was found to have advanced 22′ 25″ faster than it should.

DIE 5 FEBRUARIJ, MANE.

- About hour 6, between ♀ and Spica ♍, by the Q. portat. 82 22
- Second observation 82 22
- with a quite clear sky 82 22
- About hour [Hor.] 7: azimuth of ♀ 26 0, altitude 11 57
- 25 0; 12 11½
- 24 0; 12 25[1044]

In the azimuths, account was taken of the 10 minutes [Minut.] by which the circle deviated from the meridian line. They are counted from the south toward the east [verſus ortum].

- H. 9 M. 10: ♀ had a meridian altitude [Alt. merid.], by the Q. portat., of 15 17
- H. 9⅓: distance of ♀ from ☉ by the Sext. Trig. 45 42
- 45 40
- 45 40
- 45 42

[1042] the word *bis* is set in small type — after the fraction on the first line, and on a line of its own under *40* after the last entry.

[1043] the first entry under 4 February and the entry *Non ſatis exquiſite …* are each set on two lines; the parentheses around the remark are printed on the leaf, and the raised *1* after them calls the footnote at the foot of the left column.

[1044] on the leaf the first entry is set on two lines (*Circa Horam 6, inter ♀ & Spicam ♍ / per Q. portat. 82 22*), the figures on the second; the second entry is likewise set on two lines, *Secunda obſervatio / cælo bene ſereno*, each line carrying its own *82 22*. On the azimuth lines the leaf prints *Azim.* and *Alt.* only on the first line; the two continuation lines carry figures only.

• 45 41[1045]

Both the refraction and the parallax of ☉ and ♀ must be taken into account, if the operation is to be put to the test of the balance [ad trutinam].

At noon, moreover, the clock was running 8′40″ faster.

DIE 25 FEBRUARIJ, VESPERI.

We observed ☿, which appeared very conspicuously next to Jupiter; in appearance it was not much smaller than Jupiter itself and equal to the stars of the first magnitude, even surpassing some of them. It was distant from ♃ about p. 2 Min. 50 — at times somewhat more, at times somewhat less, as the radius [radio] showed it — but in certain [recte: *quasdam* for the printed *quoſdam* — Corrigenda, p. 430] *azimuths its altitude was observed as follows.*

- *In azimuth [Azim.] 83 0, altitude [Alt.] 8 17*
- *85 0; 7 0*
- *86 0; 6 21*[1046]

These azimuths were counted from the south toward the west [verſus occaſum]; from this its declination can be given.

Then, to derive the right ascension and the longitude, we took the distance from Aldebaran [Aldeboram] as follows.

From hour 6½ to hour 7⅙ ☿ was observed to be distant from Aldebaran:

- *H. 6 M. 35 — I 60 12½*
- *II 60 10*
- *III 60 9*
- *IV 60 7½*
- *V 60 5*
- *VI 60 2*[1047]

This difference, however, was not produced by an error of observation but by the fact that Mercury [Mercurius] was steadily approaching the horizon and shining more and more through the refracted ray. It appeared best and most clearly when the distance was 60ᵍ 7½′; yet even then it was a little too low for this distance to be exactly right, since around the first observation it was raised not much more than 6 degrees [Gradus].

We shall therefore act more correctly and more plausibly if we take the distance at about hour 6½ as p. 60¼, so that you avoid the refraction that occurs as far as possible; and from this, and from the given declination, its right ascension [Aſc. R.], and finally its longitude and latitude, can be found.

[1045] on the leaf the first of these entries is set on two lines, its figures on the second (*portat. 15 17*); the second entry's words are set on three lines (*H. 9⅓ Diſtantia ♀ / a ☉ per / Sext. Trig.*), each line carrying a figure pair, and two further figure pairs stand below with no words.

[1046] the first of these lines closes the paragraph on the leaf (*modum. In Azim. 83 0, Alt. 8 17*), with a comma printed after *83 0*; the continuation lines carry figures only.

[1047] *H. 6 M. 35* stands at the left of the first index line only.

DIE 26 FEBRUARIJ, MANE.

Between hour 5 and 6, the distance of ♀ from Spica ♍. ♀ was very low.

- 102 13½
- 102 13⅔
- 102 13¾
- 102 14
- 102 14
- 102 14¼
- H. 5 52′, between the orient. limb. of ☾ and ♀: 12 58½
- 12 58⅔[1048]

At noon on the following day the greatest clock [horologium maximum] had advanced 2½ M. faster than it should.

DIE 26 FEBRUARIJ.

We observed ♃ and ☿ again. At hour 6½ ♃ was distant from Aldebaran about 58 10 [58 10 quaſi].

For afterwards, as it approached the horizon, it appeared at minute 7, then 4¾, then 3, and that through the refracted ray; so you would take 58⅙ as the truer value.

It was, moreover, H. 6 35½′.

- *♃ azimuth [Azim.] 83 43, altitude [Alt.] 5 54*

About hour 6¾ we twice observed, with care, that Mercury was distant from Aldebaran [Aldeboram] 58 52½, and a little before we found 58 51½ once. The azimuth of Mercury was then 88 7 from the south toward the west, and its altitude [Altit.] 5 48; from this its declination will be given. But account must be taken of the refraction that can occur at that altitude. This evening, therefore, ☿ is distant from Aldebaran by p. 1¼ less than yesterday, while in longitude itself it has advanced a little less still; hence it is clear that the reckoning of Copernicus agrees with the daily motion of Mercury, whereas the Alphonsine reckoning disagrees.

At hour 7 the distance between ♃ and ☿ by the radius [Radium] was 2 39, and that roughly on a line drawn from Jupiter [Ioue] through Mercury within [recte: *infra* for the printed *intra*, "below" — Corrigenda, p. 430] *the rear wheels of the Bear [Vrſæ], roughly in the middle of the space between these and the star* [recte: *ſtellas* for the printed *ſtellam*, "the stars" — Corrigenda, p. 430] *in the tail of Ursa Minor [vrſæ minoris]; for it was not possible to discern it for long enough, because ♃ was setting quickly. ☿, however, was everywhere more northerly and higher than it.*

DIE 28 FEBRUARIJ.

		Azim.	Alt.
6ʰ33′50″	☿	85 20	9 13
6 38 55		86 24	8 31

[1048] the first figure pair stands at the end of the line *Erat ♀ admodum decliuis.*; the entry *H. 5 52′ inter orient. / limb. ☾ et ♀* is set on two lines, each carrying a figure pair.

		Azim.	Alt.
7 10 39	Aldeb.	45 55	42 22*
10 3 55	Can. mai.	41 38	9 28
10 16 5	Mer. Cap. II	54 48	54 24
10 24 26 [recte: 10 22 26 — Corrigenda, p. 430]		56 50	53 37½
11 5½	Cor ♌	21 33½	47 33

• * ἐν πλάτει [Greek: *en platei*, "in the rough"]; it was not clear enough.[1049]

All these azimuths were counted from the south toward the west.

DIE 29 FEBRUARIJ, MANE.

Azimuth [Azim.] of ♀ from the south toward the east.

• H. 5 39′ 8″ 48 35, altitude [Alt.] 4 53
• 5 42 31 47 54; 5 13

The altitude of this later observation is fair [mediocris], the azimuth not entirely certain, because a beam set upright against the roof hindered the observations somewhat; and both are more or less ἐν πλάτει, since it was not quite clear and there was no time to adjust the instrument.

• About H. 6, before and after, between the bright one of Lyra [lucidam lyræ] and ♀ 62 23⅔
• 62 23¾
• 62 22½
• 62 23

On the same day at noon the greater clock [Horologium Maius], which we used in the preceding observations, was running 7 Min. fast; this error had come upon it since 26 February [Feb.], the day on which ☉ was last seen in the meridian.

DIE 1 MARTIJ.

• Hour 5 23′: azimuth of ♀ from the south toward the east 49 34, altitude [Alt.] 4 23
• 49 10; 4 40
• 48 55; 4 45*

*Not precise enough. In the azimuths 10 minutes [Minuta] have been added because of the error of the circle, which deviates from the meridian line.

• About H. 5½, between Spica ♍ and ♀, by the portable Q. [Q. portatilem] 106 22¼
• 106 21⅓

[1049] the note marked with the asterisk is set on the leaf as a narrow column in smaller type to the right of the table rows, in eight short lines (*ἐν / πλά- / τει / *non* / *erat* / *satis* / *sere-* / *num*); the asterisk also stands after the altitude *42 22* of the Aldeb. row. In the last row the azimuth *21 33½* and the altitude *47 33* are set close together, with no space between *33½* and *47*. The first time group carries a raised *H*, a prime and a double prime; the other six carry no marks.

- 106 22
- 106 22 10
- At H. 5¾, between the bright one of Lyra and ♀ 62 42½
- 62 43 about [fere]
- 62 42¼
- 62 42½

At noon the next day the greater clock was found to be 8 Min. slow.

- In the evening, from H. 6 26 to H. 6 36, the distance of ♃ from the eye of ♉ was observed several times by the portable Q. [Q. port.] 57 16⅔
- 57 16¼
- 57 16 twice [bis]
- 57 15½
- Hour 6 24′: azimuth of ♃ from the south toward the west 84 0, altitude 5 57½
- From H. 6 45′ to H. 6 56, the distance of ☿ from the eye of ♉ by the portable Q. 54 58½
- 54 57½ twice [bis]
- 54 57
- 54 56½
- Hour 6 52¾′: azimuth of ☿ from the north [a Septent.] toward the west 88 0, altitude 6 21

Account was also taken of the 10 M. by which the azimuthal circle is not set correctly to the meridian line.[1050]

DIE 2 MARTIJ.

Hour 6 22′: ♃, among clouds, in azimuth [Azim.] from the south toward the west [verſus occ.] 84 53, altitude [Alt.] 5 44.

DIE 3 MARTIJ.

- From hour 6½ onward ☿ was distant from the eye of ♉, by the Sext. Trig. 53 45½
- 53 45
- 53 42
- 53 42¼
- 53 44½
- 53 44
- A little before and after H. 7, between ☿ and the head of Andromeda [Andromedæ] 26 36½
- 26 34
- 26 35
- 26 37

[1050] on the leaf *fere* and both instances of *bis* are set in smaller type after their figures.

- 26 35[1051]

	Azim. ☿ a Sept. verſ. occ.	Alt.
H. 6 40′10″	89 0	7 50
6 48 40	87 10	6 34
7 2 35	84 0	4 43*

*This one is not precise enough.[1052]

About H. 7 8′, ☿ was seen to be distant from the horn [cuſpide] of ☾ nearest to it, by the Radius [Radium], 0°34′; a little later 0°30′, and then 0°26′.

H. 8 10′30″: Canis Minor in azimuth from the south toward the west 11° 0′, altitude 39°56′.

DIE 4 MARTIJ.

H. 5 35′: ♀, free of the clouds that had covered it before, in azimuth [Azimutho] from the south toward the east 48°0′, altitude 5°52′. The azimuth is not precise enough because of the beam [trabem], yet it is fair [mediocre].

About the same time the distance of ♀ from the bright one of Lyra [lucida lyræ] was found to be 63 45½, once only; for this one could not be seen any longer because of the dawning day, so it is doubtful whether it is precise.

At noon on the same day the clock [Horologium] [recte: add *maius* after *Horologium*, "the greater clock" — Corrigenda, p. 430] was found to have advanced 4 Min. slower than it should since 1 March [Martij].

The same day in the evening, about H. 7.

- Between ☿ and Aldebaran [Aldeboram], by the Sext. Trig. 53 20
- 53 18½
- 53 19¼
- H. 7 M. 7: azimuth of ☿ from Sept. toward the west 84 16, altitude 4 51½[1053]

At noon the next day the index of the greater clock [Maioris Horologij] had advanced 3 Min. faster than it should.

DIE 5 MARTIJ.

- H. 6 35′ Between ♃ and Aldeb. 56 12
- 6 40 — 56 11¾
- 6 48 Between ☿ and Aldeb. 52 59¾

[1051] on the leaf the words of each of these two entries are set on three lines (*Hora 6½ & deinceps / diſtabat ☿ ab oculo / ♉ per Sext. Trig.*; *Paulo ante & poſt H. 7 / inter ☿ & caput / Andromedæ*), each line carrying a figure pair, and the remaining figure pairs stand below with no words.

[1052] the head of the middle column is set on two lines (*Azim. ☿ a / Sept. verſ. occ.*), in smaller type, as is the head *Alt.*; the time column has no head.

[1053] the words *Inter ☿ & Aldeboram / per Sext. Trig.* are set on two lines, each with a figure pair, and a third figure pair stands below with no words; the azimuth entry is set on two lines, its figures on the second.

- 6 50 — 52 58½
- 6 53 — 52 57¼
- 6 55 — 52 59½
- *Use the distance* 52 59½
- 6 58 — 52 58½
- 7 0 — 52 57
- 7 4 Between ☿ and the head of Andromeda 25 50
- 25 49¾
- 25 51
- 25 52[1054]

These observations were quite precise, and you can rely on them, since Mercury [Mercurio] appeared quite well in a clear sky.

- H. 7¼ Between ☿ and Aldeb. 52 53
- 7⅓ — 52 50

But this is because of the ray being refracted too much.

- 7 4: azimuth of ☿ 84 0, altitude 4 53
- 7 9 — 83 0; 4 27
- 7 19 — 81 10; 3 28½[1055]

The azimuths are counted from Sept. toward the west. These observations are not precise enough, for ☿ appeared dimly, *and that as far as the azimuths and altitudes are concerned.*

DIE 6 MARTIJ, MANE.

- H. 5 15′ Between ♀ and Spica [Spicam], by the Q. portat. III 37¼
- 5 18 — III 38½
- 5 20 — III 38
- 5 22 — III 38⅓
- 5 25 — III 39¼
- H. 5½ Between ♀ and the bright one of Lyra [lucidam lyræ], by the Portat. 64 27⅓
- 64 28
- 64 28
- H. 5 21½′: azimuth of ♀ 52 45, altitude 3 59
- 24⅔ — 52 5; 4 19½
- 27¾ — 51 25; 4 40
- 31 0 — 50 45; 5 0
- 35⅔ — 49 45; 5 28

[1054] The line *Vtere diſtantia 52 59½* carries no time group; its two words are italic, set to the right on a line of their own. *Andromedæ* stands on a line of its own with the figure pair *25 49¾*.

[1055] the leaf prints *Azim.* ☿ and *Alt.* only on the first of these lines; the continuation lines carry figures only.

- 39 0 — 49 0; 5 48½[1056]

These azimuths, moreover, are counted from the south toward the east, and 10 Min. have been added to each of them because their circle deviates somewhat from the meridian [a meridie].

DIE 11 MARTIJ, MANE.

- H. 5 10′ ♀ from Spica ♍ 116 59¾
- 5 12 — 116 59⅓
- 5 15 — 117 0 10
- 5 24 ♀ from the bright one of Lyra [luc. lyræ] 66 22⅔
- 66 22⅔
- 66 22⅔
- H. 5 12′40″: azimuth [Azim.] of ♀ 55 0, Alt. 3 53
- 15 10 — 54 15; 4 16
- 19 50 — 53 25; 4 38½
- 23 45 — 52 40; 5 4½
- 26 20 — 52 8; 5 20½
- 32 55 — 50 45; 6 6½
- 38 20 — 49 40; 6 38[1057]

The azimuths are counted from the south toward the east; account has also been taken in them of the error of the circle of azimuths [circuli Azimuthorum].

About the rising of ☉ the clock [Horologium], which had not been corrected over some dark days, was found to have gone 8 Min. slower than it should.

DIE 20 AUGUSTI.

About H. 10, by the new armillae [Armillas nouas].

- Difference of right Asc. between ♃ and the bright one of the Vulture [lucidam Vulturis] 79° 4′
- Declination of ♃, north [Borea] 12 10
- Difference of right Asc. again 79 9
- ♃ declination as before 12 10
- Difference of right Asc. the same 79 9
- Declination 12 10
- Difference of right Asc. 79 9¾
- Declination 12 10[1058]

From the other, opposite side of the instrument the declination of ♃ was 12° 12′. The difference of A. R. between ♃ and the bright one of the Vulture

[1056] in the first entry the words *Inter* ♀ *&* / *Spicam per* / *Q. portat.* stand on the first three of five lines, between the time groups at the left and the figures at the right; in the second the words *Inter* ♀ *&* / *lucidam lyræ* / *per Portat.* stand on three lines, each with a figure pair. On the azimuth lines the leaf prints *Azim.* ♀ and *Alt.* only on the first line.

[1057] The leaf prints *Azim.* ♀ and *Alt.* only on the first azimuth line.

[1058] the first entry is set on two lines, the word *luci-* / *dam* divided between them, its value on the second.

is therefore 100° 50′, and the declination of ☋ 12°10′. But these observations are not to be trusted entirely, because the instrument has not yet been exactly adjusted.

The place of ☋ from the given declination [Declin.] and right Afc.:

- Longitude of ☋ 5 22 31 ♉
- Alphonsine calculation [Calculus Alphonſinus] 5 53 0
- Prutenic calculation [Calculus Prutenicus] 4 50 0
- Latitude of ☋ 1 14½Mer.
- Alphonsine calculation 1 49 Mer.
- Prutenic calculation 1 52 Mer.

DIE 8 SEPTEMBRIS.

- H. 8 56′ Between ♄ and the bright one of ♈ [luc. ♈] 31 14¾
- 9 0 — 31 14⅔
- 9 8 — 31 15
- H. 9 20 Between ♄ and ☋ 31 19⅙
- 25 — 31 19
- 28 — 31 19
- 11 55 Between ♄ and the bright one of ♈ 31 15 twice [bis]
- ♄ on the meridian [in meridie] had Alt.: by the Portat. 32 54 50
- by the Sext. Trig. 32 54 40[1059]

DIE 9 SEPTEMBRIS.

- About H. 10, between ♄ and the bright one of ♈; it was observed among small clouds. 31 21
- 31 20
- 31 21½
- Meridian Alt. of ♄ [Alt. ♄ Meridiana] by the Q. port. 32 52½
- by the Sext. Trig. 32 52[1060]

It was not clear enough.

DIE 11 SEPTEMBRIS, AD VESPERAS.

- H. 9 43′ Between ♄ and the bright one of ♈ [lucid. ♈] 31 28½
- 9 49 — 31 28⅙
- 9 55 — 31 28½
- ♄ on the meridian [in merid.] by the Q. portat. 32 49⅓

[1059] the first three of these lines stand at the foot of the left column and the rest at the head of the right, with no rubric between them. *bis* is set in smaller type after its figures. The last two lines are joined by a printed brace: at its left, on two lines, ♄ *in meridie / habuit Alt.*; at its right *per Portat. 32 54 50 / per Sext. Trig. 32 54 40.*

[1060] the words of the first entry are set on three lines (*Circa H. 10 inter* ♄ *& luc.* ♈ */ Inter nubeculas / obſeruatum eſt.*), each carrying a figure pair.

DIE 12 SEPTEMBRIS.

- When the bright one of the Vulture was 3 H. 44 M. from the meridian, the distance between ♄ and the bright one of ♈ was 31 33
- The Vulture [Vultur] from the meridian H. 3. 50 — 31 32⅓
- the same distance 31 33
- 31 34
- 31 33
- ♄ on the meridian by the Q. port. 32 46¾
- by the Sext. nov. 32 47[1061]

DIE 13 SEPTEMBRIS.

- The bright one of the Vulture was H. 3 M. 15 from the meridian, when the distance between ♄ and the bright one of ♈ was 31 37
- 31 36
- 31 36⅔
- 31 37
- 31 36½
- 31 37¼
- 31 37
- ♄ on the meridian by the Q. port. 32 45[1062]

DIE 18 SEPTEMBRIS.

- H. 9¾ Between ♄ and the bright one of ♈ 31 58⅓
- 10 3 — 31 57
- 10 47 — 31 59 50
- 10 51 — 31 59¾
- 10 56 — 31 56¾

These observations were made among clouds.

- ♄ on the meridian by the Q. Tich. 32 35¼
- by the Q. port. 32 35¼
- by the Sext. nov. 32 35½[1063]
- H. 0 36 Between ♄ and the bright one of ♈ [luc. ♈] 32 0
- 0 40 — 32 0[1064]

[1061] the first entry is set on three lines (*Cum lucida vulturis abeßet a meri- / diano 3 H. 44 M. fuit diſtantia inter* ♄ / *et lucidam* ♈), its figure pair on the third; *H. 3. 50* is printed with a point between the two figures; *eadem diſtantia* is set to the right on a line of its own.

[1062] the words of the first entry are set on three lines (*Lucida vulturis a merid. abfuit H. 3 / M. 15, cum diſt. inter / ♄ & lucidam* ♈ *eßet*), the second and third each carrying a figure pair.

[1063] the words *Inter ♄ & / lucid.* ♈ stand on the first two of the five lines, between the times and the figures. The sentence about the clouds is set in smaller type in three lines (*inter nubes ſunt / factæ hæ obſer- / uationes*), to the right of a printed brace that stands after the figures of the first two lines.

[1064] these two lines stand at the head of the left column with no rubric above them on this page; the words *Inter ♄ & / luc.* ♈ are set on two lines, between the times and the figures.

DIE 19 SEPTEMBRIS.

- H. 9⅓ P. M. Between ♄ and the bright one of ♈ [lucid. ♈] 32 3¾
- 9 25′ — 32 4
- 9 28 — 32 4
- 9 30 — 32 3⅓[1065]

DIE 22 SEPTEMBRIS.

- H. 8 56′ Between ♄ and the bright one of ♈ 32 15¼
- 9 0 — 32 15⅔
- H. 9 22 — 32 15¾
- 9 25 — 32 15⅓[1066]

DIE 1 OCTOBRIS.

- About hour 8, between ♄ and the bright one of ♈ [lucidam ♈] 32 52¼
- 32 54
- Between ♄ and ☋ 30 55½

Among clouds.[1067]

DIE 2 OCTOBRIS.

- ♄ on the meridian [in meridiano] had Alt. by the Portat. 32 11[1068]

N.B.[1] You can use this observation of ♄ in verifying its apogee [Apogæo] and eccentricity, because it lies near the mean digressions from the apogee; and compare another near the apogee. To these add, from the other side, when it was digressing in ♎, the observation I had at Augsburg [Augustæ Vindelicorum] in the year 1570 on the last day of March, when it was near ☌ ☉. It is found as follows in the book of observations recorded there, which I made with a certain wooden sextant [per Sextantem quendam ligneum] made there.

You have that observation, copied from the same book, in what follows, so that it may be at hand[2].

OBSERUATIO ♄NI ACHRONYCHIJ ANNO 1570 DIE 31 MARTIJ AUGUSTÆ VINDELICORUM HABITA.

Observation of ♄ achronychal, in the year 1570 on 31 March, made at Augsburg.

H. 9 (but put it between 9 and 10) or 9¼: between ♄ and the star which is the fifth in the southern wing of ♍, distance 6 20. Between ♄ and Spica [Spicam], distance 4 47. The distance of ♄ and Spica, moreover, appeared to lie in the straight line that

[1065] the words *Inter ♄ & / lucid. ♈* stand on the first two of the four lines.

[1066] the first two of these lines stand at the foot of the left column (the words *Inter ♄ & / lucid. ♈* on two lines) and the last two at the head of the right column, with no rubric between them.

[1067] the words of the first entry are set on two lines (*Circa horam 8 inter ♄ / & lucidam ♈*), each carrying a figure pair. A printed brace stands after the three figure pairs, and to its right, in smaller type on two lines, *Inter / nubes*.

[1068] *Alt. per Portat. 32 11* is set to the right on a line of its own.

runs between the star of the shoulder of Boötes [Bootis] which is near the Crown [coronam], and Spica itself.

And from this you will best reckon the longitude of ♄*, for an error in the distance changes the longitude little here, if you use this line; at any rate it could alter the latitude somewhat.*

Compare, however, the distance from the other star, the fifth in the wing of ♍*, of which I spoke; and it is the star which lies on a nearly straight line from the foremost of the three in the northern wing of* ♍ *and the one in the middle of* ♍ *next to the girdle. If, however, a line is drawn through this star from that same one in the middle of the body of* ♍ *which appears next to the girdle, it leaves Spica somewhat toward the east [verſus ortum]. From this you will recognize the star I am speaking of.*

The same evening, between ♄ *and the 4th star in the southern wing of* ♍*, 14 15; this star, moreover, had a latitude not unlike that of* ♄*. The observations were good and careful, and you can trust them. But rather use the preceding one, which was made with respect to Spica, for it misleads less in longitude because of the straight line drawn, as has been said.*

You can also compare what I had left written there on 25 March, that ♄ *stood 4° 50′ from Spica, although the hour is not added. But it can be gathered from the preceding entries that it was a little after the 11th [11am]; but this contributes little to the matter.*

Compare rather what was written on 22 March in the observation of ☾ *and* ♄*, just near the 90th degree; and let the place of* ☾ *also be corrected from this.*

Compare also what I left written on 7 April in the same book about the observations of ♄*, as follows:*

- *H. 9½* ♄ *and Spica 4 45*
- ♄ *and the 5th in the wing 5 45*
- ♄ *from the knee of* ♍ *6 5*

♄ *had not yet reached the straight line drawn from Spica to Arcturus [Arcturum], but was not far from it.*[1069]

[1] E codice V. [2] Cfr. ſupra, p. 31 [recte: p. 30 — Corrigenda, p. 430].[1070]

From these preceding observations of ♄, especially those made on 11 and 18 September, it is gathered that the ☍ of ☉ [☉is ☍] according to its mean motion with ♄ according to its true course took place on the 13th at H. 9 M. 27⅓ P. M.

N. B. According to a more precise investigation and correction of the right ascension [Aſc. Rectæ] of the star of ♈, ☍ falls at H. 8 M. 54 P. M. The place of ♄ at this time was 2°44′25″ ♈; the daily motion of ♄ 4′ 54″.

N. B. on ☍ ♄*. Since the observation was made on 13 September, on which day* ☍ *also occurred, then, keeping the distance of* ♄ *determined for hour 10¾ at 31 36¾, from the more correct right ascension of the bright one of* ♈ *[lucidæ* ♈*], 25*ᵖ *59′ 25″, and through the angle of difference then resulting, 22 24 5, the right ascension of* ♄

[1069] the three figure lines stand at the left and the note about the straight line beside them at the right, on the same three lines (♄ *nondum attigit lineam rectam / ductam a Spica in Arcturum, ſed / non longe diſtabat.*); no brace or rule stands between them.

[1070] the two footnotes are the editor's: the first reads "From codex V."; the second "Cf. above, p. 31."

will be 3 35 20, to which the longitude ♈ 2 45 25 corresponds. But since ☍ was a little before, namely at H. 9 M. 10, the difference is H. 1⅗; for these ♄ moves 20′, which are to be added, so its place at that time would have been 2 45 45.

- *to this the account of the latitude adds 1 3*
- *so that the truer longitude is 2 46 48*[1071]

But because the observations of 11 and 18 September draw it back toward the preceding parts [in anteriora] by about 54″, half of these, subtracted from this, left the true place of ♄ at the time of ☍, corrected, 2 46 20 ♈.

Calculation for the place of ♄ for 13 September H. 10 M. 43, from the observations, when it was nearest to ☍ with the Mean motion of ☉ [Medio ☉lis motu].

- Distance of ♄ from the bright one of ♈ 31 37
- Declination of ♄ M. 1 20½
- Right ascension of the bright one of ♈ 25 59½
- Angle of difference of ascension [Angulus differ. aſcenſ.] 22 24⅓
- Therefore right ascension of ♄ 3°35′⅙
- Corresponding longitude [Reſp. Longitudo] 2 45 15 ♈
- Latitude 2 39 40 M.[1072]
- The observations of the 11th and the 18th of September being reduced to this time, the place of ♄ becomes 2° 44′ 16″ ♈ and 2 44 32 respectively.[1073]

All these having been determined, the place of ♄ is set at 2°45′0″ ♈. From these is derived the time of ☍ of the apparent ♄ with the simple ☉ [ſimplici ☉]: 13 September H. 9 M. 10; and the place of ♄ was 2°45′0″ ♈.

DIE 8 OCTOBRIS[1].

- H. 11 50′ Distance between ☋ and Aldeb. 33 6
- 33 7
- 33 7¾
- 33 6½
- 33 5
- 33 6
- ☋ on the meridian had an altitude by the Q. Tichon. 44 32
- by the Q. Portat. 44 32½[1074]

DIE 13 OCTOBRIS.

- H. 9⅓ Distance between ☋ and the eye of ♉ [oculum ♉] 33 46 1/[?]

[1071] the two lines are set to the right, under the end of the paragraph, their figures standing under *2 45 45*; no rule is printed over the figures.

[1072] the first four lines stand at the left of a short printed vertical rule and the last three at its right.

[1073] set with two printed braces: *Reductis ad hoc tempus / obſeruationibus*, a brace, *11 / 18*, then *diej Sept. ſit locus* ♄, a brace, *2° 44′ 16″ ♈ / 2 44 32*; "respectively" renders the pairing the braces make.

[1074] the words *Diſt. inter* ☋ / *& Aldeb.* are set on the first two of the six figure lines; ☋ *in meridiano habuit altitudinem* stands on a line of its own above its two figure lines.

• 33 45
• 9 34′ — 33 46¾
• 9 36 — 33 46½
• 9⅔ — 33 46¾

It was quite clear, so trust these.[1075]

DIE 16 OCTOBRIS.

• H. 9 7′ Distance between ♃ and Aldeb. 34 11
• 34 11⅓
• 34 11
• 34 11
• 9 25 Distance between ♃ and the bright one of ♈ [lucid ♈] 11 35⅔
• 11 34
• 11 35
• 11 35

These two are better.[1076]

But because ♃ was almost perpendicularly below the head of ♈, the instrument could be set level [ad planum conſtitui] only with difficulty.

• H. 10 0′ ♄ on the meridian had altitude [Altit.] by the Tichon. 31 50
• by the Portat. 31 50½
• by the Sext. 31 50

1 Iterum e codice C.[1077]

• H. 11 44 ♃ on the meridian had altitude [alt.]
• with the Tichon. 44 10⅓
• with the Portat. 44 10¼
• with the Sextant [Sext.] 44 10⅙[1078]

♃ *was about ☍ ☉, especially on the 13th; and, with the relation of the 8th and the 16th [diej 8 & 16] applied here, the meridian altitude could be about 44° 19′*[1].

DIE 31 OCTOBRIS.

• ♄ on the meridian had altitude [altit.]
• with the Q. Port. 31 35¼
• with the Sextant 31 35

DIE 12 NOUEMBRIS.

• H. 6 0′ Distance between ♃ and ♄ 27 28
• 27 28

[1075] the words *Diſt. inter* ♃ *&* / *oculum* ♉ stand on the first two of the five lines; the second line carries no time.

[1076] the words *Diſt. inter* ♃ / *& Aldeb.* stand on the first two lines and *Diſt. inter* ♃ / *& lucid* ♈ on the fifth and sixth. A printed brace stands after the last two figure pairs, and *Hæ duæ meliores.* is set below it at the right in smaller type.

[1077] the footnote is the editor's: "Again from codex C."

[1078] these four lines stand at the head of the left column with no rubric above them on this page.

- 6¼ Between ♃ and the bright one of ♈ [lucid. ♈] 12 25½
- 12 25½
- 8¼ ♄ on the meridian had altitude
- with the Portat. 31 30
- with the Sextant 31 30[1079]
- Difference of right ascension between ♃ and Aldebor. 37 46½
- Declination of the eye of ♉ [oculi ♉] 15 35

With the armillae [per Armillas].[1080]

- H. 9½ Distance between ♃ and Aldeb. 37 21½
- 37 21½
- 10.0 ♃ on the meridian had altitude
- with the Portat. 43 7¼
- with the Sextant 43 7½

DIE 13 NOUEMBRIS, A. M.

- H. 0 30′ Distance between ♂ and the lower head of ♊ [inferius caput ♊] 35 50½
- 35 51
- 35 52
- Between ♂ and the neck of ♌ [ceruicem ♌] 6 32
- 6 33[1081]

Not very precise, because of the nearness of ☾.

When the heart of ♌ [cor ♌] was H. 4 Min. 26 from the meridian, the distance between ♂ and the lower head of ♊ was repeated: 35 53, twice [bis].

- Declination of the heart of ♌ [cordis ♌] 13 58 B
- Declination of ♂ 13 54 B

With the armillae.[1082]

Pro loco ♂ Die 12 Nou.

For the place of ♂, 12 November.

- H. 13 26 P. M. Distance between ♂ and the lower head [infer. cap.] of ♊ 35 53
- Declination of ♂ B. 15 54
- Declination [Declin.] of the lower head of ♊ 28 57⅙
- Ascensional difference [Differ. aſcenſionalis] 36 22 25
- Therefore right ascension [Aſcenſio R.] of ♂ 146 20
- The longitude of ♂ is therefore 23 14 15 ♌

[1079] *Diſtantia inter* / ♃ *&* ♄ and *Inter* ♃ *&* / *lucid.* ♈ are each set on two lines, a figure pair on each line.

[1080] *Differentia aſcenſionis rectæ inter* ♃ is set on one line and *& Aldebor.* with its figures on the next. A printed brace stands after the two figure pairs, and beside it, on two lines, *per Ar-* / *millas*.

[1081] *Diſt. inter* ♂ / *& inferius* / *caput* ♊ stand on three lines and *Inter* ♂ *&* / *ceruicem* ♌ on two, each line carrying a figure pair.

[1082] a printed brace stands after the two figure groups, and beside it, on two lines, *per Ar-* / *millas*.

• Latitude 2 12 24 B.[1083]

	Alphonſ.	Copern.
Longitude	21 40 ♌	23 52 ♌
Latitude	1 55 B.	1 36 B.

[1084]

DIE 16 NOUEMBRIS.

• ♄ in Azim. 5 Gr. 0′ from the meridian [a merid.]
• and altitude [Alt.] 31 26

When the bright one of the Vulture [lucida vulturis] was H. 5 from the meridian toward the west [verſus occaſum], the distance between ♃ and ♄ with the Sextant △ was, twice, 27 10½.

When the bright one of the Vulture was H. 5 10′ from the meridian, the distance of ♃ from the eye of ♉, with the Trigonic Sextant [Sext. Trigonicum]:

• 37 40½
• 37 41
• 37 41
• 37 41

When the bright one of the Vulture [luc. Vult.] was H. 5 M. 25 from the meridian, ♄ from the head of ♈ [capite ♈] with the Sextant, twice, 34 41.

The Vulture [Vultur] from the meridian H. 5 M. 40; ♄ from the wing of Pegasus [ala [recte: extrema alæ, "the end of the wing" — Corrigenda, p. 430] Pegaſi]:

• 15 37⅔
• 15 38¾
• 15 38¾
• Meridian altitude of ♃
• with the Portat. 43 0 20
• with the Sextant nov. [Sext. nov.] 43 0 20

When the heart of ♌ was H. 4 0′ from the meridian, the distance between ♂ and the lower head of ♊ with the Sextant:

• 37 21⅓
• 37 21⅓
• Between the neck of ♌ [cervicem ♌] and ♂, twice, 6 29⅔
• 6 30[1085]

[1083] the first four of these lines stand at the foot of the left column and the last three at the head of the right column, with no rubric between them; *Diſt. inter* ♂ *& infer. / cap.* ♊ are set on two lines, the figures on the second.

[1084] the head row *Alphonſ. / Copern.* is set in smaller type over the two figure columns; the space above the row labels is empty.

[1085] *Inter cervicem* stands on one line with *bis 6 29⅔* and ♌ & ♂ on the next with *6 30*.

DIE 17 NOUEMBRIS.

- H. 4 38′ by the greater Horol. [Maius Horol.]
- between ☿ and ♄ 27 5⅔
- 4 56′ between Aldeb. and ☿ 37 44
- with the Sextant [per Sextantem].

DIE 21 NOUEMBRIS, A. M.

With the Sextant.

- H. 6 40′ between ♂ and Spica [Spicam] ♍ 52 11½
- H. 7 between ♂ and the tail of ♌ [caudam ♌] 21 57
- 7 10′ between ♂ and the neck of ♌ 6 40
- 6 40⅓
- 6 40
- 6 40[1086]

1 E codice V.[1087]

41

- At that instant [In inſtanti], between ♂ and the heart of ♌ [cor ♌], with the Radius [per Radium] 2 43
- 2 44
- 2 43[1088]

At H. 7 25′ the distance between ♂ and Spica [Spicam] ♍ was repeated with the Sext.:

- 52 12
- 52 13

These times were taken by the lesser clock [Horologium minus], which was found, after sunrise [exorto ſole], to run 20′ fast.

EODEM DIE AD VESPERAS.

The same day, in the evening.

- ♄ on the meridian [in merid.] had Alt.
- with the Portat. 31 30
- with the Sext. 31 30

DIE 23 NOUEMBRIS AD VESPERAS.

- ♄ on the meridian [in mer.], Alt. with the Portat. 31 31
- Jupiter on the meridian, Alt.
- with the Sext. nov. and the Quadr. 42 52

[1086] *7 10′ inter* ♂ *&* / *ceruicem* ♌ are set on two lines, each carrying a figure pair.

[1087] the footnote is the editor's: "From codex V."

[1088] these lines stand at the head of the left column with no rubric above them on this page; *In inſtanti inter* ♂ *&* / *cor* ♌ *per Radium* are set on two lines, and the three figure pairs stand one to a line.

DIE 27 NOUEMBRIS.

When the lower head of ♊ was H. 2 15′ from the meridian, the Diff. Aſc. between ♂ and the same head was 41 6.

- Declination of ♂ 14 42

DIE 14 DECEMBRIS.

- H. 7 55′ between Jupiter [Iouem] and the eye of ♌ [oculum ♌] 38 36, twice [bis]
- *H. 8¼ between ♃ and Aldeb. 38 37, better [melior]*
- H. 8 25′ between Jupiter and Saturn [Saturnum] 25 48½
- 25 48½
- Between ♃ and the bright one of ♈ [lucid. ♈] 12 53[1089]

DIE 15 DECEMBRIS.

- Clock [Horol.] 8.29 Between ♃ and Aldeb. 38 38
- 38 38
- Declination [Decl.] of ♃ north [Sept.] with the armillae 8 45½
- Distance between ♃ and the bright one in the shoulder of Orion [lucid. in humero Orionis] with the Portat. 58 27
- 58 27
- 58 27
- Diff. right Aſc. [Diff. Aſc. rectæ] between ♃ and the right shoulder of Orion [dextrum humer. Orion.] with the armillae toward the north [verſus ſept.]: 58 58
- 58 59
- 58 58
- with the armillae toward the south [verſus auſtrum] 59 2
- Declination of ♃ north [Septent.] 8 45
- Hour by the clock [Hora Horol.] 11.27, distance [diſt.] between ♂ and the heart of ♌ 7 30
- 7 30¼[1090]

DIE 16 DECEMBRIS, A. M.

- H. 1⅓ Between ♂ and the neck of ♌ [ceruicem ♌] 9 3, twice[1091]

[1089] *inter Iouem &* / *oculum* ♌ and *inter Iouem* / *& Saturnum* are each set on two lines; the second line of the first pair carries its figures, and each line of the second pair carries one. *melior* is set at the right end of the italic line, in smaller italic, divided *me-* / *lior* on two lines.

[1090] the first six of these lines stand at the foot of the left column and the rest at the head of the right column, with no rubric between them. In the left column *Horol. 8.29 Inter* ♃ *&* / *Aldeb.* and *Diſtantia inter* ♃ *&* / *lucid. in humero* / *Orionis per Portat.* are set on two and three lines, each carrying a figure pair. In the right column *Diff. Aſc. rectæ inter* ♃ *&* / *dextrum humer. Orion.* / *per Armillas verſus ſept.* stand on three lines, a printed brace joining them to the three figure pairs; *Hora Horol. 11.27, diſt.* / *inter* ♂ *&* *cor* ♌ are set on two lines, each carrying a figure pair.

[1091] *bis* is set in smaller type after the figures.

DIE 17 DECEMBRIS.

- Alt. of ♃ on the meridian with the Portat. 42 51

DIE 20 DECEMBRIS AD VESPERAS.

- Diff. Aſc. between ♃ and the heel of the foot of ♊ [calcem pedis ♊] 65 4
- Diff. Aſc. between ♃ and the bright one of the shoulder of Orion [lucidum humeri Orionis] 58 58½
- Declination of ♂ (it was near the horizont.) 14 24

DIE 21 DECEMBRIS AD VESPERAS.

- Declination of ♂ 14 21½
- When ♂ was H. 1 M. 56 from the meridian
- Diff. Aſc. between ♂ and the tail of ♌ [caudam ♌] 17 20
- When ♂ was hour 1½ from the meridian
- Diff. Aſc. between ♂ and Aldebaran [Aldeboram] 91 25
- Diff. Aſc. between the eye of ♉ [oculum ♉] and the hip of ♌ [coxam ♌] 99 51½

All the preceding observations were made with the armillae toward the north [verſus ſeptentrionem].

- ♂ on the meridian, Alt. with the Q. Tich. 48 27 50
- Declination of ♂ 14 21¼
- Diff. Aſc. between ♂ and the eye of ♉ 91 31⅓

The observations immediately preceding were made with the armillae toward the south [verſus meridiem].

LOCA PLANETARUM[1].

Places of the Planets[1].

Calculation of the appearance of ♀ from the observations made above on 1 March [1 Martij] in the morning, about its greatest morning digression [digreßionem matutinam] from ☉.

- H. 5 M. 40 Distance of ♀ from Spica 106°22′, from Lyra 62°42′½
- Longitude of Spica 18 1 25 ♎, of Lyra 9 28⅜ ♑
- Latitude 1 59 0 M., 61 47½ B.[1092]

[1] E codice V.[1093]

Per vſitatam triangulorum inductionem datur

By the customary working of the triangles [triangulorum inductionem] there is given:

- ♀ Longitude 4° 20′ 20″ ♒
- Latitude 1 57¼ B.
- Altitude of ♀ 5°, reſp. Parallax 4′ 40″

[1092] *H. 5 M. 40* stands at the left of the first line only; the values for Spica and for Lyra stand in two groups on each line, the Lyra group to the right.

[1093] the footnote is the editor's: "From codex V."

- Refraction 10 0
- Difference 5 20
- and in longitude [Long.] 1′ 4″ add., latitude [Latit.] 5′ 10″ ſubt.[1094]

True longitude 4° 21′⅓ ♒, latitude 1° 52′ 5″ B.

Exploratio antecedentis loci ♀ ex obſeruationibus ad diem 25 Februarij habitis.

Examination of the preceding place of ♀ from the observations made on 25 February [25 Februarij].

The change in the latitude of ♀ over the interval of 5 days, from the first day: 24 M. add. The latitude observed on 1 March [1 Martij]: 1 57. Therefore the latitude of ♀ on 25 February [25 Feb.], in the morning: 2° 21′.

On the same day, at H. 5½, the distance of ♀ from Spica was 102° 14′. From the given distance of ♀ from Spica, therefore, and the latitude now granted [nunc conceßa], the place of ♀ is found as follows.

- CA 87° 39′
- BA 91 59
- BC 102 14
- BAC 102 10⅙
- Therefore at H. 5½ longitude 0° 11′⅗ ♒
- Latitude 2 21 B.[1095]

♀ had been very low [admodum decliuis], as conjecture from its observation afterwards from ☾ yields [recte: *prodat* for the printed *prodit* — Corrigenda, p. 430] its altitude as 3°. Its true longitude can therefore be 0 12½ ♒ at the least.

Calculus veri loci ♂tis ad diem 21 Nouembris.

Calculation of the true place of ♂ for 21 November [21 Nouembris].

H. 6⅔ A. M. Distance of ♂ from the tail of ☋ [Cauda ☋] 21° 57′, from the bright one of the neck [lucida ceruicis] 6° 40′.

From this, with the true places of the fixed stars assumed, by a joint computation of the triangles [ſupputationem conſortem [recte: conſuetam, "customary" — Corrigenda, p. 430] triangulorum] without the declination, there was found:

- ♂ Longitude 25 59½ ☋, Latitude 2 29½ B.

Δοκιμασια huius calculi.

Test [Greek: Δοκιμασια (dokimasia, "test, verification")] of this calculation.

Hour 6 M. 20 corr.: distance of ♂ from Spica 52 11½. But the distance computed from the presupposed places both of ♂ and of Spica [Spicæ ♍] was found to be 52 13⅓. Therefore, without any perceptible error, at H.

[1094] the first two lines stand at the left, level with the first two lines of the second group at the right; a short rule is printed under the figures *10 0*, above *Differentia 5 20*; *ſubt.* is set in smaller type.

[1095] the lettered lines stand at the left; the two lines beginning *Ergo H. 5½* stand at the right, level with *BA* and *BC*. No figure is printed on this page.

6½ the longitude of ♂ is set at 26 0⅓ ♌. You can use it for examining the semidiameter of the annual orb [ſemidiametro orbis annui] near the perigee of ☉, approximately [fere].

Pro calculo ♃ die 13 Octobris pro ſitu eius acronychio.

For the calculation of ♃ on 13 October [13 Octobris], for its acronychal position [ſitu … acronychio].

- H. 9½ Distance of ♃ from Aldebaran [Aldebora] 33 46½
- Declination of ♃ 10 14 B.
- Declination of Aldebaran 15 36
- Right ascension of Aldebaran 63 2 50
- Angle of the difference of ascension [differentiæ aſcenſ.] 34 15 10
- Therefore right ascension of ♃ 28 47 40

Reſp. longitude 0° 22′⅔ ♉, latitude 1° 30′½ M.

- The true place of ☉ at this time comes to [æquat] 7^{sig} 2° 19′ 8″
- Difference 0 1 56 28
- Daily motion of ☉ and ♃ 67^{M} 16″
- Reſp. time from the difference 1^{D} 17^{H} 34^{M}
- Therefore ☍ took place 11 15 56
- Longitude of ♃ 0° 36′¾ ♉.[1096]

41*

OBSERUATIONES STELLARUM AFFIXARUM & PRIMO ALTITUDINIS MERIDIANÆ.

Observations of the fixed stars [Stellarum Affixarum], and first of the meridian altitude.

DIE 4 JANUARIJ.

With the Mural [Per Muralem].

- The first of ♈ on the meridian [in merid.] had altitude [Alt.] 51 19
- The bright one of the lower [infer.] horn of ♈, altitude 52 50
- Altitude [Altit.] of the following bright one 55 33
- Meridian altitude of the upper head [ſuperioris Cap.] of ♊ 66 48
- of the lower head of ♊ 63 2½[1097]
- The preceding foot of Canis Minor [canis min.] 43 7½
- The head of the upper one of ♊ [Superioris caput ♊], about [fere] 66 48
- Canis Minor [Canis minor] on the meridian 40 18
- The lower head of ♊ [Inferius caput ♊] 63 2⅓[1098]

[1096] the six labelled lines under *Pro calculo* ♃ set their figures in an aligned column at the right; *Differentia*, *Reſp. tempus*, *Ergo facta eſt* and *Longitudo* ♃ are indented to different depths, as printed.

[1097] the last line is indented under *ſuperioris Cap.*, as printed.

[1098] these four lines stand at the head of the right column, with no rubric above them; the rubric *DIE 4 JANUARIJ.* heads the left column, level with them.

At the next following noon, the clock [Horologium] that we used in these observations — with ☉ observed at H. 1¼ by the wall [per murum], though its brightness was dim — was running faster than it should [iuſto celerius]; this error came upon it [ej accidit] from the immediately preceding noon.

DIE 5 JANUARIJ.

With the Q. Mural [Per Q. Muralem].

- Meridian altitude of Aldebaran [Aldeboræ] 49 41½

At H. 9 36½ the star of Draco [ſtella Draconis] nearest the pole of the zodiac [polo Zodiaci] crossed the meridian, the transit being observed at the wall [ad murum].

At H. 9 54 the right shoulder of Orion [Orionis] crossed the meridian, by the Mural [iuxta Muralem].

At H. 10 20′ 25″ the heel of the foot of Ⅱ [Calx pedis Ⅱ] crossed the meridian, and its altitude with the Q. Mural was 56 43¾.

DIE 6 JANUARIJ.

- In the morning [Mane], meridian altitude [Alt. mer.] of Spica [Spicæ] ♍
- with the Mural 25 9

In the evening [Ad Veſperas]. With the Mural.

- The bright one of the lower horn of ♈ 52 50
- Meridian altitude of Aldebaran 49 41¼
- The upper of the three preceding the left foot of Orion, about 28 24
- At H. 9 37′ 0″, meridian altitude [Alt. Mer.] of the left foot of Orion 25 21
- 9 46 16 The left shoulder of Orion [Sin. hum. Orion.] 39 59¼

9 59 50 The star of Draco nearest the pole of the zodiac crossed the meridian, the observation being made at the wall. Its altitude with the Q. Portat. was 32 9.

- The middle one of the belt [balthej] of Orion 32 33
- At H. 10 4′ 45″ the last one of the belt 31 51½
- The right foot of Orion, with the Mural, had on the meridian altitude 24 12⅔
- The right shoulder of Orion on the meridian, altitude 41 20⅓
- The end of the foot of Ⅱ [Extrema pedis Ⅱ] (not clearly enough visible) 56 37⅓
- At H. 10 46 45 the heel of the foot of Ⅱ 56 43⅓
- The upper foot of the lower one of Ⅱ [Superior pes inferioris Ⅱ] 50 45⅓
- The star in the thigh of the upper one of Ⅱ [femore ſuperior. Ⅱ] 59 33
- The one in the elbow of the upper one of Ⅱ [Illa quæ eſt in cubito ſuperioris Ⅱ] 68 27[1099]

[1099] the parenthesis *(non ſatis conſpicua)* is printed; *56 37⅓* and *68 27* each stand on a line of their own under their labels.

DIE 7 JANUARIJ.

- The bright foot of Erichthonius [Lucidus pes Erichtonij] 62 15

At H. 9 26′ 10″ the star of Draco nearest the pole of the zodiac crossed the meridian, the observation being made at the wall, and it had altitude with the Q. Portat. 32 9.

- The end of the foot of ♊ 56 37⅔
- At H. 10 9 30 the heel of the foot of ♊ (at most [ad ſummum]) 56 43½
- The upper head of ♊ with the Mural [per Mur.] 66 47⅔
- The lower head of ♊ 63 2⅓[1100]

DIE 8 JANUARIJ, MANE.

- Spica ♍ with the Q. Mural [per Q. Mural.] 25 9, about; but it was not clear enough.
- Arcturus with the Q. Mural 55 28⅓
- The bright one in the preceding scale-pan of ♎ [Luc. in præced. lance ♎] p. Q. M. 19 51½

At the meridian transit of ☉, observed through the slits [rimulas] of the lesser Q., the clock was running slower than it should [iuſto tardius] by 24′ 30″.

In the evening [Veſperi].

- The following one in the lower horn of ♈ 52 50
- At H. 5 46 10 the bright one of the head [Cap.] of ♈ 55 33
- The eye of ♉ [Oculus ♉] on the meridian 49 41
- with the Q. Mural.

By the lesser clock [Per minus horol.].

- At H. 8 58′ 58″ the bright foot of Orion was on the meridian.
- 9 7 19 The preceding shoulder of Orion [Hum. præced. Or.] on the meridian.
- 9 13 7 The star of Draco [draconis] nearest the pole of the zodiac was on the meridian ſeptent., and it had altitude [Altit.] with the Q. Portat. exactly [præciſe] 32 9.[1101]
- At H. 9 15 35 the first of the belt [Prima Balthei] of Orion [Orionis] on the meridian.
- 10 3 17 The heel of the foot of ♊ [Calx pedis ♊] had meridian altitude [Alt. merid.] 56 43⅓

At the next following noon the clock [Horologium] had run 23′ faster than it should [iuſto celerius promotum eſt].

DIE 9 JANUARIJ.

- In the morning [Mane], Spica ♍ 25 8½
- *The bright one of the head of ♈ [Lucida capitis ♈] 55 33*

[1100] the parenthesis *(ad ſummum)* is printed; its figures *56 43½* stand on the next line.

[1101] *Per minus horol.* is set flush left in smaller type; the time groups *H. 8 58′ 58″*, *9 7 19*, *9 13 7* stand at the left with their text in a block indented beside them; *32 9* stands on a line of its own at the end.

- At H. 8 59′ 38″ the left shoulder of Orion was on the meridian.
- 9 4 34 The star of Drac. near the pole of the Zod. [Stella Drac. vicina polo Zod.]
- 9 7 35 The first of the belt of Orion [Or.] on the meridian [in merid.].
- 9 9 35 The lower horn of ♉ [Inferius cornu ♉] on the meridian.

DIE 10 JANUARIJ.

- The northern eye of ♉ [Borealis oculus ♉], meridian altitude [Alt. mer.] 52 15
- The preceding and brighter horn of ♉ [Præcedens et lucidius cornu ♉] 62 15, about [fere]
- The lower horn of ♉ 54 53½
- The first of the belt of Orion 33 24⅔
- The southern head of ♊ [Meridionale caput ♊] 63 2 10
- with the Q. Mural [per Q. Muralem].[1102]

DIE 2 FEBRUARIJ.

- The eye of ♉ [Oculus ♉], meridian altitude 49 41
- The bright foot of Erichthonius [Lucidus pes Erichtonij] 62 15 10

DIE 3 FEBRUARIJ.

In the morning [Mane]. The heart of ♌ [Cor ♌] on the meridian had altitude with the Tychonic one [per Tich.] 48 3½.

In the evening [Veſperi]. With the Tychonic one [Per Tichonicum].

- The eye of ♉ on the meridian 49 41
- The bright foot of Erichthonius 62 15
- The first of the belt of Orion 33 24½
- The middle one of the belt [Media Balthei] 32 32½
- The last one of the belt [Poſtrema Balthei] 31 51
- The right shoulder of Orion 41 20¼
- The upper head of ♊ [Superius caput ♊] 66 48
- The lower head of ♊ [Inferius caput ♊] 63 3

DIE 4 FEBRUARIJ, A. M.

With the Tychonic one.

- The heart of ♌ on the meridian 48 3½
- Its neck [Ceruix eiuſdem] 56 0
- Its tail [Cauda eiuſdem] 51 0
- Spica ♍ 25 9
- The lower scale-pan of ♎ [Inferior lanx ♎] 19 52
- The upper scale-pan of ♎ [Superior lanx ♎] 26 19

[1102] *62 15* stands on a line of its own under its label, followed by *fere* in smaller type; *per Q. Muralem.* is set to the right on a line of its own below *Meridionale caput* ♊ *63 2 10*.

- The lowest of the three in the forehead of ♏ [Infima trium in fronte ♏] 9 12*
- The middle one of them [Media earundem] 12 43*
- The uppermost of them [Suprema earundem] 15 21*

* ἐν πλάτει [Greek: *en platei*, "in breadth"], because of the dawning day [propter illuſcentem diem].[1103]

DIE 4 FEBRUARIJ, VESPERI.

With the Tychonic one, meridian altitude [Altit. Merid.]:

- The eye of ♉ [Oculi ♉] 49 41
- The left foot of Erichthonius [Siniſtri pedis Erichton.] 66 30
- The bright foot of Erichthonius [Lucidi pedis Erichton.] 62 15
- The lower horn of ♉ [Inferioris cornu ♉] 54 53¼
- The bright shoulder of Orion [Lucidi humeri Orionis] 41 20 10
- The end of the foot of ♊ [Extremæ pedis ♊] 56 37½
- The uppermost of the foot, the one that is in the heel [Supremæ pedis quæ eſt in calce] 56 43½
- The right foot of the more northern one of ♊ [Dextri pedis borealioris ♊] 54 28
- The bright one that is in the left foot of Auſtr. ♊ [Lucidæ quæ eſt in ſiniſtro pede Auſtr. ♊] 50 45
- The upper head of ♊ [Superioris capitis ♊] 66 48
- The lower head of ♊ [Inferioris capitis ♊] 63 2¾[1104]

DIE 5 FEBRUARIJ, MANE.

With the Tychonic one. Meridian altitude [Alt. Merid.]:

- The heart of ♌ [Cordis ♌] 48 3½
- The neck of ♌ [Ceruicis ♌] 56 0
- The tail of ♌ [Caudæ ♌] 51 0
- Spica ♍, exactly [exquiſite] 25 9
- Arcturus [Arcturi] 55 28¼
- The lower scale-pan of ♎ [Inferioris lancis ♎] 19 52
- The upper scale-pan of ♎ [Superioris lancis ♎] 26 19

DIE 6 FEBRUARIJ, MANE.

With the Tychonic one [Per Tichon.], meridian altitude [Altitudo Merid.]:

- Spica ♍ 25 9
- The lower scale-pan of ♎ 19 52
- The upper scale-pan of ♎ 26 19
- The bright one of the crown [Lucidæ coronæ] 62 16

[1103] the first six lines stand at the foot of the left column; the three asterisked lines and the asterisked note stand at the head of the right column, with no rubric above them.

[1104] *56 43½* stands on a line of its own under *Supremæ pedis quæ eſt in calce*; *pede Auſtr.* ♊ *50 45* is set to the right on the second line of its entry.

DIE 17 FEBRUARIJ.

- With the Tychonic one, the upper head of ♊ [Super. caput ♊] 66 48 10
- Canis Minor [Canis minor] 40 19
- The lower head of ♊ 63 2¾

DIE 25 VESPERI & MANE D. 26.

The 25th, in the evening, and in the morning of D. 26.

With the Tychonic one.

- The lower head of ♊ 63 2⅔
- The heart of ♌ 48 3 30
- The bright one in the back of ♌ [Lucida in dorſo ♌] 56 53
- The tail of ♌ [Cauda ♌] 50 59½
- The middle one of the lower wing of ♍ [Media inferioris alæ ♍] 34 56½
- The navel of ♍ [Vmbilicus ♍] 47 18⅔
- Spica ♍ 25 9
- Arcturus 55 28⅔
- The southern scale-pan of ♎ [Meridionalis lanx ♎] 19 52¾
- The northern scale-pan of ♎ [Borealis lanx ♎] 26 19
- The middle one of the three in the forehead of ♏ [Media trium in fronte ♏] 12 46½
- The uppermost of them [Suprema earundem] 15 20

DIE 29 FEBRUARIJ.

- Canis Minor [Canis minor], by the Tichon. [per Tichon.] 40 18¾
- The bright one of Hydra [Lucida Hydræ], by the Tich. 27 12¼
- by the Portat. 27 12⅙
- The star in the foot of ♌ [Stella in pede ♌], by the Tich. 45 50½
- by the Portat. 45 50
- The heart of ♌ [Cor ♌], by the Tichon. 48 3½
- by the Portat., not good [non bona] 48 2⅔
- The neck of ♌ [Ceruix ♌], by the Tichon. 56 0
- by the Portat. 56 0
- The star in the shoulder of ♌ [Stella in armo ♌], by the Port. 45 30
- The star in...[1] of Hydra [Stella in...[1] Hydræ], by the Tich. 20 5
- by the Port. 20 5
- The star in the thigh of ♌ [Stella in fæmore ♌], by the Tich. 51 47¼
- by the Port. 51 47⅓
- The knee of ♌ [Genu ♌], by the Tichon. 46 54⅔
- The tail of ♌ [Cauda ♌], by the Tichon. 50 59½
- by the Portat. 50 59½

DIE 1 MARTIJ, MANE.

- The preceding one of the two upper ones in the square of Corvus [Præcedens ex duabus ſuperioribus in quadrato corui] 18 53¾

- by the Portat, about [fere] 18 54
- The following one of them [Sequens earundem], by the Tich. 19 56¼
- not precisely enough [non ſatis exquiſite],
- by the Portat. 19 56
- The middle one of the lower wing of ♍ [Media inferioris alæ ♍], 2 following [2 ſequ.], by the Tich. 34 56⅔
- In the following side of Corvus, under the girdle of ♍ [In latere ſequenti corui [recte: tertia, "the third", for the printed *corui* — Corrigenda, p. 430] ſub cingulo ♍], by the Tich. 39 47
- by the Portat. 39 47
- Vindemiatrix [Vindemiator], by the Tich., about 47 19
- by the Portat. 47 18½
- not precise enough [non ſatis exquiſita].
- Spica ♍, by the Tichon. 25 9
- by the Portat. 25 9

VESPERI.

- The upper head of ♊ [Superius caput ♊] 66 48
- The lower [Inferius] 63 2¾
- by the Tichon. [per … Tichon.]
- The bright one of Hydra, by the new sextant [per Sext. nov.] 27 12
- The heart of ♌, by the new sextant [per Sext. nouum] 48 3 35[1105]
- The following one aqud [?] the girdle in the wing of ♍ [Sequens aqud cingulum in ala ♍], by the new sextant 39 47
- Spica ♍, by the Port., at most [ad ſummum] 25 9⅙
- by the new sextant [per Sext. nouum] 25 9 5[1106]

DIE 3 MARTIJ.

- The hip of ♌ [Coxa ♌] 56 53
- Its tail [Cauda eiuſdem] 50 59⅔
- by the Q. Tichon. [per Q. Tichon.], to which a new pinnule [pinnacidium] had been fitted.[1107]

DIE 7 APRILIS.

- Spica ♍ in merid., by the Q. Tich. 25 9

DIE 8 APRILIS.

- By the Portat., Schedar of Cassiopeia [Schedir Caßiop.] 20 11½

[1105] *per* is printed at the end of the line *Superius caput* ♊ *per 66 48* and *Tichon.* in the middle of the next line, *Inferius Tichon. 63 2¾*, so that the two words run across both lines; the setting does not say whether they belong to one line or to both.

[1106] these lines stand at the head of the right column, with no rubric above them.

[1107] a printed right brace joins the two figure lines, with *per Q. / Tichon.* beside it; *cui nouum pinnacidium erat impoſitum* follows below as a separate two-line paragraph.

- the Girdle [Cingulum] 21 31½
- the Bend [Flexura] 24 22⅔
- the Knee of Cassiopeia [Genu] 23 58 50
- By the Tichon., Spica ♍ 25 9 0

DIE 14 APRILIS.

- Alt. min. of the pole star [Stellæ polaris] 52 58
- Spica ♍ 25 9
- by the new sextant [per Sextantem nouum].

DIE 16 APRILIS.

- The more southern of the scale-pans of ♎ [Auſtralior lancium ♎] 19 52¼
- by the new sextant.

DIE 17 APRILIS, MANE.

- The bright one in the neck of Ophiuchus [Luc. in collo Serpentarij] 41 53
- The knee of Ophiuchus [Genu Ophiuchi] 19 0½
- by the new sextant. It could not be seen precisely enough [Non ſatis exquiſite videri potuit].

VESPERI.

- The fifth in the Chair of Cassiopeia [Quinta in cathedra Caßiopeæ], by the sextant noum [?] [per Sext. noum] 22 47 25
- Schedar of Cassiopeia [Schedir Caßiop.], by the Port. 20 11 15
- Alt. min. of the pole star
- by the new sextant [per Sext. nou.] 52 58
- by the Portat. 52 58
- The Bend of Cassiopeia [Flexura Caßiop.], by the Portat. 24 22½
- by the sextant [per Sext.] 24 22
- The Knee of Cassiopeia [Genu Caßiop.], by the new sextant 23 58½
- by the Portat. 23 58¾

[1] »Ventre« deletum eſt et aliud verbum ſcriptum eſt, quod legere non potuimus.

[1] »Ventre« was deleted and another word written, which we could not read.

- H. 9 14′ 23″ the tail of ♌ [cauda ♌] crossed the meridian [tranſiuit … meridianum], by the lesser Q. [per Q. Minorem].
- 9 14 36 by the Tychonic Q. [per Q. Tichonicum].
- 10 52 31 Spica ♍ crossed the meridian, by the Tychonic one [per Tichonicum].
- 10 52 55 by the lesser Q. [perQ.Minor.], Alt. 25 9
- The star in the bend of Arcturus [Stella in flexura Arcturi], Alt. by the Tychonic one 54 36¾
- 11 46 20 Arcturus on the meridian [in meridiano], by the Q. min. [per Q. min.],

- 11 46 40 by the Tychonic Q. [per Q. Tichon.], Alt. 55 29¼

DIE 18 APRILIS.

- The Chair of Caßiop. [Cathedra Caßiop.], by the Port. [per Port.] 22 47⅓
- by the new Sext. [per Sext. nou.] 22 47½
- Alt. min. of the pole star [Stellæ polaris]
- by the Portat. 52 58
- by the new Sext. 52 58
- Schedar of Caß. [Schedir Caß.], by the new Sext. 20 11 10
- The Bend of Caß. [Flexura Caß.], by the Port. 24 22⅓
- by the new Sext. 24 22
- The Knee of Cassiopeia [Genu Caß.], by the Portat. 23 58⅔
- by the new Sext. 23 58½
- H. 10 26′ 16″ Vindemiatrix [Vindemiator] crossed the meridian, the observation made with the Square [per Quadratum facta obſeruatione].
- 10 26 22 the same one [eadem] crossed with the least Quadrant [per Quadrantem minimum].
- 10 48 29 Spica ♍ crossed the meridian [tranſiuit merid.], by the □ [per □], obſerv. tranſ.
- 10 48 42 by the least Quadrant [per Quadrantem minimum].

At the following noon the clock [Horologium] went 3½ minutes [minutis] faster [celerius iuit].

DIE 20 APRILIS.

- The meridian Alt. [Alt. merid.] of the tail of ♌ [caudæ ♌], by the Tychonic one [per Tichon.] with the new pinnule [cum nouo pinnacidio] 50 59⅔
- The following one of the upper ones in the Quad. of Corvus [Sequens ex ſuperioribus in Quad. Corui]
- by the Port. 19 55⅔
- by the new Sext. [per Sext. nouum] 19 56
- The following one in the lower wing of ♍ [Sequens in infer. ala ♍]
- by the Portat. 34 56½
- by the new Sext. 34 56⅔
- Vindemiatrix, by the new Sext. Trig. [per Sext. Trig. nouum], about [fere] 47 19
- Spica ♍, seen exactly [exquiſite viſa]
- by the Port. 25 9 0
- by the new Sext. 25 9 0

- The outermost star in the northern foot of ♍ [Stella in boreo pede ♍ extrema][1108]
- by the Portat. 30 27 50
- by the new Sext. 30 28 10[1109]
- The southern of the scale-pans of ♎ [Auſtralis lancium ♎], by the Port. [p. Port.] 19 52¼
- by the new Sext. 19 52¼
- The northern of the scale-pans of ♎ [Borealis ex lancibus ♎]
- by the Portat. 26 19⅓
- by the new Sext. 26 19⅓
- The middle one in the forehead of ♏ [Media in fronte ♏]
- by the Portat. 12 47 25
- by the Sext. no. [per Sext. no.] 12 47 35
- The heart of ♏ [Cor ♏]
- by the Portat. 8 45 30
- by the new Sext. 8 45 35

DIE 22 APRILIS.

- The upper of the two following ones in the Quadril. of Corvus [Superior duarum ſequentium in Quadril. Corui], by the Portat. 19 55¾
- by the new Sext. 19 56
- The following one in the lower wing of ♍ [Sequens in inferiori ala ♍]
- by the Port., not exactly enough [non ſatis exquiſite] 34 56⅓
- by the new Sext., about 34 57
- Spica ♍, by the Portat. 25 9
- by the new Sext., about 25 9
- The more southern of the scale-pans of ♎ [Auſtralior lancium ♎]
- by the Port. 19 52
- by the new Sext. 19 52 10
- The northern of the scale-pans [Borealis lancium], by the Portat. 26 19⅓
- by the new Sext. 26 19½
- The middle one of the three in the forehead of ♏ [Media trium in fronte ♏]
- by the Portat. 12 47½
- by the new Sext. 12 47⅔
- The uppermost in the forehead of ♏ [Suprema in fronte ♏]
- by the Portat. 15 33
- by the new Sext. 15 33
- The lower one in the hand of Ophiuchus [Inferior in manu Ophiuchi]

[1108] in the two entries *Sequens in / infer. ala* ♍ and *Spica* ♍ *ex- / quiſite viſa*, the label stands in two lines at the left and a printed brace joins it to the two *per* lines beside it. *Stella in boreo pede* ♍ *extrema* is the last line of the left column and carries no figures.

[1109] these two lines stand at the head of the right column, with no label and no rubric above them.

- by the Portat. 30 30
- by the new Sext. 30 30
- The heart of ♏
- by the Portat. 8 45 35
- by the new Sext. 8 45⅔
- The left knee of Ophiuchus [Siniſtrum genu Ophiuchi]
- by the Portat. 24 28
- by the new Sext., not exactly [non exquiſite], 24 28⅔
- The right knee of Ophiuchus [Dextrum genu Ophiuchi]
- by the Portat. 19 0⅓
- by the new Sext. 19 0½
- The head of Ophiuchus [Caput Ophiuchi]
- by the Port. 47 2 10
- by the new Sext. 47 2 25

Towards daybreak [Verſus illuſcentem diem]. While we were observing, all the instruments were at times shaken by the wind [vento interdum omnia inſtrumenta commouebantur].

DIE 29 APRILIS, MANE.

With the Tychonic one [Per Tichonicum].

- The right shoulder of Hercules [Dexter humerus Herculis] 56 32⅔
- The left shoulder of Ophiuchus [Siniſter humerus Ophiuchi] 44 11⅓
- The head of Hercules [Caput Herculis] 49 1¾
- The left shoulder of Hercules [Sin. humerus Herculis], about [fere] 59 30
- The head of Ophiuchus [Caput Ophiuchi] 47 2 10

DIE 12 JUNIJ.

- The head of Ophiuchus, by the Tich. [per Tich.] 47 2½

The star was seen among thin clouds [Stella inter raras nubes viſa].

DIE 13 JUNIJ.

- The head of Hercules, by the Tich. 49 2¼
- The head of Ophiuchus, by the Tich. 47 2¼

DIE 14 JUNIJ.

The bright shoulder of Erichthonius [Lucidus Humerus Erichtonij] had its least altitude [altitudinem minimam] on the northern meridian [in meridiano ſeptentrionali], by the old sextant △ [per Sext. △ veterem]: 11 26 50.

DIE 10 JULIJ.

- The bright one of the Vulture [Vulturis lucida], by the Tich. 41 56
- by the Port. [per Port.] 41 56½

DIE 28 JULIJ.

- The tail of the Vulture [Cauda Vulturis], by the Port. 47 25
- by the new sextant △ [per Sext. △ nou.], about 47 25
- The small one of it, above the bright one of the Vulture [Parua illius ſupra Lucid. Vult.]
- by the Port. 43 46¾
- by the new sextant [per Sext. nou.] 43 46¾
- The bright one of the Vulture [Lucida Vult.], by the Tich. 41 56¼
- by the Portat. 41 56¾
- by the new sextant 41 56¾
- The left hand of Antinous [Siniſtra manus Antinoi]
- by the Port. 32 7⅔
- by the new sextant 32 7¾
- The upper one in the horn of Capr. [Superior in cornu Capr.]
- by the Portat. 20 23⅔
- by the new sextant 20 23½
- The lower of them [Inferior earundem]
- by the Port. 18 8⅔
- by the new sextant, about 18 8[1110]

This latter one was not exact, because of haste [Non exquiſita hæc poſterior propter feſtinationem].

DIE 6 AUGUSTI.

- The bright one of the Vulture [Luc. Vult.], by the Port. 41 56
- by the sextant [per Sext.] 41 56

DIE 8 AUGUSTI.

- The bright one of the Vulture, by the Port. 41 57
- by the sextant 41 56¼

The wind was strong [Ventus erat validus].

DIE 14 AUGUSTI.

- The small one above the Vulture [Parua ſupra Vulturem]
- by the new sextant 43 46¾
- The bright one of the Vulture, by the new sextant [per Sext. nouum], exactly [exquiſite] 41 56½
- The hand of Antinous [Manus Antinoi], by the new sextant 32 7¾
- by the Portat. 32 8
- The upper horn of ♍ [Superius cornu ♍], by the sextant 20 24
- The lower horn of ♍ [Inferius cornu ♍], by the Port. 18 7½

[1110] *Parua illius ſupra / Lucid. Vult.* stands in two lines at the left, and a printed brace joins it to the two readings beside it, the second of which is set across two lines (*per Sext. / nou. 43 46¾*). The labels *Siniſtra manus Antinoi*, *Superior in cornu Capr.* and *Inferior earundem* each stand in two lines at the left, level with their two readings, without a brace.

- by the sextant 18 7⅔

DIE 15 AUGUSTI.

With the new sextant [Per Sextantem nouum].

- The small one above the Vulture [Parua ſupra Vult.] 43 46¾
- The bright one of the Vulture [Lucida Vulturis] 41 56 30
- The hand of Antinous 32 7 40
- The upper horn of ♑, not certain enough [non ſatis certa] 20 23

DIE 19 AUGUSTI.

- The bright one of the Vulture, by the new sextant 41 56½
- by the Port. 41 57
- A certain star in the head of the Horse [Stella quædam in capite Equi], by the Port. 37 41
- The left shoulder of ♒ [Humerus ſiniſter ♒], by the Port. 26 46¾
- by the new sextant 26 46½
- The preceding one in the tail of ♑ [Præcedens in cauda ♑]
- by the Port. 15 40¾
- The following one in the tail of ♑ [Sequens in cauda ♑]
- by the new sextant 16 11

They were observed among small clouds [Inter nubeculas obſeruabantur].

DIE 20 AUGUSTI.

- The bright one of the Vulture [Luc. Vulturis], by the new sextant 41 56 35
- The bright one in the tail of ♑ [Luc. in cauda ♑], by the new sextant 16 11 0

DIE 21 AUGUSTI.

- The hand of Antinous, by the Portat. 32 7½
- by the new sextant, not good [non bona] 32 7 10
- The upper horn of ♑
- by the new sextant 20 23
- by the Port. 20 23⅓
- The lower horn of ♑
- by the new sextant 18 7⅓
- by the Port. 18 7½
- The tail of Delphinus [Cauda Delphini], by the Portat.,
- not exactly enough [non ſatis exquiſite] 44 4
- by the new sextant 44 3¼
- The preceding one in the □ of Delphinus [Præcedens in □ Delphini]
- by both [per vtrumque] 47 18
- The following, upper one in the □ [Sequens in □ ſuperior]
- by both [per vtrumque] 48 36

- The last in the □ of the same, not certain enough [Vltima in □ eiuſdem, non ſatis certa]
- by the new sextant [per Sext. nouum] 48 46
- by the portable one [per Portat.] 48 47
- The left shoulder of ♒ [Iniſter humerus ♒]
- by the new sextant [per Sext. nov.] 26 46½
- The preceding one in the tail of ♍ [Præcedens in cauda ♍]
- by the portable one 15 40
- by the new sextant [per Sext. nou.] 15 40½
- The bright one of the tail of ♍ [Lucida caudæ ♍], by the portable one [per Port.] 16 11½
- by the new sextant 16 11¼
- The mouth of Pegasus [Os Pegaſi], by the new sextant 42 7
- The right shoulder of ♒ [Dexter humerus ♒]
- by the portable one 31 49
- by the new sextant 31 48¾[IIII]

DIE 22 AUGUSTI.

With the new sextant [Per Sextantem nouum].

- The hand of Antinous [Manus Antinoi] 32 8
- The upper horn of ♍ [Superius cornu ♍] 20 23
- The lower horn of ♍ [Inferius cornu ♍] 18 7½

DIE 25 AUGUSTI.

- The upper horn of ♍ [Super. cornu ♍], by the new sextant 20 23
- by the portable one 20 23¼
- The lower horn of ♍, by the portable one 18 7⅔
- by the new sextant 18 7½

DIE 26 AUGUSTI.

- The hindmost in the □ of Delphinus [Poſtrema in □ Delphini] 48 47

DIE 27 AUGUSTI.

With the portable quadrant [Per Quadrantem portatilem].

- The left shoulder of ♒ 26 47
- The preceding one in the tail of ♍ 15 41
- The following one in the tail of ♍ [Sequens in cauda ♍] 16 11¾
- The mouth of Pegasus 42 7½
- The right shoulder of ♒ 31 49
- The first of the wing of Pegasus [Prima alæ Pegaſi] 47 5¼

[IIII] the labels *Præcedens in / cauda* ♍ and *Dexter hume- / rus* ♒ each stand in two lines at the left, level with their two readings, without a brace.

DIE 31 AUGUSTI.

With the portable quadrant [Per Quadrantem Portatilem].

- The tail of Delphinus [Cauda Delphini] 44 3½
- The hand of ♒ [Manus ♒] 23 11½
- The hindmost in the □ of Delphinus 48 47
- The left shoulder of ♒ [Humerus ſiniſter ♒] 26 47¼
- The mouth of Pegasus 42 7 35

DIE 2 OCTOBRIS.

- The first of the wing of Pegasus, by the portable one 47 6

DIE 4 OCTOBRIS.

- The first of the wing of Pegasus, by the portable one 47 5½
- by the sextant [per Sext.] 47 6

DIE 16 OCTOBRIS.

The southern star in the △ of Pegasus [Stella auſtralis in △ Pegaſi] 59 57⅓, by the Q. Tichon. [per Q. Tichon.], among small clouds [inter nubeculas].

DIE 7 NOUEMBRIS.

- H. 3 M. 58½ the bright one of the Vulture [Luc. Vulturis]
- 10 10 48 the bright one of ♈ [Lucida ♈]
- 12 38 38 the eye of ♉ [Oculus ♉]
- 15 45 30 the Mer. head of ♊ [Mer. Caput ♊]

On the meridian [in meridiano].[1112]

DIE 17 NOUEMBRIS.

- The star in the urn of ♒ nearest towards the south [Stella in vrna ♒ proxime verſus auſtrum], by the portable one 31 53⅙
- by the sextant 31 53⅙
- The bright one in the neck of Pegasus [Lucida in collo Pegaſi]
- by the portable one 42 47⅔
- by the new sextant 42 47¾
- The lower of the two small ones in the breast of Pegasus [Inferior ex duabus paruis in pectore Pegaſi], by the portable Q. [per Q. Port.], not certain enough [non ſatis certa] 55 30¼
- The more southern one in the △ of Pegasus, or Scheat [Auſtralior in △ Pegaſi ſeu Scheat], by the portable one 59 57½
- The first of the wing of Pegasus [Prima alæ Peg.]
- by the portable one 47 5½

[1112] a printed brace at the right of the four time lines joins them to *in meridiano*., which is set beside the brace in three lines (*in* / *meri-* / *diano*.).

- by the sextant 47 5⅔[1113]

DIE 21 NOUEMBRIS.

- The middle one in the urn of ♒ [Media in vrna ♒]
- by the new sextant 32 0
- by the portable Q. 32 0⅓
- by the Q. Minor. [per Q. Minor.] 32 0
- The last in the urn of ♒ [Vltima in vrna ♒], by the sextant 31 53¼
- by the Q. Minor. 31 52½
- The lowest in the △ of Pegasus [Infima in △ Pegaſi]
- by the Q. Mural. [per Q. Mural.] 56 32½

Among clouds, not certain enough [Inter nubes non ſatis certa].

- The southern one in the triangle of Pegasus [Auſtralis in trigono Pegaſi]
- by the portable Q. [per Q. Portat.] 59 57
- The first of the wing of Pegasus, by the portable one 47 5½
- by the Q. Minor. [Per Q. Minor.] 47 5

DIE 23 NOUEMBRIS.

With the portable Q. [Per Q. Portatilem].

- The lower one in the breast of Pegasus [Inferior in pectore Pegaſi] 55 30⅓
- The bright one in the breast of Pegasus [Lucida in pectore Peg.] 56 33⅓
- Scheat of Pegasus [Scheat Pegaſi] 59 57
- The first of the wing of Pegasus 47 5½
- The head of Andromeda [Caput Andromedæ] 60 53¾

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- The far end of the wing of Pegasus [Extrema alæ Pegaſi] 46 58½
- The first star of ♈ [Prima ſtella ♈] 51 20
- The lower horn of ♈ [Inferius cornu ♈] 52 50¾
- The eye of ♉ [Oculus ♉] 49 41½
- by the sextant [per Sextantem] 49 41⅙

DIE 15 DECEMBRIS.

With the new sextant [Per Sextantem nouum].

- The left foot of Orion [Siniſter pes Orionis] 25 21½
- The left shoulder of Orion [Siniſter humerus Orionis] 39 59
- The first in the belt of Orion [Prima in baltheo Orionis] 33 25
- The middle one in the belt [Media in baltheo] 32 33¼
- The last in the belt [Vltima in baltheo] 31 51⅔
- The right foot of Orion [Dexter pes Orionis] 24 13½
- by the portable one [per Portat.] 24 13

[1113] *Lucida in / collo Pegaſi* and *Prima alæ Peg.* stand at the left, level with their two readings, without a brace; the figures *55 30¼* stand alone on a line, set to the right, under *Pegaſi per Q. Port., non ſatis certa*.

- The right shoulder of Orion [Dexter hum. Or.], by the portable one 41 20
- The foot of Canis Major [Pes Canis maioris], by the portable one 16 18½
- by the new sextant [per Sext. nouum] 16 18½
- Canis Major [Canis maior], by the new sextant [per Sext. nou.] 17 54
- by the portable Q. [per Q. Portat.] 17 54½
- The star in the right hip of Canis Major [Stella in dextra coxa Canis maioris], by the sextant [per Sext.] 5 45
- The lowest star in the belly of Canis Major [Stella infima in aluo Canis maioris], by the sextant 8 22⅓

DIE 20 DECEMBRIS.

- The greatest Alt. of the pole star [Alt. Stellæ Polaris maxima], by the portable one 58 50 55

DIE 21 DECEMBRIS.

- The preceding one in the first side of the □ of Ursa Minor [Præcedens in primo latere □ vrſæ minoris], by the portable Q. 41 45 10
- by the sextant Trig. [per Sext. Trig.] 41 45 5

DIE 22 DECEMBRIS A. M.

- The least Alt. of the preceding one in the seat of Cassiopeia [Alt. minima præcedentis in ſella Caßiopeæ], by the portable Q. 22 48
- by the sextant Trigon. [per Sext. Trigon.] 22 48
- The least Alt. of the pole star [Alt. min. Stellæ Polaris]
- by the portable one [per Port.] 52 58½
- by the new sextant 52 58⅓

This observation is not certain enough, because, on account of clouds suddenly rising, it was observed somewhat before the true time [Hæc obſeruatio non eſt ſatis certa, quia propter repente exorientes nubes aliquantulum ante verum tempus obſeruabatur].

DIE 29 DECEMBRIS.

- The greatest Alt. of the pole star [Alt. Stellæ Polaris max.] 58 50¾, by the portable one.

It was not clear enough [Non erat ſatis ſerenum].

DIE 30 DECEMBRIS, MANE.

- The knee of Cepheus [Genu Cephei], by the portable one 41 15
- The bright star of the Chair of Cassiopeia [Luc. cathedræ Caß.], by the portable one 22 48
- by the sextant 22 48
- The least Alt. of the pole star [Alt. min. St. Polaris], by the portable one 52 58

- by the sextant 52 58 [recte: 52 58¼ — Corrigenda, p. 430]
- Schedar of Cassiopeia [Schedir Caßiop.], by the portable one 20 12
- by the sextant 20 11⅚
- by the sextant vet. Trig. [per Sext. vet. Trig.] 20 11¾
- Spica ♍, by the Q. Tichon. [per Q. Tichon.] 25 8 50
- The greatest Alt. of the pole star 58° 50′ 50″
- The least Alt. of the same [Alt. eiuſdem minima] 52 58 10
- The diameter of its circle [Diameter circuli eius] 5 52 40
- The semidiameter 2 56 20
- The elevation of the pole above the horizon [Eleuatio Poli ſupra horizontem] 55 54 30[1114]

OBSERUATIONES DISTANTIARUM ET LOCORUM PER ARMILLAS.

Observations of distances and positions with the armillae [PER ARMILLAS].

DIE 4 JANUARIJ.

- Between the pole star [Inter Stellam polarem] and the bright one of ♈ [lucidam ♈] 65 47 45 three times [ter]
- the merid. head of ♊ [merid. cap. ♊] 61 49 30 four times [quater]
- Between the Merid. head of ♊ [Inter Merid. cap. ♊] 74 44 45
- and the bright one of ♈ [& lucid. ♈] 74 45 0[1115]

With the portable one [Per Portatilem].

DIE 5 JANUARIJ.

- In the evening [Ad veſperas]. Between the two outermost bright ones of Cassiopeia [Inter duas extremas Caßiopeæ claras], by [per] 13 18
- sextant Trigon. [Sext. Trigon.] 13 18[1116]

Now these two were near the crown of the head [Erant autem hæ duæ iuxta verticem capitis].

- Between the pole star and Schedar of Cassiopeia [Inter ſtellam polarem & Schedir Caßiopeæ], by the sextant Trigon. 32 47¾ three times

These two also were near the crown of the head [Erant & hæ duæ iuxta verticem capitis].

- Between the star in Draco nearest the pole of the zodiac [Inter ſtellam in Dracone proximam polo Zodiaci] and the heel of the foot of ♊ [calcem pedis ♊], by the portable Q. 90 37 twice [bis]

[1114] these five lines are set indented, as a group, below *Spica ♍ per Q. Tichon. 25 8 50*, with the labels at the left and the figure groups in an aligned column at the right; there is no head row and no rule, and the first figure group alone carries degree, minute and second marks.

[1115] *lucidam ♈* and *merid. cap. ♊* are set one under the other, indented under *Inter Stellam polarem &*; *& lucid. ♈* is indented under *Inter Merid. cap. ♊*. The words *ter*, *quater* (and, below, *ter* and *bis*) are set in smaller type after their figures.

[1116] *Caßiopeæ claras per 13 18* is the last line of the left column below the heading; *Sext. Trigon. 13 18* stands alone, set to the right, as the first line of the right column, with no rubric above it.

- Between the bright one of ♈ and the lower head of ♊ [Inter lucidam ♈ & inferius caput ♊] 74 45

DIE 6 JANUARIJ.

With the portable Q. [Per Q. Portatilem].

- Between Spica ♍ and the lower head of ♊ [Inter Spicam ♍ & inferius caput ♊]
- 90 46
- 90 46
- Between Spica ♍ and that one in Draco [Inter Spicam ♍ & illam in Dracone], twice [bis] 87 4½
- Between Spica ♍ and the pole star, towards day [Inter Spicam ♍ & Polarem verſus diem]
- I 101 39
- II 101 40
- III 101 40

With the triangular sextant [Per Sextantem Trigonicum].

- Between the pole star and Schedar of Cassiopeia [Inter Stellam polarem & Schedir Caßiopeæ]; these were inclined down toward the horizon [erant decliues hæ ad horizontem]
- 32 47¾
- 32 47¾
- Between the two outermost bright ones in Cassiopeia [Inter duas extremas in Caßiopea lucidas] 13 18[1117]

Now at that time they were inclined down toward the horizon [Erant autem tunc decliues ad horizontem].

It is therefore evident, since the distance of these two near the zenith overhead yesterday evening, around the sixth hour of the evening, was the same as this morning around the sixth hour of the morning, 13 18, and the distance from the pole star was the same on both occasions, 32 47¾. It is evident, I say, that in other places, especially beyond 20 Grad. of altitude, the stars do not appear more inclined than near the vertex, as Witelo and Ibn al-Haytham have taught in the Optics [Patet itaque cum eadem fuerit harum duarum diſtantia iuxta Zenith capitis heri veſperi circa horam ſextam veſpertinam, quæ hodie mane iuxta ſextam matutinam 13 18 et eadem diſtantia vtrobique a Stella Polari 32 47¾. Patet inquam [recte: itaque, "therefore" — Corrigenda, p. 430] non apparere in alijs locis ſtellas decliuiores, præſertim vltra 20 Grad. altitudinis quam iuxta verticem, prout Vitellio Alhazenque in Opticis tradiderunt].

- *From the Vulture to Spica [A Vulture ad Spicam] 97 47*
- *From Spica to the mer. head of ♊ [A Spica ad mer. cap. ♊] 90 46*

[1117] in these entries the label runs across two or three lines at the left and one figure group stands level with each line; *erant de- / cliues hæ ad horizontem* is set as the continuation of the Schedar label, the word divided across the two lines. The ordinal numerals *I*, *II*, *III* are set in full-size capitals before the figures.

• *From the mer.* ♊ *to the head of* ♈ *[A mer.* ♊ *ad caput* ♈*] 74 45*

At the next following noon, the clock we used in these observations was running 1 hour 8½ faster [Proxime ſequenti meridie Horologium quo in his obſeruationibus vſi ſumus 1 Hora 8½ celerius mouebatur].

DIE 8 JANUARIJ.

With the triangular sextant.

- Between the two stars in Perseus [Inter duas ſtellas in Perſeo]
- 12 33½
- 12 33½
- Between the bright one of ♈ and the left shoulder of Orion [Inter Lucid. ♈ & ſiniſtrum humerum Orionis], twice [bis] 50 31⅓
- Between the bright one of ♈ and the first of the belt of Orion [Inter Lucid. ♈ & primam balthej Orionis] 55 7⅔

DIE 9 JANUARIJ, A. M.

- Between Spica ♍ and the heel of the foot of ♊ [Inter Spicam ♍ & calcem pedis ♊]
- 108 23 40
- 108 23 40
- Between the heel of the foot of ♊ and the star of Draco [Inter calcem pedis ♊ & Draconis ſtellam]
- 90 31 15
- 90 31¼
- Between Spica ♍ and the pole star [Inter Spicam ♍ & Stellam polarem]
- 101 45
- 101 44¾
- 101 45
- Between the star of Draco and Spica ♍ [Inter ſtellam Draconis & Spicam ♍]
- 87 1½
- 87 1½
- Between Spica and the Vulture [Inter Spicam & Vulturem]
- 97 44
- 97 43½[1118]

At the next following noon, the clock we used in these observations had advanced 23′ faster than it should [Proxime ſequenti meridie Horologium quo in his obſeruationibus vſi ſumus23′ celerius iuſto promotum eſt].

*[All the following observations with the portable quadrant were made through the external pinnules, corrected and verified; for some error had

[1118] The third reading *101 45* and each other lone figure group below stand by themselves on a line, set to the right.

previously lain hidden because of the double lines near the end, so the earlier ones are not true]*1.[1119]

The same day, in the evening [Eodem die ad veſperas].

- Between the heel of the foot of ♊ and the pole star [Inter calcem pedis ♊ & Stellam polarem]
- 67 4 10
- II 67 4 10
- III 67 4 10
- IIII 67 4 10
- Between the heel of the foot of ♊ and the star of Draco [Inter calcem pedis ♊ & Stellam Draconis]
- 90 37
- 90 37
- 90 37
- *Between the lower head of* ♊ *and the bright one of* ♈ *[Inter infer. caput* ♊ *&* *Luc.* ♈*] 74 45*

They were observed twice, precisely, as also before [Bis obſeruabantur exquiſite vt etiam prius].

- *Between the head of* ♈ *and the bright one of Draco nearest the pole of the zodiac [Inter caput* ♈ *& lucidam Draconis polo Zodiaci proximam], precisely, three times [exquiſite ter] 84 20⅔*
- *Between the heel of the foot of* ♊ *and the head of* ♈ *[Inter calcem pedis* ♊ *&* *caput* ♈*], precisely, twice [exquiſite, bis] 58 21½*
- *From the bright head of* ♈ *to Aldeb. [A capite lucido* ♈ *ad Aldeb.], three times [ter] 35 32¼*
- *Between the eye of* ♉ *and the heel [Inter oculum* ♉ *&* *calcem] 25 53, twice, and it could not be greater [bis, nec poterat eße maior].*
- *The lower head of* ♊ *and the eye of* ♉ *[Inferius caput* ♊ *&oculus* ♉*] 45 5* twice [bis]
- *The eye of* ♉ *and the heart of* ♌ *[Oculus* ♉ *et cor* ♌*] 80 9½* twice [bis][1120]

DIE 2 FEBRUARIJ, VESPERI.

- Between the bright foot of Erichthonius and the heart of ♌ [Inter lucidum pedem Erichtonij & cor ♌]
- 67 22¼
- 67 21⅓

[1119] the square brackets that open and close this italic paragraph are printed on the leaf; the footnote call *1* stands after the closing bracket, before the point. The Latin reads: *Omnes obſeruationes ſequentes perquadrantem portatilem ſunt factæ per pinnacidia externa correcta & verificata, nam error aliquis prius latuit propter duplices lineas iuxta finem, vnde anteriores non ſunt veræ.*

[1120] the final *bis* of the last two lines is set in a smaller upright type after the italic figures; the first line of the list, *Inter infer. caput* ♊, stands alone, with *&* *Luc.* ♈ *74 45* set to the right below it.

- twice [bis] 67 21

In the three later observations [In tribus poſterioribus obſeruatio-]

[1] Duabus lineis transverſe inducta. [Struck through crosswise with two lines.]

the instrument did not wobble as much as before, when it was shaken by a violent storm [nibus non adeo vacillabat inſtrumentum vt prius valida tempeſtate agitatum].

- Between the heart of ♌ and the star of Draco [Inter cor ♌ & Stellam Draconis]
- 85 9 10
- 85 9 0

DIE 3 FEBRUARIJ, MANE.

- Between the heart of ♌ and Spica ♍ [Inter cor ♌ & Spicam ♍]
- 54 2½ twice [bis]
- 54 2⅓
- Between Spica ♍ and the pole star [Inter Spicam ♍ & Polarem Stellam]
- 101 52 twice
- about [fere] 101 52 twice
- Between Spica ♍ and the star of Draco [Inter Spicam ♍ & ſtellam Draconis]
- 87 5
- 87 5⅓
- 87 6 twice

You can therefore use 87 5½ without perceptible error [Potes itaque abſque ſenſibili errore vti 87 5½].

- *Between Spica ♍ and the Vulture [Inter Spicam ♍ & Vulturem]*
- *97 48*
- *97 47*
- *97 47½*

We also found 97 50 once, but it is more probable that it is 97 48 [Inuenimus etiam ſemel 97 50 ſed probabilius eſt eße 97 48].

DIE 3 FEBRUARIJ, VESPERI.

- Between the knee of Pegasus and that one in the hand of Andromeda, with the triangular sextant [Inter genu Pegaſi & illam in manu Andromedæ per Sext. Trigon.]
- I 17 0
- II 17 0
- III 17 0
- Between the same one in the hand of Andromeda and Scheat of Pegasus [Inter eandem in manu Andromedæ & Scheat Pegaſi] 16 38

This distance was found several times higher, so that this was one minute greater or less [Inuenta eſt hæc diſtantia aliquoties altior vt hæc vno minuto maior vel minor fuerit] 16 38.

- Between the foot of Erichthonius and the heart of ♌ [Inter pedem Erichtonij & cor ♌]
- 67 20
- 67 20
- 67 20
- The heart of ♌ and the pole star [Cor ♌ et Stella Polaris]
- 78 20½
- 78 20
- about 78 20
- The heart of ♌ and the star of Draco [Cor ♌ & Stella Draconis]
- 85 9
- 85 10
- 85 8
- 85 9⅔

The instrument was being moved too much by the wind [Vento nimium mouebatur inſtrumentum].

DIE 4 FEBRUARIJ, MANE.

- Between Spica ♍ and the pole star [Inter Spicam ♍ & Polarem]
- 101 50
- 101 49¾
- 101 49
- *Between Spica ♍ and the star of Draco [Inter Spicam ♍ & Stellam Draconis]*
- *I 87 6*
- *II 87 5½*
- *III 87 6⅙*
- *IIII 87 5½*
- *V 87 5*
- *Between Spica and the Vulture [Inter Spicam & Vulturem]: precisely, three times [exquiſite, ter] 97 49¼; once [ſemel] 97 48¾*[1121]

DIE 4 VESPERI ET DIE 5 MANE.

This whole night it was very clear, and the air very pure and very calm. All the following observations, therefore, were made this night, and are most exact in distances and altitudes and were taken with the greatest care; you can rely on them with certainty. And so, where they disagree with the preceding ones, that happens because in the preceding night observations there was such violence of the winds that it was

[1121] The word *Erich- / tonij* is divided across two lines of its label, and so are *Andro- / medæ* and *An- / drom.* below. The ordinal numerals *I* to *V* in the right column are italic capitals; *I* to *III* in the left column are roman capitals. The line-final *bis* after *2½*, *52* (twice) and *6* is set in a smaller type.

not possible to direct the instrument exactly and steadily enough onto the centres of the stars; therefore those are less to be trusted, but these very greatly[1] [Hac tota nocte fuit ſereniſſimum aërque puriſſimus&tranquilliſſimus. Sunt itaque omnes ſequentes obſeruationes hac nocte factæ, & in diſtantijs & altitudinibus exactiſſimæ, ſummaque diligentia habitæ, quibus potes te certo fundare, & ſic vbi diſcrepant ab antecedentibus, fit ob id, quia in præcedentibus nocturnis obſeruationibusfuit tanta ventorum vehementia, vt inſtrumentum non licuerit ſatis exacte quieteque in centra ſtellarum dirigere, quare illis minus fidendum, his vero plurimum[1]].

- Between the more southern one in the hand of Andromeda and the knee of Pegasus, with the triangular sextant [Inter auſtraliorem in manu Andromedæ & genu Pegaſi, per Sextantem Trigonicum]
- twice [bis] 17 1
- 17 0½
- 17 1
- Between the same one in the hand of Andromeda and the bright one of ♈, with the triangular sextant [Inter eandem in manu Androm. & luc. ♈ per Sext. Tr.]
- 36 25
- twice 36 25
- Between the heart of ♌ and the pole star [Inter cor ♌ & Stellam Polarem]
- 78 19¾
- 78 19¾
- 78 19¾
- Between the heart of ♌ and the star of Draco [Inter cor ♌ et ſtellam Draconis]
- 85 9
- 85 9
- 85 9
- Between the heart of ♌ and the bright foot of Erichthonius [Inter cor ♌ & lucidam pedem Erichtonij]
- 67 20 10
- 67 20 10
- 67 20 10
- Between the heart of ♌ and the left foot of Erichthonius [Inter cor ♌ & ſiniſtrum pedem Erichtonij]
- 73 24 10
- 73 24 10
- 73 24 10
- Between the southern head of ♊ and the star of Draco [Inter meridionale caput ♊ & ſtellam Draconis]
- 81 31 50
- 81 31 50
- 81 31 50

- Between the heel of the foot of ♊ and Spica ♍ [Inter calcem pedis ♊ & Spicam ♍]
- 108 28 5
- 108 28 5
- 108 28 5[1122]

[1] In margine a Tychone ſcripta. [Written in the margin by Tycho.]

- Between Spica ♍ and the heart of ♌ [Inter Spicam ♍ & cor ♌]
- 54 1 40
- 54 1 40
- 54 1 40
- Between the southern head of ♊ and Spica ♍ [Inter meridionale caput ♊ & Spicam ♍]
- 90 46 15
- 90 46 15
- 90 46 15
- Between Spica ♍ and the pole star [Inter Spicam ♍ & Stellam polarem]
- 101 49 50
- 101 49 50
- 101 49 50
- Between Spica ♍ and the star of Draco [Inter Spicam ♍ & Draconis ſtellam]
- 87 6 30
- 87 6 30
- 87 6 30
- Between Spica ♍ and the lowest one in the forehead of ♏ [Inter Spicam ♍ & infimam in fronte ♏]
- 39 6½
- 39 6½
- 39 6½
- Between Spica ♍ and the middle one in the forehead of ♏ [Inter Spicam ♍ & mediam in fronte ♏]
- 38 40
- 38 40
- about [fere] 38 40
- Between the bright one of the Vulture and Spica ♍ [Inter lucidam Vulturis & Spicam ♍]
- 97 49½
- 97 49½
- 97 49½
- Between Spica ♍ and the heart of ♏ [Inter Spicam ♍ & cor ♏]
- 45 51¼
- 45 51¼

[1122] *Inter eandem in manu An- / drom. & luc.* ♈ *per Sext. Tr.* carries the figures *36 25* on its first line; the second reading, *bis 36 25*, stands alone below, set to the right.

- 45 51¼

All the observations written above were made with the portable quadrant, when the air was calm and the sky quite clear [Omnes præſcriptæ obſeruationes per Quadrantem Portatilem factæ ſunt, cum aër tranquillus & cœlum bene ſerenum eßet].[1123]

DIE 5 FEBRUARIJ, VESPERI.

- Between the head of ♈ and the right knee of Pegasus, with the triangular sextant [Inter caput ♈ & dextrum genu Pegaſi, per Trigon.]
- 45 40
- 45 40
- 45 39
- 45 40½
- Between the head of ♈ and Scheat of Pegasus [Inter caput ♈ & Scheat Pegaſi], twice [bis] 41 19

DIE 17 FEBRUARIJ.

With the portable quadrant [Per Portatilem].

- Between the first of the belt of Orion and Scheat of Pegasus [Inter primam balthei Orionis & Scheat Pegaſi]
- 96 22
- 96 21½
- 96 22
- 96 21
- 96 21
- Between the head of Androm. and the first of the belt of Orion [Inter caput Androm. & primam balthei Or.]
- 82 12⅔
- 82 12⅔
- Between Canis Minor and the bright one of ♈ [Inter canem minorem & lucidam ♈]
- 81 35⅓
- 81 35
- 81 35

DIE 21 FEBRUARIJ.

- Between the heart of ♌ and Canis Minor [Inter cor ♌ & Canem minorem]
- 37 19½
- 37 19⅔
- 37 19¾

[1123] Each entry's label runs across two or three lines at the left, one figure group standing level with each line, and a third figure group, where the label has only two lines, stands alone below, set to the right.

- Between Canis Minor and Spica ♍ [Inter Canem minorem & Spicam ♍]
- about [fere] 87 30
- 87 30½
- 87 30
- 87 30½

DIE 25 FEBRUARIJ.

With the triangular sextant [Per Sextantem Trigonicum].

- Between Schedar of Cassiopeia and the bright one of ♈ [Inter Schedir Caßiopeæ & lucidam ♈]
- 36 40
- 36 40¼
- 36 40¼
- Between the bend of Cassiopeia and the bright one of ♈ [Inter flexuram Caßiopeæ & lucidam ♈]
- 39 12
- about [fere] 39 12
- 39 11¾
- Between the Knee of Cassiopeia and the bright one of ♈ [Inter genu Caßiopeæ & lucidam ♈]
- 37 29
- 37 29
- 37 29
- Between the bright one in the seat of Cassiopeia and the bright one of ♈ [Inter lucidam in ſella Caßiopeæ & lucidam ♈]
- 41 21
- 41 20½
- 41 20
- 41 20⅔

The bright one of ♈ was then close to the horizon [Erat tum luc. ♈ propinqua horizonti].

- Between the heart and the tail of ♌ [Inter cor & caudam ♌]
- 24 40¼
- 24 40
- 24 40
- Between Spica ♍ and the tail of ♌ [Inter Spicam ♍ & caudam ♌]
- 35 2¾
- 35 2 [recte: 35 3 — Corrigenda, p. 430]
- 35 2½[1124]

[1124] the sentence *Erat tum luc.* ♈ */ propinqua horizonti* is set in the label column on the two lines that carry *41 20½* and *41 20*, below the label *Inter lucidam in ſella Caßiopeæ &* */ lucidam* ♈ *41 21*; *41 20⅔* stands alone below it. The words *Caßio-* / *peæ* and *luci-* / *dam* are divided across the lines of their label.

DIE 26 FEBRUARIJ

- Between the topmost one of the Chair of Cassiopeia and the bright one of ♈ [Inter ſupremam Cathedræ Caßiopeæ & lucidam ♈]
- 41 21½
- 41 22
- 41 21½
- Between Schedar of Cassiopeia and the bright one of ♈ [Inter Schedir Caßiop. & lucidam ♈]
- 36 39¾
- 36 40
- Between the eye of ♉ and the topmost one of the Chair of Cassiopeia [Inter oculum ♉ & ſupremam Cathedræ Caßiopeæ]
- 64 0½
- 64 1
- 64 1
- Between the eye of ♉ and Schedar of Cassiopeia [Inter oculum ♉ & Schedir Caßiopeæ]
- 59 16⅔
- 59 16¾
- 59 16¾
- Between the bend of Cassiopeia and the eye of ♉ [Inter flexuram Caß. & oculum ♉]
- 58 44¾
- 58 45

DIE 29 FEBRUARIJ.

- Between the bright one of ♈ and the topmost one of the Chair of Cassiopeia [Inter lucidam ♈ & ſupremam Cathedræ Caß.]
- 41 20
- 41 21[1125]

Not certain enough, because of the violent storm [Non ſatis certæ propter validam tempeſtatem].

DIE 3 MARTIJ.

- Between Canis Minor and the eye of ♉ [Inter Canem minorem & oculum ♉]
- 46 21¼
- 46 22½
- 46 23
- 46 22⅓

[1125] the words *Ca- / thedræ* (26 February) and *ſu- / premam* (29 February) are divided across the lines of their labels. The rubric of 26 February is printed without a terminal point.

With the triangular sextant, which, however, was moved not a little by the wind [Per Sextantem Trigonicum qui tamen vento non parum mouebatur].

DIE 5 MARTIJ.

With the new sextant [Per Sextantem nouum].

- Between the bright one of ♈ and the Chair of Cassiopeia [Inter lucidam ♈ & Cathedram Caßiopeæ]
- 41 19
- 41 19 10
- 41 19
- Between Schedar and the bright one of ♈ [Inter Schedir & lucidam ♈]
- 36 36½
- 36 36½
- Between the Bend and the bright one of ♈ [Inter Flexuram & lucidam ♈]
- 39 9
- 39 8½

With the portable quadrant [Per Portatilem].

- Between the pole star and the heel of ♊ [Inter Stellam polarem & calcem ♊]
- 67 4 55
- 67 4 55
- 67 4 55
- 67 4 55
- 67 4 55
- Between the southern head of ♊ and the pole star [Inter caput. merid. ♊ & Polarem]
- 61 49⅓
- 61 49⅓
- 61 49⅓
- The heel of the foot of ♊ and the heart of ♌ [Calx pedis ♊ & cor ♌]
- 54 34⅓
- 54 34⅓
- 54 34⅓
- The heart of ♌ and the pole star [Cor ♌ & Stella polaris]
- 78 19½
- 78 19¾
- 78 19¾
- The heart of ♌ and the southern head of ♊ [Cor ♌ & meridionale caput ♊]
- 37 0
- 37 0
- 37 0

With the new sextant.

- Between the star at the tip of the lower wing of ♍ and the heart of ♌ [Inter ſtellam in extremitate inferioris alæ ♍ & cor ♌], twice [bis] 27 12⅔
- Between the middle one of the same wing and the heart of ♌ [Inter mediam ejusdem alæ & cor ♌]
- 34 59
- 34 58¾
- Between the following one under the girdle of ♍ and the heart of ♌ [Inter ſequentem ſub cingulo ♍ & cor ♌]
- 40 22½
- 40 22
- about [fere] 40 22
- The star in the *cimento* [?] of ♍ and the heart of ♌ [Stella in cimento [recte: cingulo, "girdle" — Corrigenda, p. 430] ♍ & cor ♌]
- 42 16
- 42 15⅔
- Vindemiatrix and the heart of ♌ [Prævindemiator & cor ♌]
- 42 32½
- 42 32⅓[1126]

DIE 12 MARTIJ.

With the new sextant.

- Between Aldebaran and the upper head of ♊ [Inter Aldeboram & ſuperius caput ♊]: 43 10 10, three times [ter]
- Between the upper head of ♊ and the upper foot of Erichthonius [Inter ſuperius caput ♊ & ſuperiorem pedem Erichtonij]: 33 3½, once [ſemel]
- Between the lower head of ♊ and the upper foot of Erichthonius [Inter inferius caput ♊ & ſuper. pedem Ericht.]
- 36 23½, twice [bis]
- 36 23⅔, once
- Between the lower head of ♊ and the bright foot of Erichthonius [Inter inferius caput ♊ & lucidum pedem Ericht.]: 30 33, three times[1127]

DIE 14 MARTIJ.

- Between the upper head of ♊ and the heart of ♌, with the portable quadrant [Inter ſuperius caput ♊ & cor ♌ per Portatilem]
- 40 32¼
- 40 32⅓
- 40 32½
- 40 32⅓

[1126] the words *meri-* / *dionale* and *cin-* / *gulo* are divided across the lines of their labels. The point after *caput* in *Inter caput. merid.* ♊ is printed.

[1127] *ter*, *ſemel* and *bis* stand after the figures at the ends of their lines, set in a smaller roman than the text. The word *ſupe-* / *riorem* is divided across two lines.

- 40 32⅓

DIE 17 MARTIJ.

- Between the eye of ☿ and the heart of ☋, with the portable Q. [Inter oculum ☿ & cor ☋ per Q. Port.]
- 80 10
- 80 10
- Between the upper head of ♊ and the eye of ☿, with the portable quadrant [Inter ſuper. caput ♊ & oculum ☿ per Portat.]
- 43 12
- 43 12½

It was not clear enough [Non erat ſatis ſerenum].

DIE 18 MARTIJ.

With the portable quadrant [Per Portatilem].

- Between the eye of ☿ and the heart of ☋ [Inter oculum ☿ & cor ☋]
- 80 10
- 80 10
- Between the upper head of ♊ and the eye of ☿ [Inter ſuperius caput ♊ & oculum ☿]
- 43 12½
- 43 12⅔
- 43 12½
- 43 12⅓
- 43 12½
- Between the upper head of ♊ and the heart of ☋ [Inter ſuperius caput ♊ & cor ☋]
- 40 32⅓
- 40 32½
- 40 32⅓
- 40 32⅓
- Between the lower head of ♊ and the bright foot of Erichthonius [Inter inferius caput ♊ & lucidum pedem Erichtonij]
- 30 34
- 30 34
- 30 34

DIE 23 MARTIJ.

- Between the heel of the foot of ♊ and the star of Draco, with the portable Q. [Inter calcem pedis ♊ & Stellam Draconis per Q. Portatilem]
- 90 37
- 90 37¼
- 90 37 10

- Between Canis Minor and Spica ♍, with the portable quadrant [Inter Canem minorem & Spicam ♍ per Port.]
- about [fere] 87 30
- 87 30
- 87 30

DIE 27 MARTIJ.

- Between the eye of ♉ and the super. head of ♊, with the new sextant [Inter oculum ♉ & ſuper. ♊ caput per Sextantem nouum]
- 43 10
- 43 10
- 43 10¼
- Between the star of Draco and the heel of ♊, with the portable Q. [Inter ſtellam Draconis & calcem ♊ per Q. Port.]
- 90 37
- 90 37
- Between Canis Minor and Spica ♍, with the Portable [Inter Canem Minorem & Spicam ♍ per Port.]
- 87 30
- 87 30

With the new Trig. sextant [Per Sextantem Trig. nouum].

- Between the bright star of the Chair of Cassiopeia and Schedar [Inter lucidam Cathedræ Caßiopeæ & Schedir]
- 4 58
- 4 58⅓
- 4 58
- Between the Bend of Cassiopeia and the Chair [Inter Flexuram Caßiopeæ & Cathedram]
- 6 10⅓
- 6 10⅓
- Between Schedar and the Bend of Cassiopeia [Inter Schedir & Flexuram Caß.]
- 4 38, twice [bis]
- 4 38½

DIE 29 MARTIJ.

- Between Aldebaran and the Chair of Cassiopeia, with the Portable [Inter Aldeboram & Cathedram Caßiopeæ per Portat.]
- 64 1½
- 64 1 1/[?][1128]
- 64 1½
- Between Aldebaran and the Bend of Cassiopeia, with the Portable [Inter Aldeboram & Flexuram Caßiopeæ per Portat.]

[1128] The denominator is 3 or 8; the page offers no fraction-size 8 to decide it.

- 58 45
- 58 45¼
- 58 45⅓

During this last observation there were some thin clouds around the Eye of ♉, and it was sinking toward the horizon [In vltima hac obſeruatione erant raræ quædam nubes circa Oculum ♉ & ad horizontem vergebat].

DIE 30 MARTIJ.

With the Portable [Per Portatilem].

- Between the lower head of ♊ and the Chair of Cassiopeia [Inter inferius caput ♊ & Cathedram Caßiop.]
- 77 25½
- 77 25¾
- about [fere] 77 25
- Between the lower head of ♊ and the Bend of Cassiopeia [Inter inferius caput ♊ & Flexuram Caßiop.]
- 71 25
- 71 25
- 71 25

DIE 3 APRILIS.

Distances of the stars in Cassiopeia [Diſtantiæ ſtellarum in Caßiopea].

- Between the head of Cassiopeia and the bright star of the Chair [Inter caput Caßiopeæ & lucidam Cathedræ]
- 6 32
- 6 32¼
- 6 32
- Between Schedar and the same one in the Chair [Inter Schedir & eandem in Cathedra]
- 4 57½
- 4 58
- 4 58
- Between the star in the Girdle and the Chair [Inter ſtellam in cingulo & Cathedram]
- 5 17¼
- 5 17⅔
- 5 17¼
- Between the Bend and the Chair [Inter Flexuram & Cathedram]
- 6 11⅓
- 6 10¾
- 6 10¾
- Between the Bend and the Knee of Cassiopeia [Inter Flexuram & genu Caßiop.]
- about [fere] 3 35

- 3 34
- 3 34
- Between the Knee of Cassiopeia and the Chair [Inter genu & Cathedram]
- 9 41¼
- 9 41¼
- Between the star at the end of the foot and the Chair [Inter ſtellam in extremo pedis & Cathedram]
- 13 17
- 13 17
- Between the eleventh and the Chair [Inter vndecimam & Cathedram]
- 4 46
- 4 44⅔
- 4 46½

The one in the seat which they call the eleventh was not clearly enough visible [Non erat illa in ſella quam vndecimam vocant ſatis conſpicua].

- Between the Girdle and Schedar [Inter cingulum & Schedir]
- 1 40
- about [fere] 1 40
- Between the Girdle and the Knee of Cassiopeia [Inter cingulum & genu]
- 5 19⅓
- 5 20

These observations were made with the new sextant, which was at times moved somewhat by the wind [Per Sextantem nouum factæ ſunt hæ obſeruationes, qui interdum vento nonnihil mouebatur].

DIE 7 APRILIS.

- Between the eye of ♉ and the Chair of Cassiopeia [Inter oculum ♉ & Cathedram Caßiopeæ]
- 64 2
- 64 0½
- 64 0⅓
- Between the heel of the foot of ♊ and the Chair of Cassiopeia [Inter calcem pedis ♊ & Cathedram Caß]
- 72 34
- 72 33½
- 72 33⅔
- 72 33⅔
- Between the heel of ♊ and Schedar of Cassiopeia [Inter calcem ♊ & Schedir Caßiopeæ]
- 68 58 50
- 68 58 50
- Between Spica ♍ and Canis Minor [Inter Spicam ♍ & Canem Minorem]
- 87 31, not good [non bona]
- 87 30, five times [quinquies]

- Between the heel of the foot of Ⅱ and the Bend of Cassiopeia [Inter calcem pedis Ⅱ & Flexuram Caßiop.]
- 66 24
- 66 24
- Between the southern head of Ⅱ and the Chair of Cassiopeia [Inter meridionale caput Ⅱ & Cathed. Caßiop.]
- 77 25
- 77 25⅓
- about [fere] 77 25
- The southern head of Ⅱ and the Bend of Cassiopeia [Caput meridionale Ⅱ & Flexura Caßiopeæ]
- 71 25
- 71 24½
- 71 25½
- 71 25
- The southern head of Ⅱ and Schedar of Cassiopeia [Caput merid. Ⅱ & Schedir Caßiopeæ]
- 75 11½
- 75 11⅓

DIE 8 APRILIS.

- Between the heel of the foot of Ⅱ and the Chair of Cassiopeia [Inter calcem pedis Ⅱ & Cathedram Caßiop.]
- 72 34
- 72 34
- Between the heel of the foot of Ⅱ and the Bend of Cassiopeia [Inter calcem pedis Ⅱ & Flexuram Caßiop.]
- 66 24
- 66 24
- 66 23⅔
- Between the heel of the foot of Ⅱ and Schedar of Caßiop. [Inter calcem pedis Ⅱ & Schedir Caßiop.]
- 68 59
- 68 58¾

DIE 9 APRILIS.

- Between the head of Ⅱ¹ and the bright star of the Chair of Caßiop. [Inter caput Ⅱ¹ & lucidam Cathedræ Caßiop.]
- 77 24½
- 77 24½
- Between the head of Ⅱ and the Bend of Caßiop. [Inter caput Ⅱ & Flexuram Caßiop.]
- 71 25⅔
- 71 25½

- Between the head of Ⅱ and Schedar of Caßiop. [Inter caput Ⅱ & Schedir Caßiop.]
- 75 11
- 75 11

DIE 12 APRILIS.

- Between the Bend of Caß. and the bright star of the Chair, with the new sextant [Inter Flexuram Caß. & lucid. Cathedræ per Sext. nou.]
- 6 10
- 6 10½
- Between the Chair and Schedar, with the new sextant [Inter Cathedram & Schedir per Sext. nouum]
- 4 57⅓
- 4 57¼

DIE 25 APRILIS.

With the new △ sextant [Per Sextantem △ nouum].

- Between the Pole Star and the tail of Cygnus [Inter Polarem & caudam Cygni]
- 44 39⅓
- 44 39⅔
- 44 39⅓
- Between the Pole Star and the bright star of Lyra [Inter Polarem & lucidam Lyræ]
- 51 34⅔
- 51 34⅔
- Between the Pole Star and the bright star in the square of Draco, ἐν πλάτει [Greek: *en platei*, "in breadth"] [Inter Polarem & lucidam in quadrato Draconis, ἐν πλάτει]
- 38 57

DIE 31 OCTOBRIS.

With the armillae [Per Armillas].

- Declination of the small star above the bright star of the Vulture [Declinatio paruæ ſtellæ ſupra lucid. Vult.]
- 9 42 B.
- Declination of the head of ♈ [Declinatio capitis ♈]
- 21 28 B.
- Declination of the southern one in the △ of Pegasus [Decl. auſtralis in △ Pegaſi]
- 25 52 B.
- Declination of the eye of ♉ [Declinatio oculi ♉]
- 15 35 B.

- Difference of right ascension between the eye of ♉ and the lower head of ♊ [Differentia Aſcenſionis Rectæ inter oculum ♉ & inferius caput ♊]
- 46 52

DIE 12 NOUEMBRIS.

- Difference of right ascension between Aldebaran and the southern head of ♊, not certain enough [Differentia Aſcenſionis R. inter Aldeboram & meridionale caput ♊, non ſatis certa]
- 46 56
- Declination of the lower head of ♊ [Declin. infer. cap. ♊]
- 28 55½

DIE 16 NOUEMBRIS.

- Difference of right ascension between the lowest of those two small stars near the triangle of Pegasus and the bright star of ♈ [Differentia Aſcenſionis R. inter infimam ex duabus illis paruis ſtellis apud trigonum Pegaſi & lucidam ♈]
- 49 30
- Declination of that small one, by the armillae, not certain [Declinatio paruæ illius per Armillas, non certæ]
- 21 24 B.
- Distance between the same one, next to the lowest in the triangle of Pegasus, and the bright star of ♈, with the Trigonic sextant [Diſtantia inter eandem proximam infimæ in trigono Pegaſi et lucidam ♈ per Sext. Trigonicum]
- 45 40
- 45 41
- Between the more southern of the two upper ones in the triangle of Pegasus and the bright star of ♈, with the Trigonic sextant [Inter auſtraliorem e duabus ſuperioribus in trigono Pegaſi & lucidam ♈ per Sext. Trig.]
- 41 16
- 41 16
- Between the more western of the same ones in the triangle of Pegasus and the bright star of ♈, with the Trigonic sextant [Inter occidentaliorem ex ijſdem in trigono Pegaſi & lucidam ♈ per Sext. Trig.]
- 45 36
- 45 35⅔

DIE 17 NOUEMBRIS.

- Between the bright star of the Vulture and the left shoulder of ♒ [Inter lucidam Vulturis & humerum ſiniſtrum ♒]
- 29 1, twice [bis]
- 29 0¼
- 29 1⅙

DIE 21 NOUEMBRIS.

- Difference of right ascension between the bright star of ♈ and the upper one in the breast of Pegasus, with the armillae [Differentia Aſc. R. inter lucidam ♈ & ſuperiorem in pectore Pegaſi per Armillas]
- 48 28
- The declination of that one in the breast of Pegasus [Iſtius in pectore Pegaſi declinatio]
- 22 27⅔
- Difference of right ascension between the lower one in the breast of Pegasus and the bright star of the head of ♈, with the armillae [Differentia Aſc. R. inter inferiorem in pectore Pegaſi & lucidam capitis ♈ per Armillas]
- 49 18½
- Declination of that one in Pegasus [Decl. illius in Pegaſo]
- 21 16½ [recte: 21 26½ — Corrigenda, p. 430]

DIE 23 NOUEMBRIS.

- Difference of right ascension between the bright star of ♈ and the northern one in the triangle of Pegasus [Differentia Aſcenſ. R. inter lucidam ♈ & ſeptentrionalem in trigono Pegaſi]
- 50 0
- Declination of that one in Pegasus [Declinatio illius in Pegaſo]
- 28 6½
- Difference of right ascension between the eye of ♉ and the more northern one in the △ of Pegasus [Differentia Aſc. R. inter oculum ♉ & ſeptentrionaliorem in △ Pegaſi]
- 87 6½
- Declination of the same one in Pegasus [Decl. eiuſdem in Pegaſo]
- 28 3¾
- Between the eye of ♉ and Scheat of Pegasus [Inter oculum ♉ & Scheat Pegaſi]
- 82 2
- Its declination in Pegasus [Declinatio eius in Pegaſo]
- 25 55
- Difference of right ascension between the eye of ♉ and the lowest one in the △ of Pegasus [Differentia Aſcenſ. R. inter oculum ♉ & infimam in △ Pegaſi]
- 85 27½
- Its declination in Pegasus [Declinatio eius in Pegaſo]
- 22 27½
- Difference of right ascension between the outermost one of the wing of Pegasus and the bright star of ♈ [Differentia Aſcenſ. R. inter extremam alæ Pegaſi & lucidam ♈]
- 28 2⅓

- Declination of the outermost one of the wing [Declinatio extremæ alæ]
- 12 50
- Difference of right ascension between the bright star in the belt of Andromeda and the head of ♈ [Differentia Aſcenſ. R. inter lucidam in zona Andromedæ & caput ♈]
- 14 20

[1] The lower head, or Pollux [Caput inferius vel Pollucem].

- Declination of that one in the belt of Androm. [Decl. illius in zona Androm.]
- 33 24½
- Difference of Aſcenſ. R. between the brighter of the two upper ones in the Triangle and the lower head of ♊ [Differentia Aſcenſ. R. inter lucidiorem ex duabus ſuperioribus in Triangulo & inferius caput ♊]
- 83 39
- Declination of that one in the Triangle [Declinatio illius in Triangulo]
- 32 58½
- Difference of Aſcenſ. between the lowest in the Triangle and the lower head of ♊ [Differentia Aſcenſ. inter infimam in Trigono & inferius caput ♊]
- 85 31½
- Declination of that one in the Triangle [Declinatio illius in Triangulo]
- 27 33

This last observation was made among clouds [Hæc poſtrema obſeruatio inter nubes facta eſt].

DIE 27 AD VESPERAS.

- Difference of Aſcenſ. R. between the lower head of ♊ and Canis Major [Differentia Aſcenſ. R. inter inferius caput ♊ & Canem maiorem]
- 13 15
- Declination of the lower head of ♊ [Decl. inferioris capitis ♊]
- 28 53
- Difference of Aſcenſ. R. between the lower head of ♊ and the heart of ♌ [Differentia Aſcenſ. R. inter inferius caput ♊ & cor ♌]
- 36 31
- Declination of the heart of ♌ [Declinatio cordis ♌]
- 13 54
- Difference of Aſcenſ. R. between the lower head of ♊ and the neck of ♌ [Differentia Aſcenſ. R. inter inferius caput ♊ & ceruicem ♌]
- 39 14
- Declination of the neck of ♌ [Declinatio ceruicis ♌]
- 21 52½

DIE 2 DECEMBRIS AD VESPERAS.

- Difference of Aſcenſ. R. between the eye of ♉ and the bright shoulder of Orion [Differentia Aſcenſ. R. inter oculum ♉ & lucidum humerum Orionis]
- 20 4
- Difference of Aſcenſ. R. between the same bright shoulder of Orion and the lower head of ♊ [Differentia Aſcenſ. R. inter eundem lucidum humerum Orionis & inferius caput ♊]
- 26 41½
- Difference of Aſcenſ. R. between the lower head of ♊ and the left shoulder of Orion [Differentia Aſcenſ. R. inter inferius caput ♊ & finiſtrum humerum Orionis]
- 34 10
- Difference of Aſcenſ. R. between the lower head of ♊ and Canis Major [Differentia Aſcenſ. R. inter inferius caput ♊ & Canem maiorem]
- 13 20

DIE 20 DECEMBRIS.

With the southern armillae [Per Armillas Auſtrales].

- Declination of the upper head of ♊ [Declinatio ſuperioris capitis ♊]
- 32 41
- Declination of the meridion. head of ♊ [Declin. meridion. capitis ♊]
- 28 57
- Declination of the bright foot of Erichthonius [Declin. lucidi pedis Ericht.]
- 28 9
- Declination of the heel of the foot of ♊ [Declin. calcis pedis ♊]
- 22 37
- Declination of the heart of ♌ [Declin. cordis ♌]
- 14 0
- Declination of the neck of ♌ [Declin. ceruicis ♌]
- 20 57

They were near the horizon [Erant prope horizontem].[1129]

- Declination of the bright star in the head of ♈ [Declin. lucidæ in capite ♈]
- 21 27

DIE 21 DECEMBRIS AD VESPERAS.

- Declination of the heart of ♌ [Declinatio cordis ♌]
- 13 59
- of the neck of ♌ [ceruicis ♌]

[1129] this note is set in smaller type to the right of the two preceding figure lines, joined to both of them by a printed brace.

- 21 54
- of the tail of ♌ [caudæ ♌]
- 16 55
- of the hip of ♌ [coxæ ♌]
- 22 48½
- of the northern foot of Erichthonius [boreal. pedis Erichtonij]
- 32 25
- of the bright foot of Erichthonius [lucidi pedis Erichtonij]
- 28 10
- Difference of Aſcenſ. R. between the eye of ♉ and the hip of ♌ [Differentia Aſcenſ. R. inter oculum ♉ & coxam ♌]
- 99 51½[1]
- Difference of Aſcenſ. between the eye of ♉ and the tail of ♌ [Differentia Aſcenſ. inter oculum ♉ & caudam ♌]
- 108 49
- Difference of Aſcenſ. between Spica ♍ and the eye of ♉ [Differentia Aſcenſ. inter Spicam ♍ & oculum ♉]
- 132 45[2] [recte: 132 48 — Corrigenda, p. 430]

All the preceding observations were made with the armillae toward ſeptent. [Omnes præcedentes obſeruationes per Armillas verſus ſeptent. ſunt factæ.]

- Difference of Aſcenſ. R. between the eye of ♉ and the bright shoulder of Orion [Differentia Aſcenſ. R. inter oculum ♉ & lucidum humerum Orionis]
- 20 7½
- Declination of the eye of ♉ [Declinatio oculi ♉]
- 15 38
- Difference of Aſcenſ. R. between the lower head of ♊ and the tail of ♌ [Differentia Aſcenſ. R. inter inferius caput ♊ & caudam ♌]
- 61 59
- Declination of the meridion. head of ♊ [Declinatio meridion. cap. ♊]
- 28 55½
- Difference between the heart of ♌ and Arcturus [Differentia inter cor ♌ & Arctur.]
- 62 41½
- Declination of the heart of ♌ [Declinatio cordis ♌]
- 13 58½

The observations immediately preceding were made with the armillae toward the south [Obſeruationes proxime præcedentes factæ ſunt per Armillas verſus meridiem].

- Declination of the small star preceding Arcturus [Declinatio paruæ ſtellæ Arcturum præcedentis]
- 20 31½
- Declination of Arcturus [Declinatio Arcturi]
- 21 26½

- of the bright star of Corona [lucidæ Coronæ]
- 28 12⅔
- of the northern head of ♊ [borealis cap. ♊]
- 32 39
- of the merid. head of ♊ [merid. cap. ♊]
- 28 55
- of the heel of the foot of ♊ [calcis pedis ♊]
- 22 36

With the armillae toward ſeptent.; they are not certain enough, because of the wind [Per Armillas verſus ſeptent., non ſunt ſatis certæ propter ventum].

Comparison of the declination of certain fixed stars: that which was observed by altitude, and that which the armillae gave [Collatio declinationis quarundam fixarum, eius quæ [recte: add *ex* before *Altitudine*, "from the altitude" — Corrigenda, p. 430] Altitudine obſeruata eſt, & eius quæ per Armillas dabatur.]

	Declination from altitude [Declinatio ex altit.]	Declination by the armillae, ſeptent. [Declin. per Armill. ſeptent.]
Head of ♈ [Caput ♈]	21 27½	21 27
Heel of ♊ [Calx ♊]	22 38	22 36
Arcturus	21 23	21 26
Bright foot of Erichthonius [Lucid. pes Ericht.]	28 9½	28 10
Merid. head of ♊ [Merid. cap. ♊]	28 57½	28 57
Heart of ♌ [Cor ♌]	13 58	13 59
Upper head of ♊ [Superius cap. ♊]	32 42½	32 41

[1] Hard to read [Difficile lectu].

[2] The minutes uncertain because the leaf is torn [Minuta incerta ob folium laceratum].

	Declination from altitude [Declinatio ex altit.]	Declination by the armillae, ſeptent. [Declin. per Armill. ſeptent.]
Neck of ♌ [Ceruix ♌]	21 54½	21 54
Bright star of Corona [Lucida Coronæ]	28 10½	28 12⅔
Bend of Arcturus [Flexura Arcturi]	20 31¼	20 31½
Tail of ♌ [Cauda ♌]	16 54½	16 54

This variation in the armillae could have arisen because the pinnules were not fixed firmly enough, but tilted somewhat, in various ways, toward the plane of the circle [*Hæc varietas in armillis inde fieri poterat quod pinnacidia non fuerint ſatis firmata ſed varie ſeſe nonnihil ad planum circuli inclinarint.*]

- Right ascension of the bright hum. of Orion [Aſc. R. luc. hum. Orionis]
- 83 9½[1]
- of the ſuper. head of ♊ [ſuper. cap. ♊]
- 106 59⅙[1]
- of the eye of ♉ [oculi ♉]
- 63 3
- Difference of right ascension from Spica ♍ [Diff. Aſc. R. a Spica ♍]
- 132 48
- Right ascension of Spica ♍ [Aſc. R. Spicæ ♍]
- 195 51

LOCA QUARUNDAM STELLARUM FIXARUM[2]. [Positions of certain fixed stars.]

AD DIEM 4 JANUARIJ.

From these distances and altitudes of the stars, found earlier, and from their declinations known on that account, we shall inquire whether the Pole Star [Stella polaris] has the same declination as the observation gave through both of its altitudes; and we shall do so in this way [Ex his diſtantijs & altitudinibus ſtellarum prius inuentis & ob id declinationibus earum cognitis, inquiremus vtrum Stella polaris habeat eandem declinationem quam dedit obſeruatio per vtramque eius altitudinem idque in hunc modum].

I. Since in the triangle ABD the three sides are given from observation [Quia in triangulo ABD dantur tria latera ex obſeruatione],

- BA 65°47′45″
- BD 61 49 30
- AD 74 45 0

the angle BDA will be given by the ninth proposition: 70 21 50 [dabitur per nonum dogma Angulus BDA 70 21 50].

Diagram. A figure of arcs forming nested triangles. At the top stands the letter C at a point where two arcs meet; a little below C, on a short line descending from it, a star-mark lettered B. A star-mark lettered A stands at the lower left and a star-mark lettered D at the right. Two outer arcs run from C down to A and to D; two inner arcs run from B down to A and to D; an arc joins A to D. Below, a further arc lettered *Æquator* runs along the foot of the figure, joined to the points below A and below D by short strokes. The letters and the word *Æquator* are drawn in a slanting, looped letterform unlike the text type. Beside the figure, at its left, a legend is set in roman type.

- C (apex, top): C
- B (star-mark below the apex): B
- A (star-mark, lower left): A
- D (star-mark, right): D
- Æquator (lower arc): Equator [Æquator]

- Legend (set in type, left of the figure): B the Pole Star [B Stella polaris]; C the pole [C Polus]; A the bright star of ♈ [A Lucida ♈]; D the head of ♊ [D Cap. ♊]

II. Next, in the triangle [trigono] CAD, the side AC is the complement of the declination of the bright star of ♈, 68 32 30. The side CD is the complement of the declination of the southern head of ♊, 61 2 30; the side AD, again, 74 45. Therefore by the same proposition the angle CDA is given. If the angle ADB found before is subtracted from it, there remains the angle CDB, known: 3 13 37 [Deinde in trigono CAD Latus AC eſt complementum declinationis Lucidæ ♈ 68 32 30. Latus CD eſt complementum declinationis Meridionalis Capitis ♊ 61 2 30, Latus AD rurſus 74 45. Ergo per idem dogma datur Angulus CDA. Ab hoc ſi auferatur prior inuentus ADB relinquitur Angulus CDB cognitus 3 13 37.]

III. In the triangle CDB, since the two sides BD and CD are now known, together with the included angle BDC, the required side BC will be given by proposition VI: 2 56 25 [In triangulo CDB quia duo latera BD & CD iam ſunt nota cum angulo comprehenſo BDC, dabitur per VI dogma latus BC quæſitum 2 56 25]. Since, therefore, the side BC is 2 56 25, and the distance from the pole was also found, through both altitudes, to be 2 56½, it is plainly evident that these stars cause no difference through a refraction of sight in the air, such as the opticians suppose [Cum itaque Latus BC ſit 2 56 25 et diſtantia a polo ſit reperta per vtramque altitudinem etiam 2 56½, patet euidenter, ſtellas has nullam cauſare differentiam per viſus refractionem in aëre, vt optici opinantur]. For otherwise the declination found through the distances would not have been the same as that found through the altitudes, but somewhat smaller, as is gathered from what Witelo [Vitellio] and Ibn al-Haytham [Alhaſen] have handed down in their Optics [Nam alias non eadem declinatio per diſtantias quæ per altitudines reperta fuißet, ſed aliquanto minor. Vt ex ijs quæ Vitellio & Alhaſen in Opticis tradiderunt, colligitur]. It is evident, moreover, that the instruments correspond to one another precisely and are exactly divided; for otherwise the declination, sought in different ways from the altitudes and from the distances, would not agree with itself [Patet inſuper quod inſtrumenta ad amußim ſibi reſpondeant & ſint exacte diſtributa, alias enim declinatio ex altitudinibus & diſtantijs diuerſimode petita non inuicem quadraret]. There is this besides: the altitude of the pole, in partibus 55 54½, found correctly and exactly, is confirmed, the declination having just been found the same by either method — a declination which confirms the exact measurement of the altitude [Accedit & hoc quod Poli altitudo in partibus 55 54½ rite exacteque inuenta comprobetur ex vtraque ratione eadem modo inuenta declinatione quæ altitudinis menſuram exactam confirmat].

For the difference of right ascension of the same Pole Star from one of these, proceed as follows. In the triangle CBA, since all three sides are known, the angle at the pole, BCA, will be given: 20 48 30, which is the difference of ascension between the bright head of ♈ and the Pole Star [Pro differentia

Aſcenſionis rectæ eiuſdem ſtellæ polaris ab aliqua harum ſic facito. In triangulo CBA quia cognita ſunt omnia tria latera dabitur Angulus ad polum BCA 20 48 30, qui eſt differentia Aſcenſionis inter lucidum caput ♈ & polarem].

[1] Hard to read, in the margin. They are missing in codex V [Difficilia lectu, ad marginem. Deſunt in codice V.].

[2] From codex V [E codice V.].

For the differences of the right ascensions of certain stars, from the preceding observations made[1] [PRO DIFFERENTIJS ASCENSIONUM RECTARUM QUARUNDAM STELLARUM EX OBSERUATIONIBUS PRÆCEDENTIBUS FACTIS[1].]

- A the pole of the equator [A Polus Æquatoris]
- B one of the stars [B Una ſtellarum]
- C the other [C Altera]

Between the bright star of ♈ and Aldebaran [Inter lucidam ♈ & Aldeboram]

- Side AB [Latus AB] 68° 32′ 30″
- AC 74 24 30
- BC 35 32 15
- BAC 37 3 18

Difference of right ascension of the bright star of ♈ and the eye of ♉ [Differentia Aſcenſ. R. Lucidæ ♈ & Oculi ♉]

Between the bright star of ♈ and the heel of the foot of ♊ [Inter Lucidam ♈ & calcem pedis ♊]

- Side AB [Latus AB] 68 32 30
- AC 67 22 10
- BC 58 21 30
- BAC 63 27 34

Difference of right ascension of the bright star of ♈ and the heel [Diff[a] Aſcenſ. R. Lucidæ ♈ & Calcis.]

Between Aldebaran and the heel of ♊ [Inter Aldeb. & Calcem ♊]

- Side AB [Latus AB] 74 24 30
- AC 67 22 10
- BC 25 53 0
- BAC 26 24 32

Difference of right ascension of Aldebaran and the heel of ♊ [Diff[a] Aſc. R. Aldeb. & Calcis ♊.]

Between the bright star of ♈ and the lower head of ♊ [Inter Lucidam ♈ & inferius Cap. ♊]

- Side AB [Latus AB] 68 32 30
- AC 61 3 0
- BC 74 45 0

- BAC 83 56 29

Difference of right ascension of the bright star of ♈ and the lower head of ♊ [Diffª Aſc. R. Luc. ♈ & infer. Cap. ♊]

Between the eye of ♉ and the lower head of ♊ [Inter Oculum ♉ & inferius Caput ♊.]

- Side AB [Latus AB] 74 24 20
- AC 61 3 0
- BC 45 5 0
- BAC 46 53 32

Difference of right ascension of Aldebaran and the lower head of ♊ [Diffª Aſc. R. Aldeboræ & inferioris ♊]

Between the eye of ♉ and the heart of ♌ [Inter Oculum ♉ & Cor ♌]

- Side AB [Latus AB] 74 24 20
- AC 76 2 0
- BC 80 9 30
- BAC 83 29 7

Difference of right ascension of the eye of ♉ and the heart of ♌ [Diffª Aſc. R. Oculi ♉ & Cordis ♌]

Verification [Greek: Δοκιμασία (dokimasia, "test, verification")] of the differences of right ascension found [Δοκιμασία inuentarum differentiarum Aſcenſ. R.]

Diagram. A circle crossed by two straight lines and a set of arcs. The letter L stands on the circle at the top, a little right of centre. A straight line runs horizontally across the circle somewhat below its middle, from M at the left edge to N at the right edge. A second straight line runs obliquely down from F on the circle at the upper left to the circle at the lower right, crossing the horizontal line at I; the letters G, H, I and K stand along it in that order from left to right. Four lines descend from L: an arc to the left passing B and ending at G; an arc passing C and ending at H; a nearly straight line passing D and ending at I; and an arc to the right passing E and ending at K. A broken line joins A (on the circle at the upper left), B, C, D and E in that order. No star-marks are drawn. The letters are drawn, not set in the text type: several (A, B, D, F, H, M, N) in a slanting, looped form, the others (C, E, G, I, K, L) plainer. Below the figure a legend is set in roman type.

- L (on the circle, top): L
- A (on the circle, upper left): A
- B (on the arc from L, below A): B
- C (on the second arc from L): C
- D (on the third line from L): D
- E (on the arc from L at the right): E
- F (on the circle, left, at the end of the oblique line): F
- G (on the oblique line): G
- H (on the oblique line): H

- I (at the crossing of the two straight lines): I
- K (on the oblique line, right): K
- M (on the circle, left end of the horizontal line): M
- N (on the circle, right end of the horizontal line): N
- Legend (set in type, below the figure): FGHIK the equator [FGHIK Æquator]; L the pole of the equator [L Polus Æquatoris]; MIN the horizon [MIN Horizon]; B the eye of ♉ [B Oculus ♉]; A the bright star of ♈ [A Lucida ♈]; C the heel of ♊ [C Calx ♊]; D the lower head of ♊ [D Inferius Caput ♊]; E the heart of ♌ [E Cor ♌]

Triangle ALB [Triangulus ALB]

- Side AL [Latus AL] 68° 32′ 30″
- BL 74 24 30
- Angle ALB [Angulus ALB] 37 3 18
- AB 35 32 14

The observed distance between the eye of ♉ and the bright star of ♈: 35 32½ [Diſtantia obſeruata inter Oculum ♉ & lucidam ♈ 35 32½.]

Triangle ALC [Triangulus ALC]

- Side AL [Latus AL] 68 32 30
- LC 67 22 10
- ALC 63 27 34
- AC 58 21 31

The observed distance between the bright star of ♈ and the heel of the foot of ♊: 58 21½ [Diſtantia obſeruata inter lucidam ♈ & calcem pedis ♊ 58 21½]

Triangle BLC [Triangulus BLC]

- Side BL [Latus BL] 74 24 30
- LC 67 22 10
- BLC 26 24 32
- BC 25 53 0

The observed distance between the eye of ♉ and the heel of the foot of ♊: 25 53 [Diſtantia obſeruata inter oculum ♉ & Calcem pedis ♊ 25 53]

[1] In codex V, after 9 January [In codice V poſt diem 9 Januarij.].

Triangle ALD [Triangulus ALD]

- Side AL [Latus AL] 68 32 30
- DL 61 3 0
- ALD 83 56 29
- AD 74 44 58

The observed distance between the bright star of ♈ and the lower head of ♊: 74 45 [Diſtantia obſeruata inter lucidam ♈ & inferius Cap. ♊ 74 45]

Triangle BLD [Triangulus BLD]

- Side BL [Latus BL] 74 24 30

- DL 61 3 0
- BLD 46 53 32
- BD 45 5 0

The observed distance between Aldebaran [Aldeboram] and the lower head of ♊: 45 5 [Diſtantia obſeruata inter Aldeboram & inferius Cap. ♊ 45 5]

Triangle BLE [Triangulus BLE]

- Side BL [Latus BL] 74 24 30
- EL 76 2 0
- BLE 83 29 7
- BE 80 9 31

The observed distance between Aldebaran and the heart of ♌: 80 9½ [Diſtantia obſeruata inter Aldeboram & Cor ♌ 80 9½.]

For the difference of right ascension between the lower head of ♊ and Spica ♍ [Pro differentia Aſcen. R. inter Inferius Caput ♊ & Spicam ♍.]

Diagram. A figure of arcs. The letter A stands at the apex at the top. From A two arcs descend: the left one passes B and ends at D, at the lower left; the right one passes C and ends at E, at the lower right, where a short straight stroke joins C to E. From B an arc runs down to E; from D an arc runs across to C; these two cross near the foot of the figure. No star-marks are drawn. The letters are drawn, not set in the text type: A, B and D in a slanting, looped form, C and E plainer. To the right of the figure a legend is set in roman type.

- A (apex, top): A
- B (on the left arc): B
- C (on the right arc, above E): C
- D (lower left): D
- E (lower right): E
- Legend (set in type, right of the figure): A the pole of the equator [A Polus Æquatoris]; B the lower head of ♊ [B Inferius / Caput ♊]; E Spica ♍
- Side BA [Latus BA] 61 3 0
- EA 98 56 30
- BE 90 46 0
- Angle BAE [Angulus BAE] 85 54 0

Between the Pole Star [Stellam polarem] and the bright star of ♈ [Inter Stellam polarem & Lucidam ♈]

Diagram. A long, narrow three-sided figure. C stands at the top, B a little lower at the right, and A far below at the lower left. A short straight side joins C to B; two long, slightly curved sides run down from C and from B and meet at A in a sharp point. No star-marks are drawn. The letters are drawn, not set in the text type, in a slanting, looped form (C, B, A). No legend is set beside this figure.

- C (top): C

- B (right, below C): B
- A (lower left, the sharp point): A
- Side CA [Latus CA] 68 32 30
- BC 2 56 30
- BA 65 47¾
- Angle [Angulus]
- ACB 20 48 30

Difference of right ascension of the bright star of ♈ and the Pole Star [Differentia Aſcenſionis R. Lucidæ ♈ & Stellæ polaris.]

For the differences of the right ascensions of certain fixed stars whose distances from one another, across the whole sky, were captured in a few observations [PRO DIFFERENTIJS ASCENSIONUM RECTARUM QUARUNDAM FIXARUM, QUARUM DISTANTIÆ AD INUICEM PER TOTUM COELUM PAUCIS OBSERUATIONIBUS COMPREHENSÆ SUNT.]

At an elevation of the equator of 34 5½ [Sub elevatione Æquatoris 34 5½.]

- A the pole of the equator [A Polus Æquatoris]
- B the bright star of ♈. Its meridian altitude 55° 33′ [B Lucida ♈. Eius Altitudo meridiana 55° 33′]
- C the lower head of ♊. Meridian altitude 63 2½ [C Infer. Cap. ♊. Alt. mer. 63 2½]
- Side BA [Latus BA] 68 32 30
- CA 61 3 0
- BC 74 45 0
- Angle BAC [Angulus BAC] 83 56 29

which is the difference of right ascension between the bright star of ♈ and the lower head of ♊ [qui eſt diff. Aſc. R. inter Lucidam ♈ & inferius Cap. ♊.]

- B the lower head of ♊ [B Inferius Cap. ♊]
- C Spica ♍, whose meridian altitude is 25 9 0 [C Spica ♍ cuius Alt. mer. 25 9 0]
- Side BA [Latus BA] 61 3 0
- CA 98 56 30
- BC 90 46 15
- Angle BAC [Angulus BAC] 85 54 5

Difference of right ascension between the lower head of ♊ and Spica ♍ [Differentia Aſc. R. inter inferius Cap. ♊ & Spicam ♍.]

- B Spica ♍
- C Vultur, whose altitude in merid. is 44 56¼ [C Vultur, cuius Alt. in merid. 44 56¼]
- Side BA [Latus BA] 98 56 30

- CA 82 9 10
- BC 97 49 30
- Angle BAC [Angulus BAC] 96 44 40

Difference of right ascension of Spica ♍ and the bright star of Vultur [Diffª Aſc. Spicæ ♍ & Luc. Vulturis]

- B Vultur
- C the bright one of ♈ [C Lucida ♈]
- BA 82 9 10
- CA 68 32 30
- BC 90 14 0
- Angle BAC [Ang. BAC] 93 21 32

Difference of ascension between Vultur and the bright one of ♈ [diff. aſc. inter Vulturem & Lucidam ♈.]

Collection of the differences of right ascension [Collectio diffªʳᵘᵐ Aſc. R.]

- From the bright one of ♈ to Cap. ♑ [A Lucida ♈ ad Cap. ♑] 83 56 29
- From Cap. ♑ to Spica ♍ [A Cap. ♑ ad Spicam ♍] 85 54 5
- From Spica to Vultur [A Spica ad Vulturem] 96 44 40
- From Vultur to the bright one of ♈ [A Vulture ad Luc. ♈] 93 21 32
- Aggreg. 359 56 46
- B the bright one of ♈ [B Lucida ♈]
- C the heel of the foot of ♊, whose meridian altitude is 56 43¼ [C Calx pedis ♊, cuius Alt. meridiana eſt 56 43¼]
- Side BA [Latus BA] 68 32 30
- CA 67 22 10
- BC 58 21 30
- Angle BAC [Angulus BAC] 63 27 34

Difference of right ascension of the bright one of ♈ and the heel of ♊ [differentia Aſcenſionis R. Lucidæ ♈ & Calcis ♊.]

- B the heel of ♊ [B Calx ♊]
- C Spica ♍
- BA 67 22 10
- CA 98 56 30
- BC 108 28 5
- BAC 106 22 10

Difference of right ascension of the heel of ♊ and Spica ♍ [diffª Aſc. R. Calcis ♊ & Spicæ ♍.]

- From the bright one of ♈ to the heel of ♊ [A Lucida ♈ ad Calcem ♊] 63 27 34
- From the heel to Spica ♍ [A Calce ad Spicam ♍] 106 22 10
- From Spica to Vultur [A Spica ad Vulturem] 96 44 40
- From Vultur to the bright one of ♈ [A Vulture ad Luc. ♈] 93 21 32
- 359 55 56

For the differences of right ascension of the same, at an elevation of the equator of 34 9 50 [Pro earundem differentijs Asc. R. sub eleuatione Æquatoris 34 9 50.]

All the differences collected [Diff. omnes collectæ]

- From the bright one of ♈ to Cap. ♊ [A Luc. ♈ ad Cap. ♊] 83 52 48
- From Cap. ♊ to Spica ♍ [A Cap. ♊ ad Spicam ♍] 85 52 30
- From Spica to Vultur [A Spica ad Vult.] 96 44 46
- From Vultur to the bright one of ♈ [A Vult. ad Luc. ♈] 93 19 6
- 359 49 10
- From the bright one of ♈ to the heel of ♊ [A luc. ♈ ad calcem ♊] 63 25 27
- From the heel of ♊ to Spica ♍ [A Calce ♊ ad Spicam ♍] 106 20 40
- From Spica to Vultur [A Spica ad Vulturem] 96 44 46
- From Vultur to Cap. ♈ [A Vulture ad Cap. ♈] 93 19 6
- 359 49 59

It is therefore clear that the former altitude of the pole is the more correct. But on account of refraction the equinoctial distances have to be limited in this way.

Method I *[*I ratio*]*

- *I. From the bright one of* ♈ *to the lower one of* ♊ [*I. A lucida* ♈ *ad inf.* ♊] *83 57¼*
- *II. From the lower one of* ♊ *to Spica* [*II. Ab inferiori* ♊ *ad Spic.*] *83 54½*
- *III. From Spica* a [?] *Vultur* [*III. A Spica a Vulturem*] *96 45⅓*
- *IIII. From Vultur to the bright one of* ♈ [*IIII. A Vulture ad luc.* ♈] *93 22¼*
- *I. 83ᵖ57′30″*
- *II. 85 54 30*
- *III. 96 45 30*
- *IIII. 93 22 30*
- *360 0 0*

The other *[*Altera*]*

- *From the bright one to the heel* [*A lucida ad Calcem*] *63 28¼*
- *From the heel to Spica* [*A Calce ad Spicam*] *106 23⅔*
- *From Spica to Vultur* [*A Spica ad Vult.*] *96 45½*
- *From Vultur to the bright one* [*A Vult. ad luc.*] *93 22½*
- *I. 63 28 15*
- *II. 106 23 45*
- *III. 96 45 30*
- *III. 93 22 30*
- *360 0 0*

From the observations of ♀ in the year 1582, in the month of March, the right ascension of the heel of the foot of ♊ was found to be 89°24′50″. With this presupposed, by distances made from it in the heel of ♊ in the year 1584, the right ascensions of certain fixed stars were sought; and with their declinations

given, their longitudes and latitudes became known, as follows, at an elevation of the equator of 34 5½[1].

[1] We have omitted the calculations. Cf. *Progymn.* pp. 205 ff. (T. II pp. 208 ff.) [Supputationes omiſimus. Cf. Progymn. pp. 205 ſqq (T. II pp. 208 ſqq).]

	Right ascension [Aſcenſio Recta]	Declination [Declinatio]	Hence longitude [Ergo Longitudo]	Latitude [Latitudo]
Of the head of ♈ [Capitis ♈]	25°57′22″	21°27′	1°49′26″♉	9°57′ 3″B.
Of the heel of ♊ [Calcis ♊]	89 24 50	22 38	29 27 44 ♊	0 52 52 M.
Of the Merid. head of ♊ [Merid. Cap. ♊]	109 53 40	28 57	17 26 55 ♋	6 38 5 B.
Of the heart of ☌ [Cordis ☌]	146 30 3	13 58	24 1 55 ☌	0 26¼ B.

The places of these stars being known, the longitude and latitude of the Pole Star [Stellæ polaris], of the star of Draco [Stellæ draconis] near the pole of the zodiac, and of Spica ♍ were sought by distances, at the same elevation of the equator, 34 5½.

For the place of the Pole Star [Pro loco Stellæ polaris.]

From the head of ♈ and the heel of ♊, by the sixth and ninth proposition [per ſextum & nonum dogma].

- Longitude of Polaris [Longitudo Polaris] 22 46 36 ♊
- Latitude [Latitudo] 66 1 42

Another method for the place of Polaris, from the head of ♈ and the Merid. head of ♊ [Alia ratio pro loco Polaris, ex Capite ♈ & Merid. Cap. ♊]

- Longitude of Polaris 22 46 55 ♊
- Latitude 66 2 4

A third method for the place of Polaris, from the heel of ♊ and the heart of ☌ [Tertia ratio pro loco Polaris, ex Calce ♊ & Corde ☌.]

- Longitude of Polaris 22 46 13 ♊
- Latitude 66 1 53

Use, therefore, for the latitude of the Pole Star 66°1′55″, which will deviate imperceptibly, and for the longitude 22 46 35 ♊.

For the place of Spica ♍ [Pro loco Spicæ ♍.]

From the given distances from the Pole Star and the heel of ♊ [Ex datis diſtantijs a Stella polari & Calce ♊.]

- Longitude of Spica [Longitudo Spicæ] 17 58 39 ♎
- Latitude M. [Latitudo M.] 2 1 48

Another method for the place of Spica, from the Pole Star and the Inf. head of ♊ [Alia ratio pro loco Spicæ, ex Stella polari & Inf. Cap. ♊.]

- Longitude of Spica 17 59 30 ♎
- Latitude 2 0 20

A third method for the place of Spica, from the Pole Star and the heart of ♌ [Tertia ratio pro loco Spicæ, e Stella polari & Corde ♌.]

- Longitude of Spica [Spicæ Longitudo] 18 0 51 ♎
- Latitude 2 0 2 Merid.

It should be noted, however, that this method of finding the latitude of Spica ♍ *is not as certain as the one which follows, by the star of Draco which is near the pole of the ecliptic.*

For the place of the star of Draco near the pole of the ecliptic[1] *[Pro loco Stellæ Draconis vicinæ Polo Eclipticæ*[1]*.]*

- By the heel of ♊ and the heart of ♌ [Per calcem ♊ & Cor ♌]: longitude [Longitudo] 26 36 21 ♍
- Latitude 84 45 37

Another method for the place of the star of Draco, by the head of ♈ and the merid. head of ♊ [Alia ratio pro loco Stellæ Draconis per Cap. ♈ & Cap. merid. ♊.]

- Longitude 26 38 51 ♍
- Latitude 84 45 24

A third method, by the Merid. head of ♊ and the heart of ♌ [Tertia ratio per Merid. Caput ♊ & Cor ♌]

- Longitude 26 39 10
- Latitude 84 45 27

N. B. Use, therefore, for the star of Draco the longitude 26 39 0 ♍ and the latitude 84 45 30 [N. B. Vtere itaque Stellæ draconis Longitudine 26 39 0 ♍ Latitudine 84 45 30].

[1] Cfr. *Progymn.* pp. 210 ff. (T. II pp. 213 ff.) [Cfr. Progymn. pp. 210 ſqq (T. II pp. 213 ſqq).]

For the longitude and latitude of Spica ♍ *from the known place of the star of Draco*[1] *[Pro Longitudine & Latitudine Spicæ* ♍ *ex cognito loco Stellæ draconis*[1]*.]*

- From the place of the star of Draco and the Merid. head of ♊ [Ex loco Stellæ drac. & Merid. cap. ♊]: latitude of Spica [Latitudo Spicæ] 1 59 32 M.
- From the place of the star of Draco and the heart of ♌ [Ex loco Stellæ drac. & Cordis ♌]: 1 59 25 M.

*For the difference of longitude of Spica from the same star of Draco [Pro diff*ª *Longitudinis Spicæ ab eodem [recte: eadem — Corrigenda, p. 430] Stella draconis.]*

- P the pole of the ecliptic [P Polus Eclipticæ]
- B the star of Draco [B Stella draconis]
- C Spica
- Side PB [Latus PB] 5 14½
- BC 87 6½
- PC 91 59½

- PBC 21 18 52, the difference of longitude of Spica and the star of Draco [diff[a] Longitudinis Spicæ & Stellæ draconis.]
- 176 39[1130]

Longitude of Spica ♍ 17 58 ♎, latitude 1 59 30 M. [Longitudo Spicæ ♍ 17 58 ♎, Latitudo 1 59 30 M.]

But the latitude of Spica should rather be taken in this way than the longitude. [*Sed latitudo Spicæ potius ſic capienda eſt quam longitudo.*]

For the longitude of Spica ♍ *from its given latitude and declination, at an elevation of the equator of 34 5½ [Pro Longitudine Spicæ* ♍ *ex data eius Latitudine & Declinatione, ſub Æquatoris eleuatione 34 5½.]*

- D the southern pole of the equator [D Polus Auſtralis Æquatoris]
- H the southern pole of the zodiac [H Polus Auſtralis Zodiaci]
- I Spica ♍
- Triangle DIH [Triangulus DIH]
- Side IH [Latus IH] 88 0 30
- ID 81 3 30
- DH 23 31 0
- Angle IHD [Angulus IHD] 71 56 59

The complement of this angle to 90 measures the distance of Spica from the equinox. Therefore the longitude of Spica is 18 3 1 ♎. [Eius anguli complementum ad 90 metitur diſtantiam Spicæ ab Æquinoctio. Ergo eſt Spicæ Longitudo 18 3 1 ♎.]

Note. Because the greatest and the least altitudes of the Sun, even with parallax applied, give an altitude of the pole of 55 50½, whereas the circumpolar stars showed the preceding one as 55 54½, I therefore made trial in what follows whether, with this altitude of the pole taken from the Sun presupposed, although it is less true, the places of the stars would agree, or would reduce it to absurdity. [*Nota. Quia altitudo Solis maxima & minima etiam adhibita parallaxi præbent altitudinem poli 55 50½, cum tamen ſtellæ circumpolares præcedentem oſtenderent 55 54½, ideo feci in ſequentibus periculum an præſuppoſita hac licet minus vera poli altitudine ex Sole petita reſponderent ſtellarum loca aut eam deducerent in abſurdum.*]

At an elevation of the equator of 34 9½ the longitudes and latitudes of the same stars were sought by the same procedures, for the sake of *experiment*. [Sub eleuatione Æquatoris 34 9½ earundem ſtellarum Longitudines & Latitudines inquiſitæ ſunt iuxta eoſdem proceßus ex-*perimenti gratia*.]

	Right ascension [Aſcenſio Recta]	Declination [Declina-tio]	Hence derived: longitude [Hinc deductæ — Longitudo]	Hence derived: latitude [Hinc deductæ — Latitudo]
Of the head of ♈ [Capitis ♈]	25 46	21 23	1 42 55 ♉	9 59 15 B.
Of the heel of ♊ [Calcis ♊]	89 12½	22 34	29 16 26 ♊	0 52 53 M.

[1130]a short rule is printed under *176 39*.

	Right ascension [Aſcenſio Recta]	Declination [Declina-tio]	Hence derived: longitude [Hinc deductæ — Longitudo]	Hence derived: latitude [Hinc deductæ — Latitudo]
Of the Mer. head of ♊ [Cap. Mer. ♊]	109 42	28 53	17 17 3 ♋	6 36 29 B.
Of the heart of ☋ [Cordis ☋]	146 18	13 54	23 51 35 ☋	0 20 45 B.

1131

For the longitude and latitude of the star of Draco near the pole of the zodiac, at an elevation of the equator of 34 9⅚ [Pro Longitudine & Latitudine Stellæ Draconis vicinæ polo Zodiaci ſub eleuatione Æquatoris 34 9⅚.]

- I. From the distance from the merid. head of ♊ and the heart of ☋ [I. Ex diſtantia a merid. Cap. ♊ & Corde ☋]: longitude [Longitudo] 26 36 35 ♍; latitude [Latitudo] 84 38 20
- II. From the distances from the heel of ♊ and the heart of ☋ [II. Ex diſtantijs a Calce ♊ & Corde ☋]: longitude 26 28¾ ♍; latitude 84 38 50 B.

The difference of longitude of the same from the Merid. head of ♊, with the same latitude remaining, which was found almost the same twice: 69 21 26. Therefore the longitude is 26 38 29 ♍ [Differentia longitudinis eiuſdem a Merid. Cap. ♊, manente eadem latitudine, quæ bis eadem fere inuenta eſt, 69 21 26. Ergo Longitudo 26 38 29 ♍]

[1] Cf. *Progymn.* pp. 215–217 (*Op.* T. II pp. 217–220). [Cfr. Progymn. pp. 215–217 (Op. T. II pp. 217–220).]

[2] Ibid. p. 218 (*Op.* II p. 220). [ibid. p. 218 (Op. II p. 220).]

The longitude of the star of Draco is therefore taken as 26 37 ♍, the latitude 84 38½. [Accepta eſt igitur Longitudo ſtellæ drac. 26 37 ♍, Latit. 84 38½.]

Therefore, presupposing the longitude of the star of Draco at 26 37 0 ♍ and the latitude at 84 38½ B., let the place of Spica be sought from the distances from the star of Draco and the Mer. Cap. ♊: [Præſuppoſita itaque Longitudine Stellæ Draconis in 26 37 0 ♍ & Latitudine 84 38½ B., inquiratur locus Spicæ ex diſtantijs a Stella Draconis & Mer. Cap. ♊:]

- The longitude of Spica ♍ is therefore 17 48¼ ♎. [Longitudo igitur Spicæ ♍ 17 48¼ ♎.]
- Latitude 2 6¼ Mer. [Latitudo 2 6¼ Mer.][1132]

From this given latitude of Spica and the declination 9°0′50″, let its place in the ecliptic be sought, at this same elevation of the equator, 34 9⅚. Greatest declination 23°27′0″. The longitude of Spica ♍ is thus 18 1 ♎, which does

[1131] a printed vertical rule divides the Declination column from the Longitude column; the words *Hinc deductæ* stand as one head spanning the Longitude and Latitude columns.

[1132] a short horizontal stroke is printed above *Mer.* in the latitude line; it is not a letter and is not transcribed as one.

not agree with the longitude found above from the distances. [Ex data hac latitudine Spicæ & declinatione 9°0′50″ inquiratur eius locus in Ecliptica, ſub hac eadem eleuatione Æquatoris 34 9⅚. Declinatio max. 23°27′0″. Eſt itaque Spicæ ♍ Longitudo18 1 ♎, quæ cum longitudine ſuperius ex diſtantijs inuenta non conuenit.]

It is therefore clear that this greatest declination and altitude of the pole are not true, but the former one. [*Patet itaque hanc declinationem maximam & poli altitudinem non eße veras, ſed priorem.*]

Appendix to the observations of the year 1584. [APPENDIX AD OBSERUATIONES ANNI 1584.]

Astronomical observations [OBSERUATIONES ASTRONOMICÆ] made in Germany in the year 1584 with the trigonal sextant. [IN GERMANIA FACTÆ ANNO 1584 PER SEXTANTEM TRIGONICUM.]

There follow certain observations of the meridian altitude of the Sun and of certain stars, made with the new Sextant at Frombork [Fruenburgi] in Prussia, where Copernicus once lived, for investigating the exact altitude of the pole there; and also certain ones taken at Königsberg [Regiomonti] for the same reason. [*Sequuntur Obſeruationes quædam altitudinis Solis & quarundam ſtellarum meridianæ factæ per Sextantem nouum Fruenburgi Prußiæ, vbj COPERNICUS olim vixit, pro inveſtiganda illic poli altitudine exacta, & quædam etiam Regiomonti eadem de cauſa habitæ.*]

At Frombork in Prussia, or Warmia, in the house of Master Ecardus de Kempen [Domini ECARDI DE KEMPEN], nearest on the west to that little tower in which Nicolaus Copernicus is said by the inhabitants of that place to have made all his observations. [FRUENBURGI PRUSSIÆ SIUE WARMIÆ in ædibus Domini ECARDI DE KEMPEN, proximis ab occidente turriculæ iſti, in qua NICOLAUS COPERNICUS omnes ſuas obſeruationes ab iſtius loci incolis feciße dicitur.][1133]

DIE 17 MAIJ

With the instrument ἐν πλάτει [Greek: *en platei*, "in breadth"] first set up to the meridian, I observed the altitude of the ☉ repeatedly until it reached its highest elevation above the horizon, and I found it 57ᴳ 0ᴹ 10″. After that the altitude kept decreasing. On this day, around the time of noon, the sky was quite clear; afterwards, although clouds at times obscured the Sun, I nevertheless made myself somewhat more certain of the meridian line by means of a plane firmly fixed to a trunk. [inſtrumento ἐν πλάτει ad meridiem primum collocato, obſeruaui ſæpius altitudinem ☉$^{l_{is}}$, donec ad ſummam ſupra horizontem eleuationem peruenit, & inueni eam 57ᴳ 0ᴹ 10″. Poſtea ſemper altitudo diminuebatur. Erat hoc die circa meridianum tempus cœlum bene ſerenum, poſtea quamquam nubes interdum Solem offuſcabant, tamen de linea meridiej aliquantulum per planitiem trunco firmiter iniunctam certior factus ſum.]

[1133] below this point the page is set in two columns divided by a printed vertical rule.

DIE 18 MAIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 57 9
- This observation, made among clouds, is not certain enough. [non eſt ſatis certa hæc obſeruatio inter nubes facta.]
- On the same day, in the evening. [Eodem die ad veſperas.]
- Arcturus on the meridian [Arcturus in Meridiano] 57^{G} 1′¼
- The northern one of the Scales ♎ [Borealis Lancium ♎] 27 50½
- The bright one in the neck of Ophiuchus [Lucida in collo Serpentarij] 43 25 10
- The upper one in the hand of Ophiuchus [Superior in manu Ophiuchi] 33 5⅙
- not certain enough [non ſatis certa]
- The left knee of Ophiuchus [Iniſtrum genu Ophiuchi] 26 0

DIE 19 MAIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 57 20
- It was moderately clear. [erat mediocriter ſerenum.]
- On the same day, in the evening. [Eodem die ad veſperas.]
- Arcturus on the meridian [Arcturus in Meridiano] 57 1⅓

DIE 20 MAIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 57 28⅔

DIE 21 MAIJ AD VESPERAS.

- Altitude of the upper one of the Scales [Altitudo ſuperioris Lancium] 27 50⅔
- The star in the breast of Ophiuchus [Stella in pectore ſerpentarij] 33 23⅔
- The highest one in the forehead of ♏ [Suprema in fronte ♏] 17 3½
- They could not be seen well enough. [Non ſatis bene conſpici potuerunt.]
- The heart of ♏ [Cor ♏] 10 17 30[1134]

DIE 22.

- The middle one of the forehead of ♏ on the meridian [Media frontis ♏ in Merid.] 14 19
- It was observed among clouds. [Inter nubes obſeruata eſt.]

DIE 23 MAIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 57 52 50
- It was quite clear on this day; the observation is nevertheless not certain enough. [Erat bene ſerenum hoc die, non ſatis certa tamen eſt obſeruatio.]
- Arcturus on the meridian [Arcturus in Meridiano] 57 2

[1134] a printed brace stands to the right of the values of the first three entries under 21 May, grouping them; the remark below it follows the brace.

- Because of the twilight it could not be seen precisely enough on the meridian. [Propter crepuſculum non ſatis exquiſite videri in meridiano potuit.]
- The northern one of the Scales ♎ [Borealis Lancium ♎] 27 50⅔
- at the highest [ad ſummum]
- The middle one in the forehead of ♏ [Media in fronte ♏] 14 19¼
- The highest one of the forehead of ♏ [Suprema frontis ♏] 17 5¼
- The following one in the hand of Ophiuchus [Sequens in manu Ophiuchi] 32 1
- not precisely enough [non ſatis exquiſite]
- The heart of ♏ [Cor ♏] 10 17½
- The preceding knee of Ophiuchus [Præcedens genu Ophiuchi] 25 59 50
- The left shoulder of Ophiuchus [Humerus ſiniſter Ophiuchi] 45 44
- The head of Hercules [Caput Herculis] 50 34½
- The head of Ophiuchus [Caput Ophiuchi] 48 35
- not certain enough [non ſatis certa]
- The brighter one near the right hand of Ophiuchus [Lucidior apud dextram manum Ophiuchi] 26 2 10

DIE 25 MAIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 8 20

On the same day, in the evening, M. Matthias Menius, professor of mathematics at Königsberg, observed certain distances, in order to see the method of finding the intervals between the stars with such an instrument. [Eodem die ad veſperas obſeruauit M. MATTHIAS MENIUS, professor mathematum Regiomonti, diſtantias quasdam, vt rationem cognoſcendi ſtellarum intercapedines per tale inſtrumentum videret.]

Between the Pole Star and the bright one of Lyra we had 51 34, sometimes much more and sometimes less, but this recurred more often. [Inter ſtellam polarem & lucidam Lyræ 51 34, interdum multo plus, interdumque minus habuimus, ſed hoc ſæpius redijt.]

- Between the tail of Cygnus and the Pole Star [Inter Caudam Cygni & polarem]:
- I 44 38¾
- II 44 39¼

DIE 26 MAIJ AD VESPERAS.

- The bright one in the neck of Ophiuchus [Lucida in collo Serpentarij] 43 33½
- It is not good, because it could scarcely be seen on account of the rays of daylight. [Non eſt bona, quia propter radios diurnos videri vix potuit.]
- The bright one of the left hand of Ophiuchus [Lucida manus ſiniſtræ Ophiuchi] 33 7
- precisely [exquiſite]

- The heart of ♏ [Cor ♏] 10 17⅔
- The left knee of Ophiuchus [Siniſtrum genu Ophiuchi] 26 0
- The left shoulder of Ophiuchus [Siniſter humerus Ophiuchi] 45 44
- The following knee of Ophiuchus [Sequens genu Ophiuchi] 20 32⅓
- not precisely enough [non ſatis exquiſite]
- The head of Hercules [Caput Herculis] 50 34⅓
- The head of Ophiuchus [Caput Ophiuchi] 48 34½
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 27½ [recte: 40 27⅓ — Corrigenda, p. 430]
- The brighter one of the right hand of Ophiuchus [Lucidior dextræ manus Ophi:] 26 1¾
- The one that follows it in the tail of Ophiuchus [Quæ eam ſequitur in cauda Serpentarij] 32 43¼

DIE 27 MAIJ A. M.

- Altitude of the bright one of Aquila on the meridian [Altitudo lucidæ Vulturis Mer:] 43 29
- toward day [verſus diem]
- On the same day [Eodem die]
- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 20¾

DIE 28 MAIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 27¼
- Here the sight [pennacidium] could only with difficulty be drawn ad angulus rectos [?]. [hic difficulter pennacidium ad angulus rectos trahi potuit.]

DIE 31 MAIJ A. M.

- The bright one of the right hand of Ophiuchus [Lucida dextræ manus Ophiuchi] 26 0½
- not good, because of intervening clouds [non bona propter nubes interuenientes.]
- The bright one of Aquila on the meridian [Lucida Vulturis in Meridiano] 43 29 10
- at the highest; the sky was then quite clear and the air almost calm. [ad ſummum, erat tum cælum bene ſerenum & aer fere tranquillus.]

On the same day, in the evening. [Ad veſperas eodem die.]

- The bright one of the left hand of Ophiuchus [Lucida finiſtræ manus Ophiuchi] 33 6
- It was not visible enough. [non erat ſatis conſpicua]
- The heart of ♏ on the meridian [Cor ♏ in Meridiano] 10 17⅔
- The preceding knee of Ophiuchus [Præcedens genu Ophiuchi] 26 0¼
- The left shoulder of Ophiuchus [Siniſter humerus Ophiuchi] 45 44 10
- The following knee of Ophiuchus [Sequens genu Ophiuchi] 20 33

- This one was then seen precisely. [exquiſite hæc tum videbatur.]
- The head of Hercules [Caput Herculis] 50 35, approximately [fere]
- The head of Ophiuchus [Caput Ophiuchi] 48 34¾
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 27⅔

Note NB. That on this night, because of mists or rather dew, the stars did not appear bright enough. [Nota NB. Quod nocte hac propter nebulas vel potius rorem non ſatis lucidæ apparuerunt ſtellæ.]

DIE 3 JUNIJ MANE.

- The small star above the bright one of Aquila [Parua ſtella ſupra lucidam Vulturis] 45 18⅔
- The bright one of Aquila [Lucida Vulturis] 43 29 10
- On the same day [Eodem die]
- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 54⅓
- In the evening [Ad Veſperas]
- The heart of ♏ on the meridian [Cor ♏ in Meridiano] 10 18
- The left knee of Ophiuchus [Siniſtrum genu Ophiuchi] 25 59 50
- The rear knee of Ophiuchus [Poſterius genu Ophiuchi] 20 32¾
- The head of Hercules [Caput Herculis] 50 34½
- The head of Ophiuchus [Caput Ophiuchi] 48 34 25
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 27⅔

On the same night, to observe distances, I and a certain chorister named Brixius, who had studied at Leipzig, set the instrument on its foot. [Eadem nocte ad obſervandas diſtantias ego cum chorali quodam, qui Lipſiæ ſtuduerat, nomine BRIXIUS, inſtrumentum pedi impoſuimus.]

- Between the Pole Star and the tail of Cygnus [Inter polarem & caudam Cygni]:
- 44 39⅓
- 44 38⅔
- 44 40
- 44 39½
- 44 38 50
- The small star above Aquila [Parua ſtella ſupra Aquilam] 45 19
- The bright one of Aquila on the meridian [Lucida Vulturis in Mer.] 43 29
- observed afterwards on the meridian on 4 June in the morning. [in Meridiano poſtea obſeruatæ die 4 Junij Mane.][1135]

DIE 4 JUNIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 57¾
- The left shoulder of Ophiuchus [Siniſter humerus Ophiuchi] 45 44¼
- The following knee of Ophiuchus [Sequens genu Ophiuchi] 20 33

[1135]a printed brace stands to the right of the values of the two entries *Parua ſtella ſupra Aquilam* and *Lucida Vulturis in Mer.*, grouping them; the remark below follows the brace.

- The head of Hercules [Caput Herculis] 50 34½
- The head of Ophiuchus [Caput Ophiuchi] 48 34⅔
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 27 35

___[1136]

- The brighter one of the right hand of Ophiuchus [Lucidior dextræ manus Ophi:] 26 1
- It was not visible enough. [non erat ſatis conſpicua.]
- The knee of ♐ [Genu ♐] 9 0½
- The tail of Aquila [Cauda Vulturis] 48 57⅔
- The small star that follows it [Parua ſtella quæ eam ſequitur] 38 0½
- not certain enough [non ſatis certa.]
- The one that is above the bright one of Aquila [Quæ eſt ſupra lucidam Vult:] 45 19
- The bright one of Aquila [Lucida Vulturis] 43 29 10

The sky was very clear this night, and the air calm. [Erat hac nocte cælum ſereniſſimum & aer tranquillus.]

DIE 5 JUNIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 59 0 0

From these observations it is concluded that the difference in the altitude of the pole between Frombork [Frauenburgum], where Copernicus observed, and this one is 1ᴳ 32½. Therefore, since the true altitude here is 55 54½, the altitude at Frombork in Prussia will be 54 22, which Copernicus fixed at 54 19½, smaller than the correct value by two and a half minutes.[1137] [*Ex his obſeruationibus colligitur, quod differentia altitudinis poli inter Frauenburgum, vbi Copernicus obſeruauit, & hunc ſit 1ᴳ 32½, quare cum hic ſit vera altitudo 55 54½, erit eadem Fruenburgi Pruſſiæ 54 22, quam Copernicus ſtatuit eſſe 54 19½, ſesquitribus ſcrupulis iuſto minorem.*]

Observations made in the garden residence of the most illustrious Margrave, Duke of Prussia, at Königsberg. [OBSERUATIONES FACTÆ IN ÆDIBUS HORTENSIBUS ILLUSTRISSIMI MARCHIONIS DUCIS BORUSSIÆ REGIOMONTI.][1138]

DIE 11 JUNIJ.

- The bright one of Aquila on the meridian [LucidaVulturis in Meridiano] 43 7⅔
- On the same day [Eodem die]
- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 45¼

[1136] the head of this page is set in two columns divided by a printed vertical rule. The first entries of the left column stand under no date heading on this page.

[1137] *ſesquitribus* is an unusual word; it can be taken as 2½ or as 3½. The subtraction on this page (54 22 less 54 19½) gives 2½, and so does the next page, which states the same difference as *duobus ſcrupulis cum ſemiße*, "two minutes and a half".

[1138] Below it the page is again set in two columns divided by a printed vertical rule.

It was exceptionally clear. Because the pinnule touching the end of the instrument could only with difficulty be pressed to right angles, however, the observation has less certainty on that account; this is always to be noted in all altitudes of the ⊙ exceeding 58ᴳ & M. 20. [Erat apprime ſerenum, licet quia pinnacidium attingens finem inſtrumenti difficulter ad angulos rectos comprimi potuerit, inde obſeruatio minus certitudinis habeat, quod notandum ſemper in omnibus altitudinibus ⊙$^{l_{is}}$ 58ᴳ & M. 20 excedentibus.]

DIE 12 JUNIJ MANE.

- The bright one of Aquila on the meridian [LucidaVulturis in Meridiano] 43 8
- precisely [exquiſite.]
- On the same day [Eodem die]
- Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 58 46
- It was not clear enough. [non erat ſatis ſerenum.]

DIE 13 JUNIJ.

- Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 58 44⅔[?]
- It was moderately clear. [erat mediocriter ſerenum.]

DIE 14 JUNIJ.

- Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 58 43¾
- Nor was the shadow of the ⊙ strong enough on this day. [neque hoc die fuit vmbra ⊙ ſatis valida.]
- On the same day, in the evening. [Die eodem ad veſperas.]
- The rear knee of Ophiuchus [Poſterius genu Ophiuchi] 20 10
- The head of Hercules [Caput Herculis] 50 13
- not precisely enough [non ſatis exquiſite]
- The head of Ophiuchus [Caput Ophiuchi] 48 13½
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 6¾[1139]

DIE 15 JUNIJ MANE.

- Altitude of the bright one of Aquila [Altitudo Lucidæ Vulturis] 43 8

This night the stars crossing the meridian could be seen moderately well, but during some preceding hours of the night no observation could be made because of the brightness of the nearby Moon, although otherwise the sky was moderately clear. [Hac nocte ſtellæ per meridianum tranſeuntes mediocriter conſpici potuerunt, ſed præcedentibus aliquot nocturnis horis propter vicinæ Lunæ ſplendorem obſeruatio fieri nulla potuit, licet alias cælum eßet mediocriter ſerenum.]

- On the same day, the 15th. [Eodem die 15.]

[1139]a printed brace stands to the right of the values of the entries *Poſterius genu Ophiuchi* and *Caput Herculis*, grouping them; the remark *non ſatis exquiſite* is set in smaller type beside the brace.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 42⅔

DIE 16. JUNIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 41
- On the same day, in the evening. [Eodem die ad veſperas.]
- The heart of ♏ on the meridian [Cor ♏ in Meridiano] 9 56
- The preceding knee of Ophiuchus [Præcedens genu Ophiuchi] 25 38
- The left shoulder of Ophiuchus [Iniſter humerus Ophiuchi] 45 21
- They were not visible enough. [non ſatis erant conſpicuæ]
- The rear knee of Ophiuchus [Poſterius genu Ophiuchi] 20 12
- The head of Hercules [Caput Herculis] 50 13½
- The head of Ophiuchus [Caput Ophiuchi] 48 13½
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 6½
- The bright one in the knee of ♐ [Lucida in genu ♐] 8 38⅔[1140]

DIE 17 MANE.

- The first star above the bright one of Aquila [Prima ſtella ſupra Lucidam Vulturis] 44 58
- Meridian altitude of the bright one of Aquila [Lucidæ Vulturis altitudo meridiana] 43 8

This night the sky was quite clear and the air calm, and the brightness of the Moon did not hinder the observations. [Hac nocte erat cælum bene ſerenum & aër tranquillus, & ſplendor Lunæ non impediuit obſeruationes.]

- On the same day, in the evening [Eodem die ad veſperas]
- The head of Hercules on the meridian [Caput Herculis in Meridiano] 50 13½
- The head of Ophiuchus [Caput Ophiuchi] 48 13½
- The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 6⅔

___[1141]

DIE 18 JUNIJ.

- Meridian altitude of the ☉ [Altitudo ☉ Meridiana] 58 35⅔
- not certain enough [non ſatis certa.]

DIE 25 JUNIJ.

Since the sky was quite clear, I set up the instrument again in the same place where the immediately preceding observations were made. [Cum cælum eßet bene ſerenum, rurſus in eodem loco, vbi obſeruationes proxime præcedentes factæ ſunt, inſtrumentum erexi.]

[1140] a printed brace stands to the right of the values of the three entries *Cor ♏ in Meridiano*, *Præcedens genu Ophiuchi* and *Iniſter humerus Ophiuchi*, grouping them; the remark *non ſatis erant conſpicuæ* is set in smaller type beside the brace, on five short lines.

[1141] the upper part of this page is set in two columns divided by a printed vertical rule. A full-measure paragraph follows below both columns.

• Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 58 6⅔

This observation of the Sun is to be trusted much more than the earlier ones of the ⊙ made here at Königsberg, for although the wind was blowing a little, the pinnule could nevertheless stay on the instrument at right angles without being pressed. [Huic obſeruationi Solis multo magis quam antecedentibus hic Regiomonti in ⊙ factis credendum eſt, nam quamquam ventus aliquantulum ſpirabat, tamen pinnacidium ſine compreßione ad angulos Rectos inſtrumento inhærere potuit.]

• On the same day, in the evening [Eodem die ad veſperas]
• The head of Ophiuchus on the meridian [Caput Ophiuchi in Meridiano] 48 13½
• The right shoulder of Ophiuchus [Dexter humerus Ophiuchi] 40 6⅓
• It was not visible enough. [non ſatis fuit viſibilis.]

DIE 26 JUNIJ.

• Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 58 0 50
• precisely [exquiſite]

N. B. When, leaving Königsberg, I had landed at Frombork, I made a few observations there again, since I did not have a small boat ready at once by which the instrument could be carried further. [N. B. Cum Regiomonte decedens FRUENBURGUM appuliſſem, illic iterum cum nauiculam ſtatim, qua longius tranſportaretur inſtrumentum, in promptu non haberem, paucas feci obſeruationes.]

DIE 30 JUNIJ AD VESPERAS.

• Altitude of the bright one of Aquila [Altitudo lucidæ Vulturis] 43 29

This star appeared clearly enough; the others crossing the meridian could scarcely be seen because of vapours from the earth. [Apparebat hæc ſtella ſatis conſpicue, reliquæ per Meridianum tranſeuntes propter vapores terreſtres vix conſpiciebantur.]

DIE 1 JULIJ.

• Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 57 46½
• precisely [exquiſite]

N.B. Note well that the pinnule was now again able to stand at right angles. [N.B. Nota bene nunc iterum pinnacidium potuiße ad angulos rectos conſiſtere.]

• On the same day, in the evening. [Eodem die ad veſperas.]
• The tail of Aquila on the meridian [Cauda aquilæ in Meridiano] 48 57½
• The small one above the bright one of Aquila [Parua ſupra lucidam Vulturis] 45 18⅔
• The bright one of Aquila [Lucida Vulturis] 43 29

DIE 2 JULIJ.

- Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 57 38 5
- It was moderately clear. [mediocriter erat ſerenum.]
- In the evening [Ad veſperas]
- The bright one of Aquila [Lucida Vulturis] 43 29

DIE 3 JULIJ.

- Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 57 30⅙

DIE 4 JULIJ.

- Meridian altitude of the ⊙ [Altitudo ⊙ Meridiana] 57 21 10

It is concluded from these observations that the altitude of the pole of Warmia at Frombork, where Copernicus had his observations, is exactly 54 22; Copernicus himself, however, assumed it to be 54 19½, so that his observation is two and a half minutes smaller than the correct value. [*Colligitur ex his, quod altitudo poli Varmiæ apud Fruenburgum, vbi Copernicus ſuas habuit obſeruationes, ſit exacte 54 22, quam tamen Copernicus ipſe præſuppoſuit eße 54 19½, vt ſit duobus ſcrupulis cum ſemiße ipſius obſeruatio iuſto minor.*]

The altitude of the pole at Königsberg in Prussia, on the other hand, is concluded to be 54 43. Erasmus Reinhold, however, assumed it in his Prutenic Tables to be 54 17, 26 minutes smaller than the correct value; but Erasmus Reinhold borrowed his altitude from Peter Apian and did not obtain it by observations. Since, however, Peter Apian sets the altitude of Gdańsk at 54 54, while this is somewhat more southerly than Königsberg and therefore has a smaller latitude, in my judgement the latitude there must be 54½. [*Altitudo autem polj colligitur Regiomonti Prußiæ eße 54 43, quam tamen Reinholdus præſuppoſuit eße in ſuis Tabulis Prutenicis 54 17, ſcrupulis 26 iuſto minorem, ſed Reinholdus ſuam altitudinem mutuatus eſt a Petro Apiano, non per obſeruationes eam habuit. Cum tamen Dantiſci altitudinem conſtituat Apianus 54 54, cum hoc ſit Regiomonte paulo auſtralius ideoque minorem latitudinem obtineat, oportet illic eße latitudinem meo iudicio 54½.*]

Observations of the year 1585. [OBSERUATIONES ANNI 1585.]

Observations of the Sun. [OBSERUATIONES SOLIS.][1142]

DIE 7 JANUARIJ.

- Alt. merid. by the Tychonic quadrant [Alt. merid. per Quadrantem Tichonicum] 13 25 10
- Decl. by the southern armillae [Decl. per Arm. auſtr.] 20 38 30

DIE 8 JANUARIJ.

- By the Tychonic quadrant [Per Q. Tichon.] 13 37 10

[1142] Below them the page is set in two columns divided by a printed vertical rule.

DIE 14 JANUARIJ.

- By the Tychonic quadrant [Per Q. Tichon.] 14 58 0
- Decl. by the merid. armillae [Decl. per Arm. merid.] 19 7

DIE 15 JANUARIJ.

- By the Tychonic quadrant [Per Q. Tichon.] 15 12 50
- Decl. by the armillae [Decl. per Armillas] 28 52⅔ [recte: 18 52⅔ — Corrigenda, p. 430]

DIE 18 JANUARIJ.

- By the Tychonic quadrant [Per Q. Tichon.] 15 58⅓

DIE 21 JANUARIJ.

- Alt. merid. 16 47 30
- Decl. by the southern armillae [Decl. per Auſtr. Arm.] 17 16
- It was quite clear. [Erat bene ſerenum.]

DIE 24 JANUARIJ.

- Alt. merid. 17 39½

DIE 1 FEBRUARIJ.

- By the Tychonic quadrant [Per Q. Tichon.] 20 9⅙
- Declin. by the southern armillae [Declin. per Arm. auſtr.] 13 55

DIE 3 FEBRUARIJ.

- By the Tychonic quadrant [Per Q. Tichon.] 20 49¼
- By the lesser quadrant [Per Q. Minor.] 20 49⅔
- Decl. by the southern armillae [Decl. per auſtr. Arm.] 13 15⅓

DIE 12 FEBRUARIJ.

- By the portable one [Per Portatilem] 23 58¾
- By the Tychonic one [Per Tichonicum] 23 59⅓

DIE 19 FEBRUARIJ.

- By the Tychonic one, not certain enough [Per Tich., non ſatis certa] 26 36
- By the portable quadrant [Per Q. Portat.] 26 35
- By the new Sext. [Per Sext. nouum] 26 35⅓
- By the old Sext. △ [Per Sext. △ veterem] 26 35
- Decl. by the southern armillae [Decl. per Arm. auſtr.] 7 29½

DIE 3 MARTIJ.

- By the Tychonic one [Per Tichon.] 31 14 10
- By the portable one [Per Portat.] 31 14 0

- By the old Sext. [Per veterem Sext.] 31 14 0

DIE 9 MARTIJ.

- By the Tychonic quadrant [Per Q. Tich.] 33 36⅙
- By the portable quadrant [Per Q. Portat.] 33 36 0
- By the new Sext. [Per Sext. nouum] 33 35 50
- By the old Sext. [Per Sext. veterem] 33 36⅙

DIE 10 MARTIJ.

- By the portable quadrant [Per Q. Portat.] 33 59
- By the new Sext. [Per Sext. nouum] 33 59½
- It was not clear enough. [Non erat ſatis ſerenum.]

DIE 11 MARTIJ.

H. 4 M. 11. By the southern armillae the whole body of the ☉ was seen above the equator by some minutes. [H. 4 M. 11 Per Armillas auſtrales ali- aliquot minutis totum corpus ☉ ſupra æquatorem conſpiciebatur.][1143]

4.16 P. M. By the northern armillae the ☉ also appeared to have crossed the equator by some minutes. [4.16 P. M. Per Armillas boreales ☉ æquatorem transcendiße etiam aliquot minutis apparuit.]

H. 6 M. 4½. By the armillae the middle part of the ☉ was observed above the horizon at setting. [H. 6 M. 4½ Per Armillas media pars ☉ ſupra horizontem in occaſu obſeruabatur.]

DIE 12 MARTIJ.

- By the Tychonic quadrant [Per Q. Tich.] 34 47
- By the portable quadrant [Per Q. Portat.] 34 47
- Among clouds. [Inter nubes.]

DIE 13 MARTIJ.

- By the Tychonic quadrant [Per Q. Tich.] 35 10 35
- By the portable quadrant [Per Q. Portat.] 35 10⅔
- By the new Sext. [Per Sext. nouum] 35 11
- By the old Sext. [Per Sext. veterem] 35 11

At $6^{H}9^{M}30^{s}$ the ☉ was seen to set, by the armillae; but at this elevation of the pole it ought to have set, according to the true motion of the ☉, at $6^{H}6⅔^{M}$. [$6^{H}9^{M}30^{s}$ viſus eſt ☉ occidere per Armillas, debuit autem ſub hac poli eleuatione occidiße ſecundum verum motum ☉ $6^{H}6⅔^{M}$.]

DIE 15 MARTIJ.

- By the Tychonic quadrant [Per Q. Tich.] 35 57⅔
- By the portable quadrant [Per Q. Portat.] 35 57⅔
- By the new Sext. [Per Sext. nouum] 35 57⅚

[1143] the leaf prints *ali-* at the end of one line and *aliquot* in full at the head of the next.

- By the old Sext. [Per Sext. veterem] 35 58
- It was not perfectly clear. [Non erat exquisite serenum.]

___[1144]

DIE 17 MARTIJ.

- By the Tich. quadrant [Per Q. Tich.] 36 45
- By the portable quadrant [Per Q. Portat.] 36 45
- By the new Sext. [Per Sext. nouum] 36 45⅙
- By the old Sext. [Per Sext. veterem] 36 45
- It was quite clear. [Erat bene serenum.]

DIE 23 MARTIJ.

- By the Tich. quadrant [Per Q. Tich.] 39 4
- By the portable quadrant [Per Q. Portat.] 39 4⅙
- By the new Sext. [Per Sext. nouum] 39 4⅓
- By the old Sext. [Per Sext. veterem] 39 3⅚

DIE 25 MARTIJ.

- By the Tich. quadrant [Per Q. Tich.] 39 49 50
- By the portable quadrant [Per Q. Portat.] 39 49 40
- By the new Sext. [Per Sext. nouum] 39 49 45
- By the old Sext. [Per Sext. veterem] 39 49 40
- The sky was moderately clear. [Erat cœlum mediocriter serenum.]

DIE 26 MARTIJ.

- By the Tich. quadrant [Per Q. Tich.] 40 12½
- By the portable quadrant [Per Q. Portat.] 40 12⅓
- By the new Sext. [Per Sext. nouum] 40 12⅙

DIE 27 MARTIJ

- By the Tich. quadrant [Per Q. Tich.] 40 35⅙
- By the portable quadrant [Per Q. Portat.] 40 35⅓
- By the new Sext. [Per Sext. nouum] 40 35⅙

DIE 28 MARTIJ.

- By the Tich. quadrant [Per Q. Tich.] 40 57⅚
- By the portable quadrant [Per Q. Portat.] 40 57⅚
- By the new Sext. [Per Sext. nouum] 40 57¾

DIE 30 MARTIJ.

- By the Tichon. quadrant [Per Q. Tichon.] 41 42⅔
- By the portable quadrant [Per Q. Portat.] 41 42⅚

[1144]this page is set in two columns divided by a printed vertical rule.

- By the new Sext. [Per Sext. nouum] 41 42⅙
- It was not clear enough. [Non erat ſatis ſerenum.]

DIE 3 APRILIS.

- By the Tichon. quadrant [Per Q. Tichon.] 43 10⅙
- By the portable quadrant [Per Q. Portat.] 43 10¼

DIE 9 APRILIS.

- By the Tichon. quadrant [Per Q. Tichon.] 45 17½
- By the portable quadrant [Per Q. Portat.] 45 17
- It was not clear enough. [Non erat ſatis ſerenum.]

DIE 15 APRILIS.

- By the Tichon. quadrant [Per Q. Tichon.] 47 19 10
- By the portable quadrant [Per Q. Portat.] 47 19 0
- By the new Sext. [Per Sext. nouum] 47 19 0

DIE 18 APRILIS.

- By the portable quadrant [Per Q. Portat.] 48 16
- By the new Sext. [Per Sext. nouum] 48 15½

DIE 19 APRILIS.

- By the Tichon. quadrant [Per Q. Tichon.] 48 35⅙
- By the portable quadrant [Per Q. Portat.] 48 35½
- By the new Sext. [Per Sext. nouum] 48 34½
- It was not clear enough. [Non erat ſatis ſerenum.]

DIE 26 APRILIS.

- By the Tichon. quadrant [Per Q. Tichon.] 50 39 35

This one is truer because of the weather. [Hæc verior propter tempeſtatem.]

- By the portable quadrant [Per Q. Portat.] 50 39⅓
- By the new Sext. [Per Sext. nouum] 50 39

DIE 17 MAIJ.

- By the Tichon. quadrant [Per Q. Tichon.] 55 25
- By the portable quadrant [Per Q. Portat.] 55 24½
- Decl. by the Arm. auſtr. [Decl. per Arm. auſtr.] 21 20

DIE 18 MAIJ.

- By the Tichon. quadrant [Per Q. Tichon.] 55 35
- By the portable one, not good [Per Port., non bona] 55 34

DIE 19 MAIJ.

- By the Tichon. quadrant [Per Q. Tichon.] 55 49⅚

• It was not clear enough. [Non erat ſatis ſerenum.]

DIE 7 JUNIJ.

• By the Tichon. quadrant [Per Q. Tichon.] 57 31½
• By the portable quadrant [Per Q. Portat.] 57 31⅙

But the portable quadrant had not been set upright with the perpendicular exactly enough. [Sed Quadrans Portatilis non ſatis exacte cum perpendiculari erectus erat.]

DIE 8 JUNIJ.

• By the Tichon. quadrant [Per Q. Tichon.] 57 33⅓
• By the portable quadrant [Per Q. Portat.] 57 33
• It was moderately clear. [Erat mediocriter ſerenum.]

DIE 9 JUNIJ.

• By the Tichon. quadrant [Per Q. Tichon.] 57 34⅙
• By the portable quadrant [Per Q. Portat.] 57 34
• It was quite clear. [Erat bene ſerenum.]

___[1145]

• Declination of the ☉ by the greater subterranean armillae in Urania 23 29½ [Declinatio ☉ per Armillas Maiores in Vrania ſubterraneas 23 29½]
• 23 28½[1146]

By the Portat., on this day, the 9th, the altitude of the ☉ was 57 34, and the place of the ☉ was then in 27 48♊, distant from the greatest declination by 1′ 6″; therefore the greatest apparent altitude is gathered as [*Per Portat. fuit hoc die 9 Alt. ☉ 57 34 eratque tunc locus ☉ in 27 48♊, diſtans a maxima declinatione 1′ 6″, ideo maxima viſa altitudo colligitur*]

• *57 35 6*
• *to which parallax adds 1 34* [*cui parallaxis addit 1 34*]
• *so that the true altitude is 57 36 40* [*vt ſit vera 57 36 40*]
• *and since the altitude of the equator is* [*cumque æquatoris altitudo ſit*]
• *34 5 15*
• *the greatest declination comes out 23 31 25* [*prouenit Declin. max. 23 31 25*]
• *The mean of the observation of both instruments was 57 34 5* [*Medium obſeruationis vtriusque inſtrumenti erat 57 34 5*]
• *The Sun still increased by 1′ 6″; therefore* [*Sol creuit adhuc 1′ 6″ quare*]
• *the greatest apparent altitude will be 57 35 10* [*maxima viſa erit 57 35 10*]
• *to this parallax adds 1 30* [*huic addit parallaxis 1 30*]
• *so that it is 57 36 40* [*vt ſit 57 36 40*]
• *Altitude of the equator 34 5 30* [*Alt. æquatoris 34 5 30*]
• *The greatest declination will be 23 31 10* [*Erit Declinatio max. 23 31 10*]

[1145] this page is set in two columns divided by a printed vertical rule.
[1146] the second value stands alone on the line below the first, under it, with no label.

DIE 10 JUNIJ.

We observed the declination of the ☉ around hour 4 P. M. as 23 29½, by the greater subterranean armillae. [Obſeruauimus Declinationem ☉ circa Horam 4 P. M. 23 29½ per Armillas maiores ſubterraneas.][1147]

Declination of the ☉ [Declinatio ☉]	Altitude [Altitudo]
23 34½	8[9]
23 35	6
23 35⅓	5⅓
23 36	5

DIE 11 JUNIJ.

Die Solſtitij.[1148]

At noon it was not clear, but clouds and rain were preventing the sight of the Sun, and so the altitude of the Sun could not be observed by the quadrants. [*In meridie non fuit ſerenum, ſed nubes & pluuiæ impediebant Solis aſpectum, ideoque per quadrantes Solis altitudo non fuit obſeruabilis.*]

But at about hour 1¼, since the ☉ was so high that it caused no refraction, being not far removed from the meridian, we took the declination of the ☉ by the greater subterranean armillae of Urania in this way: [*Verum Hora quaſi 1¼ cum ☉ adeo altus eßet, vt nullam cauſaret refractionem vtpote non multum a meridiano remotus, per Armillas Maiores Vraniæ ſubterraneas accepimus declinationem ☉ in hunc modum.*]

- *By one pin. 23 29 45* [*Per vnum pin. 23 29 45*]
- *By the other pin. 23 29 50* [*Per alterum pin. 23 29 50*]
- *Mean 23 29 47½* [*Medium 23 29 47½*]
- *Moderately well clear.* [*Mediocriter bene ſerenum.*][1149]
- *23 29 45*
- *23 30 0*
- *23 29 52½*
- *better, and quite clear.* [*melius & bene ſerenum.*]

Therefore, considering the mean of both, by comparing the mean of the differences, the greatest apparent declination of the Sun by these armillae is 23 29 50, on this day around the 1st hour from noon; nor could the declination be perceptibly increased. [*Eſt itaque conſiderando vtriusque medium per collationem medij differentiarum declinatio Solis viſa maxima per has Armillas 23 29 50 hoc die circa horam 1ᵃᵐ a meridie, nec poterat ſenſibiliter augeri declinatio.*]

Now the armillae had been set to the meridian by the star Arcturus [Arcturi] yesterday evening and by the Sun yesterday, so that they deviated imperceptibly

[1147] in the entry above, the value *23 29½* stands at the right of the second printed line, *Horam 4 P. M.*, and the third line, *per Armillas maiores ſubterraneas.*, follows it.

[1148] the two rubric lines read: "11 June. The day of the solstice."

[1149] a second printed vertical rule stands to the right of the lines above; beyond it, level with them, the following are printed.

from the meridian. [*Erant autem Armillæ poſitæ ad meridianum per Arcturi ſtellam heſterno veſperi & per Solem heſternum, ita vt inſenſibiliter a meridiano deviarint.*]

The plumb-line, however, showed the altitude of the pole as 55 54½ exactly, so that this declination is to be taken with respect to that presupposed altitude of the pole. [*Perpendiculum vero monſtrabat poli altitudinem 55 54½ exacte, ita vt hæc declinatio fuerit accipienda reſpectu eius præſuppoſitæ altitudinis poli.*]

But since, by our motions, the Sun was only about ⅓ of a minute away from the solstice, the declination did not vary up to the solstice. [*Quia vero Sol aberat ſaltem a Solſtitio per noſtros motus per minuti ⅓ quaſi, declinatio non variabatur in Solſtitium.*]

Therefore, by these armillae adjusted in this way, there was [*Igitur per has Armillas hac ratione rectificatas fuit*]

- *the greatest apparent declination 23 29 50* [*Declinatio viſa maxima 23 29 50*]
- *to which parallax adds 1 30* [*Quibus parallaxis addit 1 30*]
- *so that the true greatest declination is 23 31 20* [*Vt ſit vera Declinatio Maxima 23 31 20*]

This agrees quite well with the observation by the Tychonic quadrant and by the Portat. quadrant. [*Id quod obſeruationi per Q. Tichonicum & per Q. Portat. ſatis bene quadrat.*]

EODEM DIE P. M.[1150]

Altitude [Altitudo]	Declination of the ⊙ [Declinatio ⊙]
3	23 43½
2⅙	49
2	49½
1⅓	50
0¾	51
0⅔	52
0½	52½
0⅓	52⅔
0¼	54½

- When it grazed the horizon 23 55 [Cum horizontem ſtringeret 23 55]
- When the middle of it appeared 23 56 [Cum medius appareret 23 56]
- When only a small part was seen 24 0 [Cum particula tantum conſpiceretur 24 0][1151]

DIE 13 JUNIJ A. M.

[1150] the rubric reads: "The same day, P. M."
[1151] these three lines follow the table, their values standing under its right-hand column.

Altitude [Altitudo]	Declination of the ⊙ observed [Declinatio ⊙ obſeruata]
8⅙	23 36
8½	35⅔
10	35⅙

___[1152]

Altitude [Altitudo]	Declination of the ⊙ observed [Declinatio ⊙ obſeruata]
10⅓	23 35
11	34⅚
12½	34½
13⅔	34⅓
15⅓	33
18	32
37½	30, nearly [30 fere]

Around the meridian, when the ⊙ was almost at its greatest altitude, the declination was observed several times: [Circa meridianum cum ⊙ eßet propemodum in maxima ſua altitudine Declinatio aliquoties obſeruata]

- 23° 29′ 45″
- 45
- 40
- 50
- 45[1153]
- 40″
- 35
- 35
- 40
- 35

These are almost equal to the ones above. [*Hæc ferme ſunt æqualia ſuperioribus.*]

P. M.

Altitude [Altitudo]	Declination [Declinatio]
31⅙	23 29⅚
20	30
19	30⅙
17	30½

[1154]

[1152] this page is set in two columns divided by a printed vertical rule.

[1153] a short printed vertical rule stands to the right of the five lines above; beyond it, level with them, the following are printed.

[1154] a brace to the right of the Declination column encloses all four rows, and against it is printed:

Among clouds. [Inter nubes]

- At setting, with the middle of the ⊙ appearing, 23 58¼ [In occaſu ⊙ medio apparente 23 58¼]
- With the Sun now sinking, 24 0½ [Demergente iam Sole 24 0½]

DIE 14 JUNIJ A. M.

Altitude of the ⊙ [Altitudo ⊙]	Declination [Declinatio]
35	23 30
36	29⅚
40	29¾
41	30
43	29¾

1155

With a moderately clear sky. [Mediocriter ſereno cœlo]

- Meridian altitude of the ⊙ 57 34 5 by the Tichon. [Alt. ⊙ merid. 57 34 5 per Tichon.]
- 57 34 0 by the Portat. [57 34 0 per Portat.]
- *Hence the greatest declination comes out 23 31 30* [*Hinc prodit max. declin. 23 31 30*]
- *Day 9 gave the greatest declination 23 31 10* [*Dies 9 dedit max. declin. 23 31 10*]
- *The mean of both, 23 31 20, as the true declination* [*Medium vtriusque 23 31 20 pro vera*]
- Meridian declination of the ⊙ by the arm. subterr. 23 29 [Declin. ⊙ merid. per arm. ſubterr. 23 29]
- with the other pinnule 23 29½ [altero pinnacidio 23 29½]

DIE 15 JUNIJ A. M.

After the instrument had been adjusted to the stars. [*Poſt rectificatum inſtrumentum ad ſtellas.*]

Altitude of the ⊙ [Altitudo ⊙]	Declination [Declinatio]
26	23 29
27	28⅚
28	28⅚
30	28⅔
31	28⅓
33	28½
35	28½
36	28⅓

1155a brace to the right of the Declination column encloses all five rows, and against it is printed:

Altitude of the ⊙ [Altitudo ⊙]	Declination [Declinatio]
40	28
41	28
42	28
55	27⅚
55½	27¾
56⅙	27⅚

1156

It was somewhat darker. [Erat aliquanto obſcurius [recte: ſerenius, "clearer" — Corrigenda, p. 430].]

- Meridian altitude of the ⊙ by the Q. Tich. 57 32 15 [Alt. ⊙ merid. per Q. Tich. 57 32 15]
- by the Q. Port. 57 32 15 [per Q. Port. 57 32 15]
- Declination by the Arm. M. 23 27 10 [Declin. per Arm. M. 23 27 10]
- by the other pinnule 23 27 20 [per alterum pinnac. 23 27 20][1157]

P. M.

Altitude [Altitudo]	Declination [Declin.]	Refraction [Refractio]
42⅙	23 27½	
40	28	about 34° [circa 34°]
39	27¾	it comes out [prouenit]
31	28	about 1 [quaſi 1]
30½	28⅙	minute [minuto]
26¾	28¾	
21⅓	29	about 18° [circa 18°]
18½	29½	2½ M.
Meanwhile it was not clear. [Interea non erat ſerenum.]		
5	23 35	about 5° [circa 5°]
4	36	8 M.
3⅔	36⅓	
3½	37	
3	38	
2⅚	39	
2¾	39⅓	
2½	39⅔	
2⅙	43	
2	43¼	
1⅚	45	
1½	46½	

[1156] a brace to the right of the Declination column encloses the seven rows from altitude 31 to altitude 42, and against it is printed:

[1157] in the first two lines above, *Alt. ⊙ merid.* is set once, on two lines at the left, and a brace joins it to *per Q. Tich.* and *per Q. Port.*

Altitude [Altitudo]	Declination [Declin.]	Refraction [Refractio]
1⅓	47	
1	49½	
0⅚	50	

1158

___1159

Hence, therefore, the refraction at 1° of altitude is about 24′. [*Hinc itaque refractio in vno gradu altitudinis quaſi ſcrupulorum 24.*]

DIE 16 JUNIJ P. M.

Altitude of the ⊙ [Altitudo ⊙]	Declination [Declinatio]
8½	23 30⅔
8⅓	31
8⅙	31 1/[?][1160]
7⅚	31⅓
7½	31¾
7⅙	32⅙
6⅚	33

DIE 18 JUNIJ A. M.

Altitude [Altitudo]	Declination [Declinatio]
43	23 20½
44	20¾
44½	20⅔
45	20⅔
46	20⅔
	20⅓
	20½
	20½

1161

With the other pinnule. [altero pinnacidio]

1158 the line *Interea non erat ſerenum.* is printed across the table, beginning at its left edge; the fifteen rows below it stand in the same three columns with no head row of their own. In the Refraction column the words run on from row to row: "at about 34° it comes out about 1 minute"; "at about 18°, 2½ M."; "at about 5°, 8 M."

1159 this page is set in two columns divided by a printed vertical rule.

1160 The denominator is 3 or 8.

1161 a brace to the right of the Declination column joins the second and third rows (*20¾*, *20⅔*), and against it is printed:

- Meridian altitude of the ⊙ [Altitudo ⊙ meridiana]
- by the Q. Tichon. 57 26 0 [per Q. Tichon. 57 26 0]
- by the Q. Portat. 57 26 0 [per Q. Portat. 57 26 0]
- Declination by the armillae ſubt. 23 20½ [Declinatio per Armillas ſubt. 23 20½]
- by the other pinnule 23 20⅚ [per alterum pinnacid. 23 20⅚]
- *The apparent max. altitude comes out 57 35 15* [*Prouenit Alt. max. viſa 57 35 15*]
- *Parallax 1 30* [*Parallaxis 1 30*]
- *true altitude 57 36 45* [*vera Alt. 57 36 45*]
- *altitude æquat. 34 5 30* [*Alt. æquat. 34 5 30*]
- *max. declination 23 31 15* [*Declin. max. 23 31 15*]

This agrees nearly with the ones above. [*Quod fere conſentit cum ſuperioribus.*]

P. M.

H.	M.	Altitude of the ⊙ [Alt. ⊙]	Declination [Declinatio]
2	32	47½	23 21
2	37	46⅔	21⅙
2	40	46⅓	21
3	32	39½	21⅔
3	36	38⅚	21½
3	40	38¼	21⅔
4	15	32½	21¾
4	20	31⅔	21¾
4	30	31	22

The declination of the ⊙, moreover, was changing by 3½′ in 24 hours; therefore by 35″ in 4 hours, by which the declination could have changed on this day within the space of four hours. [Mutabatur autem declinatio ⊙ 24 horis 3½′, ergo 4 horis 35″, quibus declinatio mutari hoc die quatuor horarum ſpacio potuerit.]

DIE 21 JUNIJ P. M.

H.	M.	Altitude [Alt.]	Declination of the ⊙ by the max. armillae [Decl. ⊙ per Arm. max.]
0	45		23 10½
			10⅓
			10½
3	10	42⅔	11½
	15	42.0	11⅓
	20	41⅛	11½
	30	40.0	11½
4	35	31	12
5	5	26⅓	12⅙

H.	M.	Altitude [Alt.]	Declination of the ⊙ by the max. armillae [Decl. ⊙ per Arm. max.]
6	40	13½	13⅔
	45	12 50	14
	48	12 20	13⅚
7	0	10 40	14⅔
			14¾[1]
	5	10 0	15
	10	9½	15¼
	15	8 50	15⅔
			16[1]
	20	8 0	16½
	33	6 40	18 — it was not clear enough [non erat ſatis ſerenum.]

1162

24 hours change the declination by 4′ 10″; therefore in one hour it changed by 10″, and in 7 hours it changed by 1′ 13″. [24 horæ mutant declinationem 4′ 10″, ergo in vna hora mutauit 10″ et 7 horis mutauit 1′ 13″.]

Hence it is gathered that at about 10° of altitude the refraction was 5′ 53″. [Hinc colligitur quod circa altitudinem 10° fuerit refractio 5′ 53″.]

DIE 22 JUNIJ A. M.

H.	M.	Altitude [Altitudo]	Declination of the ⊙ [Decl. ⊙]
7	0	28	23 7⅓
	5	28	7½
	15	29	7
	20	29½	7
	26	30	7
	32	33	7
	40	34	6¾
8	15	39⅓	6½
	20	40	6⅓
	30	41½	6½
	45	43	6½
	50	44⅚	6½
9	11	47½	6½

[1] That is, by the other pinnule. [Id eſt, per alterum pinnacidium.][1163]

[1162] two braces stand to the right of the Declination column. The first joins the six rows from *11½* (the *3 10* row) to *12⅙* (the *5 5* row), and against it is printed *Inter nubes*, "Among clouds". The second joins the ten rows from *13⅔* (the *6 40* row) to *16½* (the *20* row), and against it is printed *Erat bene ſerenum*, "It was quite clear". On the last row the words *non erat* follow *18* in smaller type, and *ſatis ſerenum.* stands on the line below. The raised figures after *14¾* and *16* call the footnote at the foot of the page.

[1163] the footnote above is printed in small roman at the foot of the left column; it carries one numeral, *1*, and two raised figures *1* stand in the 21 June table, after *14¾* and after *16*.

___[1164]

H.	M.	Altitude [Altitudo]	Declination of the ⊙ [Decl. ⊙]
9	30	50	23 6½
10	46	56	6¼
10	50	56¼	6¼
11	15	57	6⅙

P. M.

- 1 50 — 50⅓ — 23 6⅓
- 1 53 — 50 — 6½
- 1 56 — 49½ — 6⅓[1165]

DIE 26 JUNIJ.

- The merid. altitude by the Q. Tichon. 56 51 [Alt. merid. per Q. Tichon. 56 51]

DIE 29 JUNIJ.

H.	M.	Altitude of the ⊙ [Alt. ⊙]	Declination [Declinatio]
3	22	41	22 26
3	40	38½	26
4	25	32	25½
4	35	31⅙	25½
7	10	10⅙	28
7	13	9	28⅛

DIE 30 JUNIJ.

- The merid. altitude by the Portat. 56 23½ [Alt. merid. per Portat. 56 23½]
- by the Tichon. 56 23⅔ [per Tichon. 56 23⅔]
- The max. declination by the armillae ſubt. 22 18½ [Decl. per Armillas ſubt. max. 22 18½]
- by the southern armillae 22 17¾ [per Arm. auſtrales 22 17¾]

P. M.

[1164] this page is set in two columns divided by a printed vertical rule.

[1165] the three rows under *P. M.* stand in the four columns of the table above (hour, minute, altitude, declination), with no head row of their own.

H.	M.	Altitude [Alt.]	Declination [Declin.]
1	10	54⅓	22 18
2	0	50½	22 18, or rather 17′ 50″ [22 18 vel potius 17′ 50″]
4¼		34	22 17½

1166

DIE 1 JULIJ.

- 10ᴴ 10ᴹ A. M., altitude of the ☉ 50°, [10ᴴ 10ᴹ A. M. Alt. ☉ 50°,]
- declination by the armillae ſubt. 22 11 [Decl. per Armillas ſubt. 22 11]
- The merid. altitude by the Tichon. 56 16 [Alt. merid. per Tichon. 56 16]
- by the Portat. 56 16½ [per Portat. 56 16½]
- It was not clear enough. [Non erat ſatis ſerenum.]

DIE 3 JULIJ P. M.

H.	M.	Altitude [Alt.]	Declination [Declin.]
1	40	52	21 54
2	5	50	54
3	35	40	53⅔
4	5	37	53½

DIE 4 JULIJ A. M.

H.	M.	Altitude [Alt.]	Declination [Declin.]
8	25	38	21 48
			21 47⅔
8	35	38⅔	21 48
			21 47⅔
8	55	42⅓	21 47¾
9	15	45	21 47½
1	35 p. m.	52⅓	21 45½

DIE 5 JULIJ A. M.

H.	M.	Altitude [Alt.]	Declination [Declin.]
7	0	28	21 40
10	45	53½	37½
11	0	54⅓	37

[1166] on the second row, *vel* follows *22 18* and *potius 17′ 50″* stands on the line below, in the Declination column.

DIE 6 JULIJ.

H.	M.	Altitude [Alt.]	Declination [Declin.]
9	45 a. m.	48	21 28⅚
10	30	53¾	21 28

- It was not clear enough. [Non erat ſatis ſerenum.]
- The merid. altitude by the Tich. 55 32½ [Alt. merid. per Tich. 55 32½]
- by the Portat. (not good) 55 31⅙ [per Portat. (non bona) 55 31⅙]
- The max. declination by the armillae ſubter. [Decl. per Armillas ſubter. max.]
- 21 27 0

DIE 8 JULIJ A. M.

H.	M.	Altitude [Alt.]	Declination of the ⊙, with one pinnule [Declin. ⊙ Pinn. vno]	with the other [altero]
6	35	23½	21 11½	21 10
	37	23¾	11⅓	10
	40	24⅙	11⅛	10
	45	25	11⅙	9⅚
8	0	35	9¾	8½
	5	35⅔	9¾	8⅔
	8	36	9⅔	8½
10	30	51	7¼	
	35	51⅔	7¼	
	38	52	7¼	
	43	52½	7⅙	6½
	45	52⅔	7	6½
	47	53	7	6½
	50	53½	7	6⅓
	55	53¾	6⅚	6¼

1167

* With a single pinnule, for because of a beam it was not possible to observe with both. [* Vnico pinnacidio, nam propter trabem obſeruare vtroque non licuit.]

- The merid. altitude by the Tichon. 55 11½ [Alt. merid. per Tichon. 55 11½]
- by the Portat. 55 11½ [per Portat. 55 11½]
- Declination by the armillae ſubt. 21 6½ [Decl. per Armill. ſubt. 21 6½]
- by the other pinnule 21 6⅛ [per alterum pinnac. 21 6⅛]

1167 *Declin.* ⊙ is printed once over the last two columns, with *Pinn. vno* under it over the first and *altero* over the second. A brace to the right of the *Pinn. vno* column joins the three rows *10 30*, *35*, *38* (each *7¼*), and an asterisk stands against it.

___[1168]

DIE 11 JULIJ P. M.

H.	M.	Altitude [Alt.]	Decl. by one [Decl. per vnum]	Decl. by the other pinnule [per alt. pinn.]
3	55		20 33	20 32⅚
3	58		33	33
4	0	34½	33	32¾
4	5	34	32⅚	32⅔
5	20	20⅔	33	32½
5	25	20	33⅙	32⅔
5	28	19⅔	33⅙	32⅔
7	0	10⅓	35	34½
7	5	10	35⅙	34⅚

[1169]

DIE 13 JULIJ.

- The mer. altitude by the Q. Tichon. 54 14⅔ [Alt. mer. per Q. Tichon. 54 14⅔]
- by the Q. Portat. 54 14½ [per Q. Portat. 54 14½]
- by the new Rulers 6136½, half 3068¼, resp. arc 17 52⅙, dist. from the vertex 35 44⅓, altitude 54 15⅔ [per Regulas nouas 6136½ dimidium 3068¼ reſp. arcus 17 52⅙, diſt. a vertice 35 44⅓, altitudo 54 15⅔]

DIE 14 JULIJ.

- By the Q. Tichon. 54 2⅙ [Per Q. Tichon. 54 2⅙]
- By the Portat. 54 1⅔ [Per Portat. 54 1⅔]
- By the new Rulers 6174, resp. 17 59, altitude 54 2 [Per Reg. nou. 6174, reſp. 17 59, altitudo 54 2]
- Decl. by the Arm. ſubt. 19 57½ [Decl. per Arm. ſubt. 19 57½]

DIE 15 JULIJ.

- By the Q. Tich. with the new pinnule 53 50 [Per Q. Tich. cum nouo pinnacidio 53 50]
- with the old pinnule 53 49½ [cum veteri pinnac. 53 49½]
- By the Q. Portat. 53 49⅚ [Per Q. Portat. 53 49⅚]
- By the new Rulers 6207, resp. 18 5, altitude 53 50 [Per Reg. nou. 6207, reſp. 18 5, altitudo 53 50]
- Decl. by the Arm. ſubter. 19 44½ [Decl. per Arm. ſubter. 19 44½]

[1168] this page is set in two columns divided by a printed vertical rule.

[1169] *Decl.* is printed once, on a level of its own, over the last two columns; *per vnum* and *per alt. pinn.* stand under it.

DIE 18 JULIJ.

- By the Q. Tich., new pinnule 53 9⅓ [Per Q. Tich., nou. pinn. 53 9⅓]
- old pinnule 53 8⅚ [veteri pinn. 53 8⅚]
- By the Q. Portat. 53 8⅔ [Per Q. Portat. 53 8⅔]
- By the new Rulers 6320, resp. arc 18 25⅓, altitude 53 9⅓ [Per Reg. nouas 6320, reſp. arcus 18 25⅓, alt. 53 9⅓]
- Decl. by the Arm. max. ſubt. 19 3½ [Decl. per Arm. max. ſubt. 19 3½]

DIE 20 JULIJ.

- By the Q. Tichon. 52 40⅓ [Per Q. Tichon. 52 40⅓]
- By the Q. Portat. 52 40⅓ [Per Q. Portat. 52 40⅓]
- By the lesser Rulers 6397½, resp. 52 41⅓ [Per Reg. minores 6397½, reſp. 52 41⅓]

DIE 23 JULIJ.

- By the Q. Tichon. 51 55½ [Per Q. Tichon. 51 55½]
- By the Q. Portat. 51 55⅓ [Per Q. Portat. 51 55⅓]

DIE 24 JULIJ.

- By the Q. Tichon. 51 40⅓ [Per Q. Tichon. 51 40⅓]
- By the Q. Portat. 51 40⅔ [Per Q. Portat. 51 40⅔]
- Decl. by the Arm. ſubt. 17 35 [Decl. per Arm. ſubt. 17 35]
- with the other pinnule 17 36 [altero pinn. 17 36]

DIE 25 JULIJ.

- By the Q. Tichon. 51 24⅔ [Per Q. Tichon. 51 24⅔]
- By the Q. Portat. 51 24⅓ [Per Q. Portat. 51 24⅓]
- By the Rulers 6610, altitude 51 24 [Per Regulas 6610, alt. 51 24]
- Decl. by the Arm. ſubt. 17 20 [Decl. per Arm. ſubt. 17 20]

DIE 30 JULIJ.

- By the Q. Tichon. 50 1 [Per Q. Tichon. 50 1]
- By the Q. Portat. 50 0⅙ [Per Q. Portat. 50 0⅙]
- By the Rulers 6840, resp. 50 0⅙ [Per Reg. 6840, reſp. 50 0⅙]

It was not clear enough. [Non erat ſatis ſerenum.]

DIE 2 AUGUSTI.

- By the Q. Tichon. 49 8 [Per Q. Tichon. 49 8]
- By the Q. Portat. 49 7⅙ [Per Q. Portat. 49 7⅙]
- By the lesser Rulers 6980, resp. 49 8 [Per Reg. minores 6980, reſp. 49 8]
- Decl. by the Arm. ſubterr. 15 2 [Decl. per Arm. ſubterr. 15 2]
- with the other pinnule 15 2½ [altero pinnac. 15 2½]

DIE 5 AUGUSTI.

- By the Q. Tich. 48 12⅔ [Per Q. Tich. 48 12⅔]
- By the Q. Portat. 48 12⅓ [Per Q. Portat. 48 12⅓]

DIE 9 AUGUSTI.

- By the Q. Tichon. 46 36 [Per Q. Tichon. 46 36]
- with the other pinnule 46 35⅔ [alt. pin. 46 35⅔]
- By the Q. Portat. 46 36 [Per Q. Portat. 46 36]
- By the lesser Rulers 7396, resp. 46 36 [Per Reg. minores 7396, reſp. 46 36]
- Decl. by the Arm. ſubterr. 12 30 [Decl. per Arm. ſubterr. 12 30]
- with the other pinnule 12 30¼ [alt. pin. 12 30¼]

DIE 11 AUGUSTI.

- By the Q. Tichon. 46 15⅔ [Per Q. Tichon. 46 15⅔]
- By the Q. Portat. 46 16 [Per Q. Portat. 46 16]
- By the new Rulers 7450, resp. 46 16 [Per Reg. nou. 7450, reſp. 46 16]

DIE 13 AUGUSTI.

- By the Q. Tichon. 45 35½ [Per Q. Tichon. 45 35½]
- old pinnule 45 35⅚ [vet. pin. 45 35⅚][1170]

___[1171]

- By the Q. Portat. 45 35⅔ [Per Q. Portat. 45 35⅔]
- By the new Reg. 7559, resp. about 45 36 [Per Reg. nou. 7559, reſp. fere 45 36]

With the sky clear enough and calm. [Cœlo ſereno ſatis & tranquillo.]

DIE 18 AUGUSTI.

With a dimmer brightness. [Splendore obſcuriori.]

- By the Q. Tichon. 43 50⅔ [Per Q. Tichon. 43 50⅔]
- By the Q. Portat. 43 50⅚ [Per Q. Portat. 43 50⅚]

DIE 25 AUGUSTI.

- By the Q. Tichon. 41 18⅔ [Per Q. Tichon. 41 18⅔]
- By the Q. Portat. 41 18¼ [Per Q. Portat. 41 18¼]
- Decl. by the armillae ſubterr. 7 13½ [Decl. per Arm. ſubterr. 7 13½]

[1170] several entries on this page are printed on two or more lines (13 July, *per Regulas nouas …* on four lines; 14 July, 15 July and 18 July, the *Per Reg.* entries on two lines each; 15 July, *Per Q. Tich. cum nouo / pinnacidio 53 50* on two). The lines beginning in lower case (*per Q. Portat.*, *cum veteri pinnac.*, *veteri pinn.*, *altero pinn.*, *altero pinnac.*, *alt. pin.*, *vet. pin.*) are set indented or to the right under the line before them.

[1171] this page is set in two columns divided by a printed vertical rule.

DIE 26 AUGUSTI.

- By the Q. Tichon. 40 56⅙ [Per Q. Tichon. 40 56⅙]
- By the Q. Portat. about 40 56 [Per Q. Portat. fere 40 56]
- By the new Reg. 8302, resp. 40 56 [Per Reg. nouas 8302, reſp. 40 56]

DIE 1 SEPTEMBRIS.

- By the Q. Tichon. 38 42 [Per Q. Tichon. 38 42]
- By the Q. Portat. 38 42¼ [Per Q. Portat. 38 42¼]

DIE 3 SEPTEMBRIS.

- By the Q. Tichon. 37 54 [Per Q. Tichon. 37 54]
- By the Q. Portat. 37 54½ [Per Q. Portat. 37 54½]

DIE 5 SEPTEMBRIS.

- By the Q. Tichon. 37 8⅙ [Per Q. Tichon. 37 8⅙]
- By the Q. Portat. 37 8⅔ [Per Q. Portat. 37 8⅔]
- By the Reg. min. 8900, resp. 37 8 [Per Reg. min. 8900, reſp. 37 8]
- Decl. by the armillae 3 3 [Decl. per Arm. 3 3]
- with the other pinnule 3 3½ [altero pin. 3 3½]

DIE 6 SEPTEMBRIS[1].

H.	*M.*	*Declin. of the ☉ by the armillae ſubt.* [*Declin. ☉ per Arm. ſubt.*]	*Altitude of the ☉ by the Q. min.* [*Altit. ☉ per Q. min.*]
8	*20*	*2 43½ B.*	*21⅓*
8	*56*	*42¾*	*25⅔*
9	*16⅓*	*43*	*27⅔*
9	*44*	*42*	*30⅙*
10	*38*	*41½*	*34½*
11	*27*	*40¼ with both* [*40¼ vtroque*]	
11	*48*	*40¼ with both* [*40¼ vtroque*]	

1172

- The meridian altitude by the Q. Tichon. 36 45⅙ [Alt. mer. per Q. Tichon. 36 45⅙]
- by the Q. Portat. 36 45⅔[2] [per Q. Portat. 36 45⅔[2]]
- by the Sext. vet. 36 45⅙ [per Sext. vet. 36 45⅙]
- By the Reg. min. 8960, resp. about 36 46 [Per Reg. min. 8960, reſp. fere 36 46]
- Decl. by the greater armillae ſubt., exactly 2 40 15 [Decl. per Armillas ſubt. maiores exquiſite 2 40 15]

[1172] the table under 6 September, its head included, is printed in italic; the rubric above it is roman. The head is set on two levels: *Declin.* ☉ over *per Arm. ſubt.*, and *Altit.* ☉ over *per Q. min.* The raised figure after *SEPTEMBRIS* calls the first note at the foot of the page.

This observation, moreover, was certain enough, by both pinnules, afterwards rectified. [*Fuit autem hæc obſeruatio ſatis certa, per vtrumque pinnacidium poſt rectificata.*]

DIE 7 SEPTEMBRIS.

H.	*M.*	*Declin. of the* ⊙ [*Declin.* ⊙]	*Altitude of the* ⊙ [*Altit.* ⊙]
10	*5*	*2 17⅔*	
10	*20*	*2 18*	*33 very nearly* [*33 proxime*]
10	*32*	*2 17½*	*34*
10	*40*	*2 17½*	*34½* ἐν πλάτει [Greek: *en platei*, "in breadth"]
11	*0*	*2 17*	*35⅙*
11	*10*	*2 17*	
11	*41*	*2 16½*	

1173

- The meridian altitude by the Q. Tichon. 36 21½ [Alt. mer. per Q. Tichon. 36 21½]
- by the Q. Portat. 36 21⅚ [per Q. Portat. 36 21⅚]
- by the Sext. vet. △ 36 21⅔ [per Sext. vet. △ 36 21⅔]
- By the Reg. min. 9021, resp. 36 22 [Per Reg. min. 9021, reſp. 36 22]
- Decl. at noon by the armillae ſubter. with both pinnules 2 16 30 [Decl. in meridie per Arm. ſubter. vtroque pinnacidio 2 16 30]

DIE 8 SEPTEMBRIS.

In the morning, at hour 6 M. 10, the Declin. of the ⊙ *was observed as 2ᵍ 10′, when it was very near the horizon.* [*Mane Hora 6 M. 10 obſeruabatur Declin.* ⊙ *2ᵍ 10′, cum admodum eßet Horizonti propinquus.*]

H.	*M.*	*Declin. of the* ⊙ [*Declin.* ⊙]	*Altitude of the* ⊙ [*Altit.* ⊙]
6¾		*2 1½*	*8½*
7	*0*	*2 0*	*10 0*
7	*4*	*1 59½*	
7	*16*	*1 59*	*12⅓*
7	*33*	*1 58*	*14⅔*
7	*42*	*1 58*	*16*
7	*57*	*1 57*	*18*
8	*14*	*1 56½*	*20*
8	*30*	*1 56*	
8	*42*	*1 56*	
9	*20*	*1 55⅚*	*27½*
9	*50*	*1 55*	
10	*2*	*1 54¾*	

1173 the table under 7 September, its head included, is printed in italic; the rubric above it is roman.

1174

[1] See below, among the observations of the Moon on the days 6, 7, 8, 10 September. [Vide infra inter obſervationes Lunæ dierum 6, 7, 8, 10 Septembris.]

[2] In codex C the observations of the meridian altitude of this day are found twice: by the Port. 36 45⅔ and 45½, by the Sext. 36 45⅙ and 45⅓. [In codice C obſervationes altitudinis meridianæ hujus diei bis reperiuntur, per Port. 36 45⅔ et 45½, per Sext. 36 45⅙ et 45⅓.][1175]

___[1176]

H.	*M.*	*Declination of the ⊙ [Declin. ⊙]*	*Altitude of the ⊙ [Altit. ⊙]*
10	*18*	*1 54½*	*32¾*
10	*32*	*1 54½*	
10	*50*	*1 54¼*	*34¼*
11	*26*	*1 53*	
11	*28*	*1 53*	

1177

- The mer. altitude by the Q. Tichon. 35 58⅙ [Alt. mer. per Q. Tichon. 35 58⅙]
- by the Q. Portat. 35 58⅙ [per Q. Portat. 35 58⅙]
- by the Sext. vet. 35 57⅙ [per Sext. vet. 35 57⅙]
- By the lesser Reg. 9084, resp. 35 58 [Per Reg. min. 9084, reſp. 35 58]
- Declination at noon by the greater subterranean armillae 1 53 0 [Decl. in Meridie per Arm. ſubterraneas maiores 1 53 0]

These following observations of the ⊙, made in the afternoon by the greater subterranean armillae in the order in which they follow, should by all means be recorded, inasmuch as they may prove very useful for investigating the amount of the solar refraction. [Hæ ſequentes obſeruationes ⊙ pomeridiano tempore quo ſequuntur ordine per Armillas ſubterraneas maiores factæ, omnino referantur. Vtpote quæ ad quantitatem refractionis Solaris indagandam perutiles faciantur [recte: *faciunt* for the printed *perutiles faciantur* (first written was: *perutiles ſunt*) — Corrigenda, p. 430].]

H.	M.	Declination of the ⊙ [Declin. ⊙]	Altitude [Altit.]
2	3	1°52¾′	
2	5	52⅓	
3	20	51¾ twice [51¾ bis]	

[1174] the rubric, the paragraph and the table under 8 September are all printed in italic, the table's head included.

[1175] the two notes above are printed in small roman across the full width of the page, below both columns. The first is called by the raised figure after *SEPTEMBRIS* in the 6 September rubric; the second by the raised figure after *36 45⅔* in the Portat. line at the head of the right-hand column.

[1176] this page is set in two columns divided by a printed vertical rule.

[1177] this table, its head included, is printed in italic, under no date rubric on this page.

H.	M.	Declination of the ⊙ [Declin. ⊙]	Altitude [Altit.]
4	22	51½	15°10′
4	35	51⅔	13 10
4	50	52⅓	11 10
4	57½	52½	10 10
5	7	53	9
5	16⅔	53½	7⅚
5	20⅔	54	7
5	26	54½	6⅓
5	29⅔	55	6
5	33	55½	5½
5	42	57½	4

DIE 10 SEPTEMBRIS.

Early in the forenoon, the declination of the ⊙ was faithfully observed by the same greater subterranean armillae, with its altitude by the lesser quadrant. [Primo antemeridiano tempore Declinatio ⊙ per eaſdem Armillas maiores ſubterraneas fideliter obſeruata, altitudine eiuſdem per Quadrantem minorem exiſtente.]

H.	M.	Declination of the ⊙ [Declin. ⊙]	Altitude [Altit.]
6	32⅓	1°16′	5⅚° or thereabouts [5⅚° aut circiter]
6	35½	15½	6½
6	39⅓	14⅚	7⅙
6	41½	14½	7½
6	45	14	8
6	48½	16 35″	8½
6	52	13¼	9

H.	M.	Declination of the ⊙ [Declin. ⊙]	Altitude [Altit.]
6	56½	1 13	9⅔
7	22½	12¼	13
7	24½	12	13¼
7	26½	11¾	13¾

Note at this point that the clock was being advanced by 5 minutes (for in the space of two days it had fallen short of the true moment of time by just as much). [Nota hoc loco quod Horologium per 5 ſcrupula promouebatur (tantundem enim in duorum dierum ſpatio a vero temporis momento defecerat).]

With the clock corrected [Correcto Horologio]		Declination [Declin.]	Altitude [Altit.]
7	53½	1°11′	16⅓°
8	0½	10½	17⅓
8	16	10	19½

With the clock corrected [Correcto Horologio]		Declination [Declin.]	Altitude [Altit.]
8	31⅔	9½	21¼
8	43½	9	22½
9	34	8⅔	28
11	11	7	34⅓
11	29	about 7 [7 fere]	
11	39	6½	
11	49	about 6½ [6½ fere]	

1178

- The mer. altitude by the Q. Tichon. 35 11⅔ [Alt. mer. per Q. Tichon. 35 11⅔]
- by the Q. Portat. 35 11½ [per Q. Portat. 35 11½]
- by the Sext. vet. 35 12 [per Sext. vet. 35 12]
- By the lesser Reg. 9206, resp. 35 11 [Per Reg. min. 9206, reſp. 35 11]
- Declination at noon by the armillae 1 6 0 [Decl. in merid. per Armillas 1 6 0]
- Shortly after noon, the declination 1 6½, on both sides [Paulo poſt meridiem Declin. 1 6½ vtrinque]

Observed in the same way on the Sun, P. M. [Obſeruata eodem modo in Sole P. M.]

H.	M.	Declination [Declin.]	Altitude by the lesser Q. [Altit. per Q. Min.]
1	35	1° 5¼′	
3	25	4¼	21°55′
3	36	4	20⅓
3	49	4⅓	18⅔
4	3	4½	17
4	23	4¾	14⅓
4	32	5	13
4	43⅓	5¼	11⅔
4	52	5½	10½
5	12	6½	8
5	16	7	7⅓

1179

From this point dense clouds were taking in the solar rays. [Hinc radios ſolares denſæ nubes recipiebant.]

I made these observations on the ⊙ so that the reckoning of the refraction of the rays itself might be established. [*Has obſeruationes in ⊙ feci vt conſtaret ratio ipſius refractionis radiorum.*]

1178 the head *Correcto / Horologio* is printed on two levels over the two time columns.
1179 in the head of this table *Altit.* stands on a level of its own above *per Q. Min.*

As, at a morning altitude of 10 partium, the declination of the ☉ appeared to be 1ᵍ 13′, whereas [*Vt in altitudine matutina 10 partium videbatur declinatio ☉ 1ᵍ 13′ cum*][1180]

___[1181]

it should have been (by reason of the declination observed at noon, 1ᵍ 6½′) partium 1 11′ at most; therefore the refraction amounted to about 2′ minutes of declination. But P. M., at an equal altitude, the declination appeared to be 1ᵍ 6′ when it should have been 1ᵍ 2′; here, therefore, the refraction adds 4 minutes. Taking, then, the mean of the two, the refraction at an altitude of 10 partium will be about three minutes. And the reckoning for the rest will be made in the same way. [*deberet eſſe (ratione declinationis obſeruatæ in Meridie 1ᵍ 6½′) partium 1 11′ ad ſummum, ergo refractio erat declinationis ſcrupulorum quaſi 2′. Sed P. M. in pari altitudine viſa eſt declinatio 1ᵍ 6′ cum deberet eſſe 1ᵍ 2′, igitur hic refractio addit 4 ſcrupula, accipiendo itaque medium vtriusque, erit refractio in altitudine 10 partium quaſi ſcrupulorum trium. Et ſic fiet ratiocinatio de cæteris.*]

And this difference of refraction is smaller than the one that appeared around the summer solstice, perhaps because refraction becomes smaller around the equinoxes than around the solstices — just as Bernhard Walther, a pupil of Regiomontanus, also asserts that he once noticed at Nuremberg.[1] [*Atque hæc differentia refractionis minor eſt quam ea quæ circa Solſtitium æſtivum apparebat, forte quod minor fiat refractio circa æquinoctia quam circa ſolſtitia. Quemadmodum etiam Bernardus Walterus Regiomontani diſcipulus olim Norinbergæ ſe animaduertiſſe aſſerit*[1].]

DIE 14 SEPTEMBRIS, A. M.[2]

H.	*M.*	*Declination of the ☉ [Declin. ☉]*	*Altitude of the ☉ [Altit. ☉]*
6	34	0°18¼′ [recte: 18 — Corrigenda, p. 430]	6½°
6	48	20	8½
6	56	20½	9½
7	1½	21⅙	10¼
7	22½	22	12⅔
7	35	22½	14⅓
7	47	23	16
8	0	23½	17½
8	7	23¾	18½
8	19½	24	20
8	36	24⅙	22
8	53	24½	23⅚
9	7	25⅓ [recte: 25¼ — Corrigenda, p. 430]	25⅙
9	22½	25½	26½
9	31	25⅚	27½
9	50	26	29

[1180] the last two paragraphs of this page are printed in italic; the rest of the right-hand column is roman.

[1181] this page is set in two columns divided by a printed vertical rule.

H.	*M.*	*Declination of the ⊙ [Declin. ⊙]*	*Altitude of the ⊙ [Altit. ⊙]*
10	17½	26½	31
11	*16*	*26¾*	
11	*35*	*26¾*	

twice or three times [*bis vel ter*][1182]

In these observations the pinnules nearly always agreed exactly. [Pinnacidia in his obſeruationibus ad amußim ſemper fere concordabant.]

Note that the subterranean clock was advanced around the point of noon by 13 minutes 20 S., for in the last 4 days it had fallen short of the true time by the same amount. [Nota, quod Horologium ſubterraneum circa punctum meridianum in 13 ſcrup. 20 S. promotum ſit, totidem enim in proximis 4 diebus a tempore vero defecerat.]

The meridian altitude of the ⊙ was [Altitudo ⊙ meridiana erat]

- By the Q. Tichon. 33 37 35 [Per Q. Tichon. 33 37 35]
- By the Q. Portat. about 33 37½ [Per Q. Portat. 33 37½ fere]
- By the Sext. Trig. 33 37½ [Per Sext. Trig. 33 37½]
- By the lesser Reg. 9449, resp. 33 37 [Per Reg. min. 9449, reſp. 33 37]
- Declination by the subterranean armillae 0 27 0 M. [Decl. per Arm. ſubt. 0 27 0 M.]

DIE EODEM P. M.

H.	M.	Declination of the ⊙ [Declin. ⊙]	with the other pinnule [altero pin.]	Altitude [Altit.]
0	6	0°27′		
0	13		0°27′	
2	48⅔	29⅙	28	24⅓°
3	28	28⅓	29½	20
3	51	28½	29½	17¼
4	6	28⅓	29⅓	15⅓
4	14½	28	29	14
4	24	27½	28½	13
4	32	27¼	28¼	12
4	37⅓	27	28	11
4	45½	26½	27⅔	10
4	54	26	27	9
5	2½	25½	26½	about 8 [8 fere]
5	9¼	25	about 26 [26 fere]	7
5	17	24⅔	25½	6
5	22	24	about 25 [25 fere]	5⅙

[1182] the head of this table is printed in italic and its first seventeen rows in roman; the last two rows are italic. A printed brace to the right of the two values *26¾* groups them, and the italic words *bis vel ter* stand to the right of the brace, between the two rows. The raised figure after *A. M.* in the rubric calls the second note at the foot of the page.

H.	M.	Declination of the ⊙ [Declin. ⊙]	with the other pinnule [altero pin.]	Altitude [Altit.]
5	26½	23¼	23⅔	4½
5	32	22½	22½	3⅚
5	36	21	21	3¼
5	43	21⅚	22	2½
5	46	21	21	1⅚
5	49½	20	20	1⅓

With small clouds obscuring the solar rays. [Nubeculis ſolares radios obfuſcantibus.]

DIE 15 SEPTEMBRIS.

A. M., by the subterranean armillae. [A. M., per Armillas ſubterraneas.]

H.	M.	Declination of the ⊙ [Declin. ⊙]	with the other pinnule [altero pin.]	Altitude [Altit.]
6	23	0°34¼′		2¾°
6	25½	34⅓		3
6	29	35½		3½
6	37	37⅔		4⅚
6	42½	39½		5½
6	48	40		
6	51½	40¼		6½
6	57½	41		7½
7	8½	42⅓	0°42′	9
7	19	43	42¾	10⅓

[1] Cfr. the Writings of Joh. Regiomontanus, fol. 53[r], under the day 1489 March 7. [Cfr. Scripta Joh. Regiomontani fol. 53[r], ad diem 7 Martii 1489.]

[2] Cf. below, among the observations of the planets. [Cf. infra inter obſervationes planetarum.][1183]

___[1184]

H.	M.	Declination of the ⊙ [Declin. ⊙]	with the other pin. [altero pin.]	Altitude [Altit.]
7	23	0 43½	0 43	11
7	32	44	43½	12
7	41	43½	43¾	13
7	49	44½	44	14
8	0½	45	44½	15⅔
8	13⅓	45⅔	45¼	17⅙
8	29	46	45½	18½

[1183] the two notes above are printed in small roman across the full width of the page, below both columns. The first is called by the raised figure after *aßerit* at the end of the second italic paragraph; the second by the raised figure after *A. M.* in the 14 September rubric.

[1184] this page is set in two columns divided by a printed vertical rule.

H.	M.	Declination of the ⊙ [Declin. ⊙]	with the other pin. [altero pin.]	Altitude [Altit.]
8	42½	46¾	46½	21
9	7	47		23¼

On the other side the shadow was obstructed by a certain fixed beam, which at that time could not yet be moved away. [Ab altera parte vmbra fixo quodam tygno impediebatur, quod tum temporis nondum potuit dimoueri.]

9	21	0°47½′	0°47½′	24⅓°
9	33½	48¼	48⅙	26
9	50½	48½	48½	27⅔
10	24	49½	49½	30
11	12	50	50	32½
11	38	50⅓	*	33½

1185

*On the other side it touched exactly the same. [*Ab altera parte plane idem tetigit.]

Note that the clock had anticipated the point of noon by three minutes. [Nota quod Horologium punctum meridianum in tribus ſcrupulis præoccupauerat.]

The meridian declination by the greater subterranean armillae 0° 51′· [Declinatio meridiana per Armillas ſubterraneas maiores 0° 51′·]

The meridian altitude of the ⊙ [Altitudo ⊙ meridiana]

- By the Q. Tichon. 33 14, good [Per Q. Tichon. 33 14 bona]
- By the Q. Portat. about 33 14 [Per Q. Portat. 33 14 fere]
- By the Sext. Trig. 33 13⅔ [Per Sext. Trig. 33 13⅔]
- By the Reg. min. 9510, resp. 33 13 [Per Reg. min. 9510, reſp. 33 13]

P.	M.	Declination of the ⊙ [Decl. ⊙]	on the other side [ab altera parte]	Altitude [Alt.]
12	6	0°51′	0°51′	
12	7	51		
12	10		51	
12	16	50½	51¾	
12	19	50¼		
12	22		51¾	
12½		50¾	51½	
2	54⅔	53¾	53¾	23⅓°
3	18½	53½	53½	20½
3	38	53	53	18
3	55⅔	52¾	53	16

[1185] these six rows stand in the columns of the table above.

With small clouds drifting in [Nubeculis affluentibus]

4	14	52⅓	52½	12½
4	37	52	52	10½
5	1	51		7¼
5	5	50⅔		6⅔

1186

The sky being thicker with small clouds, the Sun was overshadowed as they massed together. [Cœlo nubeculis ſpißiore quibus conglomeratis Sol obumbrabatur.]

DIE 17 SEPTEMBRIS.

A. M. By the greater subterranean armillae. [A. M. Per Armillas ſubterraneas maiores.]

H.	M.	Declination of the ⊙ [Decl. ⊙]	with the other pin. [altero pin.]	Altitude [Alt.]
6	52⅓	1°27¼	1°27¼′	6°
7	1⅓	28	28	7½
7	21⅓	29⅓		10¼
7	28	30		11
7	33¾	30⅓		12
7	41⅔	31		13
7	53⅔	31½		14½
8	about 1⅔ [1⅔ fere]	31⅚		15⅓
8	10½	32⅙		17
8	23	32½		18
8	33	33		19¼
8	53⅓	33½		21½
9	10	33¾		23
10	6⅓	35		28
10	44⅓	35½		30½
11	8¼	36		31⅔
11	23¼	about 36½ [36½ fere]		32¼

Note that around noon it was not clear enough, and so we first corrected the clock in the afternoon at about hour 3. We found by the southern armillae that in the space of two days it had run ahead of the true moment of time by no more than 7 minutes; hence we subtracted about as much from the observed time. [Nota quod iuxta meridianum tempus non ſatis ſerenum fuit, ideoque Horologium pomeridiano tempore ad horam circiter 3 primum correximus, quod in ſpacio biduurno non vltra 7 Scrup. verum temporis momentum

[1186] these four rows stand in the columns of the table above.

anteuertißet, per Armillas Auſtrales experti ſumus, vnde a tempore obſeruato tantundem fere ſubduximus.]

Observed on the same day, in the afternoon, by the same instrument, as long as the rising clouds allowed. [Eodem die pomeridiano tempore per idem inſtrumentum obſeruata, donec per exorientes nubes licuit.]

After the correction of the clock [Poſt correctionem Horologij]		Declination of the ☉ [Decl. ☉]	Altitude [Alt.]
3	13	1°39½	20½°
3	31	1 40	18½
3	49½	1 40¼	16⅓
4	7½	1 40⅙	14⅓
4	24	1 39½	12⅙
4	43	1 39	about 10 [10 fere]

1187

DIE 19 SEPTEMBRIS.

- The meridian altitude by the Q. Tich. 31 40 [Alt. mer. per Q. Tich. 31 40]
- by the Q. Portat. 31 40½ [per Q. Portat. 31 40½]

___1188

DIE 20 SEPTEMBRIS A. M.

H.	M.	Decl. ☉	Alt.
6	53⅔	2°36′ on both sides [2°36′ vtrinque]	5°
7	0¼	37	6
7	12½	39	7½
7	22	40⅙	9
7	36	41	10¾
7	56	43	13⅓
8	11	43¼	15⅙
8	23	44	16½
8	31⅚	44¼	17⅛
8	50	44½	19⅓
9	3½	45	21
9	17	45⅓	22½
10	6	46	26⅔
10	25	about 47 [47 fere]	28⅛
10	53½	47½	30
11	24	about 48 [48 fere]	31

1187the head *Poſt correc- / tionem / Horologij* is printed on three lines over the two time columns.
1188this page is set in two columns divided by a printed vertical rule.

• The meridian Alt. by the Q. Tich. 31 15½ [Alt. mer. per Q. Tich. 31 15½]
• by the Q. Portat. 31 16½ [per Q. Portat. 31 16½]

Because of the scattered small clouds it could not be observed exactly enough. [Per nubeculas diſperſas non potuit exacte ſatis obſeruari.]

Note that on this day almost the whole sky was girdled with white small clouds, as if with a rather thin veil, and most of all around noon; hence on this day the rays of the Sun could not be observed exactly. No error of the clock. [Nota quod hoc die cœlum fere totum candidis nubeculis quaſi velo quodam tenuiori obcingebatur & maxime circa meridianum tempus, vnde hoc die exacte Solis radij obſeruari non potuerunt. Horologij error nullus.]

Then observed P. M. [Deinde obſeruata P. M.]

H.	M.	Decl. ⊙	Alt.
4	22⅓	2°49′	11⅓°
4	34	48½ on both sides [48½ vtrinque]	
4	52	47½	7½
5	1	46¾	6
5	about 9 [9 fere]	45	5
5	13	44½	4½
5	16½	44	4
5	21⅓ [recte: 21½, the group *5 21½* — Corrigenda, p. 430]	about 43 [43 fere]	3½
5	25½	41	3
5	28⅛	39½	2½
5	31	38	2
5	34⅓	36½	1½
5	37⅓	34½	1¼
5	40⅓	32	0½

When it was hanging over the horizon 2 30 [Cum immineret horizonti 2 30]

At H. 5 M. 44⅓ with its lowest limb, at 47′ with its hemisphere, and at 49′ with its highest limb, the Sun was carried below the western horizon. [H. 5 M. 44⅓ cum infimo limbo, 47′ cum hemisphærio, 49′ cum ſupremo limbo Sol ferebatur ſub Horizontem occidentalem.]

DIE 21 SEPTEMBRIS.

A. M. By the greater armillae. [A. M. Per Armillas maiores.]

H.	M.	Decl. ⊙	Alt. by the lesser Q. [Alt. per Q. minor.]
6	26	2°49′	roughly 1⅔° [1⅔° quaſi]
6	37	50½	3
6	41	56½	4
6	55	2 59	5½

H.	M.	Decl. ⊙		Alt. by the lesser Q. [Alt. per Q. minor.]
7	3½	3 0		6
7	10	1		7
7	20	2		
7	33½	3		10⅙
7	39 [recte: 36, the group *7 36* — Corrigenda, p. 430]	3½		11
7	52	3⅚		
8	0	about 5 [5 fere]		13½
8	9⅓	5½		14⅔
8	25	6		16¼
8	36	6⅓		18
8	53	7		20
9	9	7½		22⅙
9	28	8		23⅙
9	50	8⅔		24¼
10	0	9		26
10	20	9⅓[1]		27⅔
10	35	9½	3 9 alt.	28⅔
11	5	10⅙	10 pin.	30⅙
11	39	10½		30 25′

1189

At the point of noon 3°11½′ by the same armillae. [In puncto meridiej 3°11½′ per easdem Armillas.]

- The meridian Alt. by the Q. Tich. 30 53½ [Alt. mer. per Q. Tich. 30 53½]
- by the Q. Port. 30 53⅙ [per Q. Port. 30 53⅙]
- By the lesser Reg. 9867, resp. 30 54 [Per Reg. min. 9867, reſp. 30 54]

The subterranean clock was found to run faster than it should by only a minute and a half in 24 hours; therefore it had no notable error. [Horologium ſubterraneum tantum ad ſesquiminutum iuſto celerius moueri deprehenſum eſt in 24 horis, ergo notabilem errorem non habuit.]

By the same instruments, P. M. [Per eadem inſtrumenta P. M.]

H.	M.	Decl. ⊙	Alt.
2	58½	3°13¼′	21°
3	14	13½	19

[1189] in the rows *10 35* and *11 5* the figures *3 9* and *10* stand between the Decl. and Alt. columns, closed on the right by a printed brace spanning the two rows; *alt.* and *pin.* are set in small roman to the right of the brace, *alt.* on the upper row and *pin.* on the lower. In the head, *Alt. per* stands on a level of its own above *Q. minor.* The raised figure after *9⅓* calls the note at the foot of the page.

H.	M.	Decl. ⊙	Alt.
3	30	about 14 [14 fere]	17
3	47½	13⅔	15
3	59	13	13½

[1] There is written in addition: »With both pinnules agreeing«. [Adſcriptum eſt: »Pinnacidijs vtrisque [recte: vtrinque, "on both sides" — Corrigenda, p. 430] conuenientibus«.][1190]

___[1191]

H.	M.	Declination of the ⊙ [Decl. ⊙]	Altitude [Alt.]
4	59⅔	3 10⅓	
5	6⅔	9½	5
5	9	9	4½
5	15	7¾	3½
5	18⅚	6¾	3¼
5	22⅙	5⅙	2¾
5	26⅓	about 4 [4 fere]	2
5	31	3 0½	1⅔
5	34½	2 58½	1⅓
5	37	56½	roughly 1 [1 quaſi]

- 5 40 6[?] [recte: 5 40⅔ — Corrigenda, p. 430] the lower limb [5 40 6[?] inferior limbus]
- 5 42⅙ the middle [5 42⅙ medium]
- 5 45 the upper limb of the Sun disappeared conspicuously in the west: it was clearly seen to sink below the horizon, with the sky serene and calm on every side. [5 45 ſuperior limbus Solis ad occidentem conſpicue diſparauit: manifeſte ſeſe horizonti immergere viſus eſt, cœlo ab omni parte ſereno et tranquillo.]

Trust these observations, which were made with sky, instrument and pinnules all in agreement. [His obſeruationibus fide, quæ cœlo, inſtrumento, pinnacidijs annuentibus factæ.]

DIE 22 SEPTEMBRIS.

On this day, before noon — when the ⊙ could not be observed because of a very black cloud — we were able to take little or nothing from the sun. [Hoc die ante meridianum tempus, in quo præ nube quadam nigerrima ⊙ obſeruari nequiuit, a ſole parum vel nihil ſumere potuimus.]

- The meridian altitude by the Q. Tichon. 30 29 50 [Alt. mer. per Q. Tichon. 30 29 50]

[1190] the note above is printed in small roman below both columns. It is called by the raised figure after *9⅓* in the 21 September table, row *10 20*.

[1191] this page is set in two columns divided by a printed vertical rule.

- by the Q. Portat. 30 30 [per Q. Portat. 30 30]
- by the Reg. min. 30 30 [per Reg. min. 30 30]
- The meridian declination by the subterranean armillae 3 34 15 [Decl. merid. per Arm. ſubt. 3 34 15]

What we noted at sunset between it and the Moon, together with the altitude and declination of each, is to be looked for separately in its proper place among the observations of the ☾. [Quæ autem Sole occidente inter hunc & Lunam annotauimus, vna cum vtriuſque altitudine & declinatione, ea ſuo loco in ☾ obſeruatis ſeorſim quærenda ſunt.]

DIE 23 SEPTEMBRIS A. M.

At H. 6 M. 14⅚ the upper limb of the Sun, at M. 17⅔ the hemisphere, and at M. 21⅙ the lower limb emerged above the horizon, when the altitude of ♀ was 27 partium. [H. 6 M. 14⅚ Solis ſuperior limbus, M. 17⅔ Hæmiſphærion, M. 21⅙ inferior limbus emerſit Horizonti, quando ♀ altitudo eßet 27 partium.]

H.	M.	Declination of the ⊙ [Declin. ⊙]	Altitude [Alt.]
6	37	3° 39½′	2½°
6	42⅙	41½	3⅙
6	46	42¼	3½
6	53⅓	44½	4⅔
7	4½	46	6
7	11⅔	47½	7

H.	M.	Declination of the ⊙ [Declin. ⊙]	Altitude [Alt.]
7	17⅙	3 48	8
7	29⅔	49½	9⅓
7	44	50½	11
7	53	51	12⅓
8	28	53	15
8	54⅚	54¼	19½
9	9⅓	54⅓	21
9	45	about 55 [55 fere]	24⅙
10	28⅓	56	27⅓
10	58	56½	28⅚
11	16	56⅚	29⅓

1192

The meridian declination of the ⊙, moreover, 3° 58′ by the same armillae. Its meridian altitude 30 7 by the Q. Tichon. [Declinatio autem meridiana ⊙ 3° 58′ per easdem Armillas. Altitudo eiuſdem meridiana 30 7 per Q. Tichon.]

The subterranean clock, by which we noted all the times above, had accumulated an error of barely 1½ ſcrup. by running slower. [Horologium

[1192] no rubric stands over this table on this side; it carries its own printed head.

ſubterraneum, iuxta quod omnia tempora prænotauimus, errorem vix 1½ ſcrup. tardiori motu contraxerat.]

In the afternoon it did not look clear enough; but what we take on the ☾ with the Sun sunk below the horizon is to be sought in its proper place. [Pomeridiano tempore ſatis ſerenum non apparuit, quæ autem Sole inclinato ſub horizontem in ☾ capimus, ſuo loco perquirenda.]

DIE 27 SEPTEMBRIS.

- The meridian altitude by the Q. Tich. 28 34 [Alt. mer. per Q. Tich. 28 34]
- by the Q. Portat. 28 34½ [per Q. Portat. 28 34½]
- By the Reg. Min. 10212, resp. 28 34 [Per Reg. Min. 10212, reſp. 28 34]
- The declination of the ⊙ observed by the greater subterranean armillae 5 30 [Declin. ⊙ per Armillas ſubterraneas Maiores obſeruata 5 30]

With the sky not bright enough. [Cœlo non ſatis lucido.]

DIE 28 SEPTEMBRIS.

- By the Q. Tichon. 28 11 [Per Q. Tichon. 28 11]
- By the Q. Portat. 28 11⅙ [Per Q. Portat. 28 11⅙]
- By the new Sext. 28 11 [Per Sext. nouum 28 11]
- By the rulers min. 10276½, resp. 28 10 [Per regulas min. 10276½, reſp. 28 10]
- The meridian declination by the same greater subterranean armillae 5 54 [Declin. Merid. per Armillas eaſdem ſubterraneas Maiores 5 54]

In stormy air. [Tempeſtuoſo aëre.]

DIE 1 OCTOBRIS.

- By the Q. Tichon. 27 2½ [Per Q. Tichon. 27 2½]
- By the Q. Portat. 27 2¼ [Per Q. Portat. 27 2¼]
- By the new Sext. 27 3 [Per Sext. nouum 27 3]
- The meridian declination by the subterranean armillae 7 2½ [Decl. Merid. per Arm. ſubt. 7 2½]

In air still turbulent. [Turbulento adhuc aëre.]

___[1193]

DIE 5 OCTOBRIS.

- By the Q. Tichon. 25 32 [Per Q. Tichon. 25 32]
- By the Q. Portat. 25 32½ [Per Q. Portat. 25 32½]
- By the new Sext. 25 31½ [Per Sext. nouum 25 31½]
- By the Reg. min. 10670, resp. 25 32 [Per Reg. min. 10670, reſp. 25 32]

Decl. by the armillae subt. 8 31¼ at the most, but an error of the instrument was soon found. [Decl. per Arm. ſubt. 8 31¼ ad ſummum, ſed error inſtrumenti mox inuentus eſt.]

[1193]this page is set in two columns divided by a printed vertical rule.

DIE 18 OCTOBRIS.

- By the Q. Tichon. 20 54⅔ [Per Q. Tichon. 20 54⅔]
- By the Q. Portat. 20 54⅔ [Per Q. Portat. 20 54⅔]
- Decl. by the armillae subt. 13 9¾M. [Decl. per Armillas ſubt. 13 9¾M.]

DIE 19 OCTOBRIS.

- By the Q. Tichon. 20 34¾ [Per Q. Tichon. 20 34¾]
- By the Q. Portat. 20 35 [Per Q. Portat. 20 35]
- By the new Reg. 11390½, resp. 20 34 [Per Reg. nouas 11390½, reſp. 20 34]
- Decl. by the armillae subt. 13 30 M. [Decl. per Arm. ſubt. 13 30 M.]
- With the other pinnule 13 30⅙ [Cum altero pinnacidio 13 30⅙]

DIE 22 OCTOBRIS.

- By the Q. Tich. with the old pinnule 19 35⅔ [Per Q. Tich. veteri pinn. 19 35⅔]
- with the other pinnule 19 36 [cum altero pinnac. 19 36]
- By the Q. Portat. 19 35⅔ [Per Q. Portat. 19 35⅔]
- By the Reg. min. 11529, resp. 19 36 [Per Reg. min. 11529, reſp. 19 36]
- Decl. by the armillae subt. 14 29½ [Decl. per Arm. ſubt. 14 29½]

DIE 27 OCTOBRIS.

- By the Q. Tichon. 18 3 [Per Q. Tichon. 18 3]
- By the Q. Portat. 18 3 [Per Q. Portat. 18 3]
- Decl. by the armillae subt. 16 3 [Decl. per Arm. ſubt. 16 3]

It was moderately clear. [Erat mediocriter ſerenum.]

DIE 6 NOUEMBRIS[1].

- By the Q. Tichon. 15 18 [Per Q. Tichon. 15 18]
- By the Q. Portat. 15 17½ [Per Q. Portat. 15 17½]

DIE 9 NOUEMBRIS.

- By the Q. Tich., with one pinnule 14 34 [Per Q. Tich., vno pinnac. 14 34]
- with the other pinnule 14 34¾ [altero pinnac. 14 34¾]
- By the Q. Portat. 14 34¾ [Per Q. Portat. 14 34¾]
- By the Reg. min. 12235, resp. 14 34 [Per Reg. min. 12235, reſp. 14 34]
- Decl. by the armillae subt. 19 31¾ [Decl. per Arm. ſubt. 19 31¾]

The face of this day looked clear rather than calm. [Huius diej facies ſerena magis quam tranquilla videbatur.]

The clock at noon was 2 minutes slower than it should be. [Horologium in meridie 2 minutis iuſto tardius.]

DIE 13 NOUEMBRIS.

- By the Q. Tichon. 13 41 30 [Per Q. Tichon. 13 41 30]
- By the Q. Portat. 13 41 40 [Per Q. Portat. 13 41 40]
- Decl. by the armillae subt. 20 25 [Decl. per Arm. ſubt. 20 25]

With the sky somewhat dark. [Cœlo ſubobſcuro.]

DIE 23 NOUEMBRIS^{2}.

- At H. 8.15 the upper limb of the ⊙ was seen to rise. [H. 8.15 ſuperior limbus ⊙ viſus eſt oriri.]
- At 8.16⅔ the middle of the Sun was rising. [8.16⅔ Sol medius oriebatur.]
- At 8.19 the Sun was rising fully among the clouds, yet not clearly enough visible. [8.19 Plane Sol oriebatur inter nubes, non ſatis tamen conſpicuus.]

At noon, the meridian alt. of the ⊙ [In meridie, alt. ⊙ meridiana]

- By the Q. Tichon. 11 57⅓ [Per Q. Tichon. 11 57⅓]
- By the Q. Portat. 11 57⅓ [Per Q. Portat. 11 57⅓]
- Decl. by the armillae subt., with one 22 9 0 [Decl. per Arm. ſubt., vno 22 9 0]
- with the other pinnule 22 8 45 [altero pinnacidio 22 8 45]

DIE 24 NOUEMBRIS^{2}.

- By the Q. Tichon. 11 49 [Per Q. Tichon. 11 49]
- By the Q. Portat. 11 50 [Per Q. Portat. 11 50]

DIE 25 NOUEMBRIS.

- By the Q. Tichon. 11 41⅔ [Per Q. Tichon. 11 41⅔]
- By the Q. Portat. 11 41⅔ [Per Q. Portat. 11 41⅔]
- Decl. meridian by the armillae subt. 22 23½ [Decl. merid. per Arm. ſubt. 22 23½]
- with the other pinnule 22 23½ [altero pinnacidio 22 23½]

DIE 17 DECEMBRIS.

- By the Q. Tichon. 10 45½ [Per Q. Tichon. 10 45½]
- By the Q. Portat. 10 46 [Per Q. Portat. 10 46]

It was not clear enough. [Non erat ſatis ſerenum.]

DIE 24 DECEMBRIS.

- By the Q. Tichon. 11 16½ [Per Q. Tichon. 11 16½]
- with the other pinnule 11 16⅔ [altero pinnacidio 11 16⅔]
- Decl. by the armillae subt. 22 48¾ [Decl. per Arm. ſubt. 22 48¾]

DIE 29 DECEMBRIS.

- By the Q. Tichon. 11 51 50 [Per Q. Tichon. 11 51 50]
- Decl. by the armillae subt. 22 12½ [Decl. per Arm. ſubt. 22 12½]

[1] See below among the observations of the Moon for the days 6 and 7 Nov. [Vide infra inter obſervationes Lunæ dierum 6 et 7 Nov.]

[2] Cf. below among the observations of the planets. [Cf. infra inter obſervationes planetarum.][1194]

LOCA SOLIS.

Day [Die]	Observed meridian Alt. [Alt. merid. obſeruata]	Par-all.	True Alt. [Alt. vera]	Decli-nation [De-clin.]	Longitude [Longitudo]	Our Ephem. [Ephem. noſtræ]	Alphons. Cypr. [Alphonſ. Cypr.]	Pruten. Maestl. [Pruten. Maeſtl.]
9 Mart.	33°36′10″	2′29″	33 38 39	0°26′51″	28°52′42 ♓	28°52′43″	29° 8′23″	28°22′ 0″
13 —	35 10 40	2 26	35 13 6	1 7 36	2 49 30 ♈	2 49 59	3 4 58	2 20 0
	35 11 0		35 13 26	1 7 56	2 50 20 ♈			
15 —	35 57 40	2 24	36 0 4	1 54 34	4 47 25 ♈	4 48 25	5 3 1	4 19 0
	35 58 0		36 0 24	1 54 54	4 48 15 ♈			
17 —	36 45 0	2 23	36 47 23	2 41 53	6 46 30 ♈	6 46 44	7 0 50	6 17 0
23 —	39 4 10	2 18	39 6 28	5 0 58	12 39 29 ♈	12 40 41	12 53 37	
15 Apr.	47 19 10	2 2	47 21 12	13 15 42	5 5 39 ♉	5 5 59	5 15¼	4 40
26 —	50 39 35	1 53	50 41 28	16 35 58	15 43 33 ♉ [recte: 15 43 13 ♉ — Corrigenda, p. 430]	[1195]	15 50 22	15 21 0
6 Sept.	36 45 30	2 23	36 47 53	2 42 23	23 12 15 ♍	23 13 46		
7 —	36 22 0	2 23	36 24 23	2 18 53	24 11 2 ♍	24 12 27		
8 —	35 58 30	2 24	36 0 54	1 55 24	25 10 30 ♍	25 11 11		
10 —	35 11 30	2 26	35 13 56	1 8 26	27 8 25 ♍	27 8 45		

[1196]

OBSERUATIONES LUNÆ.[1197]

DIE 2 JANUARIJ.

☾ about 90 G. H. 8.19 P. M. [☾ circa 90 G. H. 8.19 P. M.]

[1194] the two notes above are printed in small roman below both columns. Note 1 is called by the raised figure after *NOUEMBRIS* in the rubric of 6 November; note 2 by the raised figure after *NOUEMBRIS* in the rubrics of both 23 and 24 November.

[1195] Corrigenda, p. 430: add *15 43 33* here

[1196] the day figures in the first column are given from a second copy of the same printing; in the copy otherwise followed they are cut away at the edge of the page.

[1197] below the title, this page is set in two columns divided by a printed vertical rule.

The distance between the western limb of the ☾ and the southern head of ♊, with the triangular sextant. [Diſtantia inter occidentalem limbum ☾ & meridionale caput ♊ per Sextantem Trigonicum.]

- H. 8 M. 14 — 39 48
- 18 — 39 46
- 19 — 39 43
- 21 — 39 42
- 23 — 39 41
- 25 — 39 40
- 27 — 39 38½
- 29 — 39 38
- 30 — 39 37½
- 32 — 39 37
- 34½ — 39 36½
- H. 8 M. 16 the bright head of ♈ was distant from the meridian towards the west, by the northern armillae, 32 36 [H. 8 M. 16 Diſtabat lucidum caput ♈ a Merid. verſus occaſum per Armillas Boreales 32 36]
- The western limb of the ☾ from the meridian towards the east 8 35 [Occ. limb. ☾ a mer. verſ. ort. 8 35]
- The difference of Ascens. R. therefore 41 11 [Differentia igitur Aſcenſ. R. 41 11]
- H. 8 M. 22 the bright head of ♈ from the meridian 33 57½ [H. 8 M. 22 Luc. cap. ♈ a mer. 33 57½]
- The western limb of the ☾ from the meridian 7 16 [Occ. limb. ☾ a merid. 7 16]
- The difference of Asc. R. 41 13½ [Differentia Aſc. R. 41 13½]

These two observations of the ☾ I myself and my architect M. Ioannes made with the northern armillae, previously rectified by the fixed stars. [Has duas obſeruationes ☾ ego ipſe & meus architectus M. Ioannes fecimus per Armillas Boreales, antea per Stellas fixas rectificatas.]

With the southern armillae. [Per Armillas Auſtrales.]

When Canis Minor was distant from the meridian 46°20′ towards the east (resp. H. 8 M. 34), the declination of the upper horn of the ☾ was 20 5. [Cum Canis Minor diſtaret a merid. 46°20′ verſus ortum (reſp. H. 8 M. 34) fuit decl. ſuper. cornu ☾ 20 5]

Canis Minor from the meridian towards the east 43 20 (resp. H. 8 M. 46): the upper horn of the ☾ had a northern declination 20 7. [Canis Minor a merid. verſus ortum 43 20 (reſp. H. 8 M. 46), habuit ſuperius cornu ☾ Decl. bor. 20 7]

Therefore at H. 8 M. 21, taking it proportionally, the declination of the upper horn was: [*Ergo H. 8 M. 21 proportionaliter accipiendo fuit declinatio ſuperioris cornu*]

- *20 3*
- *subt. semidiam. 16* [*ſubt. ſemidiam. 16*]

• *19 47*[1198]

Therefore in the later operation too great a declination was assumed. [*Ergo in poſteriore operatione nimis magna eſt aſsumpta declinatio.*]

The ☾ crossed the meridian with its western limb when Canis Minor was roughly 42° before the meridian. (From which comes H. 8.51½.) And the upper horn of the ☾ had, on the meridian, an Alt. by the Q. Tichon. of 54 13; the lower horn 53 40½. [☾ tranſiuit meridianum per occidentalem limbum, cum Canis Minor abeßet quaſi 42° ante meridianum. (Unde prouenit H. 8.51½). Et habuit ſuperius cornu ☾ in merid. Alt. per Q. Tichon. 54 13 / Inferius cornu 53 40½]

___[1199]

• The difference between the two alt. 32½ [Differentia vtriusque alt. 32½]

• So the alt. of the centre of the ☾ was 53 57 [Fuit itaque centri ☾ alt. 53 57]

All these times of the observation of the ☾ were verified by the fixed stars. [Omnia hæc tempora obſeruationis ☾ per ſtellas fixas ſunt verificata.]

DIE 7 JANUARIJ.

When Spica ♍ was distant from the meridian 20 51, the western limb of the ☾ was on the meridian, and the upper horn had an altit. by the Q. Tichon. of 41 3½; the lower horn 40 31. [Cum Spica ♍ abeßet a meridiano 20 51 fuit occidentalis limbus ☾ in merid. habuitque ſuperius cornu altit. per Q. Tichon. 41 3½ / inferius cornu 40 31]

H. 3 M. 56 the ☾ was in the 90th degree. [H. 3 M. 56 fuit ☾ in 90 Gradu.]

With the northern armillae, towards the west. [Per Armillas Boreales, verſus occaſum.]

Canis Minor from the meridian [Canis minor a merid.]	Eastern limb of the ☾ [Orient. limbus ☾]	Difference of Asc. R. [Differ. Aſc. R.]
68° 0′	27°44′	40°16′
69 30	29 11	40 19
73 30	33 2	40 28
73 44	33 15	40 29
74 1	33 30	40 31

Distances between the eastern limb of the ☾ and Spica ♍ with the triangular sextant. [Diſtantiæ inter orientalem limbum ☾ & Spicam ♍ per Sextantem Trigonicum.]

Lower head of ♊ from the meridian [Inferius caput ♊ a merid.]	Distance of the eastern limb from Spica [Diſt. or. limbi a Spica]
$4^{H}33'$	48 26
4 44	48 21

[1198] in the computation above, a short rule is printed over the figures between *16* and *19 47*.

[1199] this page is set in two columns divided by a printed vertical rule.

Lower head of ♊ from the meridian [Inferius caput ♊ a merid.]	Distance of the eastern limb from Spica [Diſt. or. limbi a Spica]
4 45	48 20½
4 47	48 20

Declination of the lower limb of the ☾ 5° 58′ by the southern armillae. [Decl. infer. limbi ☾ 5° 58′ per Arm. Auſt.]

Spica ♍ from the meridian [Spica ♍ a meridie]	Distance of the eastern limb of the ☾ from the southern head of ♊ [Diſt. or. limbi ☾ a mer. cap. ♊]
4 50	44 0
4 51½	44 0½
4 53	44 1⅓

DIE 9 JANUARIJ, MANE.

H. 5 M. 25 P. M. N. the ☾ in the 90th degree. [H. 5 M. 25 P. M. N. ☾ in 90 Gradu.]

The distance between the eastern limb of the ☾ and Spica ♍, before midday. [Diſtantia inter orientalem limbum ☾ & Spicam ♍, ante meridiem.]

Southern head of ♊ from the meridian [Merid. caput ♊ a mer.]	Distance [Diſtantia]	Resp. time [Reſp. tempus]
$5^{H}23^{M}$	33° 11¾′	$4^{H}38'$
24	33 11½	4 39
26	33 11	4 41
29	33 9	4 44
32	33 7	4 47

This time was gathered from the distance of the southern head of ♊ from the meridian towards the west. Moreover, the southern head of ♊ crossed the meridian at H. 11 15′ P. M. [Hoc tempus collectum eſt ex diſtantia meridionalis capitis ♊ a meridiano verſus occaſum. Tranſiuit autem Merid. caput ♊ per meridianum H. 11 15′ P. M.]

With the lesser quadrant [Per Quadrantem minorem]

Southern head of ♊ from the meridian [Merid. cap. ♊ a mer.]	Time [Tempus]	Eastern limb of the ☾ in Azim. [Or. limb. ☾ in Azim.]	Altit. of the upper horn [Altit. ſuper. cornu]
$5^{H}47^{M}$	$5^{H}\ 2^{M}$	38° 20′	29° 3′
53	8	39 20	28 41
56	11	39 50	28 30

The distance between the eastern limb of the ☾ and the heart of ♌. [Diſtantia inter orient. limbum ☾ & Cor ♌.]

Southern head of ♊ from the meridian [Mer. cap. ♊ a merid.]	Resp. time [Reſp. Tempus]	Eastern limb of the ☾ and the heart of ♌ [Or. limb. ☾ & cor ♌]
$6^{H}16^{M}$	$5^{H}31^{M}$	21 28
19	34	21 30
21	36	21 32

The distance between the lower horn of the ☾ and the hip of ♌. [Diſtantia inter inferius cornu ☾ & coxam ♌.]

Southern head of ♊ from the meridian [Mer. cap. ♊ a merid.]	Lower horn of the ☾ and the hip of ♌ [Inf. cornu ☾ & coxa ♌]
$6^{H}45^{M}$	22 20
52	22 22
57	22 21
59½	22 25

The declination of the upper horn of the ☾ by the armillae, towards the south, 1° 2½′B. [Declin. ſuperioris cornu ☾ per Armillas verſus Auſtrum 1° 2½′B.]

At that time the southern head of ♊ was distant from the meridian towards the west H. 6 26′, that is, H. 5 M. 41. [Abfuit tunc meridionale caput ♊ a meridiano verſus occaſum H. 6 26′, id eſt H. 5 M. 41.]

When the southern head of ♊ was distant from the meridian H. 6 37′, the declination of the upper horn of the ☾ was 1° 0′ northern. [Cum abeßet merid. caput ♊ a merid. H. 6 37′ fuit declinatio ſuperioris cornu ☾ 1° 0′ Borealis.]

With the northern armillae [Per Armillas Boreales]

Eastern limb of the ☾ from the meridian towards the west [Orient. limb. ☾ a merid. verſ. occ.]	Southern head of ♊ towards the west [Mer. cap. ♊ verſ. occ.]	Difference of Asc. R. [Differ. Aſc. R.]	Resp. time [Reſp. Tempus]
30° 11½	84° 28′	54° 16½′	4 52½
30 42	84 57	54 15	4 54⅓
31 15	85 33	54 18	4 56 [recte: 4 56⅔ — Corrigenda, p. 430]
31 27	85 47	54 20	4 57⅔
32 1	86 22	54 21	5 0
32 47	87 9	54 22	5 3
	Upper head of ♊ towards the west [Cap. ſuper. ♊ verſ. occ.]		
35 21	92 46	57 25	5 13 44
35 39	93 4½	57 25½	5 15
35 57	93 23½	57 26½	5 16¼
36 18	93 45	57 27	5 17 40

___[1200]

[1200] this page is set in two columns divided by a printed vertical rule.

The northern head of ♊ crossed the meridian at 11ʰ3′40″ P. M. [Septent. caput ♊ tranſiuit per meridianum 11ʰ3′40″ P. M.]

There is some doubt in the observations of the ☾ made on this day with the armillae. [In huius diej obſeruationibus ☾ per Armillas factis aliquod dubium eſt.]

DIE 10 JANUARIJ.[1201]

☾ in the 90th degree H. 6 M. 30 P. M. N. [☾ in 90 Gradu H. 6 M. 30 P. M. N.]

When the heart of ♌ was distant from the meridian H. 2 2½′, the eastern limb of the ☾ was on the meridian, having an altitude [Cum Cor ♌ abeßet a meridiano H. 2 2½′ fuit orientalis limbus ☾ in meridiano, habens altitudinem]

- with the upper horn 30 25¼ [ſuperiore cornu 30 25¼]
- with the lower horn 29 55 [inferiore cornu 29 55]

Spica ♍ from the meridian vers. occ. [Spica ♍ a mer. verſ. occ.]	Distance between the eastern limb of the ☾ and the heart of ♌ by the Sext. △ [Diſt. inter orient. limb. ☾ & cor ♌ per Sext. △]
H. 0 59′	36°20′
1 20	36 29⅓

Eastern limb of the ☾ from the meridian vers. occ. [Orient. limb. ☾ a merid. verſ. occ.]	The heart of ♌ from the meridian vers. occ. [Cor ♌ a mer. verſ. occ.]	Difference of Right Ascension [Diff. Aſc. R.]
35°32′	67°13′	31°41′
36 10	67 53	31 43
37 13	68 57	31 44
37 34½	69 19½	31 45
37 50½	69 37	31 46½

These observations were made with the northern armillae, but at that time it was not clear enough. [Hæ obſeruationes ſunt factæ per Armillas ſeptentrionales, ſed eodem tempore non fuit ſatis ſerenum.]

DIE 14 JANUARIJ, MANE.[1202]

Distance between the eastern limb of the ☾ and the head of Ophiuchus [Diſt. inter / or. limb. ☾ & / caput Ophiuchi]:

- H. 6 35 — 42 35
- 6 36⅔ — 42 33⅔
- 6 38½ — 42 32

[1201] Corrigenda, p. 430: in the codex Tycho himself added, in the margin of cod. V at this day, "☾ die 12 intermedia fuit in maxima diſtantia Epiciclorum" — "On the 12th, the day in between, the ☾ was at the greatest distance of the epicycles."

[1202] in the six lines below, the leaf sets a time at the left, a figure pair at the right, and between them the words of each heading spread over three lines, one phrase to a line; each heading stands beside three of the lines.

Distance between the eastern limb of the ☾ and Spica ♍ [Diſt. inter / or. limb. ☾ & / Spicam ♍]:

- 6 41 — 35 8⅔
- 6 42 — 35 8½
- 6 45½ — 35 8

When the head of Ophiuchus was distant from the meridian 21°28½′, the declination of the upper horn of the ☾ by the southern armillae was 18 56. [Cum Caput Ophiuchi abeßet a meridiano 21°28½′ fuit declinatio ſuperioris cornu ☾ per Armillas Auſtrales 18 56]

☾ in the 90th degree from the ascendant H. 8 37′ A. M. [☾ in 90 Gradu ab Aſcendente H. 8 37′ A. M.]

With the southern armillae [Per Armillas Auſtrales]

Head of Ophiuchus from the meridian [Caput Ophiuchi a meridiano]	Difference of Right Ascension between the eastern limb of the ☾ and the head of Ophiuchus [Diff. Aſc. R. inter or. limbum ☾ & cap. Ophiuchi]
$21^{H}43^{M}$	28 19
21 46½	28 22⅓
21 49	28 23
21 52	28 24

At H. 6 40½′ the meridian altitude of the upper horn of the ☾ by the Tichon. quadrant was 15 6; of the lower horn 14 36⅔. [H. 6 40½′ fuit altitudo ſuperioris cornu ☾ meridiana per Q.Tichon.15 6 / inferioris cornu 14 36⅔]

At that time, moreover, the eastern limb of the ☾ was on the meridian. [Erat autem tunc orientalis limbus ☾ in meridiano.]

Difference of Right Ascension between the ☉ and the eastern limb of the ☾ by the meridional armillae. [Differentia Aſcenſionis Rectæ inter ☉ & orientalem limbum ☾ per Armillas Meridionales.]

- H. 9 6′ — 75°10½′
- 12⅓ — 75 6½
- 17 — 75 5
- 19 — 75 3
- 21 — 75 2½
- 24¼ — 75 1½
- 9 25 — 75 0
- 9 20 Declination of the upper horn of the ☾ 19° 9′ [9 20 Decl. ſuper. cornu ☾ 19° 9′]
- 9 29 — 19 10

DIE 22 FEBRUARIJ[1].

With the lesser quadrant. [Per Quadrantem Minorem.]

H.	M.	Altitude of the eastern limb of the ☾ [Altit. limbi orient. ☾]	Azim. of the same from the meridian vers. occas. [Azim. eiuſdem a mer. verſ. occaſ.]
6	36	20 38	74 55
6	41	19 59½	76 0
6	45	19 27½	76 48

DIE 27 FEBRUARIJ.

At H. 6 M. 16 the ☾ was in the 90th degree from the ascendant, but according to the motion of the ☉ from our Ephem. at H. 6.19 P. M. [H. 6 M. 16 fuit ☾ in 90 Gradu ab aſcendente, ſed ſecundum motum ☉ ex noſtra Ephem. H. 6.19 P. M.]

At H. 4 M. 52 the eye of ♉ crossed the meridian. [H. 4 M. 52 tranſiuit Oculus ♉ per meridianum.]

By the greater clock [Per Horol. Maius]	Aldebaran from the meridian vers. occas. [Aldeboram a meridie verſ. occaſ.]	Time resulting from it [Tempus inde proueniens]
$6^{H}37$	$1^{H}36^{M}$	$6^{H}28^{M}$
6 38½	1 37½	6 29½

So the clock was running 9 minutes faster than it should. [Ergo Horologium 9 ſcrupulis iuſto citius mouebatur.]

Distance between the western limb of the ☾ and Aldeb. by the old Sext. [Diſtantia inter occidentalem limbum ☾ & Aldeb. per Sext. veterem.][1203]

- $6^{H}21^{M}$ — 22°12′
- 6 23 — 22 13
- 6 28 — 22 14
- 6 29½[2] — 22 15

Around these last times, when the ☾ was crossing the meridian, [Circa hæc vltima tempora, cum ☾ pertranſiret meridianum, habuit ſu-]

[1] You will find the distances between the ☾ and ☿ below, among the observations of ☿. [Diſtantias inter ☾ et ☿ infra inter obſervationes ☿ invenies.]

[2] In codex L. the minutes are 21½, 23½, 28½, 30, and there is written beside them: »Error in æquator., which has been corrected, add. ½ M.« [In codice L. minuta ſunt 21½, 23½, 28½, 30, et adſcriptum eſt: »Error in æquator. qui correctus eſt, add. ½ M.«.]

___[1204]

the upper horn had an altitude of 54°5′, as far as could be seen through the thinner clouds. [perius cornu Alt. 54°5′ quantum inter rariores nubes videre licuit.]

[1203] the words *Tempus correctum* ("corrected time") stand at the left against the first three of the four lines below, set over three lines as *Tempus / correc- / tum*.

[1204] this page is set in two columns divided by a printed vertical rule.

When it was at azimuth 3 towards the west, the altitude was about 54 by the lesser quadrant. [Cum eßet in Azim. 3 verſus occaſum fuit Alt. fere 54 per Quadrantem Minorem.]

When the western limb of the ☾ was at azimuth 5, the altitude of the upper horn was 53° 50′; this is more certain than the former, and from it the declination of the ☾ will be obtained. [In Azim. 5 cum eßet occidentalis limbus ☾, fuit Alt. ſuperioris cornu 53° 50′, idque eſt priori certius, hinc dabitur ☾ declinatio.]

The ☾ crossed the meridian at H. 6 M. 26. [☾ per meridianum tranſiuit H. 6 M. 26.]

For H. 6 M. 21 let the longitude and latitude of the ☾ be sought, taking the distance of the western limb from Aldebor. as p. 22.12, and accounting for the centre by adding the semidiameter. [Ad H. 6 M. 21 inquiratur longitudo et latitudo ☾, poſita diſtantia occidentalis limbi ab Aldebor. p. 22.12 & habendo rationem centri per additionem ſemidiametri.]

The declination of the ☾ can be obtained from the meridian altitude, which was near that time and was 54° 5′ at the upper horn; from this the semidiameter of the ☾ will be taken away for the centre. [Declinatio ☾ haberi poterit ex altitudine meridiana, quæ prope id tempus fuit, & erat in ſuperiori cornu 54° 5′, vnde auferetur [recte: auferatur — Corrigenda, p. 430] ſemidiameter ☾ pro centro.][1205]

DIE 28 FEBRUARIJ.

At H. 7 M. 50 P. M. the ☾ was in 90 Gr. from the ascendant. [H. 7 M. 50 P. M. fuit ☾ in 90 Gr. ab Aſcendente.]

Observations of the ☾: taking the distance from the eye of ☿ with regard to the western limb of the ☾; the altitude of the upper horn, but the azimuth of the western limb, by the lesser quadrant. [Obſeruationes ☾ accipiendo diſtantiam ab oculo ☿ reſpiciendo occidentalem limbum ☾, in altitudine ſup. cornu, in azimutho vero occidentalis limbi per Q. Minorem.]

Time by the clock 6 M. 48⅔: when the bright shoulder of Orion [lucidus Humerus Orionis] was distant from the meridian towards the west 0° 36⅙′, the distance was 36°41′, the altitude 52° 8′, and the azimuth from the meridian towards the east 15°10′. [Hora per Horologium 6 M. 48⅔ cum lucidus Humerus Orionis verſus occaſum abeßet a meridie 0° 36⅙′ fuit diſtantia 36°41′, Alt. vero 52° 8′ et Azim. a meridie verſ. ortum 15°10′.]

With the old sextant [Per Sextantem veterem]

H.	M.	Aldeb. from the meridian towards the west [Aldeb. a mer. verſ. occ.]	Distance [Diſtantia]	Altitude [Altit.]	Azimuth [Azim.]
7	0	2 11½	36 45⅙	52 28	9 0
7	5	2 16½	36 47¼	52 33	7 2

[1205] Corrigenda, p. 430: in the codex Tycho himself added, at the end of this day (27 February), in cod. V, "Semidiameter ☾ accipiatur vtrobique ſcrupulorum 16" — "Let the semidiameter of the ☾ be taken in both cases as 16′."

H.	M.	Aldeb. from the meridian towards the west [Aldeb. a mer. verſ. occ.]	Distance [Diſtantia]	Altitude [Altit.]	Azimuth [Azim.]
7	9	2 20½	36 50	52 38⅓	5 3
7	13	2 24⅔	36 51½	52 38	4 0
7	19	2 29¾	36 53	52 38⅛	2 0

1206

7 25⅓ 2 36⅓: the ☾ crossed the meridian with its western limb, and the upper horn had an altitude [7 25⅓ 2 36⅓, tranſiuit ☾ per meridianum per occidentalem limbum & habuit ſuperius cornu altitudinem]

- by the Tichon. 52 40 [per Tichon. 52 40]
- by the Portat. 52 38 [per Portat. 52 38]
- by the lesser quadrant 52 38½ [per Q. Min. 52 38½]

The lower horn by the Tich. 52 2 [Infer. cornu per Tich. 52 2]

So the altitude of the centre was 52 20 [Fuit itaque altitudo centri 52 20]

- 7 36⅙ — 2 46 — 37 0 — 52 30 — 4 43
- 7 42½ — 2 52¾ — 37 3 — 52 29⅚ — 6 32

Afterwards clouds obscured Aldebaran [Aldeboram], so we observed the ☾ from the heart of ♌. [Poſtea nubes offuſcarunt Aldeboram, itaque obſeruauimus ☾ a corde ♌.]

	The heart of ♌ from the meridian [Cor ♌ a mer.]	Distance [Diſt.]	Altitude [Altit.]	Azimuth [Azim.]
7 48⅔[1]	2 35	43 5¾	52 30	9 15
7 50⅙	2 34	43 6		
7 53	2 31½ [recte: 2 31 — Corrigenda, p. 430]	43 1	52 29	10 20

But the ☾ was then in clouds, so this is less to be trusted. [Sed tunc ☾ fuit in nubibus, vnde minus huic credendum.]

But the observation you can rely on is when the heart of ♌ was distant from the meridian H. 2 M. 35 and the clock showed H. 7 M. 49: the western limb of the ☾ was distant from the heart of ♌ 43° 6′, and the altitude of the upper horn was 52°30′, the azimuth of the western limb 9°10′. [Sed obſeruatio cui potes fidere, eſt cum cor ♌ abeßet a meridiano H. 2 M. 35 & Horologium haberet H. 7 M. 49, diſtabat occidentalis limbus ☾ a corde ♌ 43° 6′ & fuit Alt. ſuperioris cornu 52°30′, Azim. 9°10′ occidentalis limbi.]

DIE 30 MARTIJ.

At H. 6 6′ 44″ the lower head of ♊ crossed the meridian; from this you can correct the clock by the armillae. [H. 6 6′ 44″ tranſiuit inferius caput ♊ per meridianum, vnde poteris per Armillas horologium corrigere.]

[1206] the figures *7 25⅓* and *2 36⅓* that open the next paragraph stand under the first three columns of the table above; the rest of that line and the paragraph are set as text.

At H. 8⅙ the western limb of the ☾ was on the meridian, and by the Tich. quadrant the upper horn had an altitude of 43 10⅔, the lower horn 42 42¼. [H. 8⅙ fuit occidentalis limbus ☾ in meridiano & habuit per Q. Tich. ſup. cornu alt. 43 10⅔ / inferius cornu 42 42¼]

☾ in the 90th degree H. 10.8 P. M. [☾ in 90 Gradu H. 10.8 P. M.]

DIE 26 APRILIS.

At H. 7 57 the ☾ reached 90 G. from the ascendant. ☾ near the perigee of the epicycle. [H. 7 57 peruenit ☾ in 90 G. ab aſcendente. ☾ circa perigæum epicycli.]

At H. 6 15′, from an observation of the ☉ with the armillae, the western limb of the ☾ was on the meridian, and the upper horn had an altitude by the Tich. of 44 33, by the Portat. 44 32. [H. 6 15′ ex obſeruatione ☉ per Armillas fuit occidentalis limbus ☾ in meridiano, & habuit ſuperius cornu Alt. per Tich. 44 33 / per Portat. 44 32]

[2] Declination of the lower horn of the ☾ by the southern armillae 9 37⅓ [[2] Decl. inferioris cornu ☾ per Armillas Auſtrales 9 37⅓]

At H. 8 56′ the declination of the upper horn of the ☾ by the southern armillae was 10 14¼ B [H. 8 56′ Decl. ſuperioris cornu ☾ per Armillas Auſtrales 10 14¼ B]

At H. 10 25½′ the merid. head of ♊ was distant from the meridian towards the west H. 6.0½; correct the clock from this. [H. 10 25½′ abfuit merid. caput ♊ a meridie verſus occaſum H. 6.0½, hinc rectifica Horologium.][1207]

[1] There is written beside it: Corrected time 7^{H} 47½ ^{M}. [Adſcriptum eſt: Tempus correctum 7^{H} 47½ ^{M}.]

[2] The time is not noted. The observation was made after the observation of the distance of the ☾ and ♀, H. 7.59. [Tempus notatum non eſt. Obſeruatio facta eſt poſt obſervationem diſtantiæ ☾ et ♀ H. 7.59.]

___[1208]

DIE 27 APRILIS.

☾ in the 90th degree H. 9.22 P. M. [☾ in 90 Gradu H. 9.22 P. M.]

With the old sextant, between the western limb of the ☾ and [Per Sextantem veterem, inter occidentalem limbum ☾ &][1209]

- H. 9 M. 18 the lower head of ♊ [inferius caput ♊] — 46 12
- 22 — 46 13½
- 23⅔ — 46 15

[1207] Corrigenda, p. 430: in the codex Tycho himself added, at the end of this day (26 April), in codex V, "Circa 7^{mam} Horam Horologium aberrabat 19 Min." — "About the 7th hour the clock was out by 19 Min."

[1208] this page is set in two columns divided by a printed vertical rule.

[1209] in the six lines below, the leaf sets a time at the left, words beside the first and the fifth line, and a figure pair at the right; a printed brace joins the figure pairs of the last two lines, with an asterisk after it.

• 25 — 46 16½
• 9 28 the heart of ☋ [cor ☋] — 10 10
• 31 — 10 12 *

(Not certain enough, because of the nearby brightness of the ☾.) [(non ſatis certæ propter vicinæ ☾ ſplendorem).]

• 9 36½ Spica ♍ [Spicam ♍] — 45 49
• 37½ — 45 48
• 38½ — 45 46½
• 39 — 45 46

9 19: declination of the lower horn of the ☾ by the southern armillae 4 55 [9 19 Decl. infer. cornu ☾ per Armillas Auſtrales 4 55]

9 46: declination of the same 4 50½ B. [9 46 Decl. eiuſdem 4 50½ B.]

At 9 51½ the heart of ☋ was distant from the merid. vers. occas. H. 3. 1½, which you may also note for correcting the clock. [9 51½ diſtabat cor ☋ a merid. verſ. occaſ. H. 3. 1½, quod pro rectificando horologio etiam notare poteris.]

DIE 6 SEPTEMBRIS A. M.[1]

☾ about 90 G. from the ascendant H.4 M.46. [*☾ circa 90 G. ab aſcendente H.4 M.46.*]

Since the Moon was not far from its greatest remoteness, which is caused by both epicycles, I observed it in person in the following way, and that with the greater subterranean armillae, the clock having been corrected to the Sun at hour 8, minute 15, with the southern armillae; by the following noon the clock was running at least one single minute faster than it should. We observed the ☾ against the Sun by taking the declination of the Sun and the declination of the ☾ at a fixed time with the whole armilla, and the equinoctial distances of both the Sun and the ☾ in the half armilla, which represents the equator. In the declination of the ☾ we took its uppermost limb almost everywhere; in the distance by right ascensions in the equator, however, the centre of the ☉ and the eastern limb of the ☾, the one nearest to it. The observations made in this way turned out as follows. [*Luna cum non longe abeßet a maxima remotione quæ per vtrumque cauſatur epicyclum, in hunc modum ipſemet præſens obſeruaui, idque per Armillas maiores ſubterraneas, Horologio correcto ad Solem Hora 8 Minuto 15 per Armillas Auſtrales, quod in meridie proxime ſequenti ſaltem vnico ſcrupulo iuſto celerius mouebatur, obſeruauimus autem ☾ ad Solem capiendo Solis declinationem & ☾ declinationem certo tempore per Armillam integram & Solis & ☾ diſtantias æquinoctiales in Armilla dimidiata, quæ æquatorem repræſentat, accepimus autem in declinatione ☾ vbique fere limbum ipſius ſupremum, in diſtantia vero per Aſcenſiones rectas in æquatore ☉ centrum & ☾ limbum orientalem ipſi proximum: obſeruationes vero ea ratione habitæ ſic ſe exhibuerunt vt ſequitur.*]

At H.8 M.20 the ☉ was observed: declination seen 2 43½ B., when its altitude was 21⅓ by the smallest quadrant. [*H.8 M.20 obſeruabatur ☉ Declinatio viſa 2 43½ B. cum eßet ipſius Altitudo 21⅓ per Quadr. minimum.*]

At H. 8 M. 25 the declination of the upper limb of the ☾ was 19 9½ B., and the altitude of the ☉ at that time, by the same small quadrant, was roughly partium 22 0.

[*H. 8 M. 25 fuit declinatio ſuperioris limbi ☾ 19 9½ B., eratque tunc Altitudo ☉ per eundem paruum Quadrantem quaſi partium 22 0.*]

At H.8 M.27 the same upper horn of the ☾ was observed to have a declination of 19 9½ B., when the altitude of the ☉ was 22⅓. [*H.8 M.27 idem ſuperius cornu ☾ obſeruabatur habere Declin. 19 9½ B. cum ☉ Altitudo exiſteret 22⅓.*]

At H. 8 M. 36½ we took the equinoctial distance of the eastern limb of the ☾ and the centre of the ☉, 98 18½. [*H. 8 M. 36½ accepimus diſtantiam æquinoctialem orientalis limbi ☾ & centri ☉ 98 18½.*]

At H.8 M.44½ we found the same distance, in the same way, 98 14½, which agrees well enough with the interval of time elapsed; the altitude of the ☉ at that time was roughly 24⅓. [*H.8 M.44½ eandem diſtantiam pari ratione inuenimus 98 14½ quod ſatis bene quadrat cum interuallo interlapſi temporis, fuit autem tunc Alt. ☉ 24⅓ quaſi.*]

At H.8 M.48½ the declination of the upper limb of the ☾ was again 19 9, and at the same instant the upper horn had an altitude of P. 37½ ἐν πλάτει [Greek: *en platei*, "in breadth"] *by the smallest quadrant, as did all the other altitudes taken on this day and the next, of the Sun and the ☾.* [*H.8 M.48½ fuit rurſus Declin. ſuperioris limbi ☾ 19 9, habuitque eodem inſtanti ſuperius cornu Altitudinem P. 37½* ἐν πλάτει *per Q. Minimum, vt cæteræ omnes Altitudines hoc die & ſequente in Sole & ☾ factæ.*]

At H.8 M.56 the declination of the Sun seen by the same armillae was 2 42¾, when its altitude appeared to be 25⅔. [*H.8 M.56 fuit Solis Declinatio viſa per easdem Armillas 2 42¾, cum ipſius Altitudo appareret 25⅔.*]

At H.9 M.8½ the declination of the uppermost limb of the ☾ was 19 8½ and its altitude 35⅙; the declination of the lower limb, however, was taken a little afterwards, H. 9 M. 10¼, as 18 34⅓, so that on this account the diameter of the ☾ appeared to be roughly 34 minutes. [*H.9 M.8½ Declin. ſupremi limbi ☾ 19 8½ & eiuſdem Altitudo 35⅙, Decl. vero inferioris limbi paulo poſt H. 9 M. 10¼ accepta eſt 18 34⅓, vt ob id diameter ☾ apparuerit quaſi ſcrupulorum 34.*]

At H.9 M.16⅓ the declination of the Sun seen was again 2 43, when its altitude was 27⅔. [*H.9 M.16⅓ fuit rurſus Solis Declin. viſa 2 43, cum ipſius Altitudo eßet 27⅔.*]

At H. 9 M. 35 the upper horn of the ☾ had a declination of roughly 19 7, and the altitude of the same horn at that time was 31⅔. [*H. 9 M. 35 habuit ſuperius cornu ☾ Declinationem quaſi 19 7, fuitque tunc eiuſdem cornu Altitudo 31⅔.*]

At H.9 M.40½ we again observed the equinoctial distance of the eastern limb of the ☾ from the centre of the ☉, and found it to be P.97 48¼, which is not inconsistent with the preceding observations made in the same way; at the same instant the altitude of the upper limb of the ☾ was 30½ ἐν πλάτει. [*H.9 M.40½ denuo obſeruauimus diſtantiam æquinoctialem orientalis limbi ☾ ad centrum ☉ inuenimusque eße P.97 48¼, id quod a præcedentibus obſeruationibus eadem ratione habitis non eſt inconueniens, fuit autem eodem inſtanti ſuperioris limbi ☾ Alt. 30½* ἐν πλάτει.]

[1] From here to the end of the day 20 September, from codex V. [Hinc usque ad finem diei 20 Sept. e codice V.]

___[1210]

At H. 9 M. 44 the declination of the Sun's centre seen was 2 42, when its altitude was 30⅙. [*H. 9 M. 44 fuit Declinatio viſa centri Solaris 2 42, cum ipſius Altitudo eßet 30⅙.*]

At H. 9 M. 46½ the declination of the upper limb of the ☾ was taken again, 19 7¼, when the altitude of the same was partium 30; a little afterwards, hour 9 M. 50, we found the declination of the lower limb of the ☾ 18 37¼, and the altitude of the upper horn at that time was 29⅙. [*H. 9 M. 46½ rurſus declinatio ſuperioris limbi ☾ accepta eſt 19 7¼ cum Altitudo eiusdem exiſteret partium 30, paulo poſt Hora 9 M. 50 inferioris limbi ☾ Declin. adinuenimus 18 37¼, fuitque tunc Altitudo ſuperioris cornu 29⅙.*]

From this it is gathered that the diameter of the ☾ appeared at least 30′, smaller by 4 minutes than before. But since the ☾ was now tilting its horns much more than before, it came about that its true and whole diameter did not present itself to a certain observation, and so it appeared smaller than it should. [*Hinc colligitur diametrum ☾ apparuiße ſaltem 30′, minorem 4 ſcrupulis quam antea, verum cum ☾ iam multo plus quam antea cornua declinabat, factum eſt vt vera & tota ipſius diameter ſeſe obſeruationi certæ non obtulerit, ideoque minor iuſto viſa fuerit.*]

At H. 9 M. 54¼ the equinoctial distance of the ☉ and the eastern limb of the ☾ was found again, 97 46, which, however, does not agree well enough with the earlier observations in view of the interval of time. I therefore suspect that some error underlies this observation itself, from whatever source it arose. Altitude of the upper horn 29 p. [*H. 9 M. 54¼ rurſus inuenta eſt diſtantia æquinoctialis ☉ & orientalis limbi ☾ 97 46, quod tamen pro ratione interualli temporis non ſatis bene quadrat cum prioribus obſeruationibus, ſuſpicor itaque in hac ipſa obſeruatione aliquem ſubeßе errorem, vndecunque is acciderit. Altitudo ſuperioris cornu 29 p.*]

At H. 10 M. 25, again, between the eastern limb of the ☾ and the Sun 97 29½; the altitude of the upper horn, however, was 24⅔. [*H. 10 M. 25 rurſus inter orientalem limbum ☾ & Solem 97 29½, Altitudo vero ſuperioris cornu erat 24⅔.*]

At H. 10 M. 28 the same equinoctial distance was noted as 97 26½; altitude of the upper limb 24⅓. [*H. 10 M. 28 Eadem æquinoctialis diſtantia animadverſa eſt 97 26½, Altitudo ſuperioris limbi 24⅓.*]

At H. 10 M. 34½ the same distance 97 23½; altitude of the upper horn 23⅓. [*H. 10 M. 34½ eadem diſtantia 97 23½, Alt. ſuper. cornu 23⅓.*]

At H. 10 M. 38 the declination of the Sun appeared as 2 41½, when its altitude was 34½. [*H. 10 M. 38 apparuit Declinatio Solis 2 41½ cum ipſius Altitudo eßet 34½.*]

Then at hour 11 M. 9¾ the equinoctial distance of the Sun and the upper limb of the ☾ was seen again as 97 6½, but this observation is doubtful; the altitude of the uppermost limb of the Moon at that time was partium 19. [*Deinde Hora 11 M. 9¾ viſa eſt rurſus Diſtantia æquinoctialis Solis & ſuperioris limbi ☾ 97 6½, ſed hæc obſeruatio eſt dubia; fuit vero tunc Altitudo ſupremi limbi Lunaris partium 19.*]

[1210] this page is set in two columns divided by a printed vertical rule.

At H. 11 M. 12 the declination of the upper horn of the ☾ 19 7 B. [*H. 11 M. 12 Declinatio ſuperioris cornu ☾ 19 7 B.*][1211]

- *H. 11 M. 13½ the ☾ was again distant from the Sun's centre, in the manner stated above [diſtabat rurſus ☾ a Solis centro modo ſupradicto] — 97 1*
- *H. 11 M. 17 The same distance [Eadem diſtantia] — 97 0½*
- *H. 11 M. 19 — 97 0½*
- *H. 11 M. 22 — 97 1*

The altitude of the upper horn of the ☾ in the first observation, at hour 11 M. 13½, was roughly partium 18½; in the last, at hour 11.22, partium proxime [?] *17.* [*Fuit autem Altitudo ſuperioris cornu ☾ in prima obſeruatione Hora 11 M. 13½ partium quaſi 18½, in vltima Hora 11.22 partium proxime 17.*]

The observations made at hour 11 M. 17 and M. 19, however, are sound enough. As for the distance having stuck at roughly the same minute from hour 11. 13½ to hour 11. 22, I believe this happened because, by as much as the proper motion of the ☾ was bringing it nearer the Sun, its parallax was drawing it back by almost the same amount, especially in so steep a position towards the horizon. [*Obſeruationes vero Hora 11 M. 17 & M. 19 habitæ ſatis bene ſe habent, quod vero ab Hora 11. 13½ in Horam 11. 22 quaſi in eodem ſcrupulo diſtantia hæſerit, ob id factum eße reor, quod quantum motus proprius ☾ appropinquabat Soli, tantundem fere parallaxis ipſius eam retrahebat, præſertim in tam decliui verſus horizontem poſitu.*]

At H. 11 M. 27 the declination of the ☉ seen through one pinnule was 2 40¼, and through the other exactly the same, 2 40¼. [*H. 11 M. 27 fuit Declinatio ☉ viſa per vnum pinnacidium 2 40¼ & per alterum eadem plane 2 40¼.*]

Again at H. 11 M. 48 the same declination of the ☉ was observed with both pinnules of the subterranean armillae, of exactly the same quantity, 2 40¼. [*Rurſus H. 11 M. 48 eadem ☉ declinatio vtroque pinnacidio Armillarum ſubterranearum obſeruata eſt eiusdem prorſus quantitatis 2 40¼.*]

Note. By noon the clock was running at least one single minute faster than it should, from the time at which it had been corrected with the southern armillae — as I said above, at hour 8 M. 15 immediately before. It is therefore clear that no perceptible error crept into the assignment of the times through a fault of the clock. [*Nota. Horologium in meridie ſaltem vnico ſcrupulo celerius iuſto mouebatur ab eo tempore quo ad Armillas Auſtrales erat correctum, vt ſupra dixi Hora 8 M. 15 proxime antecedente. Patet itaque quod in temporis aßignatione nullus ſenſibilis error vitio horologij irrepſerit.*]

DIE 7 SEPTEMBRIS.

We observed the Moon again, in the following way. [*Denuo Lunam obſeruauimus in hunc qui ſequitur modum.*]

First, in the morning, the hour being 4 52, we observed between Aldebaran [Aldeboram] and the ☾ equinoctial degrees 25 13. [*Primum mane hora exiſtente 4 52 obſeruauimus inter Aldeboram & ☾ gradus æquinoctiales 25 13.*]

[1211] in the five lines below, the leaf sets a time at the left and a figure pair aligned in a column at the right, with words between on the first two lines and on the third.

And at almost the same time the declination of the upper horn of the ☾ was 19 6. At very nearly the fifth hour, however, we found the same equinoctial distance again as 25 6. But since it has come out smaller, when it rightly ought to have been larger, this observation is doubtful; for I consider the earlier one the more certain. Nor was the sky clear enough about this morning time: clouds, both thick and thin, kept returning here and there and hindered a more certain view, from which [*Fuitque circa idem pene tempus Declinatio ſuperioris cornu ☾ 19 6, Hora vero exiſtente quinta proxime denuo eandem æquinoctialem diſtantiam inuenimus 25 6. Verum cum minor facta ſit, cum merito maior eſſe deberet, dubium eſt de hac obſeruatione, exiſtimo enim priorem eſſe certiorem. Nec erat circa hoc tempus matutinum ſatis ſerenum, ſed recurrebant hinc inde nubes tam denſæ quam raræ, quæ aſpectum certiorem impediebant, vnde*]

___[1212]

not much trust is to be placed in these observations. [*non multum fidendum hiſce obſeruationibus.*]

At H.5½ again the declination of the upper limb of the ☾ 19 5. [*H.5½ denuo Declin.ſuper.limbi ☾ 19 5.*]

Then at H. 10 M.5 the declination of the ☉ was observed as P.2 M.17⅔. [*Deinde H. 10 M.5 fuit Decl.☉ obſeruata P.2 M.17⅔.*]

At H. 10 M. 10, between the eastern limb of the ☾ and the Sun P.84 M. 2; and at almost the same instant, at least three minutes later, the declination of the upper horn of the ☾ was 18 55½ and the altitude of the same upper limb 34 0. [*H. 10 M. 10 inter orientalem limbum ☾ & Solem P.84 M. 2, fuit autem in eodem quaſi inſtanti tribus ſaltem ſcrupulis poſtea, Declinatio ſuperioris cornu ☾ 18 55½ & Altitudo eiusdem ſuperioris limbi 34 0.*]

At H. 10 M. 13 the same declination of the upper limb of the ☾ 18 57, and the altitude of the uppermost circumference 33 0. [*H. 10 M. 13 eadem Declin. ſuperioris limbi ☾ 18 57 & Altitudo ſupremæ circumferentiæ 33 0.*]

At H. 10 M. 20 the declination of the Sun was noted as 2 18, when its altitude was partium 33 very nearly. [*H. 10 M. 20 Declin. Solis animadverſa eſt 2 18, cum eſſet ipſius Altitudo partium 33 proxime.*]

At H. 10 M. 23 the eastern limb of the ☾ was again distant from the Sun 83 54½. [*H. 10 M. 23 diſtabat rurſus orientalis limbus ☾ a Sole 83 54½.*]

At H. 10 M. 24 the declination of the same upper limb of the ☾ was 18 56, altitude 32. [*H. 10 M. 24 fuit Declin. eiusdem ſuperioris limbi ☾ 18 56, Alt. 32.*]

At H. 10½ the eastern limb of the ☾ was distant from the ☉, by the span of the equator, P. 83 50, a fairly good observation; and the altitude of the uppermost limb at that time was 31½. [*H. 10½ Diſtabat orientalis limbus ☾ a ☉ per æquatoris intercapedinem P. 83 50 ſatis bona obſeruatione, fuitque tunc Alt. ſupremi limbi 31½.*]

At H. 10 M. 32 the declination of the ☉ seen 2 17½; the altitude of the Sun at that time, however, was 34. [*H. 10 M. 32 Declinatio viſa ☉ 2 17½, Altit. vero Solis tunc erat 34.*]

[1212] this page is set in two columns divided by a printed vertical rule.

At H. 10 M. 35 the declination of the uppermost limb of the ☾ was 18 55, and the altitude of the same 30⅔. [*H. 10 M. 35 Decl. ſupremi limbi ☾ fuit 18 55 & Alt. eiusdem 30⅔.*]

At H. 10 M. 38 the eastern limb of the ☾ was distant from the Sun along the equator P. 83 M. 45¼, and the altitude of the upper horn at that time was P. 30⅓; and this observation is fairly good. [*H. 10 M. 38 Limbus orient. ☾ a Sole per æquatorem abfuit P. 83 M. 45¼, fuitque tunc Altit. ſuperioris cornu P. 30⅓, eſtque hæc obſeruatio ſatis bona.*]

At H. 10 M. 40 the declination of the Sun seen was P. 2 17½, and the altitude of the same P. 34½ ἐν πλάτει [Greek: *en platei*, "in breadth"] *by the Q. Min.* [*H. 10 M. 40 fuit Declin. Solis viſa P. 2 17½ et Alt. eiusdem P. 34½* ἐν πλάτει *per Q. Min.*]

At H. 10 M. 57, between the Sun and the ☾, in the same way as above, P. 83 34; and the altitude of the uppermost limb of the ☾ at that time was 28⅓; and this observation is fairly good. [*H. 10 M. 57 Inter Solem & ☾ eadem ratione vt ſupra P. 83 34 & tunc erat Altitudo ſupremi limbi ☾ 28⅓, eſtque hæc obſeruatio ſatis bona.*]

When the hour was 11 exactly, the declination of the Sun seen was P.2 17, and the altitude of the same 35⅙. [*Hora exiſtente 11 exquiſite fuit Declin. Solis viſa P.2 17 et Alt. eiusdem 35⅙.*][1213]

- *H. 11 M. 4 ⊙ and ☾ as before [⊙ & ☾ vt prius] — 83 31½*
- *11 7 — 83 30*
- *the altitude of the ☾, however, [Alt. vero ☾] 26 30*
- *11 10 declination of the ⊙ [Declin.⊙] — 2 17*
- *H. 11 M. 41 declination of the ⊙ [Declin.⊙] — 2 16½, and [atque]*

the same was taken at noon and a little afterwards with both pinnules. [*eadem accipiebatur in Meridie & paulo poſt vtroque pinnacidio.*]

These observations, from the Sun to the ☾, made with the greater subterranean armillae, are certain enough, and the times assigned have been so corrected that no perceptible error is in them. [*Hæ obſeruationes a Sole in ☾ per Armillas Maiores ſubterraneas factæ ſunt ſatis certæ, & tempora aſsignata ſunt ita correcta, vt nullus ſenſibilis illis inſit error.*]

It should be noted, however, that in all these observations of the ☾, made both on the preceding day and on this one, the ☾ was outside the ninetieth degree of the ecliptic from the horizon. It was therefore not without a perceptible parallax, both of longitude and of latitude, which must be applied together with them when its apparent place is derived from these observations set out above; this can be done most conveniently by the Copernican methods of determining the lunar parallaxes. When this has been applied, and each item weighed in due manner, you will be able to use these observations of the ☾, near the greatest remoteness of both epicycles, quite safely in investigating the proportions of the lunar circles by which it appears to be carried round. [*Notandum vero, quod in his omnibus obſeruationibus ad ☾ tam die antecedente quam hoc factis ☾ fuerit extra Nonageſimum Gradum Eclipticæ ab Horizonte, vnde non caruit ſenſibili parallaxi tam Longitudinis quam Latitudinis, quæ venit vna adhibenda, cum locus*

[1213] in the five lines below, the leaf sets times at the left, words in the middle and figure pairs at the right; the third line carries no time and is set in under the words.

ipſius apparens ex his præſcriptis obſeruationibus eruitur, quod quam commodißime per Copernianas rationes in parallaxibus lunaribus limitandis fieri poteſt. Hac itaque adhibita et trutinatis ſingulis debita ratione poteris ſatis tuto vti his obſeruationibus ☾ iuxta maximam remotionem vtriusque epicycli, in indagandis circulorum Lunarium quibus convolui apparet proportionibus.]

DIE 8 SEPTEMBRIS.

In the morning, at hour 6 M. 10, the declination of the ☉ was observed as 2 10, when it was very close to the horizon. [*Mane Hora 6 M. 10 obſeruabatur Declin. ☉ 2 10 cum admodum eßet Horizonti propinquus.*]

And at hour 6¾ its declination was 2 1½, the altitude being 8½. These are rather to be referred to the section on the Sun, for investigating the refraction of the rays. [*Et Hora 6¾ erat eiusdem Declin. 2 1½, Altitudine exiſtente 8½, hæc potius ad locum de Sole referenda propter refractionem radiorum indagandam.*]

Now the things that pertain to the Moon will come up for consideration. [*Nunc, quæ ad Lunam faciunt, conſideranda venient.*]

At H. 6 M. 50 the declination of the upper horn of the ☾ was observed as 18 15; the uppermost limb, however, was not seen precisely, because of its thinness. [*H. 6 M. 50 obſeruabatur Declinatio ſuperioris cornu ☾ 18 15, non tamen exquiſite videbatur ſupremus limbus ob ipſius tenuitatem.*]

At H. 6 M. 53 the same as before, 18 15, and the altitude of the upper horn of the ☾ at that time was 52. [*H. 6 M. 53 idem vt prius 18 15 & erat tunc Alt. ſuperioris cornu ☾ 52.*]

Afterwards I observed the equinoctial distance between the centre of the ☉ and the nearest, that is the eastern, limb of the ☾, in this way. [*Poſtea obſeruaui diſtantiam æquinoctionalem inter centrum ☉ & proximum ſiue orientalem limbum ☾ in hunc modum.*]

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At H. 6 M. 57, between the centre of the ☉ and the eastern limb of the ☾, partes 71 30¼ were observed; the altitude of the ☉, however, was 9⅔ very nearly. [*H. 6 M. 57 inter ☉ centrum & ☾ orientalem limbum obſeruatæ ſunt partes 71 30¼, erat autem Alt. ☉ 9⅔ proxime.*]

And a little afterwards, at hour 7, the declination of the ☉ seen was exactly 2 0′ degrees, when its altitude was P. 10 0′. [*Et paulo poſt, Hora 7 fuit Declin. ☉ viſa Graduum exquiſite 2 0′ cum ipſius Alt. eßet P. 10 0′.*]

At H. 7 M. 2, between the ☉ and the ☾, in the same way as above, taking the centre of the ☉ and the eastern limb of the ☾, P. 71 M. 27; and the altitude of the ☉ at that time was roughly partium 10⅔. [*H. 7 M. 2 Inter ☉ & ☾ pari ratione vt ſuperius accipiendo ☉ centrum & orientalem limbum ☾ P. 71 M. 27, eratque tunc ☉ Alt. partium quaſi 10⅔.*]

At H. 7 M. 4 the declination of the ☉ seen 1 59½. [*H. 7 M. 4 Declin. ☉ viſa 1 59½.*]

[1214] this page is set in two columns divided by a printed vertical rule.

At H. 7 M. 7 the declination of the upper limb of the ☾ seen 18 15, and the altitude 52. [*H. 7 M. 7 Declin. ſuper. limbi ☾ viſa 18 15 & Alt. 52.*]

At H. 7 M. 16 the declination of the ☉ seen 1 59, and its altitude 12⅓. [*H. 7 M. 16 Declin.☉ viſa 1 59 & ipſius Alt. 12⅓.*]

At H. 7 M. 30 the declination of the ☾ 17 45½. [*H. 7 M. 30 Decl. ☾ 17 45½.*]

Note. The preceding declinations of the ☾ are not true; these, rather, are to be relied on, some error or other having occurred during the observing. [*Nota. Antecedentes ☾ Declinationes non ſunt veræ, ſed potius his eſt fidendum, neſcio quo errore inter obſeruandum intercidente.*]

At H. 7 M. 33 the declination of the ☉ 1 58, altitude 14⅔. [*H. 7 M. 33 Declin.☉ 1 58, Alt. 14⅔.*]

At H. 7 M. 34 the declination of the upper horn of the ☾ 17 44½. [*H. 7 M. 34 Declin. ſuperioris cornu ☾ 17 44½.*]

At H. 7 M. 42 the declination of the ☉ 1 58, altitude 16. [*H. 7 M. 42 Decl. ☉ 1 58, Alt. 16.*]

At H. 7 M. 50 the declination of the lower horn of the ☾ was noted as 17 14, and [*H. 7 M. 50 Declin. inferior. cornu ☾ animadverſa 17 14 &*]

At H. 7 M. 52 the declination of the upper limb of the ☾ was observed as 17 42, the altitude of the ☾ being roughly partium 52. [*H. 7 M. 52 Declin. ſuperior. limbi ☾ obſeruata eſt 17 42, Altitudine ☾ exiſtente partium quaſi 52.*]

At H. 7 M. 57, between the eastern limb of the ☾ and the Sun, 71 3 was again seen, and the altitude of the ☉ was P. 18. The declination of the ☉, however, was seen at about the same time as 1 57. [*H. 7 M. 57 Inter limbum orientalem ☾ & Solem rurſus videbantur 71 3 & Alt. ☉ erat P. 18. Declin. vero ☉ videbatur circa idem tempus 1 57.*]

At H. 8 M. 4 the same equinoctial distance of the ☉ and the ☾ was seen as 71 2½, its altitude being 18⅔. [*H. 8 M. 4 eadem diſtantia æquinoctialis ☉ & ☾ viſa eſt 71 2½, Altitudine ipſius exiſtente 18⅔.*]

At H. 8 M. 8 the declination of the upper horn of the ☾ was seen as 17 41½. [*H. 8 M. 8 Declinatio ſuperioris cornu ☾ viſa eſt 17 41½.*]

At H. 8 M. 10 the declination of the lower horn of the ☾ was seen as 17 12¼, and in both cases the altitude of the ☾ was roughly 51. [*H. 8 M. 10 Inferior. cornu ☾ Declin. viſa eſt 17 12¼, fuit autem vtrobique Alt. ☾ quaſi 51.*]

At H. 8 M. 12, between the ☉ and the eastern limb of the ☾, in the manner stated above, along the equator, P. 71 M. 0⅓ were observed, and the altitude of the ☉ at that time was 19½. [*H. 8 M. 12 Inter ☉ & limbum ☾ oriental. modo ſupradicto per æquatorem obſeruabantur P. 71 M. 0⅓, & erat tunc Alt. ☉ 19½.*]

At H. 8 M. 14 the declination of the ☉ 1 56½, altitude 20. [*H. 8 M. 14 Decl. ☉ 1 56½, Alt. 20.*]

At H. 8 M. 17½, between the ☉ and the ☾, as before, the equinoctial distance was seen as 70 57⅔, and the altitude of the ☾ at that time was P. 49. [*H. 8 M. 17½ Inter ☉ & ☾ vt prius viſa eſt diſtantia æquinoctialis 70 57⅔ & tunc Alt. ☾ erat P. 49.*]

At H. 8 M. 27 the same distance 70 54, and the altitude of the ☉ at that time was 22. [*H. 8 M. 27 eadem diſtantia 70 54 eratque tunc Alt. ☉ 22.*]

At H. 8 M. 30 the declination of the ☉ 1 56. [*H. 8 M. 30 Declin. ☉ 1 56.*]

At H. 8 M. 34, again between the ☉ and the ☾ along the equator, in the manner stated above, 70 52; altitude of the ☉ 22⅙. [*H. 8 M. 34 Rurſus inter ☉ & ☾ per æquatorem modo ſupradicto 70 52, Alt. ☉ 22⅙.*]

At H. 8 M. 37 the declination of the upper horn of the ☾ was seen as 17 40, and [*H. 8 M. 37 Declin. ſuper. cornu ☾ viſa eſt 17 40 &*]

At H. 8 M. 39 the lower horn 17 8; the altitude of the ☾, in the upper horn, was at that time roughly 48⅓. [*H. 8 M. 39 Inferior. cornu 17 8, Alt. ☾ fuit in ſuperiori cornu tunc quaſi 48⅓.*]

At H. 8 M. 42 the declination of the ☉ 1 56. [*H. 8 M. 42 Declin.☉ 1 56.*]

At H. 9 M. 20 the declination of the ☉ seen 1 55⅚, and the altitude was observed as 27½. [*H. 9 M. 20 Declin. ☉ viſa 1 55⅚ & Alt. obſeruabatur 27½.*]

At H. 9 M. 27 the declination of the ☾ was observed as 17 32¼ in the upper horn, and presently in the lower 17 5¼, the altitude of the upper horn being the same, P. 45. [*H. 9 M. 27 Declin. ☾ obſeruabatur 17 32¼ in ſuper. cornu & mox in inferiori 17 5¼, eadem Alt. ſuperioris exiſtente P. 45.*][1215]

- *H. 9 M. 33 ☉ and ☾ as before [☉ et ☾ vt prius] — 70 25*
- *H. 9 M. 35½ the same [eadem] — 70 24*

The altitude of the ☾ in the upper horn was noted in both cases as roughly 43½; altitude of the ☉ 29. [*Alt. ☾ vtrobique in ſuperiori cornu animaduerſa eſt quaſi 43½, Alt. ☉ 29.*]

At H. 9 M. 42 the declination of the upper horn of the ☾ 17 32½, and of the lower 17 2⅓; altitude of the ☾ 43. Note: in the altitude of the ☾ the upper horn is taken everywhere. [*H. 9 M. 42 Declin. ſuper. cornu ☾ 17 32½ & inferius 17 2⅓, Alt. ☾ 43. Nota: in Alt. ☾ vbique accipitur ſuperius cornu.*]

At H. 9 M. 50 the declination of the ☉ seen 1 55. [*H. 9 M. 50 Declin.☉ viſa 1 55.*]

At H. 9 M. 54, between the ☉ and the ☾, as above, P. 70 M. 13⅔; the altitude of the upper horn of the ☾ was seen as 41½; altitude of the ☉ 30½. [*H. 9 M. 54 Inter ☉ & ☾ vt ſupra P. 70 M. 13⅔, Alt. ſuper. cornu ☾ viſa eſt 41½, Alt. ☉ 30½.*]

At H. 9 M. 58 the declination of the upper horn of the ☾ 17 31, and presently the lower, at H. 10 exactly, 17 2; the altitude of the ☾ at that time was roughly 41¼. [*H. 9 M. 58 Declin. ſuper. cornu ☾ 17 31 & mox inferius H. 10 exquiſite 17 2, erat tunc Alt. ☾ quaſi 41¼.*]

At H. 10 M. 2 the declination of the ☉ seen 1 54¾. [*H. 10 M. 2 Declin. ☉ viſa 1 54¾.*]

At H. 10 M. 5 ☉ and ☾ as before 70 9; altitude of the ☾ 41, while the altitude of the ☉ was 31½. [*H. 10 M. 5 ☉ & ☾ vt prius 70 9, Alt. ☾ 41, Alt. vero ☉ erat 31½.*]

At H. 10 M. 8 the declination of the upper horn of the ☾ was seen as 17 29½, and afterwards. [*H. 10 M. 8 Declin. ſuper. cornu ☾ viſa eſt 17 29½ et poſtea.*]

At H. 10 M. 10 the declination of the lower 17 0; the altitude of the ☾, however, in the upper horn, as everywhere before, was 39⅔. [*H. 10 M. 10 Declin. inferior. 17 0, Alt. vero erat ☾ in ſuperiori cornu, prout vbique prius, 39⅔.*]

[1215] in the first two lines below, the leaf sets a time at the left and a figure pair aligned at the right; the last two lines are set as the turn-lines of the entry.

At H. 10 M. 16 ⊙ from ☾ as before 70 4; altitude of the ☾ 39, of the ⊙ 32½. [*H. 10 M. 16 ⊙ a ☾ vt prius 70 4, Alt. ☾ 39, ⊙ 32½.*]

At H. 10 M. 18 the declination of the ⊙ 1 54½; the altitude, however, 32¾. [*H. 10 M. 18 Declin. ⊙ 1 54½, Alt. vero 32¾.*]

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At H. 10 M.32 the same Declin. of the ⊙ 1 54½. [*H. 10 M.32 eadem ⊙ Declin. 1 54½.*]

At H. 10 M.36 ⊙ from ☾ as before 69 55⅓; the altitude of the ☾ was 37. [*H. 10 M.36 ⊙ a ☾ vt prius 69 55⅓, Alt. ☾ erat 37.*]

At H. 10 M. 40 the upper horn of the ☾, Declin. 17 23½. [*H. 10 M. 40 ſuperior. cornu ☾ Declin. 17 23½.*]

At H. 10 M. 41 the infer. horn of the ☾, Declin. 16 56. [*H. 10 M. 41 infer. cornu ☾ Declin. 16 56.*]

At H. 10 M. 46 again the Declin. of the upper horn of the ☾ 17 25⅓. [*H. 10 M. 46 rurſus Declin. ſuper. ☾ cornu 17 25⅓.*]

At H. 10 M. 47 the infer. horn of the ☾ 16 56; the altitude of the ☾ was roughly 35½ in both cases; and these two observations are more certain than the preceding ones. [*H. 10 M. 47 infer. cornu ☾ 16 56, Alt. ☾ erat vtrobique quaſi 35½, atque hæ duæ obſeruationes ſunt certiores antecedentibus.*]

At H. 10 M. 50 the Declin. of the ⊙ 1 54¼, altitude 34¼. [*H. 10 M. 50 Declin. ⊙ 1 54¼, Alt. 34¼.*]

At H. 10 M.53 the ⊙ from the ☾, in the manner stated above, was 69 46½; the altitude of the ⊙ at that time was 34⅔ and of the ☾ 34⅔, so that both luminaries were seen at almost the same altitude. [*H. 10 M.53 ⊙ a ☾ modo ſupradicto erat 69 46½, erat vero tunc Alt. ⊙ 34⅔ & ☾ 34⅔, ita vt ambo luminaria in eadem quaſi conſpicerentur Altitudine.*]

At H. 10 M. 57 ⊙ from ☾ as before 69 44½; altitude of the ⊙ 35, altitude of the ☾ 34. [*H. 10 M. 57 ⊙ a ☾ vt prius 69 44½, Alt. ⊙ 35, Alt. ☾ 34.*]

At H. 11 M. 1 ⊙ from ☾ as before 69 43; altitude of the ☾ 33⅔. [*H. 11 M. 1 ⊙ a ☾ vt prius 69 43, Alt. ☾ 33⅔.*]

At H. 11 M. 4 the Declin. of the upper horn of the ☾ 17 24, and a little later [*H. 11 M. 4 Declin. ſuper. cornu ☾ 17 24, & paulo poſt*]

At H. 11 M. 6 the infer. 16 53½; the altitude of the ☾ seen last 32⅔. [*H. 11 M. 6 infer. 16 53½, viſa Alt. ☾ vltimo 32⅔.*][1217]

- *H. 11 26 / 11 28 — Declin. of the ⊙ 1 53, and again at noon 1 53.* [*H. 11 26 / 11 28 Declin. ⊙ 1 53 & rurſus in Meridie 1 53.*]

Note. The error of the clock, if there was any in all these preceding observations, has been so corrected that it becomes imperceptible. [*Nota. Horologij error, ſi quis erat in his omnibus antecedentibus, ita reſtitutus eſt, vt inſenſibilis euadat.*]

[1216] this page is set in two columns divided by a printed vertical rule.
[1217] in the two lines below, the leaf joins the two times with a brace.

DIE 10 SEPTEMBRIS.

We observed the ☾ again, in this way. First, as regards the clock, which had not been corrected to the Sun for two days: I adjusted it at hour 7 M. 42, at that same moment setting the index of the minutes on H. 7 M. 47½, 5½ further than what I was finding by the armillae. By so much would the clock have been retarded over a span of about two days. Then we observed the following. [*Rurſus obſeruauimus ☾ in hunc modum. Primum, quantum ad horologium attinet, quod per biduum non erat ad Solem correctum, rectificaui illud Hora 7 M. 42, ponendo in eodem momento indicem Minutorum ſuper H. 7 M. 47½, 5½ vlterius eo, quod per Armillas comperiebam. Tantum horologium ſpacio quaſi duorum dierum fuißet retardatum.* [recte: from *quod* to *retardatum*: quod per Armillas comperiebam intantum horologium ſpacio quaſi duorum dierum fuiße retardatum — "than what I was finding by the armillae, that the clock had been retarded by so much over a span of about two days" — Corrigenda, p. 430] *Deinde hæc obſeruauimus.*]

At H. 7 M. 50 the Declin. of the upper horn of the ☾ was noted with the armillae Max. 11 42. [*H. 7 M. 50 Declin. ſuperioris cornu ☾ animadverſa eſt per Armillas Max. 11 42*]

At H.7 M.51 the Declin. of the infer. horn 11 7. [*H.7 M.51 Declin. infer. cornu 11 7*]

At H.7 M.53½ the Declin. of the ☉ seen 1 11. [*H.7 M.53½ Declin. ☉ viſa 1 11*]

The altitude of the ☉ at that time, however, was roughly 16⅓. [*Fuit autem tunc Alt. ☉ quaſi 16⅓.*]

At H. 7 M. 58, between the eastern limb of the ☾ and the ☉, 43 15 or 16′. [*H. 7 M. 58 Inter orient. limb. ☾ & ☉ 43 15 vel 16′.*]

At H. 8 M. 0 the Declin. of the ☉ seen 1 10½; the altitude of the ☉ at that time was 17⅓. [*H. 8 M. 0 Declin. ☉ viſa 1 10½ / Alt. ☉ tunc erat 17⅓*][1218]

- *H. 8 M. 3½ the ☉ was distant from the ☾ as before [☉ a ☾ vt prius diſtabat] — 43 14*
- *8 7⅓ — 43 12*
- *8 11⅔ — 43 10*

The Moon, however, did not appear well enough, because of the daylight and the thinness of its body. The altitude of the ☉ around these observations was roughly partium 18. [*Luna tamen non ſatis bene apparebat propter diej lumen & ipſius corporis tenuitatem. Alt. vero ☉ circa has obſeruationes fuit quaſi partium 18.*]

At H. 8 M. 16 the Declin. of the ☉ was seen as 1 10; its altitude at that time was 19½. [*H. 8 M. 16 Declin. ☉ viſa eſt 1 10 / Fuit tunc Alt. eiusdem 19½*]

At H. 8 M. 22⅔ the Decl. of the inf. horn of the ☾ 11 8. [*H. 8 M. 22⅔ Decl. inf. cornu ☾ 11 8*]

At H. 8 M. 25 the Decl. of the upper horn 11 35. [*H. 8 M. 25 Decl. ſup. cornu 11 35*]

[1218] in the lines below, the leaf sets the times at the left and the figure pairs at the right; the first figure pair stands alone on its line.

At H. 8 M. 32 the Declin. of the ☉ seen 1 9½; the altitude of the ☉ was 21¼. [*H. 8 M. 32 Declin. ☉ viſa 1 9½ / Alt. ☉ erat 21¼*]

At H. 8 M. 41 ☉ from ☾ as before 42 57½. [*H. 8 M. 41 ☉ a ☾ vt prius 42 57½*]

At H. 8 M. 43½ the ☉, Declin. 1 9; the altitude of the ☉ was 22½. [*H. 8 M. 43½ ☉ Declin. 1 9 / Alt. ☉ erat 22½*]

At H. 9 M. 34 the ☉, Declin. 1 8⅔; the ☉, altitude 28 0. [*H. 9 M. 34 ☉ Declin. 1 8⅔ / ☉ Alt. 28 0*]

At H. 10 M. 2 the Decl. of the upper limb of the ☾ 11 18. [*H. 10 M. 2 Decl. ſup. limbi ☾ 11 18*]

At H. 10 M. 4 the Decl. of the inf. limb 10 52. [*H. 10 M. 4 Decl. inf. limbi 10 52*]

☾ from ☉ as before: [*☾ a ☉ vt prius:*][1219]

- *H. 10 M.8 — 42 23½*
- *10 40 — 42 10*
- *10 42 — 42 9*
- *10 44½ — 42 7½*
- (beyond the brace) *About 90 G.* [*Circa 90 G.*]

The Moon was indeed very thin, and its eastern limb appeared with difficulty, partly because of the thinness of its own illumination, partly because of the daylight. The altitude of the ☉, however, about the middle of these observations was 33⅙. [*Fuit quidem Luna admodum tenuis, et difficulter apparebat eius orientalis limbus partim propter tenuitatem illuminationis propriæ partim propter diem. Alt. vero ☉ erat circa medium harum obſeruationum 33⅙.*]

At H. 10 M. 55 the distance of the ☉ from the ☾ 42 4; this last one I made with a single side of the pinnule. [*H. 10 M. 55 Diſtantia ☉ a ☾ 42 4 hanc vltimam feci vnico latere pinnacidij.*]

At H. 11 M. 5 the Decl. of the upper horn of the ☾ 11 10. [*H. 11 M. 5 Decl. ſup. cornu ☾ 11 10*]

At H. 11 M. 8 the Decl. of the inf. horn 10 42. [*H. 11 M. 8 Decl. inf. cornu 10 42*]

At H. 11 M. 11 the Declin. of the ☉ seen 1 7, altitude 34⅓; presently, with the other pinnule, likewise 1 7. [*H. 11 M. 11 Declin. ☉ viſa 1 7 / Alt. 34⅓, altero pinnacidio mox item 1 7*]

At H. 11 M. 40 the Declin. of the ☉ 1 6½; presently, with the other pinnule, likewise 1 6½. [*H. 11 M. 40 Declin. ☉ 1 6½, mox altero pinnacidio item 1 6½*]

___[1220]

Note. At noon the clock agreed exactly enough that there is no doubt that the times assigned are true. [*Nota. Horologium in Meridie exacte ſatis concordabat, vt nullum ſit dubium tempora aſſignata eſſe vera.*]

DIE 18 SEPTEMBRIS.

After sunset. The ☾ about the ninetieth degree at hour 5⅓. [Poſt occaſum ☉. ☾ circa nonageſimum gradum Hora 5⅓.]

[1219] in the four lines below, the leaf sets the times at the left and the figure pairs at the right, and joins the four figure pairs with a brace, beyond which stand the words "Circa 90 G."

[1220] this page is set in two columns divided by a printed vertical rule.

H.	M.	Decl. ☾	Equatorial distance from the bright star of the Vulture [Diſt. æquat. a lucida Vulturis]
6	52½	20 22 A.	40 6
7	1	20 21	40 3
7	9	20 20	40 0

Altitude of the ☾ 6 partium. [Alt. ☾ 6 partium.]

DIE 20 SEPTEMBRIS.

Equatorial distance between the ☉ and the ☾, by the subterranean armillae. [Diſtantia æquatoria per Armillas ſubterraneas inter ☉ & ☾.]

- 4 42⅓ P. M. — 91 31½ — Decl. ☾ 19 17
- 4 47 — 91 34⅔ — 19 17¼

Altitude of the ☉ 8 30, altitude of the ☾ 13ᵍ; observed in part among clouds rising. [Alt. ☉ 8 30, Alt. ☾ 13ᵍ, inter nubes exorientes obſeruatum ex parte.]

At hour 5 and three quarters, when the ☾ was in 90 G., its Declin. in the meridian was observed with the greater subterranean armillae as 19 40½, with the lower horn. The altitude of the same horn: [Hora 5 cum tribus quartis, cum ☾ in 90 G. eßet, obſeruata eſt eius Declin. in Meridiano per Armillas ſubterraneas maiores 19 40½ cum inferiori cornu. Alt. eiusdem cornu]

- by the Q. Tichon. [per Q. Tichon.] — 14 24½
- by the Q. Portat. [per Q. Portat.] — 14 25

Altitude of the upper horn by the Q. Tich. 14 56. [Alt. ſup. cornu per Q. Tich. 14 56]

Between the mouth of Pegasus [os Pegaſi] and the occid. limb of the ☾, by the Sext. △. [Inter os Pegaſi & occid. limbum ☾ per Sext. △.][1221]

- H. 7 M. 10 — 49 29½
- 7 16⅚ — 49 28
- 7 19⅔ — 49 25¼
- 7 23⅙ — 49 22½
- 7 27 — 49 20¾
- 7 25 altitude of the lower horn of the ☾ [Alt. inf. cornu ☾] — 12⅔
- 7 34 Decl. of the lower horn [Decl. inf. cornu] — 19 39¼
- 7 38⅔ the same [eadem] — 19 40
- altitude of the same lower [Alt. eiusdem inf.] — 12 0
- altitude of the upper limb [Alt. ſup. limbi] — 12½
- (in smaller type, beside the last two lines) The motion of the clock was consistent. [Horologij congruus motus erat.]

Note that on this day, at H. 5 M. 44, the ☾ was in 90 G. from the ascendant; it could not, however, be observed then, because small clouds came between in the Sun's glare. [Nota, quod ☾ hoc die H. 5 M. 44 fuerit in 90 G. ab Aſcendente,

[1221] in the lines below, the leaf sets the times at the left and the figure pairs at the right; beside the last two lines, in the place of the times, stand three short lines in smaller type.

quæ tamen interuentu nubecularum in ſplendore Solari, tum obſeruari non potuit.]

DIE 21 SEPTEMBRIS.

P. / H.	M. / M.	Equatorial distance ⊙ & ☾ [Diſt. æquat. ⊙ & ☾]	Decl. lower horn ☾ [Decl. inf. cornu ☾]	Altitude ☾ [Alt. ☾]
4	4	103 15[1]	18 0	
4	8½			8 20
4	11⅓	103 20⅓ [recte: 103 20½ — Corrigenda, p. 430]	18 0	
4	15½			9
4	50	103 29⅓	18 0	
4	53½	103 29½[2]		11 38
4	55		18 0	11⅔

Further, at H. 5 M. 58, by the same greater subterranean armillae, the Decl. of the ☾, with the lower horn, in 90 G., 17° 59′ exactly, its altitude being partium 15 by the smallest quadrant. [Porro H. 5 M. 58 per eaſdem Armillas ſubterraneas majores Decl. ☾ cum inferiore cornu in 90 G. 17° 59′ exacte, Altitudine eiusdem exiſtente partium 15 per Quadrantem minimum.]

Then at H. 6 M. 55 the Decl. of the lower horn in the meridian 18 8½; the altitude of the ☾ in the meridian: [Deinde H. 6 M. 55 Decl. infer. cornu in merid. 18 8½, Alt. ☾ in merid.]

- by the Q. Portat. [per Q. Portat.] — 16 0
- by the Q. Tichon., lower horn [per Q. Tichon. inf. cornu] — 16 5
- upper horn [ſuper. cornu] — 16 40

DIE 22 SEPTEMBRIS[3].[1222]

H.	M.	Declin. lower limb ☾ [Declin. inf. limbi ☾]	Equatorial distance from the ⊙ [Diſt. æquat. a ⊙]	Altitude ☾ [Alt. ☾]	Altitude ⊙ [Alt. ⊙]
4	38⅔	15 33M	117 10		9
4	41⅔	15 33⅙	117 11		
4	47	15 34	117 13½		
4	52	15 34½	117 14½		
4	55			10 20	6¼

Great refraction of the ⊙, and the shadow larger than it should be. [Magna ⊙ refractio atque vmbra iuſto maior.][1223]

- 4 59⅔ — 15 35 — 117 15

[1222] in the head row below, the words "per Q. Min." stand as a second line beneath the last two heads, "per Q." under the first and "Min." under the second.

[1223] the first two lines below stand under the columns of the table above, without a head row of their own.

- 5 6 — 15 35⅓ — 117 15
- 5 8⅔ altitude of the lower limb of the ☾ [Alt. inf. limbi ☾] — 12 32 roughly, [12 32quaſi,]
- 6 13 in 90 G. from the ascendant [in 90 G. ab Aſcendente]
- 15 2 with the upper limb [ſuperiori limbo]
- 15 32¼ with the lower limb [inferiori limbo]

A little later, the altitude of the same limb 16° by the lesser Q. [Paulo poſt eiuſdem limbi Alt. 16° per Q. Minorem.]

- 6 43⅔ equatorial distance from the bright star of the Vulture [Diſt. æquat. a lucida Vulturis] — 11 23½
- 6 45 the same, repeated [Eadem iterata] — 11 25
- 7 42 Declin. of the lower horn in the meridian [Declin. infer. cornu in merid.] — 15 24
- Decl. of the upper in the meridian [Decl. ſuper. in mer.] — 14 52

The altitude of the ☾ in the meridian by the Q. Tichon. Mura ralem [?]: lower limb 18 38½, upper limb 19 11½. [Alt. ☾ in merid. per Q. Tichon. Mura / ralem, infer. limbo 18 38½ / ſuper. limbo 19 11½]

- [1] In codex C the degrees are 85, but in L and V 103, correctly. [In codice C gradus ſunt 85, ſed in L et V 103, recte.]
- [2] There is written beside it: »the Sun's shadow false«. [Adſcriptum eſt: »Solis vmbra falſa«.]
- [3] Days 22 and 23 are missing in codex C. L and V have Δα [Greek: Δα, *delta alpha*, as printed] ☾ and ☉ = 99°. [Dies 22 & 23 deſunt in codice C. L et V habent Δα ☾ et ☉ = 99°.]

___[1224]

DIE 23 SEPTEMBRIS.

At H. 6½ the ☾ stood in 90 G. from the ascendant, when it had a Declin. with the lower limb of 12 29½, with the upper limb of 12 59½. [H. 6½ extitit ☾ in 90 G. ab aſcendente, cum Declin. haberet / cum inferiori limbo 12 29½ / cum ſuperiori limbo 12 59½]

Between the orient. limb of the ☾ and the bright star of the Vulture [lucidam Vulturis], by the armillae mai. [Inter orient. limbum ☾ & lucidam Vulturis per Armill. mai.]

- H. 7 M. 43 — 23 32½, — Alt. of the ☾ 20⅚ [Alt. ☾ 20⅚]
- 7 47⅓ — 23 35

At 8 29 in the Merid. the ☾ had an observed Alt., by the Tychonic Q., of 22 19½ with the upper limb, and 21 47½ with the lower. [8 29 in Merid. ☾ obſeruata Alt. habuit per Q. Tichonicum / ſuperiori limbo 22 19½ / inferiori vero 21 47½]

In these observations, however, the sight of the ☾ was partly impeded. The error of the clock at noon was 1½ scrup. [In hiſce obſeruationibus ☾ tamen viſus pro parte fuit præpeditus. Horologij error in Meridie 1½ ſcrup. erat.]

[1224] this page is set in two columns divided by a printed vertical rule.

DIE 22 OCTOBRIS.

The ☾ in 90 G. from the ascendant at H. 5 26′ P. M. [☾ in 90 G. ab aſcendente H. 5 26′ P. M.]

By the great armillae subterr. [*Per Armillas magnas ſubterr.*][1225]

H.	*M.*	*Occ. limb. of the ☾ from the merid. vers. ort.* [*Occ. limb. ☾ a merid. verſ. ort.*]	*Lucid. Vult. from the mer. vers. setting* [*Lucid. Vult. a mer. verſ. occaſ.*]	*Distance æquat. of both* [*Diſt. æquat. vtriusque*]	*Decl. M. of the upper horn* [*Decl. M. ſup. cornu*]
5	*24*				*6 10⅙*
5	*32*	*34 39⅙*	*7 15*	*41 54⅙*	
5	*33*	*34 22*	*7 33*	*41 55*	
5	*39*				*6 9½*
5	*44*				*6 8½*
		Alt. of the lower horn 22 G., nearly. [*Alt. infer. cornu 22 G. fere.*]			
5	*47*	*30 59¾*	*11 0*	*41 59¾*	
		Alt. of the upper horn 23⅔ G. [*Alt. ſuper. cornu 23⅔ G.*]			
5	*50*	*30 16½*	*11 43½*	*42 0*	
5	*53*	*Alt. of the upper horn 23⅚ G.* [*Alt. ſuper. cornu 23⅚ G.*]			*6 6½*
6	*1*	*27 35¼*	*14 28½*	*42 3¾*	
		Alt. of the upper horn 24⅙ G. [*Alt. ſuper. cornu 24⅙ G.*]			
6	*6*	*26 23*	*15 44½*	*42 7½*	
6	*10*				*6 2½*
6	*20*	*23 3¼*	*19 8¾*	*42 12*	
		Alt. of the upper horn 25⅓ G. [*Alt. ſuper. cornu 25⅓ G.*]			
6	*21½*	*22 37⅙*	*19 36¼*	*42 13½*	
6	*24*	*Alt. of the upper horn 25⅔ G.* [*Alt. ſuper. cornu 25⅔ G.*]			*6 1½*

The times of the observations of the ☾ on this day, 22 October, need no correction, for on the 23rd, the day next following, at about H. 9 A. M., the clock we used was running at least two minutes slower from the preceding noon. [Tempora obſeruationum ☾ huius diej 22 Octobris correctione non indigent, nam die 23 proxime ſequenti circa H. 9 A. M. duobus ſaltem minutis a Meridie præcedenti tardius Horologium, quo vſi ſumus, mouebatur.]

[1225] in the table below, the leaf sets some lines of words across the middle columns.

DIE 6 NOUEMBRIS, MANE.

At H. 3 20 the Decl. of the Bor. horn of the ☾ 1 43½B.; the Alt. of the lower limb 16¼. [H. 3 20 Decl. Bor. cornu ☾ 1 43½B. / Alt. inf. limbi 16¼]

At H. 3 25 the Decl. of the Bor. horn 1 42½; the Alt. of the lower limb 16½. [H. 3 25 Decl. Bor. cornu 1 42½ / Alt. inf. limbi 16½]

At 3 28, with the other pinnule, Declin. 1 42½; the Alt. of the ☾ 16¾. [3 28 Altero pin. Declin. 1 42½ / Alt. ☾ 16¾][1226]

H.	M.	Or. limb. of the ☾ from the mer. vers. ort. [Or. limb. ☾ a mer. verſ. ort.]	the heart of ♌ orient. [Cor ♌ orient.]	Distance æquat. [Diſt. æquat.]	Alt. of the lower limb of the ☾ [Alt. inf. limb. ☾]
3	34½	59 12	40 44	18 28	
3	40	57 52½	39 24	18 28½	17¾
3	43½	57 7	38 37½	18 29½	
3	45	56 35	38 4	18 31	
3	46½	56 12	37 40	18 32	19¼
3	52	Decl. of the Bor. horn of the ☾ [Decl. Bor. cornu ☾]		1 40B.	20½
3	55	Alt. pinnule [Alt. pinnac.]		1 39½	

The times of the preceding observations have been corrected. [Tempora præcedentium obſeruationum ſunt correcta.]

At H. 9 M. 37 the Declin. of the ☉ seen with one pinnule 18 45 M., with the other pinnule 18 45½; the Alt. of the ☉ 10. [H. 9 M. 37 Declin. ☉ viſa / vno pinnacidio 18 45 M. / altero pinnacidio 18 45½ / Alt. ☉ 10]

At 9 50 the Decl. of the upper horn of the ☾ 0 23 B.; the Alt. of the upper horn 28. [*9 50 Decl. ſup. cornu ☾ 0 23 B. / Alt. ſuper. cornu 28*]

At 10 1½ the Decl. repeated, upper horn of the ☾ 0 24½B.; the ☾ was distant from the merid. 34, roughly. [*10 1½ Reiterata Decl. / ſup. cornu ☾ 0 24½B. / ☾ diſtabat a merid. 34 quaſi*]

At 10 3 the ☾ from the merid. 34½, Decl. 0 24; the Alt. of the ☾ 27¾. [*10 3 ☾ a merid. 34½, Decl. 0 24 / Alt. ☾ 27¾*]

At 10 6 the ☉ from the mer. 28¾, Decl. 18 45; with the other pinnule 18 45½; the Alt. of the ☉ 11⅔. [*10 6 ☉ a mer. 28¾, Decl. 18 45 / Altero pinnac. 18 45½ / Alt. ☉ 11⅔*]

At 10 15 the ☉ from the mer. 26⅓, Decl. 18 45½. [*10 15 ☉ a mer. 26⅓, Decl. 18 45½*][1227]

- *10 19½ the orient. limb of the ☾ from the ☉, vers. setting* [*☾ orient. limbus a ☉ verſ. occaſum*] — *63 39*
- *10 22 the same distance* [*Eadem diſtantia*] — *63 35*
- *10 23⅓ — 63 34½*

[1226] in the last two rows of the table below, the leaf sets words across the middle columns.

[1227] in the three lines below, the leaf joins the three figure pairs on their right with a brace; nothing is set beyond it.

Gellius observed these. [*Has Gellius obſeruauit.*]

Declin. of the ☉ 18 46. [*Declin. ☉ 18 46*]

At 10 25½ the same distance of the ☾ from the ☉ 63 36; Decl. of the ☉ 18 46¼. [*10 25½ Eadem ☾ a ☉ diſt. 63 36 / Decl. ☉ 18 46¼*]

The following are better. [*Sequentes ſunt meliores.*][1228]

- *10 27½ the ☉ from the ☾* [*☉ a ☾*] — *63 44*
- *10 29 — 63 43¾*
- *10 30⅔ — 63 42¼*
- *(beyond the brace) Ioannes Aurifaber observed these.* [*Has Ioannes Aurifaber obſeruabat*]

Declin. of the ☉ 18 46½. [*Declin. ☉ 18 46½*]

At 10 34⅔ with the other pinnule 18 47¼; the Altit. of the ☉ 13½. [*10 34⅔ Altero pinnac. 18 47¼ / Altit. ☉ 13½*]

- *10 38 the ☉ from the ☾* ἐν πλάτει [Greek: ἐν πλάτει, *en platei*, "in breadth"] [*☉ a ☾* ἐν πλάτει] — *63 38*
- *10 45⅔ — 63 37½*

At 10 47⅔ the Declin. of the ☉ 18 47. [*10 47⅔ Declin. ☉ 18 47*]

At 10 57⅔ the Decl. of the upper horn of the ☾ 0 11. [*10 57⅔ Decl. ſuper. / cornu ☾ 0 11*]

___[1229]

At H. 11 M. 3½ the same Declin. of the ☾ 0 11; the Alt. of the ☾ 21¾. [*H. 11 M. 3½ Eadem Declin. ☾ 0 11 / Alt. ☾ 21¾*]

- *11 5½ the ☉ from the ☾ as before* [*☉ a ☾ vt prius*] — *63 26*
- *11 6¾ the same distance* [*Eadem diſtantia*] — *63 25½*
- *11 7¾ the same, repeated* [*Eadem reiterata*] — *63 25½*
- *11 9 Declin. of the ☉* [*Declin. ☉*] — *18 47½*
- *11 12 the ☉ from the ☾ as before* [*☉ a ☾ vt prius*] — *63 23¼*

At 11 15 the Declin. seen, sup. horn 0 10 B.; the Alt. of the sup. horn 20⅓. [*11 15 Declin. viſa / ſup. cornu 0 10 B. / Alt. ſup. cornu 20⅓*]

At 11 16½ the Decl. as before 0 10 B.; the Alt. of the ☾ 20 0. [*11 16½ Decl. vt prius 0 10 B. / Alt. ☾ 20 0*]

- *11 18½ the ☉ from the ☾* [*☉ a ☾*] — *63 21*
- *11 20 the same* [*Eadem*] — *63 20*
- *11 21½ the same, repeated* [*Eadem repetita*] — *63 19½*

Declin. of the ☉ 18 48; with the other pinnule 18 48½; the Alt. of the ☉ 14½. [*Declin. ☉ 18 48 / Altero pinnac. 18 48½ / Alt. ☉ 14½*]

- *11 33¾ again between the ☉ and the ☾* [*rurſus inter ☉ & ☾*] — *63 15*
- *11 34⅔ the same* [*Eadem*] — *63 15*

The Alt. of the super. horn of the ☾ 17. [*Alt. ſuper. / cornu ☾ 17*]

At 11 42⅔ between the ☉ and the ☾, ἐν πλάτει, *63 12; the Alt. of the ☾ 16⅙.* [*11 42⅔ Inter ☉ & ☾, /* ἐν πλάτει *63 12 / Alt. ☾ 16⅙*]

[1228] in the three lines below, the leaf joins the three figure pairs on their right with a brace, beyond which stand three short lines.

[1229] this page is set in two columns divided by a printed vertical rule.

At noon the clock was running 2½ slow, and that since hour 9½, when it had been corrected. The preceding times must therefore be adjusted on this basis, so that they are exact. [*Horologium in Meridie 2½ tardius ibat, idque ab Hora 9½ quod correctum erat. Quare antecedentia tempora erunt limitanda ad hanc rationem, vt ſint præciſa.*]

At H. 12 M. 3 the Decl. of the ☉ with one pinnule 18 48½, with the other 18 48⅙. [*H. 12 M. 3 Decl. ☉ vno pinn. 18 48½ / altero 18 48⅙*]

At 12 7 the Decl. of the sup. horn of the ☾ 0 2¾; you may take 0 3; the Alt. of the ☾ 13½. [*12 7 Decl. ſup. cornu ☾ 0 2¾ / Potes accipere 0 3 / Alt. ☾ 13½*]

- *12 10 the ☉ from the super. horn of the ☾* [*☉ a ſuper. cornu ☾*] — *63 0*
- *12 12 the ☾ from the ☉* [*☾ a ☉*] — *62 58*

The Alt. of the ☉ 12⅙. [*Alt. ☉ 12⅙*]

- *12 14 the same distance* [*Eadem diſt.*] — *62 57¼*

The Alt. of the ☾ 12. [*Alt. ☾ 12*]

- *12 16 the same distance* [*Eadem diſt.*] — *62 56*
- *12 18⅓ the Alt. of the ☾ 11½, distance* [*Alt. ☾ 11½, diſt.*] — *62 55*
- *12 24½* — *11⅙* — *good* [*bona*] — *62 53*
- *12 27* — *11* — *62 52½*

At 12 29 the Decl. of the super. horn 0 3½ M. At that time the ☾ had an Alt. of 10⅚. [*12 29 Decl. ſuper. cornu 0 3½ M. / Tunc habuit ☾ Alt. 10⅚.*]

- *12 31 the Decl. of the ☾ repeated* [*repetita Decl. ☾*] — *0 2 M.*
- *12 34 the same, repeated* [*eadem repetita*] — *0 6*

Put at hour 12½ the Declin. of the sup. horn 0 5′, good. [*Pone Hora 12½ Declin. ſup. cornu / 0 5′ bene.*]

At 12 40 the Declin. of the ☉ seen 18 49⅓, Alt. 15ᵍ; with the other pinnule 18 49. [12 40 Declin. ☉ viſa 18 49⅓, Alt. 15ᵍ / Altero pinnac. 18 49.]

DIE 7 NOUEMBRIS, MANE.

At H. 4 M. 2 the Decl. of the bor. horn of the ☾ 3 7½; the Alt. of the infer. limb 10½. [H. 4 M. 2 Decl. bor. cornu ☾ 3 7½ / Alt. infer. limbi 10½]

At 4 6, with the other pinnule, 3 5; the Alt. of the infer. limb 11. [4 6 Altero pinnacidio 3 5 / Alt. infer. limbi 11][1230]

		Distance of the inf. limb of the ☾ from the heart of ♌ [Diſt. inf. limbi ☾ a corde ♌]	Alt. of the inf. limb [Alt. inf. limbi]
4	16	36 23⅓	12
4	18	36 24	
4	19	36 25	12⅔
4	21	36 25¾	
4	22	36 26½	13
4	23½	36 27¼	
4	25	36 28½	13½

[1230] in the table below, the leaf joins the distances of the first eight lines in pairs with four braces on their right, and beyond each brace sets one altitude level between the two lines. In the last line the words stand across the distance column and the figures under the altitude head.

		Distance of the inf. limb of the ☾ from the heart of ♌ [Diſt. inf. limbi ☾ a corde ♌]	Alt. of the inf. limb [Alt. inf. limbi]
4	27	36 29½	
4	33	36 31¾	14
4	34½	36 33	
4	35½	36 33½	14¼
4	38	Decl. of the bor. horn of the ☾ [Decl. bor. cornu ☾]	3 12½ M.

1231

		Or. limb. of the ☾ from the meridian vers. ort. [☾ or. limb. a mer. verſ. ort.]	the heart of ♌ [Cor ♌]	Distance æquat. [Diſt. æquat.]	Alt. of the inf. limb [Alt. inf. limbi]
4	42½	56 10	23 47	32 23	15
	45	55 23½	22 59½	32 24	
	48	54 46¼	22 21¼	32 25	15⅔
	49½	54 24½	21 56¼	32 28¼	
5	22½	46 26½	13 40½	32 46	19½
	25½	45 46½	13 0	32 46½	
	28	45 12	12 24	32 48	20
	31½	44 24	11 33⅔	32 50⅓	
	36	Decl. of the ☾ [Decl. ☾]		3 27	21 nearly [21 fere]

The clock showed 9 2, the ☉ in the armillae $9^{H}17'$. [9 2 horol. monſtrauit ☉ in armill. / $9^{H}17'$]

At 4½ by the clock, the ☉ in the armillae 9 19. [4½ horol. ☉ in armillis 9 19]

I therefore advanced the clock 15 minutes. [Promoui itaque horol. 15 ſcrupula.]

On the same day the ☾ was observed from the ☉ in the following way. [Eodem die obſeruata eſt ☾ a ☉ in hunc modum vt ſequitur.]

At hour 11 the clock was corrected; it was running 4½ minutes faster than it should. The preceding times, however, have been verified by the distance of the heart of ♌ from the meridian. [Hora 11 correctum eſt horologium, 4½ ſcrupulis iuſto celerius ibat. Tempora autem præcedentia per diſtantiam cordis ♌ a meridiano ſunt verificata.]

___[1232]

The Moon in 90° at hour 11 28′. [Luna in 90° Hora 11 28′.][1233]

- H. 10 59½ — Declin. of the ☾ [Declin. ☾] — 4 31 M.
- 11 1 — northern horn [bor. cornu] — 4 30½
- 11 2½ — 4 31
- 11 4 — lower horn [infer. cornu] — 4 55½

[1231] in the table below, the hour is printed only on the first and fifth lines. In the last line the words stand across the first figure column, and *fere* is set in smaller type.

[1232] this page is set in two columns divided by a printed vertical rule.

[1233] in the list below, the leaf joins the last two figure pairs on their left with a brace, before which stands *bonæ*, level between the two lines.

- 11 5½ — good [bonæ] — 4 57½
- 11 7 — 4 58[1234]

H.	M.	the ⊙ from the or.[1] limb of the ☾ [⊙ ab or.[1] limb. ☾]	Decl. of the ☾, sup. horn [Decl. ☾ ſup. cornu]	Decl. of the ⊙ [Decl. ⊙]	Alt. of the ☾, sup. horn [Alt. ☾ ſup. cornu]
11	10	50 58¾		19 2½	
11	12	50 56½			
11	13	50 55			
11	15	50 53½		19 2¾	21
11	18½	50 51			20½
11	20½	50 49¼			20⅙
11	21½	50 48½			
11	30		with one [vno]	19 2¾	(Alt. of the ⊙ [(Alt. ⊙]
			with the other [altero]	19 2¾	15)
11	37		4 41		Alt. of the ☾ [Alt. ☾]
11	39½		4 39		18½
11	42½	50 43			18⅙
11	50	50 41½			
11	52½	50 43			17
11	55	50 35			
11	57	50 34½	good [bonæ]		16½
11	58	50 34			
		with both pin. [vtroque pin.]		19 3⅙	
12	10½	50 32½			
12	13½	50 30			
12	15	50 28½			

At noon the clock was running at least one minute slow. [Horologium in Meridie ſaltem vno ſcrupulo tardius ibat.]

DIE 8 NOUEMBRIS A. M.

In the morning, around hour 6⅙ and a little after, I saw that Spica ♍ was applying to the ☾ with the same visible latitude; and it was then also almost in visible longitude with ♀, especially as regards the western limb, and that near hour 6⅔. [Mane circa horam 6⅙ et paulo poſt, vidi quod Spica ♍ applicaret ☾ cum eadem viſibili latitudine, et erat tunc etiam quaſi in viſibili longitudine cum ♀, præſertim quoad limbum occidentalem, idque iuxta horam 6⅔.]

[1234]in the table below, the words set inside the columns stand under the columns' heads, except *vtroque pin.*, which runs across the third and fourth columns. The leaf joins the figure pairs of the lines at 11 37 and 11 39½ with a brace on their right, beyond which *Alt.* ☾ and *18½* stand; and the three pairs of the lines at 11 55–11 58 with a brace on their right, beyond which *bonæ* stands level with the middle line. The parentheses around *Alt.* ⊙ … *15* are printed.

At H. 6 43, between the orient. limb of the ☾ and Spica, 2 12. The Alt. of the lower horn of the ☾ was then 18°. [H. 6 43 Inter orient. limb. ☾ / & Spicam 2 12 / Alt. inf. cornu ☾ tunc erat 18°.]

- 6 44 — the same distance [Eadem diſtantia] — 2 11
- Alt. of the lower horn [Alt. infer. cornu] — 18⅙
- 6 46 — the same [Eadem] — 2 13

But this distance by the Radius was not certain because of clouds. [Sed non erat certa propter nubes hæc diſtantia per Radium.][1235]

- 6 49 — Decl. of the northern horn of the ☾ [Decl. borea- / lis cornu ☾] — 8 13¾
- 6 51 — 8 13½
- 6 52 — the lower horn [Inferius cornu] — 8 45¼
- 6 54 — 8 45¼

At 7 23½, again, the Declin. of the super. horn of the ☾ 8 23. [7 23½ Rurſus Declin. ſuper. / cornu ☾ 8 23]

It was not clear enough. [Non fuit ſatis ſerenum.]

At 7 28 the same, better, of the lower 8 22½. [7 28 Eadem melior in- / ferioris 8 22½]

Somewhat clearer. [Paulo ſerenius.]

At 7 30 the Decl. of the lower horn 8 51; the Alt. of the lower horn 21 35. [7 30 Decl. inf. cornu 8 51 / Alt. infer. cornu 21 35]

At 7 33 the Decl. of the sup. horn 8 23. [7 33 Decl. ſup. cornu 8 23]

At 7 35½ the lower horn 8 53. [7 35½ Inf. cornu 8 53]

These two are better. [Hæ duæ meliores.]

The Alt. of the lower 22 0. [Alt. inferioris 22 0]

N. B. The times have been corrected. [N. B. Tempora ſunt correcta.]

DIE 9 NOUEMBRIS, MANE.

At H. 7 21′ the orient. limb of the ☾ 42 57½; the heart of ♌, western, 18 9; the equatorial distance 61 6½; the Alt. of the lower horn of the ☾ 12. [H. 7 21′ Orient. limbus ☾ 42 57½ / Cor ♌ occidentalis 18 9 / Diſt. æquatoria 61 6½ / Alt. infer. cornu ☾ 12]

At 7 23 the Decl. of the super. horn of the ☾ 12 25. [7 23 Decl. ſuper. cornu ☾ 12 25]

Not certain enough. [Non ſatis certa.]

At 7 25 the heart of ♌, western, 19 5½; the or. limb of the ☾ toward rising 42 1½; the equatorial distance 61 7; the Alt. of the lower part of the ☾ 13⅓. [7 25 Cor ♌ occid. 19 5½ / Or. limb. ☾ ad ort. 42 1½ / Diſt. æquatoria 61 7 / Alt. infer. partis ☾ 13⅓]

At 7 27 the heart of ♌, western, 19 39; the or. limb of the ☾ toward rising 41 28½; the equatorial distance 61 7½; the Alt. of the lower part 13⅔. [7 27 Cor

[1235] in the two lines below, the leaf sets one label across both, the word divided *borea- / lis*; each line carries its own time and figure pair.

☋ occid. 19 39 / Or. limb. ☾ ad ort. 41 28½ / Diſt. æquatoria 61 7½ / Alt. inf. part. 13⅔]

At 7 31 the Decl. of the super. horn of the ☾ 12 29 M.; the Alt. of the ☾ 14. [7 31 Decl. ſuper. cornu ☾ 12 29 M. / Alt. ☾ 14]

At 7 34 the Decl. of the same 12 29; the Alt. of the ☾ 14⅙. [7 34 Decl. eiusdem 12 29 / Alt. ☾ 14⅙]

At 7 37 the Decl. of the lower horn 12 55; the Alt. of the ☾ 14⅓. [7 37 Decl. inf. cornu 12 55 / Alt. ☾ 14⅓]

At 7 43 the Decl. of the same 12 56; the Alt. of the ☾ 14½. [7 43 Decl. eiusdem 12 56 / Alt. ☾ 14½]

At 7 48 ♀ toward rising 23 30; the or. limb of the ☾, rising, 36 34½; the equatorial distance 13 4½; the Alt. of ♀ 27½. [7 48 ♀ ad ortum 23 30 / Or. limb. ☾ ort. 36 34½ / Diſt. æquat. 13 4½ / Alt. ♀ 27½]

At 7 56 the or. limb of the ☾ toward rising 34 24½; ♀ orient. 21 15½; the equatorial distance 13 9; the Alt. of the ☾ 15⅓. [7 56 ☾ or. limb. ad ort. 34 24½ / ♀ orient. 21 15½ / Diſt. æquatoria 13 9 / Alt. ☾ 15⅓]

[1] It is added in writing: »By the Sext., I think«. [[1] Adſcriptum eſt: »Per Sext. vt puto«.]

___[1236]

At H. 7 59 the ☾ toward rising 33 38½; ♀ toward rising 20 29⅔; the equatorial Dist. 13 8⅚; the Alt. of the ☾ 15⅔, the Alt. of ♀ 27½. [H. 7 59 ☾ ad ortum 33 38½ / ♀ ad ortum 20 29⅔ / Diſt. æquatoria 13 8⅚ / Alt. ☾ 15⅔, Alt. ♀ 27½.]

N. B. The times assigned have been verified. [N. B. Tempora aßignata ſunt verificata.]

DIE 21 NOUEMBRIS.

At H. 5 20′ P. M. the ☾ in 90° from the ascendant. [H. 5 20′ P. M. ☾ in 90° ab aſcendente.]

At 5 52 the Decl. of the sup. horn of the ☾ 4 22½ B. [5 52 Decl. ſup. cornu ☾ 4 22½ B.]

		Luc. ♈ or.	Occ. limb. or.	the equatorial Dist. [Diſt. æq.]	Alt. of the sup. horn [Alt. ſup. cornu]
5	57	49 12½	27 57¾	21 14¾	34
6	2½	47 52	26 39½	21 12½	34½
6	6	46 58	25 47	21 11	
6	9	46 22½	25 11½	21 11	
6	12	45 36	24 27	21 9	

[1236] this page is set in two columns divided by a printed vertical rule.

DIE 22 NOUEMBRIS.

Toward evening. At H. 6 22′ the ☾ in 90° from the ascendant. The clock corrected at H. 5½ by the fixed stars. [Ad Veſperas. H. 6 22′ ☾ in 90° ab aſcendente. Horologium H. 5½ per ſtellas fixas correctum.][1237]

- H. 5 58 — Decl. of the sup. horn of the ☾ [Decl. ſup. / cornu ☾] — 8 13 — Alt. sup. [Alt. ſup.] — 33½
- 6 3⅙ — 8 14 — 34¼

		Occ. limb. of the ☾ or. [Occ. limb. ☾ or.]	Luc. Vult. occ.	the equatorial Dist. [Diſt. æquat.]	Alt. of the sup. horn of the ☾ [Alt. ſup. cornu ☾]
6	8	36 7½	47 50	83 57½	34⅔
6	11⅙	35 9½	48 49⅓	83 58⅚	35⅙ [recte: 35¼ — Corrigenda, p. 430]
6	13½	34 42¾	49 15¾	83 58½	35
6	15¾	34 13	49 45½	83 58½	
6	17	33 51	50 8	83 59	
6	25	32 2½	52 2¾	84 5¼	
6	27	31 26	52 40	84 6	
6	34	29 40	54 28	84 8	
6	38½	28 37½	55 33	84 10½	37

[1238]

		Decl. of the sup. horn of the ☾ [Decl. ſup. cornu ☾]	Alt. of the sup. horn [Alt. ſup. cornu]	Dist. between Aldeb. and the occ. limb by the Sext. △ [Diſt. inter Aldeb. et occ. limb. per Sext. △]	Alt. of the eye of ♉ [Alt. oculi ♉]
6	20⅓	8 17½ B.			
6	21	8 17 [recte: 8 17½ — Corrigenda, p. 430] alt. pin.	36		
6	24¾			45 46 [recte: 45 56 — Corrigenda, p. 430]	
6	27½			45 54½	
6	31			45 52½	
6	34			45 51	
6	37			45 50	
6	40			45 48½	22
6	44	8 20 B.			

[1237] in the two lines below, the leaf sets the label *Decl. ſup. cornu* ☾ across both; *Alt. ſup.* stands on the first line only, its figure and the second line's last figure one above the other.

[1238] the leaf joins the line at 6 21 and the untimed line *alt. pin.* with a brace on their right, beyond which *36* stands level between the two lines, under the head *Alt. ſup. cornu*.

DIE 23 NOUEMBRIS.

Toward evening. At H. 7 33′ the ☾ in 90° from the ascendant. [Ad Veſperas. H. 7 33′ ☾ in 90° ab aſcendente.]

H.	M.	Decl. of the sup. horn of the ☾ [Decl. ſup. cornu ☾]	Between the eye of ☿ and the occ. limb of the ☾ by the Sext. △ [Inter oculum ☿ & occ. limb. ☾ per Sext. △]	Alt. of the sup. horn [Alt. ſup. cornu]
7	1½	11 58½ B.		38½
7	10		33 1	
7	13½		33 2	
7	16½		32 58	
7	18	12 1¾		40½
7	18½		32 58	
7	19⅙		32 57½	
7	34⅙	12 4½		
7	54½	12 6½		

1239

		Luc. Vult. occ.	Occ. limb. or.	the equatorial Dist. [Diſt. æquat.]	Alt. of the sup. horn [Alt. ſup. cornu]
7	7	64 10	32 30	96 40	
7	10⅙	64 53½	31 48¼	96 41¾	38¾
7	12	65 25½	31 17½	96 43	
7	15	66 6¾	30 38	96 44¾	
		the eye of ☿ or. [Oculus ☿ or.]			
7	21	62 39	29 3	33 36¾	40
7	23⅚	61 58	28 22½	33 35½	
7	26½	61 20½	27 46	33 34½	
7	30	60 25¼	26 52½	33 32¾	
7	32	59 53	26 21	33 32	
		Luc. Vult. occ.			
7	37	71 44¾	25 8	96 52¾	
		Not certain enough because of intervening clouds. [Non ſatis certa propter interuenientes nubes.]			
7	39	72 11½	24 40	96 51½	
		It was well clear again. [Erat bene ſerenum rurſus.]			
7	40½	72 37	24 16½	96 53½	42¼
7	52½	75 38½	21 17	96 55½	

[1239] the lines in smaller type *Oculus ☿ or.* and *Luc. Vult. occ.* stand over the first figure column. The two prose remarks stand between lines of the table, and the figures of the lines after them stand under the same heads; the word *bona* is set in smaller type below the last line.

	Luc. Vult. occ.	Occ. limb. or.	the equatorial Dist. [Diſt. æquat.]	Alt. of the sup. horn [Alt. ſup. cornu]
	good [bona]			

DIE 24 NOUEMBRIS.

Toward evening. At H. 8 47′ the ☾ in the 90th degree from the ascendant. [Ad Veſperas. H. 8 47′ ☾ in 90 Gradu ab aſcendente.][1240]

Alt. of the sup. horn [Alt. ſup. cornu]

- H. 8 21 — Decl. of the sup. horn of the ☾ [Decl. ſup. cornu ☾] — 15 12 — 45
- 8 26⅔ — the eye of ☿ from the mer. toward rising, for the clock [Oculus ☿ / a mer. ad ort. / pro Horologio] — 45 19
- 8 47½ — Decl. of the sup. horn [Decl. ſup. cornu] — 15 15⅓
- 9 4½ — 15 19

___[1241]

		the eye of ☿ or. [Oculus ☿ or.]	Occ. limb of the ☾ or. [Occ. limb. ☾ or.]	the equatorial Dist. [Diſt. æquat.]	Alt. of the sup. horn [Alt. ſup. cornu]
H8	33	43 39½	23 38	20 1½	46
8	36	42 56½	22 54½	20 2	
8	38	42 24½	22 22¾	20 1¾	
8	40½	41 47½	21 47½	20 0	
8	42⅔	41 15	21 17½	19 57½	46½
8	45¼ [recte: 45½ (corr. from 44¾) — Corrigenda, p. 430]	40 43½	20 46½	19 57	
8	49⅓	39 30	19 38¼	19 51¾	
8	51⅓	39 4	19 38¼ [recte: 19 9 — Corrigenda, p. 430]	19 55	
8	56⅙	37 55½	18 1	19 54½	
8	57⅔	37 30	17 39	19 51	
9	0	37 2¼	17 9¾	19 52½	
9	2⅓	36 21	16 30	19 51	

On 25 November, toward evening, at H. 10 8′ P. M. the ☾ in the 90th degree. [Die 25 Nouembris ad Veſperas H.10 8′ / P. M. ☾ in 90 Gradu.]

DIE 21 DECEMBRIS.

At H. 6 11′ P. M. the ☾ in the 90th degree. [H. 6 11′ P. M. ☾ in 90 Gradu.]

The eye of ☿ from the meridian toward rising, for correcting the clock: [Oculus ☿ a Meridie ad ortum pro corrigendo Horologio:]

[1240] in the lines below, the short head *Alt. ſup. cornu* stands at the right over the last figure of the first line only.

[1241] this page is set in two columns divided by a printed vertical rule.

- H. 5 31′ — 62 19½
- 5 41 40″ — 59 36

		Decl. of the sup. horn of the ☾ [Decl. ſup. cornu ☾]	Alt. of the sup. horn [Alt. ſup. cornu]
5	35	13 32½ B.	
5	40	13 34	41
6	3½	13 37	42½

1242

- 5 45¾ — Dist. between the occid. limb of the ☾ and the eye of ♉ by the Sext. △ [Diſt. inter / occid. limbum / ☾ & oculum / ♉ per Sext. △] — 25 54½
- 5 48⅔ — 25 55⅔
- 5 49½ — 25 56
- 5 50 — 25 57
- 5 50⅔ — 25 57½

		the eye of ♉ or. [Oculus ♉ or.]	Occ. limb of the ☾ or. [Occ. limb. ☾ or.]	the equatorial Dist. [Diſt. æquat.]	Alt. of the ☾ [Alt. ☾]
5	52⅓	56 59½	30 19	26 40½	
5	54½	56 26½	29 48¼	26 38¼	41½
5	56½	55 55	29 18	26 37	
5	58½	55 26½	28 51	26 35½	
6	0½	54 58	28 24	26 34	

DIE 23 DECEMBRIS.

Toward evening. At H. 8 51 the ☾ in the 90th degree. [Ad Veſperas. H. 8 51 ☾ in 90 Gradu.]

At hour 8 the clock was corrected. [Hora 8 horologium correctum eſt.]

At H. 8 28½′ the Decl. of the ☾ B. 18 22½; the Alt. of the ☾ 51°. [H.8 28½′ Decl. ☾ B. 18 22½ Alt. ☾ 51°]

- 8 57 — Decl. of the sup. horn of the ☾ [Decl. ſup. / cornu ☾] — 18 23⅔
- 9 2 — 18 24 nearly [fere], not clear enough. [non ſatis ſerenum.][1243]
- H. 8 29½ — corrected [corr.] 27⅙ — Dist. between the bright one of ♈ and the occid. limb of the ☾ by the Sext. △ [Diſt. inter lucidam ♈ et oc- / cid. limb. ☾ per Sext. △] — 36 37½

[1242] in the five lines below, the leaf sets one label across the first four lines, in the middle of the column, and a figure pair at the right of every line, in line with the last figures of the table above; no head stands over them.

[1243] in the three lines below, the two times *H.8 29½* and *corr.27⅙* are joined on their right by a brace, beyond which the words stand; the figure pair stands at the right on a third line.

Dist. between the occid. limb of the ☾ and the lower head of ♊. [Diſt. inter occid. limbum ☾ & infe- / rius caput ♊.][1244]

- 8 46½ — 42 30 — it was not clear enough [non erat ſatis / ſerenum]
- 8 49⅚ — 42 23½
- 8 51 — corrected [corr.] 48¾ — 42 25 — it was clear. [erat ſerenum [recte: ſerenius, "it was clearer" — Corrigenda, p. 430].]
- 8 51½ — 42 24¾[1245]

		By the subterranean armillae [Per Armillas ſubterraneas]: Occid. limb of the ☾ or. [Occid. limb. ☾ or.]	the bright one of ♈, occid. [Lucida ♈ occid.]	the equatorial Dist. [Diſt. æquat.]
8	39½	12 24⅔	26 23½	38 48⅙
cor- rected [corr.]	37⅙			
9	7½	5 38	32 25⅔	39 3⅔
cor- rected [corr.]	4 36	taking account of the error in the equatorial circle [habita ratione erroris in circulo æquatorio]		
9	10	5 4½	34 2	39 6½

1246

DIE 25 DECEMBRIS.

Toward evening. At H. 11 32 the ☾ in the 90th degree. [Ad Veſperas. H. 11 32 ☾ in 90 Gradu.]

At H. 11 9⅓ the Decl. of the sup. limb of the ☾ 18 33½. [H. 11 9⅓ Decl. ſup. limbi ☾ 18 33½][1247]

[1244] in the lines below, the times *8 51* and *corr.48¾* are joined on their right by a brace, beyond which *42 25* stands level between them; the figure pairs *42 25* and *42 24¾* are joined on their right by a second brace, beyond which stands *erat ſerenum.*; *non erat ſatis / ſerenum* is set across the first two lines.

[1245] in the table below, the head *Per Armillas ſubterraneas* spans the three value columns. The times *8 39½* and *corr.37⅙* are joined on their right by a brace, their values standing level between them. After *9 7½* and *corr. 4 36* a brace stands whose arms span the value line and the two lines of words that follow it.

[1246] Corrigenda, p. 430: in the codex Tycho himself added, at the end of this day (23 December), in codex V, "Tempus correctum habita ratione erroris in circulo æquatorio" — "Time corrected, taking account of the error in the equatorial circle." (The Corrigenda set no closing guillemet after these words.) The page already prints the words *habita ratione erroris in circulo æquatorio* earlier in this day's entry, beside the brace *9 7½ / corr. 4 36*; the codex addition begins *Tempus correctum*, so the printed words may be that addition set in a different place.

[1247] the label ☾ *occ.*, in smaller type, stands over the third column between the lines at 11 21 and 11 27. The times *11 32⅓* and *corr. 30⅙* are joined on their right by a brace, their values standing level between them. The last figure pair of the line at 11 37 and the words *non ſatis ſerenum* on the line below are joined on their right by a brace.

		the eye of ☿ occ. [Oculus ☿ occ.]	occid. limb of the ☾ or. [occid. limb. ☾ or.]	the equatorial Dist. [Diſt. æquat.]
II	17⅙	31 19½	1 37½	32 57
II	21	32 14	0 44½ the ☾ occ.	32 58½
II	27	33 40¼	0 37	33 3¼
II	32⅓	34 58¼	1 52⅔	33 5½
corrected [corr.]	30⅙			
II	34½	35 30½	2 24	33 6½
II	37	36 4½ not clear enough [non ſatis ſerenum]	2 58	33 6½
II	39⅔	36 47	3 37¼	33 9¾

1248

- II 15 — Dist. between the occ. limb of the ☾ and the eye of ☿ by the Sext. △ [Diſt. inter / occ. limb. ☾ / & oculum / ☿ per / Sext. △] — 31 37½
- II 17 — 31 38
- II 28½ — 31 42
- II 30⅙ — 31 43
- II 32½ — 31 43¾
- II 36 — 31 45
- II 38 — 31 46½
- II 41⅙ — 31 50

It was not clear enough, for a halo appeared around the ☾. [Non fuit ſatis ſerenum, nam appar- / uit circa ☾ Halo.]

The clock corrected around H. 9. [Horologium circa H. 9 correctum.]

Places of the Moon [LOCA LUNÆ.]

Examination of the observation of the ☾ made on 2 January. [Examinatio obſeruationis ☾ factæ DIE 2 JANUARIJ.]

- H. 8 21 P. M. — distance of the Mer. head of ♊ from the centre of the ☾ [Diſtantia capitis Mer. ♊ a centro ☾] — 39 26
- declination of the head of ♊ [Declinatio capitis ♊] — 28 57½ B.
- declination of the centre of the ☾ [Declinatio centri ☾] — 19 52 B.
- angle of the ascensional difference [Angulus differentiæ aſcenſionalis] — 42 23 3
- right ascension of the head of ♊ [Aſcenſio Recta capitis ♊] — 109 56
- of the centre of the ☾ [centri ☾] — 67 33
- But let the right ascension of the ☾ be taken as [Aßumatur autem Aſcenſio R. ☾] — 67 32

[1248] in the eight lines below, the leaf sets one label across the first five lines and a figure pair at the right of every line, in line with the last column of the table above; no head stands over them.

- corresponding longitude of the centre of the ☾ [Reſp. Longitudo centri ☾] — 8 55 ♊
- latitude of the same [Latitudo eiusdem] — 2 1 M.
- And there was then in the ascendant [Fuit autem tunc in aſcendente] — 9¾ ♍

N.B. If the right ascension of the Mer. head of ♊ were 109 58, as the declination of the centre of the ☾, taken proportionally, is 19 47 8 [recte: 19 47 B — Corrigenda, p. 430] at H. 8.21, then from the distance of the centre of the ☾ from the head of ♊ there results a difference of right ascension of 42 21, and a right ascension of the centre of the ☾ of 67 37; corresponding longitude 8 59 ♊, latitude 2 6½ M. Michael Mästlin's Ephemerides give the place of the ☾ as 9 13 ♊. Therefore the ☾ was then almost in the 90th degree of the ecliptic toward rising, lacking any sensible parallax of longitude, and its whole parallax falls in latitude. [N.B. Aſc. R. capitis Mer. ♊ eßet 109 58, vt Declinatio centri ☾ proportio- / naliter accepta 19 47 8 ad H.8.21, hinc ex diſtantia centri ☾ a capite ♊ pro- / uenit differentia Aſc. R. 42 21 & Aſc. R. centri ☾ 67 37, reſp. Long. 8 59 ♊, / Lat. 2 6½ M. Ephemerides Mæſtlini dant locum ☾ 9 13 ♊. Quare ☾ fuit tunc / quaſi in 90 Gradu Eclipticæ ad ortum, carens omni ſenſibili Parallaxi Longi- / tudinis, & tota ipſius Parallaxis cadit in latitudinem.]

- H. 8 M. 16 — distance of the centre of the ☾ from the Merid. head of ♊ [Diſt. centri ☾ a Merid. capite ♊] — 39 31
- Hence the difference of right ascension of both results as [Hinc prouenit Diff. Aſc. R. vtriusque] — 42 28 47
- right ascension of the centre of the ☾ from the head of ♊ [Aſc. R. centri ☾ ex capite ♊] — 67 27¼
- from the head of ♈ [ex capite ♈] — 67 28
- Therefore, taking the right ascension of the centre of the ☾ as [Aßumpta igitur Aſcenſione R. centri ☾] — 67 27½ — and with the declination of the centre of the ☾ remaining the same as above [& manente eadem / Declinatione centri ☾ vt ſupra] — 19 52[1249]
- the longitude of the centre of the ☾ is therefore [eſt igitur Long. centri ☾] — 8 51 ♊
- latitude of the same [Lat. eiusdem] — 2 0¼

From Mästlin, reduced to the time: 9 10 ♊; at H. 8 M. 16. the longitude of the ☾ 8 54⅓ ♊, latitude 2 6¾ M. [Ex Mæſtlino ad tempus reductum / 9 10 ♊ H.8 M.16. Long. ☾ 8 54⅓ ♊ / Lat. 2 6¾ M.]

Computation of the place of the ☾ for the day 10 January, in the morning, H. 6 M. 4 [recte: H. 6 M. 14 — Corrigenda, p. 430]. [Supputatio loci ☾ ad diem 10 JANUARIJ, Mane H.6 M.4][1250]

[1249] the three lines below are set in two parts divided by a short printed vertical rule.

[1250] in the lines below, the last two figure pairs stand under the right ascension of Regulus with no label and no rule; the two lines at the right, given after them, stand level with those two figure pairs.

- distance of the centre of the ☾ from the heart of ☋ [Diſt. centri ☾ a corde ☋] — 36 14
- declination of the ☾ [Declinatio ☾] — 4 33 M.
- of Regulus [Reguli] — 13 58 B.
- right ascension of Regulus [Aſc. R. Reguli] — 146 32
- 31 23
- 177 55
- corresponding longitude [Reſp. Long.] — 29 55⅙ ♍
- latitude [Lat.] — 5 0 0 M.

Investigation of the place of the ☾ from observations made on 27 February, *the ☾ near the 90th degree*. [Inveſtigatio loci ☾ ex obſeruationibus factis DIE 27 FEBRUARIJ, ☾ *iuxta 90 / Gradum*.][1251]

- distance of the centre of the ☾ from Aldeb. [Diſt. centri ☾ ab Aldeb.] — 22 28
- declination of the centre of the ☾, Bor. [Decl. centri ☾ Bor.] — 19 43
- angle of the ascensional difference [Angulus diff. aſcenſ.] — 23 11⅔
- right ascension of Aldeb. [Aſc. R. Aldeb.] — 63 5
- right ascension of the centre of the ☾ [Aſc. R. centri ☾] — 86 16⅔
- corresponding longitude [Reſp. Long.] — 26 29¼ ♊
- visible latitude [Lat. viſa] — 3 45⅓ M.
- Mästlin's Ephemerides give [Ephem. Mæſtlini dant] — 26 27 ♊
- Cyprian's offer [Cypriani præbent] — 26 14 ♊
- *The* ☉ *was in 19* ♓. [☉ *erat in 19* ♓.]

Hence the Copernican equation of time comes to 4 minutes, which make 2 minutes in the ☾; so the place of the ☾ would have been two minutes later, namely at 26 31 ♊. [Vnde æquatio temporis Copernicana prouenit 4 ſcrupulorum, quæ effici- / unt 2 ſcrupula in ☾, quare locus ☾ fuißet duobus ſcrupulis poſterior, videli- / cet in 26 31 ♊.]

Assuming the truer right ascension of Aldeb., 63 3, the right ascension of the centre of the ☾ must be set at 86 14⅔, from which the longitude of the ☾ is 26 27 ♊ and the latitude 3 45¾ M. From the tables, according to the correction of the mean motions, 26 40 13 ♊ corresponds — a difference of 0°13′13″. [Suppoſita veriori Aſcenſione R. Aldeb. 63 3, ponenda venit Aſc. R. centri ☾ / 86 14⅔, vnde Longitudo ☾ 26 27 ♊, Latitudo 3 45¾ M. Reſpondet ex tabulis / iuxta mediorum motuum correctionem 26 40 13 ♊, differentia 0°13′13″.]

DIE 28 FEBRUARIJ.[1252]

H. 7 M. 42

- distance of the centre of the ☾ from Aldeb. [Diſt. centri ☾ ab Aldeb.] — 37 19
- declination of the centre, B. [Decl. centri B.] — 18 16

[1251] the five lines below are set in two parts divided by a printed vertical rule.

[1252] the lines below are set in two columns divided by a printed vertical rule. In the right column an empty line stands level with the left column's parenthesis.

- (taking the semidiameter as 16′) [(aßumendo ſemidiam. 16′)]
- declination of Aldeb. [Declin. Aldeb.] — 15 36
- right ascension of Aldeb. [Aſc. R. Aldeb.] — 63 3
- right ascension of the ☾ [Aſc. R. ☾] — 102 1 46
- Resp. longitude of the ☾ [Reſp. Longitudo ☾] — 11 27 19 ♋
- latitude [Latitudo] — 4 16 56 M.

H. 7 M. 48

- distance of the centre of the ☾ from the heart of ♌ [Diſt. centri ☾ a corde ♌] — 42 50
- declination of the centre, B. [Declin. centri B.] — 18 15½
- declination of the heart of ♌ [Decl. cordis ♌] — 13 58
- right ascension of the heart of ♌ [Aſc. R. cordis ♌] — 146 32
- right ascension of the ☾ [Aſc. R. ☾] — 102 5 8
- Resp. longitude of the ☾ [Reſp. Longitudo ☾] — 11 30 33 ♋
- latitude [Latitudo] — 4 17 9 M.

Computation of the true longitude of the ☾ on 26 April, near the 90th degree, when it was perigean and in □ʳᵃ. [Supputatio veræ longitudinis ☾ DIE 26 APRILIS iuxta 90 gradum, cum eßet / perigæa & in □ʳᵃ.][1253]

- H. 7 M. 36 — distance of the centre of the ☾ from ♀ [Diſt. centri ☾ a ♀] — 47 15
- declination of the centre of the ☾ [Decl. centri ☾] — 10 8
- declination of ♀ [Decl. ♀ʳⁱˢ] — 26 29
- right ascension of ♀ [Aſc. R. ♀ʳⁱˢ] — 91 3
- therefore the right ascension of the ☾ [Ergo Aſc. R. ☾] — 138 6
- Resp. longitude [Reſp. Longitudo] — 17 25 57 ♌
- latitude [Latitudo] — 5 48 4 M.[1]
- From the Prutenic tables, with the mean motions corrected: [Ex tabulis prutenicis, correctis me- / dijs motibus]
- longitude of the ☾ [☾ Longitudo] — 17 26 30 ♌

Parallax near the ninetieth degree 33′27″; therefore our latitude 5 14 37 M. From the observation, which, however, is not very reliable because of the uncertain declination of the ☾. [Parallaxis iuxta nonageſimum gradum 33′27″, ergo noſtra Latitudo 5 14 37 M. / Ex obſeruatione quæ tamen non adeo rata eſt propter incertam ☾ Declina- / tionem.]

Calculation for the true place of the ☾ on 6 September. [Calculus pro vero loco ☾ DIE 6 SEPTEMBRIS.]

- hour 8 M. 36⅖ A. M. [Hora 8 M. 36⅖ A. M.] — distance of the eastern limb of the ☾ from the ☉ [Diſt. orientalis limbi ☾ a ☉ˡᵉ] — 98 18 30
- semidiameter of the ☾ [Semidiameter ☾ᵉ] — 16 0
- distance of the centre of the ☾ from the ☉ [Diſtantia centri ☾ a ☉ˡᵉ] — 98 34 30

[1253] the five lines below are set in two parts divided by a short printed vertical rule.

The altitude of the ☉ is about 23°, and so its refraction and parallax cancel each other out in such a way that there is no difference between the true and the visible right ascension of the ☉. [Altitudo ☉^{lis} 23° circiter, atque idcirco refractio et parallaxis eius ita ſe mu- / tuo elidunt, vt inter veram & viſam Aſcenſionem rectam ☉ nulla ſit differentia.][1254]

- true place of the ☉ [Verus locus ☉^{lis}] — 23 5 0 ♍
- Resp. right ascension [Reſp. Aſcenſio Recta] — 173 39⅙
- equinoctial distance of the ☾ from the ☉ [Diſt. æquinoctialis ☾ a ☉] — 98 34 30
- right ascension of the centre of the ☾ [Aſc. R. centri ☾] — 75 4 40
- observed declination [Declin. obſeruata] — 18 53 B.
- Resp. visible longitude of the ☾ [Reſp. ☾^{æ} viſæ Long.] — 15 52 0 ♊
- latitude [Lat.] — 3 54⅖ M.
- equation of time 13⅓ subt. [Æquatio temporis 13⅓ ſubt.]
- longitude of the ☾ from the Prutenic tables with corrected motions [Long. ☾ ex Tab. Prut. correctis moti- / bus] — 15 52 45 ♊

For the true place of the ☾ from the observation: [Pro vero loco ☾ ex obſeruatione:]

- At the time of the observation, the right ascension of the midheaven [Tempore obſeruationis, Aſcenſio Recta Medii Cœli] — 122 45⅙
- visible right ascension of the ☾ [Aſcenſio Recta ☾ viſa] — 75 4⅔
- distance of the ☾ from the meridian [Diſtantia ☾ a meridiano] — 47 40½

Diagram. A figure of curved lines at the left of the text, drawn as a narrow curved triangle. The letter A stands at the left, at a sharp point. From A one arc rises and runs right to a point lettered B at the top. From B a line curves down and to the right to a point lettered C at the foot. From A two further curves, lying close together, sweep down and to the right: the upper of the two ends at the line from B, beside the letter D, which stands just right of the line; the lower one ends at C. No star-marks are drawn. The letters are drawn in the figure, not set in the text lines: A and B upright, D and C slanting. To the right of the figure, text is set (below).

- A (left, sharp point): A
- B (top): B
- D (right, on the line from B, a little above C): D
- C (foot): C[1255]

For the altitude of the ☾. [Pro ☾ altitudine.]

In the triangle ABC are given: [In triangulo ABC dantur:]

- BA — 34 5½ — compl. eleu. of the pole [compl. eleu. poli]
- CA — 71 7 0 — compl. of the visible declination [compl. decl. viſæ]
- BAC — 47 40½ — distance of the ☾ from the meridian [diſt. ☾ a merid.]

[1254]the five lines below are set in two parts divided by a printed vertical rule.

[1255]the lines below stand to the right of the figure; the block that begins *Alt. vera* stands beyond a printed vertical rule, which begins level with *Pro ☾ altitudine.* and stops level with *Ergo CB*; the last line, *et ABC …*, runs on beneath the foot of the rule.

- therefore CB [Ergo CB] — 51 18½ — compl. of the visible altitude of the ☾ [compl. alt. ☾ viſæ]
- and ABC [et ABC] — 116 19⅚ — compl. of the azimuth to 180. [compl. Azimuth ad 180.]
- true altitude of the ☾ [Alt. vera ☾] — 38 41½
- parallax in the circle of altitude from the Prutenic tables [Parallaxis in circulo / altitudinis ex Tab. / Prut.] — 48⅙
- therefore the true altitude [Ergo vera Alt.] — 39 29⅔
- [1] There is written beside it: »*This computation has been revised and corrected because of an error in the time*«. [Adſcriptum eſt: »*Reuiſa eſt hæc ſupp. et correcta propter aberrationem temporis*«.]

II. For the separation of the parallaxes in right ascension and declination. [II. Pro discretione parallaxium in Aſcenſione R. et Declinatione.][1256]

In the △ ABD are given: [In △ ABD dantur]

- BA — 34 5 30
- DB — 50 30 20
- ABD — 116 19 50
- therefore DA [Ergo DA] — 70 26 13 — Compl. of the true declination of the ☾ [Compl. veræ / decl. ☾]
- BAD — 47 13 20 — true distance of the ☾ from the merid. [vera diſt. ☾ / a merid.]
- therefore the true right ascension of the ☾ [Ergo vera Aſc. R. ☾] — 75 31⅚
- declination B [Decl. B] — 19 33 47
- Resp. longitude [Reſp. Long.] — 16 21 47 ♊
- latitude [Lat.] — 3 16 42

DIE 8 SEPTEMBRIS.

Examination of the place of the ☾ when it was near the 90th degree, lacking, as it were, parallax of longitude. [*Examinatio loci ☾ cum eßet prope 90 gradum carens quaſi parallaxi lon- / gitudinis.*]

On this day the ☾ should have been in the 90th degree at 7ʰ 40ᵐ A. M. [*Debuit hoc die ☾ eße in 90 gradu 7ʰ 40ᵐ A. M.*]

At hour 7 M. 57, when the Moon had passed the 90th degree by at least 17 minutes of time, and so did not cause much perceptible parallax, its eastern limb was seen to be distant from the ☉, in parts of the equator, 71 and 3. And since the diameter of the ☾ was about 30, as far as could be seen, reasoning from the declination through both horns, the semidiameter was 15, which make 16 on the equator. The distance of the centre of the ☾ from the centre of the ☉ in degrees of the equator was therefore 71 19. And since the visible declination of the ☉ at that time was 1 57 north, the visible longitude of the ☉ was in 25 6 ♍; but you will rather take the place of the ☉ from the ephemerides, in 25 2 ♍, whose right ascension

[1256] the lines below are set in two parts divided by a printed vertical rule.

- *is 175 27;*
- *if the distance of the ☾, 71 19, is subtracted from this,*

its right ascension comes out as 104 8. And since, about the same time of the observation, the upper horn had a declination of 17 42 and the lower 17 14, the declination of the centre of the ☾ was the intermediate one, 17 28. Therefore, from the given right ascension of the ☾, 104ᵍ 8′, and its visible declination, 17 28, our tables give the longitude ♋ 13 31, and together with it the visible latitude of the ☾, 5 23. Michael Mästlin's calculation gives the longitude of the ☾ as 13 28, without taking account of the equation of time, which deviates imperceptibly from the truth. (Note: the visible place of the Sun was not correctly taken from the visible declination; therefore repeat[1].) Cyprian's Ephemerides give the longitude as 13 17; and if the equation of time were applied in both, it would become still less in the place of the ☾. [*Hora 7 M. 57 cum luna ſaltem 17 ſcrupulis temporis exceßißet 90 gradum / ideoque non multum perceptibilem cauſaret parallaxin, viſus eſt ipſius / limbus orientalis diſtare a ☉ in partibus æquatoris 71 & 3. Cumque diame- / ter ☾ fuerit quaſi 30 quantum videbatur per vtraque cornua ratiocinando ex / declinatione, erat ſemidiameter 15, quæ in æquatore cauſant 16. Erat ita- / que diſtantia centri ☾ a centro ☉ in gradibus æquatoris 71 19, cumque decli- / natio ☉ viſa eßet tunc temporis 1 57 borea, longitudo ☉ viſa erat in 25 6 ♍, / ſed potius ex ephemeridibus accipies locum ☉ in 25 2 ♍, cuius Aſc. Recta / eſt 175 27 / hinc ſi auferatur diſtantia ☾ 71 19 / prouenit ipſius Aſcenſio Recta 104 8, cumque circa idem tempus obſer- / uationis ſuperius cornu haberet declinationem 17 42, inferius 17 14, erat / declinatio centri ☾ intermedia 17 28. Ergo ex data Aſcenſione Recta ☾ 104ᵍ / 8′ & declinatione eius viſa 17 28 datur ex noſtris tabulis Long. ♋ 13 31 & / vna datur Lat. viſa ☾ 5 23. Calculus Mæſtlini præbet Longit. ☾ 13 28 non / habita ratione æquationis temporis, id quod inſenſibiliter a vero deuiat. / (Nota, non recte capiebatur locus Solis viſus ex declinatione viſa, ideo / repete[1]). Ephemerides Cypriani dant Long. 13 17, quod ſi æquatio tempo- / ris vtrobique adhiberetur adhuc minus fieret in ☾ loco.*][1257]

- *Latitude of the ☾ in both is 4ᵍ 32′ M.* [*Latitudo ☾ vtrobique eſt 4ᵍ 32′ M.*]
- *visible latitude* [*Latitudo viſa*] — 5 23
- *parallax of latitude* [*Parallaxis latitudinis*] — 51.

DIE 10 SEPTEMBRIS.

Examination of the place of the ☾ from these observations when it was in the 90th degree of the ecliptic from the horizon, which happened at H. 10⅔ before noon. [*Examinatio loci ☾ ex his obſeruationibus quando erat in 90 gradu Eclip- / ticæ ab horizonte, id quod eueniebat H. 10⅔ ante Meridiem.*]

At that same moment, by observation, its eastern limb was distant from the centre of the ☉, in degrees of the equator, 42ᵍ 10′; so the centre ☉ in the same, 42 25; the visible declination of the centre is gathered as 11 0, having regard to the preceding and the seq. These are given by the observation in the ☾. In the Sun, however, from

[1257] in the paragraph above, the two lines *eſt 175 27* and *hinc ſi auferatur diſtantia ☾ 71 19* are set as a displayed subtraction, the figures one under the other, with a short printed horizontal rule under *71 19*; the text then runs on with *prouenit*.

its visible declination about hour 11, P. 1 M. 7½, its place is given in 27 10 ♍; but following our Ephemerides the longitude of the ☉ was then 27ᵍ 6′, and we shall rather use this, as before. Therefore the right ascension of the ☉ will be given as 177 21, and on that account the right ascension of the centre [*Diſtabat autem tunc in eodem momento per obſeruationem eius limbus / orientalis a centro ☉ in gradibus æquatoris 42ᵍ 10′, quare centrum ☉ in ijs- / dem 42 25, declinatio viſa centri colligitur 11 0, habito reſpectu anteceden- / tium et ſeq. Hæc dantur per obſeruationem in ☾. In Sole vero ex declina- / tione viſa ipſius circa horam 11, P. 1 M. 7½ datur locus eius in 27 10 ♍, ſed / ſequendo Ephemerides noſtras erat tunc ☉ Long. 27ᵍ 6′, atque hac vtemur / potius vt prius. Ergo Aſc. recta ☉ dabitur 177 21 & ob id Aſc. recta centri*]

• [1] Added later. [Poſtea adſcriptum.]

☾ 134 56. The visible declination of the centre of the ☾, moreover, was 11 0. From this our tables yield the longitude of the Moon, 14ᵍ 12′ ♌, and the visible latitude, 5ᵍ 52′ M. [*☾ 134 56. Declinatio vero centri ☾ viſa erat 11 0. hinc ex noſtris tabulis / prouenit lunæ longitudo 14ᵍ 12′ ♌, latitudo viſa 5ᵍ 52′ M.*]

Michael Mästlin's Ephemerides have the place of the ☾ in 14ᵍ 11′ ♌, but Cyprian's Ephemerides have 14 33 ♌; the latitude in both is 4 57. It is therefore clear that Michael Mästlin's Ephemerides, computed from the Prutenic calculation, agree quite exactly with the observation at this point, as they also did on the earlier day, the 8th, without the equation of time being applied, but merely by subtracting half an hour for the reduction. [*Mæſtlini Ephemerides habent ☾ locum in 14ᵍ 11′ ♌, ſed Ephemerides Cy- / priani habent 14 33 ♌, latitudo vtrobique 4 57. Patet itaque quod Epheme- / rides Mæſtlini ex Prutenico calculo ſupputatæ hoc in loco vt etiam in pri- / ori die 8 ſatis exacte cum obſeruatione conſentiant non adhibita æquatione / temporis, ſed ſaltem pro reductione ſubtrahendo dimidiam horam.*]

The parallax of latitude comes out as 55′. [*Parallaxis latitudinis prouenit 55′.*]

The diurnal motion of the ☾ from the observation of the eighth day to this one, if it is subtracted, will be as follows. [*Motus diurnus ☾ ab obſeruatione diej octaui in hunc ſi auferatur ſic ſe / habebit.*][1258]

	Observed [*Obſeruatus*]	*Prutenic* [*Prutenicus*]	*Alfonso X* [*Alphonſus*]
8ᴰ 7ᴴ 57ᴹ AM	*13 31 ♋*	*13 28 ♋*	*13 17*
10 10 40	*14 12 ♌*	*14 11*	*14 32*
motion in the meantime [*Motus interea*]	*30 41*	*30 43*	*31 15*

It is therefore clear that the apparent motion of the Moon over this interval of roughly two days agrees quite exactly with the hypotheses of Copernicus, and differs from Alfonso X's by 34 M.; hence the Ptolemaic theory is false. [*Patet itaque motum Lunæ apparentem hoc interuallo duorum quaſi die- / rum ſatis exacte conſentire cum Copernici hypotheſibus, differre ab Al- / phonſi 34 M., vnde falſa eſt Ptolemaica theoria.*]

[1258] in the first line of the columns below, *AM* is set in small capitals beneath *57ᴹ*, between the first and second lines.

DIE 22 OCTOBRIS.

Investigation of the place of the ☾ at the first time of observation, when the ☾ was not far from 90 G. [Inquiſitio loci ☾ ad primum obſeruationis tempus cum ☾ non procul abeßet / a 90 G.][1259]

- H. 5 32 — difference of ascension R. between the occid. limb of the ☾ and the bright one of the Vulture [Differentia Aſc. R. inter occid. limbum ☾ / & lucidam Vulturis] — 41 54
- add for the diameter [Adde pro diametro] — 16
- 42 10
- ascension R. of the Vulture [Aſc. R. Vulturis] — 292 37⅙
- ascension R. of the centre of the ☾ [Aſc. R. centri ☾] — 334 47⅙
- declination [Declinatio] — 5 54 M.

Resp. longitude of the ☾ 4 29 22 ♓, latitude 4 17 20 Sept. *The parallax of longitude adds roughly one minute.* [Reſp. Long. ☾ 4 29 22 ♓, Lat. 4 17 20 Sept. *Parallax. Longit. addit quaſi / vnum minutum.*]

From the observation [Ex obſeruatione]	From Michael Mästlin's Ephemerides [Ex Ephem. Mæſtlini]	From Cyprian [Ex Cypriano]
longitude of the ☾ [Long. ☾] 4 29⅓ ♓	4 34 ♓	5 8 ♓
latitude of the ☾ [Lat. ☾] 4 17⅓ B.	4 19 B.	4 19 B.

DIE 23 DECEMBRIS.

The ☾ about the ninetieth degree at H. 8 51. [☾ circa nonageſimum gradum H. 8 51.]

H. 8 M. 48¾: distance of the centre of the ☾ from the lower head of ♊, 42 9½, subtracting 15½′ for the semidiameter. [H. 8 M. 48¾ Diſtantia centri ☾ ab inferiori capite ♊ 42 9½, ſubtrahendo pro / ſemidiametro 15½′.][1260]

- declination of the centre of the ☾ [Declin. centri ☾] — 18 8 B.
- declination of the lower head of ♊ [Declin. infer. cap. ♊] — 28 57¾ B.
- ascension R. of the lower head of ♊ [Aſc. R. infer. cap. ♊] — 109 58
- Ang. difference of ascension [Ang. diff. aſcenſ.] — 44 44¾
- therefore the ascension R. of the ☾ [Ergo Aſc. R. ☾] — 65 13¼
- Resp. longitude [Reſp. Long.] — 6 29 8 ♊
- latitude [Lat.] — 3 23⅚ M.
- Conversely. H. 9 M. 4⅗: distance æquat. between the centre of the ☾ and the bright one of ♈ [Vice verſa. H. 9 M. 4⅗ Diſt. æquat. inter centrum ☾ et lucidam ♈] — 39 19 10

[1259] the first line below runs on into a block set at the right of the measure; a short printed horizontal rule stands under *16*, beneath the figure places only; the line *Declinatio 5 54 M.* stands alone at the left, level with the last line of the right-hand block.

[1260] the four lines below are set in two parts divided by a printed vertical rule; the right part has no fourth line.

• ascension R. of the bright one of ♈ [Aſcenſio R. lucidæ ♈] — 26 0½
• therefore the ascension R. of the ☾ [Ergo Aſcenſio R. ☾] — 65 19 40

Resp. longitude 6 34⅔ ♊, latitude 3 24⅔ M. [Reſp. Long. 6 34⅔ ♊, Lat. 3 24⅔ M.]

OBSERUATIONES RELIQUORUM QUINQUE PLANETARUM.[1261]

DIE 2 JANUARIJ.

• H. 6. 0 — ♃ on the meridian, by the Tichon. [♃ in meridiano per Tichon.] — 43 13 2[?]

When ♂ was distant from the meridian, H. 5 0′ A. M., its declination by the northern armillae was 15 10 Sept. [Cum ♂ abeßet a merid. H. 5 0′ A. M. / fuit eius Declin. per Armillas Boreales / 15 10 Sept.]

By the sextant △ [Per Sextantem △][1262]

• H. 9 M. 50 — between ♂ and [Inter ♂ &] — 42 43½
• 9 57 — the lower [inferius] — 42 43⅔
• 10 3 — head of ♊ [caput ♊] — 42 43⅔
• 11 0 — between ♃ and the eye of ♉ [Inter ♃ & oculum ♉] — 37 46½

DIE 3 JANUARIJ.

• The meridian Alt. of ♂ by the Q. Tich. (it was not clear enough) [Alt. ♂ merid. per Q. Tich. (non erat / ſatis ſerenum)] — 49 12⅓[1263]
• H. 2 M. 50 — between ♂ and [inter ♂ &] — I 7 9⅙
• the heart of ♌ [cor ♌] — II 7 9 0
• H. 3¼ — between ♂ and the tail of ♌ [inter ♂ & caudam ♌] — 17 27½
• by the sextant △. [per Sext. △.]

DIE 6 JANUARIJ.

These observations were made with the northern armillae, the sky being moderately clear. [Hæ obſeruationes factæ ſunt per / Armill. Boreal., cœlo mediocriter ſe- / reno.]

When ♃ was distant from the meridian [Cum ♃ abeßet / a meridiano]	♀ was distant from the meridian [Diſtabat ♀ / a meridiano]	Diff. Ascens. of both [Diff. Aſcenſ. / vtriusque]
11 52 A. M.	48 32 P. M.	60 24
10 54	49 27½	60 21½
9 50	50 35	60 25

[1264]

[1261] below this heading the side is set in two columns divided by a printed vertical rule.
[1262] in the four lines below, each line carries its own time at the left and its own figures at the right; the words *Inter* ♂ *&* / *inferius* / *caput* ♊ run down the first three lines.
[1263] a printed brace stands at the right of the figures of the first three lines below, pointing to the right at the second line.
[1264] in the line below, the figures stand under the third column of the setting above.

• meridional declination of ♀ [Declin. ♀ meridiana] — 15 45

It was found to be such when it was first observed; afterwards, the more ♀ sank towards the horizon, the smaller the declination it always had, so that at last it was 15°40′ by the northern armillae. It was not clear enough. [Talis cum primum obſeruabatur in- / uenta eſt, poſtea quo magis ad hori- / zontem vergebat ♀, eo minorem eti- / am declinationem ſemper habuit, vt / tandem 15°40′ fuerit per Armillas Bo- / reales. Non erat ſatis ſerenum.]

DIE 7 JANUARIJ.

By the northern armillae, the distance from the meridian was: [Per Armillas Boreales diſtabat a me- / ridiano]

• ♃ towards the rising [♃ verſus ortum] — 8 34
• ♀ towards the setting [♀ verſus occaſum] — 50 25½
• Diff. Ascens. R. of both [Diff. Aſcenſ. R. vtriusque] — 58 59½
• southern declination of ♀ [Declin. ♀ Auſtralis] — 15 18
• meridian Altit. of ♃ [Altit. ♃ meridiana] — 43 23¾[1265]

♄ from the meridian [♄ a merid.]	the eye of ♉ from the meridian [Oculus ♉ / a merid.]	Diff. Ascens. R. of both [Diff. Aſcenſ. / R. vtriusque]
26 43	34 14¾	60 57¾
30 0¾	30 56 50	60 57 35
31 23	29 34½	60 57½
	the right hum. of Orion, or. [Dexter hum. / Orionis or.]	
33 27⅙	47 40	81 7⅙
34 33	46 34¼	81 7¼

1266

♂ from the meridian [♂ a merid.]	♃ from the meridian [♃ a merid.]	Diff. Asc. R. [Diff. Aſc. R.]
59 59	67 45	127 44
58 40½	69 4	127 44½
	the eye of ♉ from the meridian [Oculus ♉ / a merid.]	
55 33	34 27	90 0
54 50¼	35 10	90 0¼

• declination of ♂ [Declin. ♂] — I 15 35
• II 15 35

[1265] in the setting below, a head is printed in the middle column only above the fourth and fifth lines of figures.

[1266] in the setting below, a head is printed in the middle column only above the third and fourth lines of figures.

	the right hum. of Orion [Hum. dexter / Orionis]	Diff. Asc. R. [Diff. Afc. R.]
27 34	42 17½	69 51½
25 6⅔	44 45	69 51⅔

The preceding observations were made with the northern armillae. [Præcedentes obſeruationes per Ar- / millas Boreales factæ ſunt.][1267]

- H. 5 M. 20½ — Dist. [Diſt.] — I 38 2
- between [inter] — II 38 2
- 5 21½ — ♄ — 38 1⅔
- 5 24½ — and ♀ [& ♀] — 38 1½
- 6 14 — dist. between [diſt. inter] — 25 40⅙
- ♃ and ♄ [♃ & ♄] — 25 40

When the eye of ☿ was distant from the meridian H. 23. 16, the dist. between the eye of ☿ and ♃ by the sextant △ was: [Cum oculus ☿ abeßet a meridiano / H. 23. 16, per Sext. △ fuit diſt. inter / oculum ☿ & ♃]

- I 37 21½
- II 37 21½
- III 37 21⅓

♂ had on the meridian an Alt., by the Tichon., of 49 41½. [♂ habuit in merid. Alt. / per Tichon. 49 41½]

DIE 8 JANUARIJ.

In the evening. [Ad Veſperas.]

- ♃ on the meridian [♃ in meridiano] — 43 25⅔

the eye of ☿ from the meridian [Oculus ☿ / a merid.]	♀ from the meridian [♀ a / merid.]	Diff. Asc. R. of both [Diff. Afc. / R. vtriusque]
41 5	54 42½	95 47½
40 27	55 20⅔	95 47⅔

- declination of ♀ [Declin. ♀] — I 14 52
- II 14 52

___[1268]

the lower head of ☊ from the meridian [Infer. cap. ☊ / a merid.]	♃ from the meridian [♃ a / merid.]	Diff. Asc. R. of both [Diff. Afc. / R. vtriusque]
59 33¾	25 0	84 33¾

[1267] in the six lines below, each line carries its own time (where printed) at the left and its own figures at the right; the words *Diſt.* / *inter* / ♄ / & ♀ run down the first four lines, and *diſt. inter* / ♃ & ♄ down the last two.

[1268] below the running head the side is set in two columns divided by a printed vertical rule. In the setting below, a head is printed in the first column only above the third and fourth lines of figures, and again above the fifth and sixth.

the lower head of ♊ from the meridian [Infer. cap. ♊ / a merid.]	☋ from the meridian [☋ a / merid.]	Diff. Asc. R. of both [Diff. Afc. / R. vtriusque]
58 23½	26 10⅙	84 33⅔
♄ towards the setting [♄ verſ. occ.]		
65 41¾	42 29	23 12¾
66 31⅔	43 19	23 12⅔
the eye of ♉ towards the setting [Ocul. ♉ / verſ. occ.]		
18 0½	55 36	37 35½
18 44½	56 20	37 35½

1269

- H. 5 15′ 45″ — distance [Diſtantia] — 36 53
- 5 18 — between [inter] — 36 53
- 5 20 30 — ♀ and ♄ [♀ & ♄] — 36 53½
- 5 30 50 — distance [Diſt.] — 25 42
- 5 35 30 — between [inter] — 25 42
- 5 36 50 — ☋ and ♄ [☋ & ♄] — 25 42
- 6 11 20 — distance between the eye of ♉ and ☋ [Diſtantia inter / oculum ♉ & ☋] — 27 17⅓

These observations were made with the triangular sextant. [Hæ obſeruationes factæ ſunt per / Sext. Trigon.]

DIE 9 JANUARIJ.

A. M. Decl. of ♂, 15 50, by the northern armillae. [A. M. Decl. ♂ 15 50 per Arm. Bor.]

It was such when the southern head of ♊ was distant from the meridian H. 7¼ towards the setting; at the same time the distance between ♂ and Spica ♍ was 49 20, by the sextant. [Talis erat, quando Meridionale Ca- / put ♊ abeßet a Meridie H. 7¼ verſus / occaſum, fuit eodem tempore diſtan- / tia inter ♂ & Spicam ♍ 49 20 per Sext.]

Toward evening. By the northern armillae. [Ad Veſperas. Per Armillas Boreales.]

the eye of ♉ from the meridian, towards the rising [Oculus ♉ a mer. / verſ. ortum]	♄ from the meridian, towards the setting [♄ a mer. / verſ. occaſ.]	Diff. Asc. R. of both [Diff. Afc. R. / vtriusque]
31 50	29 1½	60 51½
28 39½	32 12	60 51½

- Diff. Asc. R. between ☋ [Diff. Afc. R. inter ☋] — 84 20½
- and the lower head of ♊ [& inf. cap. ♊] — 84 21

[1269] in the lines below, each line carries its own time at the left and its own figures at the right; the words run down the middle of the lines, the last pair of lines carrying one entry.

- The same head of ♊, moreover, was distant from the meridian towards the rising [Diſtabat autem idem caput ♊ a meri- / die verſus ortum] — 28 0
- H. 5 28 — between ♃ and the eye [inter ♃ & oculum] — 37 11
- of ♉, by the sextant △ [♉ per Sext. △] — 37 11
- Alt. of ♃ on the meridian [♃ in meridie Alt.] — 43 29
- Alt. of ♂ on the meridian [♂ in meridie Alt.] — 49 55

DIE 10 JANUARIJ, MANE.

Spica from the meridian [Spica a merid.]	distance between ♂ and Spica [Diſt. inter ♂ & Spicam]
H. 0 27½′	49 31
0 31	49 31½

Diff. Ascens. R. between ♂ and the tail of ♏, 19 21, twice, by the northern armillae. [Diff. Aſcenſ. R. inter ♂ & Caudam / ♏ 19 21 bis, per Armillas Boreales.]

DIE 14 JANUARIJ.

When the eye of ♉ was distant from the meridian towards the rising H. 9 15′, the Decl. of ♀ by the northern armillae was [Cum oculus ♉ abeßet a merid. ver- / ſus ortum H. 9 15′ fuit Decl. ♀ per Ar- / millas Boreales]

- I 13 46¼
- II 13 46¼

With the triangular sextant. [Per Sextantem Trigonicum.]

Distance between ♂ and the lower one of the neck of ♏ [Diſt. inter ♂ & infer. ceruicis ♏][1270]

		Alt. of ♂ [Alt. ♂]
7ʰ26′	5 29	11 20
7 30	5 29	12 25
7 36	5 28	
7 40	5 28¼	
7 46	5 28	
7 51	5 28⅔	
7 59	5 29	17 0
between ♂ and the heart of ♏ [Inter ♂ & cor ♏]		
8 3	5 16½	17 0
8 6	5 16½	17 30
between ♂ and the neck of ♏ [Inter ♂ & ceruicem ♏]		
8 13	5 49⅔	18 50
8 22	5 49⅔	20 0

[1270] in the setting below, the head is printed over the third column only; the lines *Inter ♂ & cor ♏* and *Inter ♂ & ceruicem ♏* are set in across the column.

		Alt. of ♂ [Alt. ♂]
8 26	5 49¾	20 40

♂, moreover, was exactly on the straight line drawn from the lower head of ♊ through the lowest one of the neck of ♌, to it. [Fuit autem ♂ exquiſite in linea rec- / ta quæ ducitur ab inferiore capite ♊ / per infimam ceruicis ♌ in ipſum.]

Between ♂ and the southern head of ♊ [Inter ♂ & meridionale caput ♊]

- 8 31 — 39 57⅙ — 21 30
- 8 35 — 39 57 — 21 40
- 8 37 — 39 57 — 22 0
- 8 38 — 39 57 — 22 20
- Alt. of ♃ on the meridian, by the Tichon. [♃ in merid. Alt. per Tichon.] — 43 41

When Arcturus was distant from the meridian 3ʰ55′ towards the rising, ♂ on the meridian, by the Tichon.: [Cum Arcturus a merid. 3ʰ55′ verſus / ortum eßet, ♂ in meridiano per Tichon.]

- 50 31½

DIE 15 JANUARIJ, A. M.

With the sextant △. [Per Sextantem △.]

Between ♂ and the lower one of the neck of ♌ [Inter ♂ & inferiorem ceruicis ♌][1271]

- H. 3 36 — 5 23¾
- 3 40 — 5 23⅓
- 3 47 — 5 23⅓
- 4 11 — 5 23½

Not good enough, because of the shaking of the instrument by the wind. [Non ſatis bona / propter agita- / tionem inſtru- / menti a vento.]

Between ♂ and the luc. of the neck of ♌ [Inter ♂ & luc. ceruicis ♌]

- H. 4 25 — 5 46
- 4 28 — 5 46

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊][1272]

		Alt. of ♂ [Alt. ♂]
4 38	39 52¾	37 55
4 45	39 52¾	37 10

___[1273]

Between ♂ and the heart of ♌ [Inter ♂ & cor ♌]

[1271] at the right of the four lines below, a note in the same roman runs down all four lines.
[1272] the head *Alt.* ♂ stands at the right end of the line above, over the third column.
[1273] the upper part of the side is set in two columns divided by a printed vertical rule.

• H. 4 55 — 5 10
• 5 4 — 5 9½
• 5 15 — 5 9½

Between ♂ and Spica ♍ [Inter ♂ & Spicam ♍][1274]

		Alt. of ♂ [Alt. ♂]
6 55	50 57	19 30
6 59	50 56⅓	19 10
7 6[1]	50 57	18 45

Not good enough, because of the dawn and the storm. [Non ſatis bonæ propter auroram / et tempeſtatem.]

EODEM DIE AD VESPERAS.

• ♃ on the meridian [♃ in meridiano] — 43 44 15

Between ♃ and ♄ [Inter ♃ & ♄][1275]

		Alt. of ♂ [Alt. ♂]
H. 5 37 35	25 52	
5 41 10	25 51	
5 44 25	25	
	49⅛	
between ♃ and the eye of ♉ [Inter ♃ & oculum ♉]		
6 9 10	36 32	
6 12 55	36	
	32⅓	
between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]		
7 22⅓	39 41	12 45

• 7 26 — 39 40 — 13 20
• 7 33½ — 39 40½
• 7 39¾ — 39 40⅙ — 15 30

Between ♂ and the lowest one of the neck of ♌ [Inter ♂ & infimam ceruicis ♌]

• 7 46 — 5 10¾ — 16 10
• 7 48 — 5 11½ — 16½
• 7 52 — 5 11, good [bona] — 17 0
• 7 57 — 5 11 — 18 0
• 8 6 — 5 10½ — 19 0
• 8 17 — 5 11 — 20 45

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]

• 8 21 — 39 39¾ — 21 5

[1274] the head *Alt.* ♂ stands at the right end of the line above, over the third column.
[1275] the head *Alt.* ♂ stands at the right end of the line above, over the third column. The lines *Inter* ♃ *&* *oculum* ♉ and *Inter* ♂ *&* *inferius caput* ♊ are set in across the column.

- 8 23 — 39 40⅙ — 21 40
- 8 25 — 39 39¾ — 22 30

Between ♂ and the luc. of the neck of ♌ [Inter ♂ & luc. ceruicis ♌]

- 8 42 — 5 36½ — 24 5
- 8 46 — 5 37 — 24 45
- 8 49 — 5 37 — 25 10

At H. 1 20 exactly, P. M. N., ♂ on the meridian had Alt. 50 39 30 [H. 1 20 exquiſite, P. M. N., ♂ in meri- / diano habuit Alt. 50 39 30][1276]

Investigation of the place of ♂ from the preceding observations.[2] [Inquiſitio loci ♂ ex præcedentibus obſeruationibus[2].]

On 14 January, H. 16 M. 40 P. M. [Die 14 Januarij H. 16 M. 40 P. M.]

The distance between ♂ and the southern head of ♊, 39 52 45. [Diſtantia inter ♂ & meridionale caput ♊ 39 52 45.]

Meridian Alt. of ♂ 50 31 30, from which, at H. 4⅔ P. M. N., its Decl. B. would have been 16 27 6. [Alt. ♂ merid. 50 31 30, vnde H. 4⅔ P. M. N. fuißet Decl. eius B. 16 27 6.]

- right ascension of the head of ♊ [Aſc. R. capitis ♊] — 109 56 0
- ascensional angle [Angulus aſcenſionalis] — 41 18 58
- right ascension of ♂ [Aſcenſio Recta ♂] — 151 14 58[1277]
- longitude of ♂ [Longitudo ♂] — 27 29½ ♌
- latitude [Latitudo] — 4 20 B.[1278]

From observation [Ex obſeruatione]	From the Alphonsine [Ex Alphonſino]	From Copernicus [Ex Copernico]
longitude of ♂ [Long. ♂] 27 29½ ♌	24 3 ♌	29 35 ♌
latitude [Latit.] 4 20 B.	4 9¾ B.	4 5 B.

Investigation of the same, at about the same time, by another method. [Eiusdem circa idem tempus alia ratione inquiſitio.]

The heart of ♌: longitude 24 5 ♌, latitude 0 26½ B. The lower head of ♊: 17 30 ♋, latitude 6 38¼ B. [Cor ♌ Long. 24 5 ♌ Lat. 0 26½ B. Inferius caput ♊ 17 30 ♋ Lat. 6 38¼ B.]

- complement of the latitude of ♂ [Complementum latitudinis ♂] — 85 41 42
- difference of longitude of ♂ from the head of ♊ [Differentia Long. ♂ a capite ♊] — 40 0 11
- therefore the longitude of ♂ [Ergo Longitudo ♂] — 27 30 11 ♌; latitude [Lat.] 4 18 18 B.[1279]

[1276] the following lines are set across the full measure.
[1277] the two lines below stand at the right, level with the second and third lines above.
[1278] in the setting below, the three columns are divided by printed vertical rules.
[1279] below this the side is again set in two columns divided by a printed vertical rule.

DIE 16 JANUARIJ.

H. 3½. The distance between ♂ and the lower head of ♊, 39 35⅔. Not exactly enough, because of the clouds. [H. 3½. Inter ♂ & inferius caput ♊ di- / ſtantia 39 35⅔. Non ſatis exquiſite prop- / ter nubes.]

DIE 17 JANUARIJ, MANE.

Between ♂ and the lower one of the neck of ♌ [Inter ♂ & inferiorem ceruicis ♌][1280]

		Alt. of ♂ [Alt. ♂]
H. 3 25′ 10	4 45 10	47 10
3 28 10	4 45 0	46 0

- H. 3 38 40 — 4 46 0 — 44 0
- 3 43 30 — 4 45 0 — 43 10
- 3 46 45 — 4 44 0
- 3 48 15 — 4 45 0

It was not clear enough. [Non erat ſatis ſerenum.]

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]

- 4 12 54 [recte: 4 12 45 — Corrigenda, p. 430] — 39 17
- 4 17 40 — 39 16

Not certain enough, because of the storm. [Non ſatis certo propter tempeſtatem.]

Meridian Altit. of ♂, 50 59, by the Tichon. [Altit. ♂ merid. 50 59 per Tichon.]

[1] Perhaps H. 7⅙. [Fortaße H. 7⅙.]

[2] From codex V., as are also the following calculations of the places of the planets. [E codice V. ſicut etiam ſequentes calculi locorum planetarum.]

___[1281]

DIE 21 JANUARIJ.

♂ in degree 90 from the ascendant, H.2 37′ P. M. N. [♂ in Gradu 90 ab Aſcendente H.2 / 37′ P. M. N.]

- The same day, toward evening, the eye of ♉ was distant from the meridian [Eodem die ad Veſperam Oculus ♉ / diſtabat a meridiano] — 30 56
- ♀ from the meridian [♀ a meridiano] — 49 39
- Difference of Asc. R. [Differentia Aſc. R.] — 80 35
- Declination of ♀, southern [Declinatio ♀ meridionalis] — 8 52½

[1280] the head *Alt.* ♂ stands on a line of its own at the right, over the third column.

[1281] below the running head the side is set in two columns divided by a printed vertical rule. The whole left column, and the right column down to the rubric *DIE 22 JANUARIJ A. M.*, are in italic type; the rest of the right column is in roman.

I myself and Escheus Bilde made this observation with the northern armillae. [Hanc obſeruationem ego ipſe & / Eſcheus [recte: Eſchillus — Corrigenda, p. 430] Bilde per Armillas Borea- / les fecimus.]

Distance between ♃ and ♀ [Diſtantia inter ♃ & ♀]

- H.4 54 40 — 48 2¾
- 4 57 10 — 47 59¾
- 4 59 50 — 47 59⅔
- 5 6 10 — 47 59

Distance between ♃ and ♄ [Diſtantia inter ♃ & ♄]

- 5 11 10 — 26 4
- 5 14 40 — 26 3¾
- 5 20 10 — 26 3

Distance between ♃ and the eye of ♉ [Diſtantia inter ♃ & oculum ♉]

- 5 30 — 35 49
- 5 33 — 35 49½
- 5 36 — 35 49¾

Distance between ♂ and the lower head of ♊ [Diſtantia inter ♂ & inferius caput ♊]

- 6 16 — 37 36
- 6 22 — 37 37¾

Distance between ♂ and the lowest one of the neck of ♌ [Diſt. inter ♂ & infimam ceruicis ♌]

- 6 34 — 3 8 — Alt. of ♂ [Alt. ♂] 12 50
- 6 42 — 3 11 — not good enough [non ſatis bona]

At that time the bright shoulder of Orion was distant from the meridian towards the rising H. 1 M. 39; correct the clock from this. [Tunc abfuit lucidus humerus Ori- / onis a meridiano verſus ortum H. 1 / M. 39, hinc rectifica horologium.]

Distance between ♂ and the lower one of the neck of ♌ [Diſt. inter ♂ & inf. ceruicis ♌]

- 6 43⅔ — 3 7 — Alt. of ♂ [Alt. ♂] 14 50
- 6 55 — 15 50
- 6 56⅔ — Aldebaran crossed the meridian by the Mural one; it should, however, have been on the meridian at H. 7 14½. After the clock had been verified, the following observations were made. [tranſiuit Aldebora per me- / rid. per Muralem, debuit / autem eße in meridiano / H. 7 14½. Poſt verificatum / horologium factæ obſerua- / tiones ſequentes.][1282]

Distance between ♂ and the lowest one of the neck of ♌ [Diſt. inter ♂ & infim. ceruicis ♌]

- 7 18 — 3 6¾ — Alt. of ♂ [Alt. ♂] 16 40
- 7 28 — 3 6½ — 17 50

[1282] in the second line above, *15 50* stands under *14 50*. The words beginning *tranſiuit* stand as a hanging paragraph of six lines to the right of the time *6 56⅔*.

That small star in the neck of ☋, moreover, was barely visible. [Erat autem parua illa ſtella in cer- / uice ☋ parum conſpicua.]

When the heart of ☋ was distant from the meridian towards the rising H. 8 M. 22, the declination of ♂ was [Cum cor ☋ diſtaret a meridiano / verſus ortum H. 8 M. 22 fuit / Decl. ♂] 17 20¼

- ♂ was distant from the meridian towards the rising [♂ diſtabat a merid. verſ. ort.] — 46 35
- The eye of ♉ from the meridian, towards the occaſ. [Oculus ♉ a merid. / verſ. occaſ.] — 39 30
- Difference of Ascens. R. of both [Diff. Aſcenſ. R. vtriusque] — 86 5
- ♂ from the meridian [♂ a meridiano] — 44 30
- The eye of ♉ from the meridian [Oculus ♉ a merid.] — 41 35
- Difference of Ascens. R. [Diff. Aſcenſ. R.] — 86 5

DIE 22 JANUARIJ A. M.

With the new sextant. [Per Sextantem nouum.]

Between the lower one of the neck of ☋ and ♂ [Inter infer. ceruicis ☋ & ♂]

- H.2 24 — 3 2⅔ [recte: for 2⅔ read 3⅜ — Corrigenda, p. 430] — I — Alt. of ♂ [Alt. ♂] 47 50
- 2 31¾ — 3 4¼ — II
- 2 34 — 3 4¼ — III
- 2 36 — 3 4 — IIII
- 2 39 — 3 4⅙ — V

Between the upper one of the neck of ☋ and ♂ [Inter ſuperiorem ceruicis ☋ & ♂]

- 2 50 — 4 30½ — I
- 2 53 — 4 31 — II
- 3 1 — 4 30⅔ — III
- 3 4 — 4 31 — IIII

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]

- 3 40 — 37 32½ — I
- 3 45 — 37 32½ — II
- 4 4 — 37 32 — III

EODEM DIE AD VESPERAS.

With the clock corrected by Aldebaran. [Horologio correcto per Aldeboram]

[Distance between ♂ and the heart of ☋ — H.6 18 — 3 47½ — Alt. of ♂ 9 45 — Not certain enough][1].[1283]

Between the lowest one of the neck of ☋ and ♂ [Inter infimam ceruicis ☋ & ♂]

With the portable sextant [Per Sextantem Portatilem]

[1283] the square brackets that open and close the three lines above are printed on the leaf; the footnote call [1] stands after the closing bracket, before the point. The lines read: *Diſt. inter ♂ & cor ☋ / H.6 18 3 47½ Alt. ♂ 9 45 / Non ſatis certa.*

- H.6 34 — 2 46½ — I — Alt. of ♂ [Alt. ♂] 12 2 [recte: 12 0 — Corrigenda, p. 430]
- 6 37 — 2 47¾ — II — 12 40
- 6 41 — 2 47⅝ — III — 13
- 6 45 — 2 47¾ — IIII — 13 30
- 6 49 — 2 47⅝ — V — 14
- 6 55 — 2 47 — VI — 15
- 7 2 — 2 47¼ — VII — 16

You can therefore use, for hour 6¾, without any perceptible error, the distance of ♂ from the lower one in the neck of ♌, P. 2 M. 47½. [Potes itaque ad horam 6¾ absque / omni ſenſibili errore vti diſtantia ♂ / ab inferiore in ceruice ♌ P. 2 M. 47½.]

[1] Lineis inducta. [Struck through with lines.]

___[1284]

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]

- 7 12 — 37 15⅓ — Alt. of ♂ [Alt. ♂] 17 20
- 7 16 — 37 15 — 17 50
- 7 21 — 37 15 — 18 45
- 7 25 — 37 14⅝ — 19 25

With the triangular sextant: [Per Sextantem Trigonicum:]

Between ♃ and ♄ [Inter ♃ & ♄]

- 6 49 — 26 16
- 6 55 — 26 16¼

Between ♃ and the outermost one of the wing of Pegasus [Inter ♃ & extremam alæ Pegaſi]

- 7 40 — 28 27¾
- 7 43 — 28 27⅔

Between ♃ and the eye of ♉ [Inter ♃ & oculum ♉]

- 7 53 — 35 41½
- 7 56 — 35 41

When the lower head of ♊ was distant from the meridian H. 7 M. 40, the Decl. of ♀ was 8 26, by the armillae Sept. [Cum inferius caput ♊ abeßet a me- / ridiano H. 7 M. 40 fuit Decl. ♀ 8 26 per / Armillas Sept.]

- When the eye of ♉ was distant from the meridian towards the setting [Cum oculus ♉ diſtaret verſus occa- / ſum a meridiano] — 44 1
- ♂ from the meridian towards the rising [♂ a meridie verſus ortum] — 41 39½
- Difference of Asc. R. of both [Diff. Aſc. R. vtriusque] — 85 40½
- The eye of ♉ from the meridian, H. 10.7′ [Oculus ♉ a meridie H. 10.7′] — 42 38
- ♂ from the meridian [♂ a meridie] — 42 42
- Difference of Asc. R. of both [Diff. Aſc. R. vtriusque] — 85 40

[1284] the upper part of the side is set in two columns divided by a printed vertical rule. The two columns are in roman type; the full-measure passage below them is in italic.

DIE 23 JANUARIJ A. M.

Between ♂ and the lowest one of the neck of ♌, with the new sextant. [Inter ♂ et infimam ceruicis ♌ per / Sextantem nouum.][1285]

- H.2 30 — 2 42 — Alt. of ♂ [Alt.♂]
- 2 34 — 2 41½ — 47 0
- 2 41 — 2 41½ — 46 25

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]

- 2 50 — 37 11⅙ — 45 40
- 2 55 — 37 11 — 45 0
- 2 57 — 37 11 — 44 55

[Distance between ♂ and the heart of ♌ — 4 51 — 4 22⅔ — 5 4 — 4 22¾][1][1286]

Between ♂ and the ſuper. one of the neck of ♌ [Inter ♂ & ſuper. ceruicem ♌]

- 4 22 — 4 26⅓
- 4 28 — 4 26⅓

Between the lower head of ♊ and ♂ [Inter inferius caput ♊ & ♂]

- 6 4 — 37 6⅔ — Alt. of ♂ [Alt. ♂] 21 0
- 6 9 — 37 6¾ — 19 50

Between ♂ and Spica ♍ [Inter ♂ & Spicam ♍]

- 6 23 — 53 40¾ — 18 0
- 6 27 — 53 40¾ — 17 20

When the heart of ♌ was distant from the meridian towards the setting H. 16 M. 14, the Decl. of ♂ was [Cum cor ♌ abeßet a meridie verſus / occaſum H. 16 M. 14 fuit / Decl. ♂] 17 30⅔

- The head of Ophiuchus from the meridian [Caput Ophiuchi a merid.] — 38 11
- ♂ from the meridian [♂ a meridiano] — 74 6
- Difference of Ascens. R. of both [Diff. Aſcenſ. R. vtriusque] — 112 17

By the northern armillae. [per Armillas Boreales.]

Examination of the motion of ♂ from the preceding observations. [*Examen Motus ♂ ex præcedentibus obſeruationibus.*]

On the day immediately preceding, at hour 2½, between ♂ and the lowest one of the neck of ♌: 3 4⅙; this day in the morning the same distance was 2 41½. Therefore the diurnal motion was 22′ 40″. The diurnal motion of ♂, taken from the place of degree 90 on both sides, was thus 22′ 40″. [*Die proxime antecedente Hora 2½ inter ♂ & infimam ceruicis ♌ 3 4⅙, hoc / die mane fuit eadem diſtantia 2 41½. Ergo fuit motus diurnus 22′ 40″. Fuit / itaque motus diurnus ♂ 22′ 40″ a loco 90 Gradus vtrinque acceptus.*]

[1285] the words *Alt. ♂*, in a smaller type, stand at the right level with the first line below, over the two figures beneath them.

[1286] the square brackets that open and close the three lines above are printed on the leaf; the footnote call [1] stands after the closing bracket. The lines read: *Diſtantia inter ♂ & cor ♌ / 4 51 4 22⅔ / 5 4 4 22¾.*

At H. 6¾ in the evening, between the lowest one of the neck of ♌ and ♂: 2 47½; at hour 2½ in the morning: 2 41½. The star ♂ therefore went back 6 first minutes in an interval of 7¾ hours. By reason of the diurnal motion, however, it ought to have gone back 7¼ minutes. [*H. 6¾ Veſperi fuit inter infimam ceruicis ♌ & ♂ 2 47½, Hora 2½ Mane 2 41½. / Retroceßit itaque ♂ ſtella interuallo horarum 7¾ ſcrupulis primis 6. Debuit / autem retrocedere ratione motus diurni ſcrupulis 7¼.*]

The corresponding motion 7½, the observed 6⅓, difference 1⅙′. The apparent motion, however, ought not to be slower than the true motion; since the contrary nevertheless appears, some error must therefore lie hidden. [*Motus reſpondens 7½ obſeruatus 6⅓, differentia 1⅙′. Debet autem motus / apparens non tardior eße motu vero, cum tamen contrarium appareat: / oportet itaque aliquem ſubeße errorem.*]

- *H.7 20 — ♂ from the lower head of* ♊ [*ab infer. cap.* ♊] *— 37 15*
- *2 50 — ♂ from the lower head of* ♊ [*ab infer. cap.* ♊] *— 37 11*
- *7 30 — 4*[1287]

The star ♂ was therefore carried forward against the order of the signs by 4 minutes, whereas it ought to have been carried forward 7 minutes. Some error must therefore lie hidden in this observation. [*Promota eſt itaque ♂ ſtella in antecedentia ſcrup. 4, cum deberet pro- / moueri ſcrup. 7. Oportet itaque errorem aliquem in hac obſeruatione / ſubeße.*]

Then from H. 2.50 to hour 6⅙, over 3⅓ hours, it was carried forward 4¼ minutes, which does not agree with the preceding. [*Deinde ab H. 2.50 in horam 6⅙ per horas 3⅓ prouehebatur ſcrupulis 4¼, / quod cum antecedente non quadrat.*]

[1] Lineis inducta. [Struck through with lines.]

___[1288]

DIE 24 JANUARIJ.

Toward evening. [Ad Veſperas.]

Between ♂ and the lower head of ♊. With the new sextant. [Inter ♂ & inferius caput ♊. Per Sex- / tantem nouum.]

- H.5 43 — 36 26⅔ — Alt. of ♂ [Alt.♂]
- 5 49 — 36 26¼ — 8 50
- 5 51 — 36 27 — 9 0
- 5 53 — 36 27½ — 9 10
- 5 56 — 36 28 — 9 25
- 5 59 — 36 28 — 9 40
- 6 2 — 36 28¼ — 10 10[1289]

With the old sextant [per / Sext. / vete- / rem]

[1287] a short printed rule stands under the time *2 50* and a second under the figures *37 11*; *7 30* is printed under the first rule and *4* under the second.

[1288] below the running head the side is set in two columns divided by a printed vertical rule. The whole side is in roman type.

[1289] the words *Alt.*♂ stand, in a smaller type, in the altitude position of the first line, over the figures below them. A brace embraces the next four lines, with the words that follow set beside it.

- 6 36 — 36 31⅔ — 15 0
- 6 38 — 36 31½ — 15 20
- 6 40 — 36 31½ — 15 50
- 6 42 — 36 31½ — 16 0[1290]

With the new sextant [per / Sext. / nou.]

- 6 48 — 36 29 — 16 40
- 6 52 — 36 29 — 17 10
- 6 54 — 36 29 — 17 40

Note[1]. This evening, at about 7¼, ♂ was almost at one longitude with the heart of ♌, except that it was a little more easterly; for a straight line drawn from the heart of ♌ through it fell on the star of Draco [Draconis] that is the nearer of the two near the pole of the Ecliptic, towards the lead-out of the tail; and it is the seventh of the visible and larger ones, counting from the end of the tail. [Nota[1]. ♂ erat fere hoc veſperi circa / 7¼ in vna longitudine cum corde ♌, / niſi quod parum eßet orientalior, nam / linea recta a corde ♌ per ipſum duc- / ta incidebat in ſtellam Draconis, quæ / eſt proxima duarum iuxta polum / Eclipticæ verſus eductionem caudæ: / eſtque ſeptima ex apparentibus & / maioribus a fine caudæ numerando.]

Between ♂ and the lowest one of the neck [Inter ♂ & infimam ceruicis]

- 7 18 — 2 4 — Alt. of ♂ [Alt. ♂] 21 25
- 7 25 — 2 4½ — 22 10
- 7 27 — 2 4 — 22 35
- 7 30 — 2 5 — 23 0
- 7 33 — 2 4¼ — 23 30
- 7 36 — 2 4⅓ — 24 0[1291]

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊][1292]

With the new sextant [per / Sext. / nou.]

- 8 26½ — 36 28 — 30 50
- 8 36 — 36 28½ — 32 10
- 8 40 — 36 28½ — 33 0[1293]

With the old sextant [per / Sext. / vet.]

- 8 51 — 36 31½ — 34 0
- 8 57 — 36 31¼ — 34 40
- 8 59 — 36 31⅓ — 35 0

P. M. N.		Alt. of the head of ♊ [Alt. cap.♊]	Alt. of ♂ [Alt.♂]
3 7	36 23	31 0	41 20
3 12	36 22		40 40
3 15	36 23½		40 20
3 22	36 21⅓		39 35

[1290]a second brace embraces the next three lines, with the words that follow set beside it.
[1291]no sign is printed after *ceruicis* in this line.
[1292]a brace embraces the next three lines, with the words that follow set beside it.
[1293]a brace embraces the next three lines, with the words that follow set beside it.

P. M. N.	Alt. of the head of ☊ [Alt. cap.☊]	Alt. of ♂ [Alt.♂]
3 26	36 22	39 5
3 28	36 20⅓	38 50
3 29	36 20⅓	38 43
3 32	36 20⅓	38 20

With the new sextant [per / Sext. / nouum][1294]

Because of the weather the instrument wobbled a great deal. [Tempeſtate inſtrumentum magno- / pere uacillabat.]

Between ♂ and the lowest one of the neck of ☋ [Inter ♂ & infimam ceruicis ☋]

- 3 50 — 1 55¼ — 36 10
- 3 55 — 1 54¾ — 35 40
- 3 59 — 1 54 — 35 0
- 4 12[2] — 1 54¾ — 33 0[1295]

With the new sextant [per / nou. / Sext.]

With the northern armillae: [Per Armillas ſeptentrionales:]

When the lower head of ☊ was distant from the meridian towards the rising H. 7 M. 14, the Decl. of ♀ was [Cum abfuit a meridie verſus ortum / inferius caput ☊ H. 7 M. 14 fuit / Decl. ♀] 7 27

Luc.♈ towards the setting [Luc.♈ / verſ. occaſ.]	♀ towards the setting [♀ / verſ. occaſ.]	♃ towards the setting [♃ / verſ. occaſ.]	Diff. Asc. of both [Diff. Aſc. / vtriusque]
H.13 M.5	55 28	14 16	41 12
13 10	56 56	15 43	41 13
20° 22′	60 26		40 4
23 13	63 18		40 5
24 27	64 31½		40 4½

	♄ towards the setting [♄ verſ. occaſ.]		
H.13 M.27	49 5½	25 20	23 45½
14 1	52 24	28 40	23 44
14 7	54 1	30 16	23 45
15 23	Decl. of ♂, northern [Decl. ♂ ſept.]		17 49
			17 49

1296

[1294] a single brace stands to the right of the second column and embraces all eight lines above; the words just given are set, in a smaller type, in the third column's place at the fourth to sixth lines.

[1295] a brace embraces the four lines above, with the words that follow set beside it. The footnote call [2] stands raised after the time *4 12*.

[1296] the head ♄ *verſ. occaſ.* stands over the second column only. In the fourth line the words *Decl. ♂ ſept.* run across the second and third columns' place; the fifth line carries a figure group in the last column only.

The eye of ☿ towards the setting [Ocul.☿ / verſ. occaſ.]	♂ towards the setting [♂ / verſ. occaſ.]	Diff. Asc. R. [Diff. Aſc. R.]
50 8	34 48	84 56
51 6½	33 50	84 56½
52 15	32 41	84 56

1297

From this[3] the place of ♂ comes out at 23° 58′ 24 ♌, with the Asc. R. of the eye of ☿ put at 63 2 40. This does not agree with the observation at H. 7¼ by the heart; for it should have been 24 4 30 ♌. [Hinc[3] prodit locus ♂ 23° 58′ 24 ♌, po- / ſita Aſc. R. Oculi ☿ 63 2 40. Quod non / conſentit cum obſeruatione H. 7¼ per / cor, debuit enim eße 24 4 30 ♌.]

When the lower head of ♊ was distant from the meridian towards the setting 14 36, ♂ crossed [Cum inferius caput ♊ abeßet a me- / rid. verſus occaſum 14 36 tranſiuit ♂]

[1] Written in the margin: »From this the place of ♂ comes out at 24° 7′ 34″ ♌, the heart of ♌ being put at 24° 3′ 28″ ♌«. [Adſcriptum eſt in margine: »Hinc prodit locus ♂ 24° 7′ 34″ ♌, poſito corde ♌ in 24° 3′ 28″ ♌«.]

[2] Written in codex V: »From hour 7.36 to hour 4.12, over 8.36 hours, by 9½′ from the same star, provided the instrument was the same«. [Adſcriptum eſt in codice V: »Ab hora 7.36 in horam 4.12 per horas 8.36 per 9½′ ab eadem ſtella, modo / idem inſtrumentum fuerit«.]

[3] Written in afterwards. [Poſtea adſcriptum.]

___1298

through the meridian, having an altitude [per merid. habens Alt.]

- by the Q. Tichon. [per Q. Tichon.] — 51 53⅓
- The heart of ♌ by the Q. Tichon. [Cor ♌ per Q. Tichon.] — 48 3½

When Canis Minor [Canis minor] was distant from the meridian towards the setting 16 6, the northern declination of ♂ was [Cum Canis minor abeßet a merid. / verſus occaſum 16 6 fuit Declin. ♂ / ſeptentrionalis] 17 47½

In the year 85 complete, the true declination [*Anno 85 completo declinatio vera*]

- *48 3 30*
- *34 5 30*
- *13 58 0*
- *of Regulus* [*Reguli*] *13 57 45*
- *add* [*adde*] *15*

1297 the third column of this setting stands in the place of the last column of the settings above it; the place between is empty.

1298 below the running head the side is set in two columns divided by a printed vertical rule. The left column is in roman type down to *ſeptentrionalis 17 47½*, then in italic — a smaller italic for the computation that follows — down to the end of the paragraph ending *Eclipticæ*, and in roman from there on; the right column is in roman throughout.

• *13 58 0*[1299]

which agrees with the observation. Therefore the meridian altitude is correct. [*quod conſentit cum obſeruatione. / Ergo altitudo meridiana recte ſe habet.*]

DIE 25 JANUARIJ.

Around the seventh hour of the evening I noticed that the star ♂ *had moved a little beyond the straight line drawn from the heart of* ♌ *to the middle one of the neck, and this line was a little more westerly; so its conjunction with the heart of* ♌ *has already passed, although Copernicus's calculation promises it as still to come. The* ☌ *in longitude, however, must have been on the preceding day or night.* [*Circa horam ſeptimam veſperti- / nam attendi quod* ♂ *ſtella egreßa / erat paululum lineam rectam quæ / ducitur a corde* ♌ *in mediam cerui- / cis, eratque hæc linea paulo occi- / dentalior, vnde coniunctio ipſius / cum corde* ♌ *iam præterijt, quam / tamen Copernici calculus futuram / pollicetur. Oportet autem* ☌ *in lon- / gitudine fuiße die vel nocte præce- / dente.*]

♂*, moreover, was on the straight line drawn from the heart of* ♌ *to the middle, as it were, of the small triangle that is near the pole of the Ecliptic.* [*Fuit autem* ♂ *in linea recta ducta / a corde* ♌ *in medium quaſi trianguli / parui quod eſt iuxta polum Eclip- / ticæ.*]

♂ towards the ort. [♂ verſ. ort.]	The lower head of ☊ towards the ort. [Inf. cap. ☊ / verſ. ort.]	Diff. Asc. R. [Diff. Aſc. R.]
104 20	142 5	37 45
105 12⅔	142 58⅓	37 45⅞[1300]
106 10	143 55	37 45
106 55¼	144 39¼	37 44

When the heart of ♌ was distant from the meridian H. 7 M. 25, the declination of ♂ was [Cum cor ♌ abeßet a merid. H. 7 / M. 25 fuit Declin. ♂] 17 55

DIE 31 JANUARIJ.

Toward evening. Between ♂ and the lower head of ☊, with the old sextant, among clouds. [Ad Veſperas. Inter ♂ & infer. caput / ☊ per Sextantem veterem inter nubes]

• H.10 34′ — 33 45⅓
• 10 36 — 33 44⅓

Afterwards the same dist. repeated [Poſtea repetita eadem diſt.]

• 10 47 — 33 43¾
• 10 49 — 33 43¾

[1299] the two sums above stand side by side on the leaf, the first at the left and the second at the right; in each a short printed rule stands above the last line, and in the second it begins after the word *adde*.

[1300] The fraction is printed unreduced, 2 over 8.

- 10 45 — the tail of ☋ from the mer. [Cauda ☋ a mer.] 2° 3′ — 33 43 twice [bis]
- 33 43⅓

♂ on the meridian, altitude [♂ in meridie Alt.] 52 48½

At 12 9 the heart of ☋ crossed the meridian; its altitude 48 3½ [recte: 48 3⅓ — Corrigenda, p. 430] [12 9 tranſiuit cor ☋ per meridi- / anum, Alt. ejusdem 48 3½]

Investigation of the place of ♂ from the preceding observations. [Inquiſitio loci ♂ ex præcedentibus / obſeruationibus.]

22 January, H.14 55 P. M. [Die 22 Jan. / H.14 55 P. M.]

- Dist. from the head of ♊ [Diſt. a cap.♊] — 37 11 0
- Declination of ♂ B. [Decl. ♂ B.] — 17 31 0
- Diff. Asc. R. of both [Diff. Aſc. R. vtriusque] — 38 43 30
- Asc. R. of ♂ [Aſc. R. ♂] — 148 39 30[1301]

Therefore ♂ is at 24° 47′ 16″ ☋, Lat. 4 28 46 B. [Eſt igitur ♂ in 24° 47′ 16″ ☋, / Lat. 4 28 46 B.]

	Observation [Obſeruatio]	Alphonſ.	Copernicus [Copern.]
Longitude [Long.]	24 47¼ ☋	21 15 ☋	27 4 ☋
Lat.	4 28¾ B.	4 16 B.	4 17 B.

24 January, H. 9.0 P.M. [Die 24 Jan. / H. 9.0 P.M.]

- Dist. from the lower head of ♊ [Diſt. ab inf. / cap.♊] — 36 31
- With the new sextant [Per nouam Sext.] — 36 28½
- Declination of ♂ B. [Decl. ♂ B.] — 17 47[1302]
- From this comes out the diff. Asc. R. [Hinc prouenit diff. Aſc. R.] — 38 5 2
- And therefore the Asc. R. of ♂ [Ideoque Aſc. R. ♂] — 148 1 2
- Lat. of ♂ [Lat. ♂] — 4 31 3

	Observation [Obſeruatio]	Alphonſ.	Copernicus [Copern.]
Longitude [Long.]	24 7¼ ☋	20 35 ☋	26 25 ☋
Lat.	4 31 B.	4 18⅓ B.	4 19 B.

31 January, around midnight. [Die 31 Jan. circa mediam noctem.]

- ♂ from the head of ♊ [♂ a capite ♊] — 33 43¼
- Declination of ♂, northern [Decl. ♂ Sept.] — 18 43 0
- Diff. Asc. R. of both [Diff. Aſc. R. vtriusque] — 35 17 30
- Asc. R. of ♂, good [Aſc. R. ♂, bona] — 145 13 30

[1301] a brace joins the date and hour to the first two lines only.

[1302] a brace joins the date and hour to the first three lines only; the first entry runs over two lines.

Hence the longitude of ♂ 21 18 11 ♌, Lat. B. 4 30 58, good from the meridian altitude[1]. [Vnde Long. ♂ 21 18 11 ♌ Lat. B. / 4 30 58, bona ex Alt. meridiana[1].]

	Observation [Obſeruatio]	Alphonſ.	Copernicus [Copern.]
Longitude [Long.]	21 18 ♌	17 39 ♌	23 38 ♌
Lat.	4 31 B.	4 19 B.	4 26½ B.

DIE 3 FEBRUARIJ.

Toward evening. With the northern armillae. [Ad Veſperas. Per Armillas Boreales.]

Luc. hum. Orion. from the mer. towards the ort. [Luc. hum. Orion. / a mer. verſ. ort.]	Reſp. time[2] [Reſp. / Tempus[2]]	Dist. of ♂ and the mer. head of ♊ [Diſt.♂ & / mer. cap.♊]	Altitude of ♂ with the old sextant [Alt.♂ per / Sext. vet.]
H.1 55′	H.5 47½	32 36¾	
1 36	6 6½	32 37	18½
Can. maior towards the ort. [Can. maior / verſ. ort.]			
3 14½	6 13	32 37	19½
3 11⅔	6 15½	32 37¼	20 0
The lower head of ♊ towards the ort. [Inf. Cap.♊ / verſ. ort.]		Dist. of ♂ and can. min. [Diſt.♂ & / can. min.]	
3 6	6 23	36 10¾	
2 58	6 32⅚	36 10½	

1303

[1] Cf. below, after the day 4 February. [Cf. infra poſt diem 4 Feb.]

[2] Written in: »Canis Minor through the meridian 9 27¼, the lower head of ♊ 9 28 48« [by computation].[1304]

___[1305]

When Canis Minor [Canis minor] was distant from the meridian towards the rising H.9 M.43, the declination of ♂ sept. was 19 1⅙ by the southern armillae. [Cum Canis minor a meridie abeßet / verſus ortum H.9 M.43 fuit Decl. ♂ / ſept. 19 1⅙ per Armillas Auſtrales.]

[1303] the rows *Can. maior verſ. ort.* and *Inf. Cap.*♊ *verſ. ort.* / *Diſt.*♂ *& can. min.* are sub-heads printed within the table, in the same smaller type as its head. The footnote call [2] stands raised after *Tempus* in the head.

[1304] footnote [2] reads *Adſcriptum eſt: »Canis minor per merid. 9 27¼, Inferius caput* ♊ *9 28 48«*, followed by the words *per ſupputationem* enclosed in square brackets printed on the leaf; the square brackets in the English line above are those printed brackets.

[1305] below the running head the side is set in two columns divided by a printed vertical rule. Below the columns the side returns to the full measure. The whole side is in roman type.

The lower horn of ♈ towards the rising [Infer. cornu / ♈ verſ. ort.]	♀ towards the occ. [♀ / verſ. occ.]	♃ towards the occ. [♃ / verſ. occ.]	Difference of Asc. R. of both [Diff. Aſc. R. / vtriusque]
H.13 54	53 7	21 43⅔	31 23⅓
	53 44½	22 21	31 23½
The lower head of ☊ towards the rising [Inf. cap. ☊ / verſ. ort.]			
55 14	57 31		112 45
54 5	58 40		112 45
		♄ towards the occ. [♄ verſ. occ.]	
48 2		57 25½	105 27½
47 28		58 0	105 28

1306

Not certain enough. [Non ſatis certæ.]

When the heart of ☋ was distant from the meridian towards the rising H. 9 M. 39, the declination of ♂ by the northern armillae was [Cum cor ☋ verſus ortum abeßet a / meridie H. 9 M. 39 fuit Declinatio ♂ / per Armillas Boreales] 19 3

The eye of ♉ towards the occas. [Oculus ♉ / verſ. occaſ.]	Resp. time [Reſp. / Tempus]	♂ towards the rising [♂ / verſ. ort.]	Difference of Asc. R. [Diff. Aſc. R.]
49 14	H.9 40	31 43¾	80 57¾
50 19	9 44	30 37¼	80 56¼

This last observation was made among clouds; there is therefore some doubt about its certainty. [Poſtrema hæc obſeruatio inter nu- / bes facta eſt, igitur de certitudine ali- / quid dubitatur.]

3 February, H. 6¼ P. M. Between ♂ and the lower head of ☊ [Die 3 Feb. H. 6¼ P. M. Inter ♂ & infe- / rius caput ☊] 32 37 0

- Declination of ♂ [Declinatio ♂] — 19 2 0
- Difference of Asc. R. of both [Diff. Aſc. R. vtriusque] — 34 9 56
- Asc. R. of ♂ [Aſc. R. ♂] — 144 5 56
- Therefore Long. 20 11 13 ☋, Lat. 4 27 59 B. [Ergo Long. 20 11 13 ☋, Lat. 4 27 59 / B.][1307]

	Obſervation [Obſeruatio]	Alphonſ.	Copernicus [Copern.]
Long.	20 11¼ ☋	16 35 ☋	22 35 ☋
Lat.	4 28B.	4 16B.	4 27B.

[1306] the rows *Inf. cap.* ☊ *verſ. ort.* and ♄ *verſ. occ.* are sub-heads printed within the table, in the same smaller type as its head.

[1307] the *B.* of the last line stands alone at the right on the line below it.

DIE 4 FEBRUARIJ.

With the northern armillae; with the old sextant. [Per Arm. Boreales Per Sext. veterem]

Canis Minor from the meridian towards the rising [Canis minor / a Mer. verſ. ort.]	Dist. between ☿ and ♀ [Diſt. inter / ☿ & ♀]
H.3 M.46 resp. $5^{H}37^{M1}$	32 51

1308

- H. 3 43 — 32 50
- 3 39½ — 32 49⅔
- 3 34⅔ — 32 48½[1309]

The lower head of ♊ from the meridian towards the rising [Inferius caput / ♊ a Mer. verſ. ort.]	Dist. between ♂ and the lower head of ♊ [Diſt. inter ♂ / & infer. cap. ♊]
3 12 resp. 6 13½	32 13⅔
3 1	32 13½
2 56½	32 13½
2 50	32 13⅙

	♀ towards the occas. [♀ verſ. occaſ.]	Difference of Asc. R. [Diff. Aſc. R.]
62° 0⅓′	49 40½	III 40¾
61 33	50 9	III 42
60 56	50 45	III 41

When the lower head of ♊ was distant from the meridian towards the rising H.9 M.14, the declination of ♂ sept. was 19 9¾ by the northern armillae. At H.8 M.16 the declination of ♂ was 19 8 by the southern armillae. [Cum inferius caput ♊ abeßet a me- / ridie verſus ortum H.9 M.14, fuit Decl. / ♂ ſept. 19 9¾ per Armillas Boreales. / H.8 M.16 fuit Decl. ♂ 19 8 per Armil- / las Auſtrales.]

The following observations were made with the northern armillae. [Factæ ſunt ſequentes obſeruationes / per Boreales Armillas.]

The eye of ♉ towards the occas. [Oculus ♉ / verſ. occaſ.]	♂ from the meridian towards the rising [♂ a mer. / verſ. ort.]	Difference of Asc. R. [Diff. Aſc. R.]
33 53¾	46 44½	80 38¼
34 56½	45 42	80 38½
35 44½	44 53	80 37½
36 34	44 4	80 38

[1308] in the line above, the letters *H* and *M* after *5* and *37* are raised small capitals; the footnote call *1* follows them.

[1309] in each of these three lines the space between the first figure and the second is wider than the space between the two figures at the right.

Between ♂ and the neck of ☋, dist. with the old sextant, not certain enough because of the nearness of the Moon. [Inter ♂ & ceruicem ☋ diſt. per Sex- / tantem veterem, non ſatis certa prop- / ter vicinitatem lunæ.]

- H.7 8 — 5 47⅔
- 7 15 — 5 48
- 7 25 — 5 47

Between the heart of ☋ and ♂ [Inter cor ☋ & ♂]

- 8 38 — 5 48½
- 8 43 — 5 48
- 9 0 — 5 48⅔
- 9 15 — 5 48

With the old sextant [per / vet. / Sext.][1310]

DIE 4 FEBRUARIJ.

H.6.40 P. M, between ♂ and the lower head of ♊ 32 13 30; the declination of ♂ B. 19 9 45. Difference of Asc. of both 33 46 21; Asc. R. of ♂ 143 42 21. Therefore the Long. of ♂ 19 47 34 ☋, Lat. 4 28 8 B. [H.6.40 P. M, inter ♂ & inferius caput ♊ 32 13 30, Decl. ♂ B. 19 9 45. / Differentia Aſc. vtriusque 33 46 21, Aſc. R. ♂ 143 42 21. / Ergo Long. ♂ 19 47 34 ☋, Lat. 4 28 8 B.]

	Observation [Obſeruatio]	Alphonſ.	Copernicus [Copern.]
Long.	19 47½ ☋	16 11 ☋	22 8 ☋
Lat.	4 28 B.	4 15 B.	4 27 B.

[1] Written in: »Canis Minor crossed the meridian at H. 9. 23¼, the lower head of ♊ crossed the meridian at H. 9 25½«. [Adſcriptum eſt: »Canis minor tranſiuit mer. H. 9. 23¼, Inferius caput ♊ tranſiuit mer. H. 9 25½«.]

___[1311]

In the place of ♂ found in this way from its observations on various days, from the distance from the southern head of ♊, the Asc. R. of the head was always presupposed to be 109 56, whereas because of the refraction of the solar rays it ought to be two minutes greater, namely 109° 58′ 0″. The longitude of Mars would therefore be 2′ greater everywhere. With that account of the place of ♂ taken, then, the time of the ☌ of its true motion and of the simple ☉ was investigated in the following way. [In inuento hac ratione loco ♂ ex obſeruationibus eius ad diuerſos dies ex / diſtantia a Meridionali Capite ♊ ſemper præſuppoſita eſt Aſc. R. Capitis / 109 56, cum propter refractionem radiorum ſolarium deberet eße duobus / minutis maior, nempe 109° 58′ 0″. Quare longitudo Martis vbique 2′ maior / eßet. Habita ergo ea loci ♂[is] ratione

[1310] the words just given stand after the second figure group of the first three lines above, one word to a line; no brace is printed.

[1311] the side is at full measure except for three short passages set in two columns divided by a short printed vertical rule. The whole side is in roman type.

inquiſitum eſt tempus ☍ ueri motus eius / & ſimplicis ☉ in hunc modum vt ſequitur.]

31 January, H. 12.0 P. M. [DIE 31 Januarij H. 12.0 P. M.]

- True motion of ☌ [Verus motus ☌] — 21° 20′ 11″ ♌
- Simple motion of ☉ [Simplex motus ☉] — 20 51 34 ♒
- 28 37
- Diurnal motion of ☉ [Diurnus ☉] — 59′ 8″
- ☌ 24 15
- Sum [Summa] — 1° 23′ 23″[1312]

1° 23′ 23″ gives 24; how much does 28′ 37″ give? From this it is gathered that the ☍ of the true motion of ☌ and of the simple ☉ was on January D. 31 H. 20 14′ 41″ P. M. [1° 23′ 23″ dat 24, quantum 28′ 37″? Hinc colligitur quod fuerit ☍ veri motus ☌ / & ſimplicis ☉ Januarij D. 31 H. 20 14′ 41″ P. M.]

Otherwise, for the same [Aliter pro eodem]

	Simple ☉ [Simpl. ☉]	True ☌ [Verus ☌]
January [Jan.] $31^{D}12^{H}0^{M}$	20 51 34 ♒	21 20 11 ♌
Feb. 3 6 15	23 34 49 ♒	20 13 13 ♌
Difference of the motions [Differentia / motuum]	2 43 15	1 6 58

[1313]

The sum of the motions of both gives D.2 45′ 37″; how much for the difference of the motions on day 31 at 12^{H}? It comes out 20 35 15, h. e. H. 8 14′ 6″. When this is added to the earlier time, it shows the time of the ☍ of the true place of ☌ and of the simple ☉ on 31 January, H. 20. 14⅙. At that time the simple ☉ was 21° 11′ 51″ ♒, the true place of ☌ 21° 11′ 52″ ♌. [Summa motuum vtriusque dat D.2 / 45′ 37″, Quantum diff. motuum die 31 / 12^{H}, prouenit 20 35 15, h. e. H. 8 14′ 6″, / quo tempori priori addito monſtratur / tempus ☍ veri loci ☌ & ſimplicis ☉ Die / 31 Jan. H. 20. 14⅙. Erat tunc ſimplex ☉ / 21° 11′ 51″ ♒, verus locus ☌ 21° 11′ 52″ ♌.]

For the apogee of ☌[1] [PRO APOGÆO ☌[1].]

Let the apogee of ☌ from the vernal equinox be presupposed at $23^{g}\ 4^{m}$ ♌, and let our precession of the equinox, which this year is 28 4, be taken away from it. Then, taking the simple motion of ☉ from our tables and finding the equal motion of ☌ from the Prutenic tables for the time of the ☍, let its true place be investigated as follows. [Præſupponatur Apogæum ☌ ab Æquinoctio verno in $23^{g}\ 4^{m}$ ♌ & auferatur / hinc noſtra præceßio Æquinoctij quæ eſt hoc anno 28 4.

[1312] the first line of the computation runs across the full measure, *Verus motus* ☌ *21° 20′ 11″* ♌ at the left and *Diurnus* ☉ *59′ 8″* at the right; the second line carries *Simplex motus* ☉ *20 51 34* ♒ toward the middle and ☌ *24 15* at the right. A short printed rule stands under *20 51 34* with *28 37* beneath it, and another under ☌ *24 15* with *Summa 1° 23′ 23″* beneath it.

[1313] in the first line the letters *D*, *H* and *M* after *31*, *12* and *0* are raised small capitals. The label *Differentia* stands on a line of its own, with *motuum* and the figures on the line below.

Inde aßumpto ſim- / plici motu ☉ ex noſtris tabulis & inquiſito motu æquali ♂ ex tabulis pruteni- / cis ad tempus ☌, eius verus locus inquiratur vt ſequitur.]

- Simple motion of ☉ [Simplex motus ☉] — 5^{fex}21 12
- True precession [Vera præceßio] — 28 4
- Simple ☉ from I ♈ [Simplex ☉ a I ♈] — 4 53 8
- Simple longitude of ♂ [Simplex long. ♂] — 1 52 37
- Motion of commutation [Commutationis motus] — 3 0 31
- Simple apogee of ♂ [Simplex Apogæj ♂] — 1 55 0
- Eccentric anomaly [Anomalia Eccentri] — 5 57 37
- Equation of the eccentric, ad. [Æquatio Eccentri ad.] — 0 26
- Proport. minutes [Scrupula proport.] — 0
- Equated anomaly of the eccentric [Coæquata anomalia Ecc.] — 5 58 3

From the Prutenic tables [ex / Prut.][1314]

- Equated longitude of ♂ [Coæquata long. ♂] — 1^{fex}53 3
- Equated commutation of ♂ [Coæquata commutatio ♂] — 3 0 5
- Equation parallax., sub. [Æquatio parallax. ſub.] — 0 7
- The following excess [Exceßus ſequens] — 0 6
- Part of the longitude from the excess [Pars long. de exceßu] — 0 0
- Equated longitude of ♂ [Coæquata long. ♂] — 1 53 3
- Equation, sub. [Æquatio ſub.] — 7
- Distance of ♂ from I ♈ [Diſtantia ♂ a I ♈] — 1 52 56
- True precession of the equinox [Vera præceßio æquin.] — 28 4
- Longitude of ♂ [Longitudo ♂] — 2 21 0[1315]
- Therefore the place of ♂ is at [Eſt ergo locus ♂ in] 21 0 ♌
- The observation gave [Obſeruatio dedit] 21 12 ♌

Since, then, the place of ♂ found by this procedure falls somewhat short of the observed place, let the place of its apogee from I ♈ be put at $1^{\text{fex}}55^\circ\ 30'$, and let the same be investigated from there. [Hinc quia locus ♂ tali proceßu inuentus a loco obſeruato aliquantulum de- / ficit, ponatur locus Apogæj eius a I ♈ $1^{\text{ſex}}55^\circ\ 30'$ & inde fiat eiuſdem inquiſitio.]

- Simple motion of ☉ [Simplex motus ☉] — 4^{fex}53 8
- Simple longitude of ♂ [Simplex long. ♂] — 1 52 37
- Apogee of ♂ [Apogæj ♂] — 1 55 30
- Eccentric anomaly [Anomalia Eccentri] — 5 57 7
- Equation of the eccentric, ad. [Æquatio Eccentri ad.] — 0 31
- Proport. minutes [Scrupula proport.] — 0
- Equated anomaly of the eccentric [Coæquata anomalia Ecc.] — 5 58 38 [recte: 5 57 38 — Corrigenda, p. 430]
- Equated longitude of ♂ [Coæquata long. ♂] — 1^{fex}53 8

[1314] the words just given stand in a smaller type to the right of the fourth and fifth lines of the column above, one word to a line; no brace is printed. In the eighth line the value stands in the last two places only, and in the ninth in the last place only.

[1315] in the second line the figure *3* stands close against the sign ♂. In the seventh line the value stands in the last place only.

- Simple commutation of ♂ [Simplex commut. ♂] — 3 0 31
- Equated commutation [Coæquata commutatio] — 3 0 0
- Prosthaphaeresis [Proſthaphæreſis] — 0 0
- Equated longitude of ♂ [Coæquata long. ♂] — 1 53 8
- True precession of the equinox [Vera præceßio Æquin.] — 28 4
- ♂ from the equinox [♂ ab Æquinoctio] — 2 21 12

Therefore the longitude of ♂ is 21 12 ♌. This place of ♂ agrees exactly with the observed one; from which it is gathered that the true place of the apogee of ♂ is at 23 34 ♌. [Ergo longitudo ♂ 21 12 ♌. Hic locus ♂ cum obſeruato plane conuenit, vnde / colligitur verum locum Apogæj ♂ eße in 23 34 ♌.]

[1] From codex V. [E codice V.]

Test of the apogee of ♂ [Δοκιμασία Apogæj ♂]

found: in the year 1582, on 28 December, H. 11. 40 P. M., at which time the opposition of the true place of ♂ and of the simple ☉ took place. With account taken of the refraction of the solar rays *(in the fixed stars from which it was observed)*, ♂ was by its own proper motion in 16 49½ ♋. For the true motion of ♂ at the same time, the computation from the Prutenic tables gives the place of ♂ in 16 46⅔ ♋. The resulting place of ♂ differs from the observation by only three minutes, which are of no great moment. [inuenti Anno 1582 die 28 Decembris H. 11. 40 P. M. quo facta eſt oppoſitio / veri loci ♂ & ſimplicis ☉. Erat ♂, habita ratione refractionis radiorum ſola- / rium *(in fixis ſtellis vnde obſeruabatur)* proprio ſuo motu in 16 49½ ♋. Pro / vero motu ♂ ad idem tempus dat ſupputatio ex tabulis prutenicis locum ♂ / in 16 46⅔ ♋. Locus ♂ proueniens tribus tantum ſcrupulis ab obſeruatione / differt, quæ non ſunt magni momenti.]

On 12 November, in the year 84, H. 13.26 P. M., the place of ♂ was found from its distance from the southern head of ♊ to be in 23 14 ♌, *when ♂ was not far from quadrature with the Sun, around the max.* προς. *of the epicycle.* From the Prutenic tables the longitude of ♂ is found to be 23°4′4″ ♌. *The observation exceeds it by at least 10 minutes, because of a proportion of the orbs not found exactly by Copernicus.* [Die 12 Nouembris An. 84 H. 13.26 P. M. ex diſtantia ♂ a capite meridionali / ♊ inuentus eſt locus eius in 23 14 ♌, *cum ♂ non longe abeßet a quadrato / Solis circa max.* προς. *epicycli.* Ex tabulis Prutenicis inuenitur longitudo ♂ / 23°4′4″ ♌. *Abundat obſeruatio ſaltem 10 ſcrupulis propter orbium proporti- / onem non exacte a Copernico inuentam.*]

- The apogee of the eccentric of ♂ at the beginning of the year of Christ 1585, from the first star of ♈ — $1^{\text{fex}}55°30'$ [Apogæum eccentrici ♂ ad initium Anni Chriſti 1585 / a prima ſtella ♈ … 1ſex55°30′]
- True precession of the equinoxes — 0 28 4 [Vera præceßio Æquinoctio- rum]
- Distance of the apogee of ♂ from the equinox — 2 23 34 [Diſtantia Apogæj ♂ ab Æquinoctio]

- Therefore the place of the apogee of ♂ is in — 23 34 ♌ [Ergo Apogæj ♂ locus in]
- According to the Prutenic calculation — 28 21 ♌ [Secundum calculum Prutenicum]
- Difference — 4 47 [Differentia]
- The apogee of ♂ in the time of Ptolemy — 25 30 ♋ [Apogæum ♂ tempore Ptolemæj]
- It differs from the apogee found by 28 degrees. [Differt ab inuento apogæo in 28 gradibus.][1316]

Therefore from Ptolemy up to now, in about 1500 years, it has moved 28 partibus; but in the meantime the precession of the equinoxes has completed at least 21 25. Hence the proper motion of the apogee was 6 35 in 1500 years. Hence it advances one degree by its proper motion in about 230 years. [Quare a Ptolemæo Annis 1500 fere hucusque motum eſt 28 partibus, ſed / præceßio æquinoctiorum interea ſaltem abſoluit 21 25. Vnde motus proprius / apogæj fuit 6 35 in annis 1500. Vnde in annis quaſi 230 vno gradu progreditur / motu proprio.][1317]

DIE 9 FEBRUARIJ.

P. M. With the old sextant. [P. M. Per Sextantem Veterem.]

Time of the clock corrected to the heart of ♌ [Tempus Horologij / ad cor ♌ correcti]	Distance between ♂ and the neck of ♌ [Diſt. inter ♂ / & ceruicem ♌]
H.9 27	7 17
9 34	7 16⅔
9 37	7 17
9 40	7 16½
Distance between ♂ and the heart of ♌ [Diſt. inter ♂ & cor ♌]	
10 1	7 21
10 4	7 21¾
10 6	7 21
10 12	7 21
Distance between ♂ and the lower head of ♊ [Diſt. inter ♂ & inferius caput ♊]	
11 21	30 28⅔
11 22	30 27½
11 26	30 27½
11 28½	30 29

[1316] in this computation dotted leaders run from each label to its figures on the seven lines that carry figures. The figures stand in three positions at the right: the first position holds *1*, *0* and *2* on the first three lines; the letters *ſex* after the first *1* are raised and smaller; a degree mark follows *55* and a minute mark follows *30* on that line only. The sign glyphs stand after the last position. No rule is printed under any line.

[1317] below this the side is set in two columns divided by a printed vertical rule. The whole side is in roman type.

1318

Uncertain because of storms and the unsteady instrument. [Incertum propter tempeſtates & / inſtrumentum vacillans.]

The meridian altitude of ♂ by the Quadr. Tichon.: 53 49½, exactly; it crossed the meridian at hour 11 M. 15. [Altitudo ♂ meridiana per Quadr. / Tichon. 53 49½ exquiſite, pertranſibat / autem meridianum Hora 11 M. 15.]

DIE 17 FEBRUARIJ.

The lower head of ♊ from the mer. vers. occas. [Inferius caput ♊ / a mer. verſ. occaſ.]	Decl. ♀
H.3 3′	24 31½
3 11	24 32

1319

With the old sextant [Per Sextantem veterem]

The clock corrected to the heart of ♌ [Horologio ad / cor ♌ correcto]	the distance between ♂ and the neck of ♌ was [fuit Diſt. inter / ♂ & ceruicem ♌]
9 23	9 37¼
9 27	9 37⅓
Distance between ♂ and the lower head of ♊ [Diſt. inter ♂ & inferius caput ♊]	
9 45	27 41½
9 48	27 41½
9 52	27 41⅔
Distance between ♂ and the heart of ♌ [Diſt. inter ♂ & cor ♌]	
10 0	9 35¾
10 3	9 35¾
10 6	9 35⅚

1320

10 40: ♂ on the meridian by the Q. Tichon. had an altitude of 54 27⅓. [10 40 ♂ in meridiano per Q. / Tichon. habuit Altitudinem 54 27⅓.][1321]

Calculation of the place of ♂ for 17 Feb. [Calculus loci ♂ ad diem 17 Feb.]

- H.9.45 Distance from the lower head of ♊ — 27 41½ [Diſt. ab inf. cap. ♊]
- Decl. ♂ — 20 21 45

[1318] the two sub-heads within the table are printed at column measure in the type of the body, not the smaller type of the head row.

[1319] in the first line of this table a minute mark stands after the second *3*.

[1320] as in the left column, the two sub-heads within this table are printed at column measure in the type of the body.

[1321] *10 40* stands in the position of the first figure column of the table above; the second line begins at the left edge of the column.

___[1322]

- Decl. of the lower head of ☊ — 28 57¾ [Decl. inf. cap. ☊]
- Ang. diff. ascens. — 29 3 54 [Ang. diff. aſcenſ.]
- Asc. R. of the lower head of ☊ — 109 57 15 [Aſc. R. inf. cap. ☊]
- Therefore Asc. R. of ♂ — 139 1 10 [Ergo Aſc. R. ♂]
- H.9½ Distance from the neck of ☋ — 9 37⅓ [H.9½ Diſt. a ceruice ☋]
- Decl. of the same — 21 54½ [Decl. eiusdem]
- Decl. ♂ — 20 21½
- Ang. diff. ascens. — 10 11 0 [Ang. diff. aſcenſ.]
- Therefore Asc. R. of ♂ — 139 1 30 [Ergo Aſc. R. ♂]
- H.9⅚ Asc. R. of ♂ — 139 1⅓ [H.9⅚ Aſc. R. ♂]
- Decl. ♂ — 20 21½ B.
- Resp. longitude — 15 12⅗ ☋ [Reſp. Longitudo]
- Latitude — 4 13¼ B. [Latitudo][1323]

DIE 19 FEBRUARIJ.

In the evening. With the old sextant. [Ad Veſperas. Per Sextantem vete- / rem.]

The distance between ☿ and ☿ was [Fuit Diſtantia inter ☿ & ☿]

- H.6 M.5 — 17 15⅓
- 6 6½ — 17 15½
- 6 8 — 17 15½
- 6 16 — 17 15⅔

Distance between ☿ and Aldebaran [Diſt. inter ☿ & Aldeboram]

- 6 51 — 28 20⅚
- 6 56⅓ — 28 20
- 7 0 — 28 19⅚
- 7 5½ — 28 19¾

Distance between ☿ and Aldebaran [Diſt. inter ☿ & Aldeboram]

- 7 17⅔ — 31 9½
- 7 35 — 31 8⅔
- 7 41½ — 31 8⅓
- 7 43 — 31 8⅓

8 2 Decl. ☿ by the Aust. armillae [8 2 Decl. ☿ per Arm. Auſt.]

- 11 39½
- 11 39½[1324]

At H.6 M.55 ☿ was at an azimuth of 75 38 from the meridian towards the setting, and had an altitude of 16 39 by the lesser Q. [H.6 M.55 fuit ☿ in

[1322] the side is set in two columns divided by a printed vertical rule. The whole side is in roman type.

[1323] *H.9½* and *H.9⅚* stand to the left of the column's text, beside the fifth and tenth lines. The figures stand in three positions at the right. *Latitudo* is set in under *Longitudo*.

[1324] the two lines *11 39½* stand at the right of the column, under the end of the line before them; no brace is printed.

Azimutho a Me- / ridie verſus occaſum 75 38 & habuit / Altitudinem 16 39 per Q. Minorem.]

Distance between ♂ and the lower head of ♊. [Diſtantia inter ♂ & inferius caput ♊.]

- H.8 29 — 27 8¼
- 8 34 — 27 8¾
- 8 37 — 27 8¾

The eye of ♉ was distant from the meridian towards the setting H.3 M.2⅓. [Abfuit oculus ♉ a / Meridie verſus oc- / caſum H.3 M.2⅓.][1325]

Distance between the neck of ♌ and ♂ [Diſtantia inter ceruicem ♌ & ♂]

- 9 28 — 10 9
- 9 33 — 10 9

Distance between ♂ and the heart of ♌ [Diſtantia inter ♂ & cor ♌]

- 9 42 — 10 6
- 9 45 — 10 6

Distance between ♂ and the lower head of ♊ [Diſtantia inter ♂ & inferius caput ♊]

- 10 10⅔ — 27 8⅙
- 10 16 — 27 8
- 10 23 — 27 8

Distance between ♂ and the heart of ♌ [Diſtantia inter ♂ & cor ♌]

- 10 43 — 10 7
- 10 46 — 10 7

With the northern armillae [Per Armillas Septentrionales]

♀ from the meridian towards the setting [♀ a mer. / verſ. occaſum]	The lower head of ♊ towards the rising [Infer. caput ♊ / verſ. ortum]	Diff. Ascens. R. [Diff. / Aſcenſ. R.]
67 38	27 34¼	95 12¼
68 20	26 53	95 13
	The heart of ♌ towards the rising [Cor ♌ / verſ. ortum]	
71 57	59 49	131 46
72 40½	59 5	131 45½
73 24⅓	58 21⅔	131 46
♂ from the meridian towards the rising [♂ a mer. / verſ. ortum]	The eye of ♉ towards the setting [Oculus ♉ / verſ. occaſ.]	
45 53	29 28	75 21
45 1	30 20	75 21
44 0	31 21⅔	75 21⅔
	The tail of ♌ towards the rising [Cauda ♌ / verſ. ortum]	
109 22	142 58	33 36
110 57½	144 32	33 35½

[1325] this sentence is printed in three short lines to the right of the three lines of figures above it, one line of text beside each line of figures.

1326

H. 10¾ ♂ on the meridian: by the Tichon. 54 33⅔; by the Portat. 54 33½. [H. 10¾ ♂ in merid. per Tichon. 54 33⅔ / per Portat. 54 33½][1327]

DIE 22 FEBRUARIJ.

In the evening. [Ad Veſperas.]

When ♀ was distant from the meridian towards the setting [Cum ♀ abfuit a / Meridie verſus occaſ.]	Distance between ♀ and the orient. limb. of ☾ [Diſt. inter ♀ / & orient. limb. ☾]
59 30	1 35⅙
59 40	1 35
62 30	1 31
63 24	1 30
64 1	1 29½

At that time, as far as could be seen, there was a ☌ of ♀ with the western horn of ☾, so that the distance is one of latitudes only. [Fuit tunc quoad viſum ☌ ♀ cum oc- / cidentali cornu ☾, vnde ſola diſtantia / latitudinum eſt.]

The lower head of ♊ from the meridian towards the setting [Inferius caput ♊ / a merid. verſ. occaſum]	Distance between the western limb. of ☾ and ♀ by the Sext. nou. [Diſt. inter occident. limb. / ☾ & ♀ per Sext. nou.]
10 15½	1 51⅔
10 17	1 50⅓
10 18	1 50
10 20	1 50¼
10 23	1 49¾

___[1328]

With the lesser quadrant [Per Quadrantem minorem]

H. M.	Altitude of ♀ [Alt. ♀]	Azim. from the meridian towards the setting [Azim. a Mer. verſ. occaſum]
6 4	23 49⅔	66 40
6 10	22 54⅔	68 0
6 16	21 5	71 15
6 21	20 35	72 26

With the old sextant [Per Sextantem veterem]

[1326] the rows carrying words are sub-heads printed within the table, in the same smaller type as its head.

[1327] *per Portat. 54 33½* stands on the line below, set to the right so that its figures fall under those of the line above.

[1328] the side is set in two columns divided by a printed vertical rule. The whole side is in roman type.

The heart of ☋ from the meridian towards the rising [Cor ☋ a merid. / verſus ortum]	Distance between ♃ and ♀ [Inter ♃ et ♀ / Diſtantia]
H.3 M.46	14 12¼
3 44	14 12⅙
3 38	14 12
3 36	14 11¾

At H.7 M.33 ♃ was at an Azim. of 73 50 from the meridian towards the setting; its altitude was 23 16. [H.7 M.33 fuit ♃ in Azim. a Meridie / verſus occaſum 73 50, Alt. eius 23 16.]

Distance between ♂ and the lower head of ♊ [Diſt. inter ♂ & infer. cap. ♊]

- H.10 12 — 26 24
- 10 16 — 26 23¾
- 10 21 — 26 23½

By the old sextant, not certain enough, because of the unsteady instrument. [per Sext. vete- / rem non ſatis / certæ, propter / inſtrumentum vacillans.][1329]

♂ on the meridian had an altitude by the Tichonicum of 54 41½, by the portable quadrant of 54 41¼. [♂ in merid. habuit Altitudinem / per Tichonicum 54 41½ / per Portatilem 54 41¼]

DIE 27 FEBRUARIJ.

Toward evening. With the old sextant. [Ad Veſperas. Per Sextantem vete- / rem.]

Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]

- H.9 M.38 — distance 25 25 [Diſt. 25 25]
- 9 42 — 25 24¾
- 9 44 — 25 24¾
- 9 46 — 25 24½
- 9 50 — 25 24½

At 10 7 ♂ was on the meridian and had an altitude by the Tichon. quadrant of 54 48, by the portable quadrant of 54 48½. [10 7 fuit ♂ in meridiano & ha- / buit Alt. per Q. Tichon. 54 48 / per Q. Portat. 54 48½]

Distance between the heart of ☋ and ♂ [Diſtantia inter cor ☋ & ♂]

- 10 15 — 11 41
- 10 19 — 11 41⅓
- 10 22 — 11 41⅓

Between ♂ and the neck of ☋ [Inter ♂ & ceruicem ☋]

- 11 52⅔ — 10 28½ [recte: 10 28½ — 11 52⅔, the two numbers exchanged — Corrigenda, p. 431]

DIE 28 FEBRUARIJ.

Toward evening. [Ad Veſperas.]

[1329] this sentence is printed in short lines to the right of the three lines of figures above it, one line beside each, the fourth line standing under the figures.

Horol.	☿ from the meridian towards the setting [☿ a merid. / verſ. occaſ.]	Distance between ☿ and ♀ [Diſt. inter / ☿ & ♀]
6 9	3 27½	8 18
6 11½	3 30	8 18⅙
6 14½	3 32½	8 17⅚

Horol. corrected from the eye of ☉ [Correcto Horol. / ab oculo ☉]	Azim. of ♀ from the meridian towards the setting [Azim. ♀ a / mer. verſ. occaſ.]	Altitude of ♀ [Alt. ♀][1]
6 11	69 33	25 34
6 15½	70 15	25 10
6 20½	71 30	24 15
	Azim. of ☿ from the meridian towards the setting [Azim. ☿ a / mer. verſ. occ.]	
6 24½	65 40	29 40
6 31	67 10	28 50¼

1330

When the eye of ☉ was distant from the meridian, by the northern armillae, towards the setting H.16.25, the Declin. of ☿ was 11 55. [Cum oculus ☉ a meridiano abeßet / per Armillas Boreales verſus occaſum / H.16.25 fuit Declin. ☿ 11 55]

The eye of ☉ from the meridian towards the setting [Oculus ☉ / a mer. verſ. occ.]	♀ from the meridian towards the setting [♀ a mer. / verſ. occaſ.]	Diff. Aſc. R. of both [Diff. Aſc. R. / vtriusque]
35 17	73 39	38 22
35 44	74 5	38 21
36 33	74 52⅔	38 19⅔
	☿ from the meridian towards the setting [☿ a mer. / verſ. occaſ.]	
39 23	69 21	29 58
39 48	69 46¼	29 58¼

1331

DIE 4 MARTIJ.

With the old sextant [Per Sextantem veterem]

[1330] the row carrying words is a sub-head printed within the table, in the same smaller type as its head, in the middle position only. The raised *1* after *Alt.* ♀ in the head is the call of the footnote at the foot of the page.

[1331] the row carrying words is a sub-head printed within the table, in the middle position only, in the same smaller type as its head.

The eye of ☿ towards the setting from the meridian [Oculus ☿ verſ. / occaſ. a mer.]	Distance between ☋ [recte: ♀ — Corrigenda, p. 431] and Aldeb. [Diſt. inter / ☋ & Aldeb.]
H.2 M.26	33 5
2 28	33 5
2 30½	33 4⅚
	Distance between ☋ and Aldeb. [Diſt. inter / ☋ & Aldeb.]
2 36	28 38¼
2 38	28 38¼
2 42	28 38
	Distance between ♀ and ☋ [Diſt. inter / ♀ & ☋]
2 45	4 29⅓
2 48	4 29⅓
2 51	4 29

At that time the altitude of ♀ was roughly 20 grad. [Tunc fuit / ♀ Altit. / quaſi 20 grad.]

At that time the altitude of ♀ [recte: ☋ — Corrigenda, p. 431] was roughly 21 gr. [Tunc fuit / ♀ Altit. / quaſi 21 gr.][1332]

With the northern armillae [Per Armillas ſeptentrionales]

The eye of ☿ towards the setting [Oculus ☿ / verſ. occ.]	♀ from the meridian towards the setting [♀ a mer. / verſ. occ.]	Diff. Aſcenſ.
43 16⅓	77 15⅔	33 59⅓
44 24½	78 23½	33 59
	☋ from the meridian towards the setting [☋ a mer. / verſ. occ.]	
46 9	75 31	39 22
46 40½	76 3	39 22½
47 21	76 42½	39 21½

[1333]

Decl. ♀ 12 29½. At that time Aldeb. was distant from the meridian H.2 M.35 towards the setting. [Decl. ♀ 12 29½. Tunc abfuit Aldeb. a / merid. H.2 M.35 verſus occaſum.]

Decl. ☋ 12 30; Aldeb. H.2 M.39. [Decl. ☋ 12 30, Aldeb. H.2 M.39.]

[1] Codex V. has »Alt. ♂« (the observations are missing in codex C.), but it ought to be ♀. [Codex V. habet »Alt. ♂« (obſeruationes deſunt in codice C.), ſed debet eße ♀.]

[1332] each of these two sentences is printed in three short lines to the right of the figures, the first beside the rows *H.2 M.26*, *2 28* and *2 30½*, the second beside the rows *2 36–2 42*. The rows carrying words inside the table are sub-heads printed in the second position only, in the same smaller type as its head. The table's head row repeats its second heading as the first sub-head, as printed.

[1333] the row carrying words is a sub-head printed within the table, in the middle position only.

___[1334]

DIE 5 MARTIJ.

Toward evening. Declin. ♀ 12 58; the eye of ☉ from the meridian towards the setting H.2 M.36. [Ad Veſperas. Declin. ♀ 12 58, oculus / ☉ a meridie verſus occaſum H.2 M.36.]

With the northern armillae. [Per ſeptentrionales Armillas.]

The eye of ☉ towards the setting [Oculus ☉ / verſ. occaſ.]	♀ from the meridian towards the setting [♀ a mer. / verſ. occaſ.]	Diff. Aſc. R.
44 20	77 10½	32 50½
47 1	79 51	32 50
47 27	80 17	32 50

Decl. ☋ 12 36; the eye of ☉ towards the setting H.2 M.29. [Decl. ☋ 12 36, oculus ☉ verſus / occaſum H.2 M.29.]

The eye of ☉ towards the setting [Oculus ☉ / verſ. occaſ.]	☋ towards the setting [☋ verſ. occ.]	Diff. Aſc. R.
49 27	78 37	29 10
49 50	79 0	29 10
50 19	79 29	29 10

	Distance between ♀ and Aldeb. by the Sext. vet. [Diſt. inter ♀ & / Aldeb. per Sext. vet.]	Altitude of ♀ [Alt. ♀]
H.2 M.10	31 57	24 gr.
2 14	31 57	
2 15	31 56⅚	
	Between Aldeb. and ☋ by the Sext. vet. [Inter Aldeb. & ☋ / per Sext. vet.]	
2 21	28 25½	Altitude of ☋ [Alt. ☋]
2 22	28 25½	25½
2 24	28 25⅓	
	Distance between ☋ and ♀ by the new Sext. [Diſt. inter ☋ & ♀ / per Sext. nouum]	
2 47	3 37¾	
2 49	3 37	

[1335]

[1334] the side is set in two columns divided by a printed vertical rule. The whole side is in roman type.

[1335] the head row of this table is printed over the second and third positions only. The rows carrying words in the second position are sub-heads printed within the table, in the same smaller type as its head. *Alt.* ☋ stands in the third position on the line of *2 21*, and *25½* on the line below it.

When Canis Minor [Canis minor] was distant from the meridian towards the setting H.1 M.15, the distance between ♂ and the inf. head of ♊ was 24 40⅓. [Cum Canis minor abeßet a meridie / verſus occaſum H.1 M.15 fuit diſtan- / tia inter ♂ & inf. caput ♊ 24 40⅓.]

Luc. hum. of Orion [Luc. hum. Orionis] H.2 M.13, distance 24 40⅓; meridian altitude of ♂ by the Tichon. 54 39⅓ [Luc. hum. Orionis H.2 M.13, diſt. / 24 40⅓, Alt. ♂ mer. per Tichon. 54 39⅓]

Canis Minor towards the setting [Canis minor / verſ. occaſ.]	Distance between ♂ and the infer. head of ♊ [Diſt. inter ♂ / & infer. caput ♊]
H.2 M.16	24 39½
2 23	24 39⅓

DIE 6 MARTIJ.

Toward evening. [Ad Veſperas.]

The eye of ♉ from the meridian towards the setting [Oculus ♉ a merid. / verſ. occaſum]	Distance between ♃ and ♀ by the new Sext. [Diſt. inter ♃ & ♀ / per Sext. nouum]
H.2 M.36	2 50⅓
2 41	2 50¼
2 43	2 50
2 45	2 49⅚
	Between ♀ and Aldeb. by the Sext. vet. [Inter ♀ & Aldeb. / per Sext. vet.]
2 52	30 46¾
2 55	30 46
2 56	30 46⅚

1336

At that time the altitude of ♀ was roughly 17 G. [Tunc fuit Altitudo ♀ quaſi 17 G.]

Aldeb. from the meridian [Aldeb. a mer.]	Between ♃ and Aldeb. by the Sext. vet. [Inter ♃ & Aldeb. / per Sext. vet.]
H.3 M.3	28 16⅓
3 4	28 16⅓

At that time the altitude of ♃ was roughly 18 G. [Tunc fuit Alt. ♃ quaſi 18 G.]

[1336] the row carrying words is a sub-head printed within the table, in the second position, in the same smaller type as its head.

Aldeb. from the meridian towards the setting [Aldeb. a mer. / verſ. occaſ.]	Between ♂ and the infer. head of ♊ by the Sext. vet. [Inter ♂ & infer. / caput ♊ per Sext. vet.]
4 44	24 36
4 46	24 36
4 48	24 36
4 53	24 36⅙

At 4 53½ ♂ was then on the meridian and had an altitude by the Q. Portat. of 54 48½ [4 53½ tunc fuit ♂ in meridiano & / habuit Alt. per Q. Portat. 54 48½]

Aldeb. from the meridian [Aldeb. a mer.]	Between ♂ and the heart of ♌ by the Sext. vet. [Inter ♂ et cor ♌ / per Sext. vet.]
5 5	12 29½
5 8	12 29

Not certain enough because of the brightness of ☾. [Non ſatis certa propter ſplendo- / rem ☾.]

With the northern armillae. [Per Armillas Boreales.]

Aldeb. from the meridian [Aldeb. a mer.]		
2 48	Decl. ♀ 13 26 B.	
3 0	Decl. ♃ 12 40 B.	
	♀ towards the setting [♀ verſ. occaſ.]	Diff. Aſc. R.
48°31′	80 11	31 40
48 59	80 40	31 41
50 40	82 20	31 40

1337

DIE 9 MARTIJ.

Toward evening. [Ad Veſperas.]

The clock [Horologium]	Distance between ♃ and ♀ by the new Sext. [Diſtantia inter ♃ & ♀ / per Sext. nouum]
H.6 M.30	1 46½
6 31½	1 47
6 32⅔	1 46⅔
6 34½	1 47
6 38	1 47

[1337] this table's head is printed in the first position only. *Decl. ♀ 13 26 B.* and *Decl. ♃ 12 40 B.* each run across the second and third positions. The row carrying words is a sub-head printed in the second and third positions, in the same smaller type as the head. The first figure group of the lower part carries a degree mark after *48* and a minute mark after *31*, close-set; the other groups carry none.

The clock [Horologium]	Distance between ♃ and ♀ by the new Sext. [Diſtantia inter ♃ & ♀ / per Sext. nouum]

When the eye of ☿ was distant from the meridian towards the setting H.2 M.40, ♃ and ♀ were in a straight line drawn from the pole star, by the ruler. [Cum Oculus ☿ a meridiano verſus / occaſum abeßet H.2 M.40, ♃ & ♀ erant / in linea recta ducta a ſtella polari per / regulam.]

The eye of ☿ from the meridian towards the setting [Oculus ☿ a mer. / verſ. occaſ.]	Reſp. time [Reſp. / tempus]	Distance between ♃ and Aldeb. [Diſt. inter / ♃ et Aldeb.]
2 53½	H.7 9′	27 35⅚
2 57	7 13	27 35⅚
2 59	7 15	27 36
		Distance between the eye of ☿ and ♀ by the Sext. vet. [Diſt. inter oculum / ☿ & ♀ per Sext. vet.]
3 2⅔ [recte: 3 3⅔ — Corrigenda, p. 431]	7 19⅛	27 21
3 6	7 23	27 21⅙
3 9	7 25	27 21

1338

___1339

		Declination [Declinatio]
2 32	6 48	♀ 14 44½ B.
2 43	6 59	♃ 12 53⅓ [recte: 53½ — Corrigenda, p. 431] B.
3 20		♀ 14 46
3 25		♃ 12 54
		Between ♂ and the infer. head of ♊, by the old sextant [Inter ♂ & infer. / caput ♊ per Sext. vet.]
4 16		24 26¼
4 26		24 26⅙
4 30		24 26
4 32		24 26⅙

1340

At hour 9 M. 9½ ♂ was on the meridian; altitude by the Q. Tich. 54 44½, by the Q. Portat. 54 44⅙. [Hora9 M.9½ ♂ in meridiano, altitudo / per Q. Tich. 54 44½ / per Q. Portat. 54 44⅙]

1338 a minute mark stands after *9* in the first line of the middle column, *H.7 9′*. The row carrying words is a sub-head printed in the third position only, in the same smaller type as the head.

1339 the side is set in two columns divided by a printed vertical rule. The whole side is in roman type.

1340 the head is printed over the third position only; the row carrying words is a sub-head printed within the table, in the third position only, in the same smaller type as the head.

The eye of ☉ from the meridian [Ocul. ☉ a mer.]	Distance between ♂ and the heart of ☋ [Diſt. inter ♂ & cor ☋]
5 7	12 36½
5 10	12 36⅔
5 14	12 36½
	Between ♂ and the neck of ☋ [Inter ♂ & ceruicem ☋]
5 21	13 0
5 24	13 0

1341

Examination of the observations of ☽ and ☿ that were made on 9 March toward evening [Examinatio obſeruationum ☽ & ☿ / quæ die 9 Martij ad veſperas ſunt factæ]

- H.7¼ Distance between ☽ and Aldebaran [H.7¼ Diſt. inter ☽ & / Aldeboram] — 27 35 50
- Declination of ☽ B. [Declinatio ☽ B.] — 12 53 30
- Diff. Aſc. R. between ☽ and the eye of ☉ [Diff. Aſc. R. inter ☽ / & oculum ☉] — 28 21 25
- Aſc. R. of ☽ [Aſc. R. ☽] — 34 43 35
- Longitude of ☽ [Longitudo ☽] — 6 44 31 ♉
- Latitude M. [Latitudo M.] — 0 58 17
- H. 7 M. 20 Between ☿ and the eye of ☉ [H. 7 M. 20 Inter ☿ / & oculum ☉] — 27 21
- Declination of ☿ B. [Declinatio ☿ B.] — 14 45
- Ang. diff. aſc. — 28 20 41
- Aſc. R. of ☿ [Aſc. R. ☿] — 34 44 19
- Longitude of ☿ [Longitudo ☿] — 7 21 40 ♉
- Latitude of ☿ B. [Latitudo ☿ B.] — 0 46 45[1342]

Comparison with both calculations, the Alphonsine and the Copernican. [Collatio cum vtroque calculo Alph. / et Copern.]

	From the observation [Ex obſeruatione]	From the Alphonsine [Ex Alphonſ.]	From the Prut. [Ex Prut.]
Longitude of ☽ [Long. ☽]	6 44½ ♉	7 6 ♉	6 14 ♉
Latitude of ☽ [Lat. ☽]	0 58¼ M.	1 0 M.	1 8 M.
Longitude of ☿ [Long. ☿]	7 21⅔ ♉	7 54 ♉	6 48 ♉
Latitude of ☿ [Lat. ☿]	0 46¾ B.	0 8 B.	0 37 B.

[1341] the row carrying words is a sub-head printed within the table, in the second position only.

[1342] the labels are set in from the left and the figures stand in a column at the right; *H.7¼ Diſt. inter* ☽ & is the third line of the paragraph above, and *Aldeboram* with its figures stands on the next line. *H. 7 M. 20 Inter* ☿ starts at the column's left edge.

1343

Thus, according to the observation, the longitude of ♀ lies exactly midway between the Alphonsine and the Copernican calculation, differing from each reckoning by 33 minutes. Much the same happened with ♃, except that it comes 8 minutes closer to the Alphonsine calculation than to the Copernican. [Eſt itaque longitudo ♀ exquiſite in- / termedia iuxta obſeruationem inter / calculum Alphonſinum & Coperni- / anum, diſtans ab vtraque ratione / ſcrupulis 33. Atque itidem ferme in ♃ / euenit, niſi quod is 8 ſcrupulis pro- / pius accedat Alphonſino quam Co- / perniano calculo.]

DIE 11 MARTIJ.

Toward evening. By the new sextant. [Ad Veſperas. Per Sextantem nouum.]

The eye of ☿ from the meridian verſ. the setting [Oculus ☿ a mer. / verſ. occaſum]		Distance between ♀ and ♃ [Diſt. inter ♀ & ♃]
H.2 M.55		3 7⅔
2 59		3 8
3 4		3 8
3 17	Declination of ♀ [Decl. ♀]	15 40⅙ B.
3 21	Declination of ♃ [Decl. ♃]	13 4½ B.
		By the old sextant, between ♃ and the eye of ☿ [Per Sextantem veterem / inter ♃ & oculum ☿]
3 31		27 9¼
3 33		27 9¼
		Between ♀ and Aldebaran [Inter ♀ & Aldeb.]
3 43		25 6
3 48		25 5½

1344

The meridian altitude of ♂ by the Q. Tichon. 44 40 40 [recte: 54 40 40 — Corrigenda, p. 431] [Altitudo ♂ meridiana / per Q. Tichon. 44 40 40]

The eye of ☿ verſ. the setting [Oculus ☿ verſ. occaſ.]	Distance between ♂ and the infer. head of ♊ [Diſt. inter ♂ / & infer. caput ♊]
H.5 M.15⅓	24 22½
5 20⅔	24 22½

[1343] printed vertical rules separate the row labels from the first column of figures and each column of figures from the next. The heading line names *Alph. et Copern.*; the third column is headed *Ex Prut.*, as printed.

[1344] to the left of the rows *3 17* and *3 21* stand the words *Per / Arm. / bor.* ("By Arm. bor.") in smaller type, with a printed brace joining the two rows. The rows carrying words only are sub-heads printed in the third position, in the same smaller type as the head.

The eye of ☉ verſ. the setting [Oculus ☉ verſ. occaſ.]	Distance between ♂ and the infer. head of ♊ [Diſt. inter ♂ / & infer. caput ♊]
5 23¼	24 22½
	Between ♂ and the heart of ☋ [Inter ♂ & cor ☋]
5 27½	12 38¼
5 30	12 38¼
5 31	12 38⅙
	Between ♂ and the neck of ☋ [Inter ♂ & ceruicem ☋]
5 32½	13 5
5 41⅔	13 5

1345

DIE 12 MARTIJ.

Toward evening. With the old sextant. [Ad Veſperas. Per Sextantem vete- / rem.]

The eye of ☉ from the meridian verſ. the setting [Oculus ☉ a mer. / verſ. occaſum]		Distance between ♃ and the eye of ☉ [Diſtantia inter / ♃ & oculum ☉]
H.3 M.15		26 58¼
3 17		26 58½
3 19		26 58¼
		Between ♀ and Aldebaran [Inter ♀ & Aldeb.]
3 24		23 59⅔
3 26		23 59¼
3 33		23 59
3 28	Declination of ♃ [Decl. ♃]	13 9¼
3 32	Declination of ♀ [Decl. ♀]	16 5⅔

1346

The transit of the upper head of ♊ across the meridian: H.7.0′. [Tranſitus ſuperioris capitis ♊ per / meridianum H.7.0′.]

---1347

At H.8 M.53 ♂ on the meridian had an altitude by the Tichon. of 54 38⅓, by the Q. Portat. of 54 38⅙. [H.8 M.53 ♂ in merid. habuit Alt. / per Tichon. 54 38⅓ / per Q. Portat. 54 38⅙]

1345 the rows carrying words are sub-heads printed within the table, in the second position only, in the same smaller type as the head.

1346 the row carrying words only is a sub-head printed in the third position, in the same smaller type as the head. The times in the first column are printed in the order *3 24*, *3 26*, *3 33*, *3 28*, *3 32*.

1347 the side is set in two columns divided by a printed vertical rule. Some passages on the side are in italic type.

The eye of ☿ from the meridian towards the setting [Oculus ☿ a mer. / verſ. occaſum]	Reſp.	Distance in ♂ and the inf. head of ♊ [Diſt. in ♂ & / inf. caput ♊]
H.5 18	H.9 23	24 22½
5 20	9 25	24 22⅔
5 25	9 30	24 22½
5 27	9 32	24 22⅓
The upper head of ♊ towards the setting [Superius caput ♊ / verſ. occaſum]		Between ♂ and the heart of ♌ [Inter ♂ & cor ♌]
2 42		12 38
2 45		12 38½
		Repeated distance between ♂ and the inf. head of ♊ [Repetita diſt. inter / ♂ & inf. cap. ♊]
3 27		24 22½
3 30		24 22½
		Repeated, between ♂ and the heart of ♌ [Repetita inter / ♂ & cor ♌]
3 48		12 38¾
3 55		12 38½
3 59		12 38¾
		Between ♂ and the neck of ♌ [Inter ♂ & ceruicem ♌]
4 8		13 6
4 12		13 5¾
4 17		13 5⅔

1348

Thus, when everything is compared, it is clear that the motion of Mars from the preceding day to this one was imperceptible, so much so that it appears stationary about this time, although in the meantime the Copernican calculation allows a retrogression of three minutes and the Alphonsine of one. [*Patet itaque collatis omnibus, Mar- / tis a die præcedente in hunc inſen- / ſibilem motum fuiße, adeo vt ſtatio- / narius circa hoc tempus appareat, / quamuis Copernianus calculus tri- / um ſcrupulorum & Alphonſinus vni- / us interea admittat retroceßionem.*]

DIE 13 MARTIJ.

The eye of ☿ from the meridian towards the setting [Oculus ☿ a merid. / verſus occaſum]	Declination [Declinatio]
H.3 M.36	♃ B. 13 13¾
3 40	♀ B. 16 30⅚

♂ on the meridian by the Q. Tichon. 54 36⅔ [♂ in merid. per Q. Tichon. 54 36⅔]

With the old sextant. [Per Sextantem veterem.]

1348 the rows carrying words are sub-heads printed within the table in the same smaller type as the head — the first in the first and third positions, the rest in the third only.

The eye of ☿ past the meridian [Oculus ☿ poſt / merid.]	Between ♂ and the infer. head of ♊ [Inter ♂ & / infer. cap. ♊]
3 57	24 22⅔
4 6	24 22⅔
	Between ♂ and the heart of ♌ [Inter ♂ & cor ♌]
4 11	12 37¾
4 13	12 38
4 15	12 37⅔

1349

By the greater clock [Per horologium maius]	Repeated distance between ♂ and the inf. head of ♊ [Repetita diſt. inter / ♂ & inf. cap. ♊]
9 31⅔	24 22⅚
9 34	24 22⅚
9 40	24 22⅚
	Repeated, between ♂ and the heart of ♌ [Repetita inter ♂ / & cor ♌]
9 46	12 37⅔
9 53	12 37¾
9 58	12 37¾
10 0	12 37¾
	Between ♂ and the neck of ♌ [Inter ♂ & ceruicem ♌]
10 4	13 7⅔
10 10	13 7¼
10 16	13 7½

1350

DIE 14 MARTIJ, P. M.

♂ on the meridian had an altitude by the Tichon. of 54 34⅚, by the Portat. of 54 34⅔. [♂ in meridiano habuit Alt. / per Tichon. 54 34⅚ / per Portat. 54 34⅔]

With the old sextant. [Per Sextantem veterem.]

Between ♂ and the southern head of ♊ [Inter ♂ & meridionale caput ♊]

- H.9 M.3 — 24 23⅚
- 9 7 — 24 24
- 9 9 — 24 24
- 9 13 — 24 24

Between ♂ and the heart of ♌ [Inter ♂ & cor ♌]

- 9 19 — 12 37
- 9 23 — 12 36⅚
- 9 31 — 12 36¾

1349 the row carrying words is a sub-head printed within the table, in the second position only.

1350 the rows carrying words are sub-heads printed within the table, in the second position only.

• 9 38 — 12 36⅚

Between ♂ and the bright neck of ♌ [Inter ♂ & lucidam ceruicem ♌]

• 9 50 — 13 8
• 9 53 — 13 8
• 9 55 — 13 8
• 9 58 — 13 8[1351]

When the observations of the preceding days, from 11 March to the 14th, are compared, it appears that Mars was stationary about the 12th, or at most between the 12th and the 13th, whereas the Alphonsine calculation carries the station on to the 14th, and the Prutenic calculation as far as the 15th. The nearest distance of Mars from the inner head of ♊ *when it was stationary is found to be 24ᵍ 22½′, and from the heart of* ♌ *12ᵍ 38½′, and this about the 12th and at the time noted above; and the meridian altitude of* ♂ *on that day was 54 38¼. From this let the longitude and lati- of Mars be sought* [*Collatis antecedentium dierum ob- / ſeruationibus a die 11 Martij vsque / in 14 apparet Martem circa diem 12 / vel ad ſummum inter 12 & 13 fuiſſe / ſtationarium, cum tamen calculus / Alphonſinus in 14 diem ſtationem / producat, Prutenicus vero usque in / 15. Colligitur vero proxima diſtantia / Martis a capite interiori* ♊ *cum eſſet / ſtationarius 24ᵍ 22½′, a corde* ♌ *12ᵍ / 38½′, idque iuxta diem 12 & tempus / ſuperius aſcriptum, fuitque Altitudo / meridiana* ♂ *eo die 54 38¼. Hinc in- / quiratur Martis Longitudo et Lati-*]

___[1352]

tude, and let it be compared with our restitution in the apogee of ♂*, and with the motion of the Sun and the precession of the equinoxes.* [*tudo, & conferatur cum noſtra reſti- / tutione in Apogæo* ♂ *& motu Solis / atque præceſſione æquinoctiorum.*]

DIE 16 MARTIJ.

By the old sextant. [Per Sextantem veterem]

The eye of ♉ p. m. [Oculus ♉ p. m.]	Distance between ♂ and the lower head of ♊ [Diſt. inter ♂ & inf. cap. ♊]
H.3 M.57	24 29⅓
4 5	24 29⅓
	Between ♂ and the heart of ♌ [Inter ♂ & cor ♌]
4 15	12 31⅓
4 17	12 31½
4 20	12 31½

[1353]

[1351] the label *Inter ♂ & cor ♌* is printed in smaller type over the right-hand figures; the other two labels are set in the body type at the left.

[1352] the side is set in two columns divided by a printed vertical rule. Some passages on the side are in italic type.

[1353] the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type as the head.

The meridian altitude of ♂, 54 28½, by the Q. Tich. [Altitudo ♂ merid. 54 28½ / per Q. Tich.]

DIE 19 MARTIJ.

By the old sextant. [Per Sextantem veterem]

	Between ♂ and the lower head of ♊ [Inter ♂ & infer. cap. ♊]
H.8 M.0	24 40⅔
8 7	24 40¾
8 9	24 40¾
8 12	24 40¾

1354

♂ on the meridian had an altitude by the Q. Tichon. of 54 18½. [♂ in meridiano habuit Alt. / per Q. Tichon. 54 18½]

	Distance between ♂ and the heart of ♌ [Dist. inter ♂ & cor ♌]
8 35	12 17½
8 39	12 17½
8 41	12 17½
	Between ♂ and the neck of ♌ [Inter ♂ & ceruicem ♌]
8 49	12 53⅙
8 53	12 52
8 59	12 53

1355

Investigation of the longitude and latitude of ♂ from the preceding observations. [Inquisitio longitudinis & latitudinis / ♂ ex præcedentibus obseruationibus.]

On 12 March at H.9⅓ P.M. [Die 12 Martij H.9⅓ P.M.]

- The distance between ♂ and the lower head of ♊ [Distantia inter / ♂ & inferius caput ♊] — 24 22½
- Declination of ♂ B. [Declinatio ♂ B.] — 20 32¾
- Angle diff. ascens. [Angulus diff. ascens.] — 25 16 2
- Asc. Recta of ♂ [Asc. Recta ♂] — 135 14 2
- Longitude of ♂ [Longitudo ♂] — 11 45 56♌
- Latitude [Latitudo] — 3 22 3B.[1356]

[1354] the head is printed over the second position only.

[1355] the head is printed over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type.

[1356] *Distantia inter* ends the line that begins *Die 12 Martij*; the labels below are set in from the left and the figures stand in a column at the right.

	From the observation [Ex obſeruatione]	Alphonsine calculation [Alphonſ. Cal.]	Prutenic [Pruten.]
Longitude [Long.]	11 45 56 ♌	8 34½ ♌	12 54 ♌
Latitude [Lat.]	3 22 3 B.	3 2 B.	3 32 B.

On 16 March at H. 7⅝. [Die 16 Martij H. 7⅝.]

- The distance between ♂ and the lower head of ☊ [Diſtantia inter ♂ / & inferius caput ☊] — 24 29⅓
- Declination of ♂ B. [Declin. ♂ B.] — 20 23 0
- Angle diff. aſcenſ. [Ang. diff. aſcenſ.] — 25 19 20
- Aſc. R. of ♂ [Aſc. R. ♂] — 135 17 10
- Therefore the longitude of ♂ [Ergo Longit. ♂] — 11 51 24♌
- Latitude [Latitudo] — 3 13 28B.

	From the observation [Ex obſeruatione]	Alphonsine calculation [Alphonſ. Cal.]	Copernican [Copern.]
Longitude [Long.]	11 51 24 ♌	8 43 ♌	12 51 ♌
Latitude [Lat.]	3 13 28 B.	2 56 B.	3 21¼ B.

For the true motion of ♂ from the Prutenic Tables, given the simple ☉ and the apogee of ♂ from the proper restitution, for the days 11, 12, 13, 14, 16 March at H.9⅓P.M. [Pro vero motu ♂ / ex tabulis Prutenicis dato ſimplici ☉ / & Apogæo ♂ ex propria reſtitutione, / addiem 11,12,13,14,16Martij H.9⅓P.M.]

- On the 11th at H.9⅓ [Die 11 H.9⅓] — ♂ 11 17 51 ♌
- 12 — — 11 17 5 ♌
- 13 — — 11 15 56 ♌*
- 14 — — 11 16 1 ♌
- 16 at H.7⅝ [16 H.7⅝] — 11 19 2 ♌[1357]

At the station the observation gave 11 46♌, a difference of 30 minutes.* [In ſtatione obſeruatio dedit 11 46♌, / differentia 30 minutorum.*]

On 19 March at H. 8¼. [Die 19 Martij H. 8¼]

- The distance between ♂ and the lower head of ☊ [Diſtantia inter ♂ / & inferius caput ☊] — 24 40 45
- Declination of ♂ [Declin. ♂] — 20 5 30
- Angle diff. aſcenſ. [Ang. diff. aſcenſ.] — 25 27 33
- Aſc. R. of ♂ [Aſc. R. ♂] — 125 25 33
- Longitude of ♂ [Longitudo ♂] — 12 1 40♌
- Latitude [Latitudo] — 3 6 4B.

[1357] in the second to fourth lines the day number is followed by a printed dash in the place of the time; the dash is transcribed after the day number. The asterisk after *11 15 56* ♌ is printed and is answered by the asterisk opening the next paragraph.

	From the observation [Ex obſeruatione]	From the Alphonsine [Ex Alphonſ.]	From the Copernican [Ex Copern.]
Longitude [Long.]	12 1 40 ♌	9 7 ♌	12 57 ♌
Latitude [Lat.]	3 6 4 B.	2 47 B.	3 14 B.

For the motion of the same according to the proper restitution, for the same time: on the 19th at H.8¼ P. M., 11°28′5″ ♌; *the observation gave 12 2; the difference is 34′.* [Pro eiuſdem motu ſecundum pro- / priam reſtitutionem ad idem tempus. / Die 19 H.8¼ P. M. 11°28′5″ ♌ / *obſeruatio dedit 12 2 / differentia eſt 34′.*]

From this it is clear that the place of ♂ on 19 March at hour 8 P. M. was in 12ᵍ 2′ ♌. And since on the 12th, when it appeared stationary in the sky, it was in 11 46 ♌, it follows that in the interval of 7 days it has advanced from the station up to now by 16 minutes; whereas the Alphonsine calculation holds that in the meantime, over the next 7 following days, it ought to be carried forward from the station by 46′ minutes, half a degree more than the observation has. But the Copernican ephemerides agree well enough with its motion in the sky, for they allow it to be carried forward from the station in the interval of seven days by at least 17 minutes, which exceeds the observation by one imperceptible minute. [*Ex his patet ♂ locum fuiſſe Die 19 / Martij Hora 8 P. M. in 12ᵍ 2′ ♌. Cum- / que die 12, quo ſtationarius in cœlo / apparebat, eſſet in 11 46 ♌, ſequitur / ipſum interuallo 7 dierum a ſtatione / hucusque progreſſum 16 ſcrupulis / primis, cum tamen calculus Alphon- / ſinus ſtatuat ipſum interea debere a / ſtatione per proximos dies 7 ſequen- / tes 46′ ſcrupulis promoueri dimidio / gradu plus quam habet obſeruatio. / At Copernianæ Ephemerides con- / ſentiunt ſatis cum motu ipſius in / cœlo. Nam admittunt a ſtatione ip- / ſum interuallo ſeptem dierum pro- / moueri ſaltem ſcrupulis 17, quod vno / ſcrupulo inſenſibili ab obſeruatione / abundat.*]

___[1358]

From this it is easily proved that no slight error lies in the Ptolemaic hypotheses on which the Alphonsine calculation rests, and that the Copernican reckoning fits the sky itself more exactly. [*Hinc facile conuincitur, Ptolemai- / cis hypotheſibus quibus Alphonſi- / nus calculus innititur, errorem non / leuem ſubeſſe, & Copernianam ra- / tionem ipſi cœlo exactius quadrare.*]

DIE 25 MARTIJ.

Toward evening. When the eye of ☿ was past the meridian towards the setting by H.4 50′, the declination of ♀ B. was 21 0. [Ad Veſperas. Oculus ☿ poſt merid. / verſus occaſum H.4 50′, fuit Decli- / natio ♀ B. 21 0]

♂ on the meridian had an altitude by the Quadr. Tichon. of 53 50⅚. [♂ in meridiano habuit Alt. / per Quadr. Tichon. 53 50⅚]

By the northern armillae. [Per Armillas Boreales]

[1358] the side is set in two columns divided by a printed vertical rule. Some passages on the side are in italic type.

The lower head of ♊ from the mer. towards the setting [Infer. caput ♊ / a mer. verſ. occaſ.]	♀ from the mer. towards the setting [♀ a mer. / verſ. occaſ.]	Diff. Aſc. of both [Diff. Aſc. / vtriusque]
28 59	85 43¾	56 44¾
29 40	86 24⅔	56 44⅔

At H. 8.59 by the greater clock, Spica ♍ was H.2 55′ from the meridian towards the rising. [H. 8.59 per Horologium maius erat / Spica ♍ a meridiano verſus ortum / H.2 55′.]

By the old sextant. [Per Sextantem veterem]

	Diſtance between ♂ and the lower head of ♊ [Diſt. inter ♂ / & infer. caput ♊]
H.9 M.0	25 22
9 5	25 22⅙
9 8	25 22
	Between ♂ and the heart of ♌ [Inter ♂ et cor ♌]
9 37	11 37½
9 41	11 37½
9 50	11 37½

1359

DIE 26 MARTIJ.

At H.8 M.3 ♂ on the meridian had an altitude by the Tichon. of 53 49¼, by the Portat. of 53 49½. [H.8 M.3 ♂ in meridiano habuit Altit. / per Tichon. 53 49¼ / per Portat. 53 49½]

By the old sextant. [Per Sextantem veterem]

	Diſtance between ♂ and the lower head of ♊ [Diſt. inter ♂ & / infer. caput ♊]
H.8 M.18	25 30⅚
8 20	25 30⅚
8 22	25 30⅚
	Between ♂ and the heart of ♌ [Inter ♂ & cor ♌]
8 26	11 28
8 28	11 28
8 32	11 27¾

1360

At 8 37½ the lower head of ♊ was H.2 19½′ from the meridian towards the setting; from this the clock can be corrected. [8 37½ abfuit inferius caput ♊ a me- / ridie verſus occaſum H.2 19½′, hinc / poteſt horologium corrigi.]

[1359] the head is printed over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type.

[1360] the head is printed over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type.

Investigation of the place of ♂. [Inquiſitio loci ♂.]
At H.8⅓ P. M.

- The distance between ♂ and the lower head of ♊ was [fuit diſtantia inter ♂ & in- / ferius caput ♊] — 25 30⅚
- Declination of ♂ B. [Declinatio ♂ B.] — 19 44 0
- Angle diff. aſcenſ. [Angulus diff. aſcenſ.] — 26 11 49
- Aſc. R. of ♂ [Aſc. R. ♂] — 136 9⅚
- Longitude of ♂ [Longitudo ♂] — 12 50 5
- Latitude [Latitudo] — 2 50 14

	From the observation [Ex obſeruatione]	Alphonsine [Alphonſ.]	Pruten.
Longitude [Long.]	12 50 ♌	10 0 ♌	13 35 ♌
Latitude [Lat.]	2 50¼ S.	2 30 B.	2 57 S.

For this time the place of ♂ was sought according to our reckoning. The place of ♂ falls in 12°13½ ♌. [Ad hoc tempus inquiſitus eſt locus / ♂ ſecundum noſtram rationem. Inci- / dit locus ♂ in 12°13½ ♌.]

DIE 30 MARTIJ.

♂ on the meridian had an altitude by the Q. Tichon. of 53 29. [♂ in meridiano habuit altitudinem / per Q. Tichon. 53 29]

DIE 7 APRILIS.

By the northern armillae. The lower head of ♊ from the mer. towards the setting, H.3 3′ P. M.; declination of ♀ B., 24°32′. [Per Armillas Boreales. / Inferius caput ♊ a mer. verſus occ. / H.3 3′ P. M., Decl. ♀ B. 24°32′.]

The lower head of ♊ from the mer. towards the setting [Infer. caput ♊ / a mer. verſ. occ.]	♀ from the mer. towards the setting [♀ a mer. / verſ. occ.]	Diff. Aſc. R. of both [Diff. Aſc. R. / vtriusque]
48 31½	89 48	41 16½
49 34	90 50	41 16
50 21	91 37¼	41 16¼
50 59¼	92 15⅚	41 16½ [recte: 41 16⅓ — Corrigenda, p. 431]
	Declination of ♂ [Decl. ♂]	
H.3 20′	18 37⅔	
	♂ from the mer. towards the setting [♂ a mer. / verſ. occ.]	
54°50′	26 15⅚	28 34⅙
55 47⅙	27 11½	28 35 40
56 52	28 17 40	28 34 20
57 56	29 20¾	28 35¼
58 46 15	30 11 0	28 35 15

1361

DIE 15 APRILIS.

Toward evening. By the northern armillae. At H.9 48′, when the lower head of ☊ was H.4 40′ from the meridian towards the setting, the declination of ♂ was north 17° 38⅔′. [Ad Veſperas. Per Armillas Boreales. / H.9 48′ cum inferius caput ☊ abeßet / a merid. verſus occaſum H.4 40′, fuit / Decl. ♂ Bor. 17° 38⅔′.]

The lower head of ☊ from the mer. towards the setting [Infer. cap. ☊ / a mer. verſ. occ.]	♂ from the mer. towards the setting [♂ a mer. / verſ. occ.]	Diff. Aſc. R. of both [Diff. Aſc. R. / vtriusque]
66 6½	35 19⅓	30 47⅙
66 48½	36 0	30 48½

The lower head of ☊, P. M. [Inf. Caput ☊ / P. M.]	Resulting time [Tempus / proueniens]	Distance between ♂ and the mer. head of ☊, by the old sextant [Diſt. inter / ♂ & mer. cap. ☊ / per Sext. vet.]
H.4 43′	9 52	30 20¾
4 45	9 54	30 20¾
4 47	9 56	30 21

___1362

		Distance between ♂ and the heart of ♌, by the old sextant [Diſt. inter ♂ / & cor ♌ / per Sext. vet.]
4 55	10 4	6 38¾
4 59	10 8	6 38⅔
5 3	10 12	6 38¾

1363

For the place of ♂ from the observation. [Pro loco ♂ ex obſeruatione.]

On 15 April at H.9 50, the distance between ♂ and [Die 15 Aprilis H.9 50 Diſt. inter ♂ &]

- the southern head of ☊ [Merid. Cap. ☊] — 30 20¾
- Declination of ♂ B. [Declin. ♂ B.] — 17 38¾
- Difference of right ascension [Differentia Aſc. R.] — 30 47 48
- Right ascension of ♂ [Aſc. R. ♂] — 140 45 48
- Therefore the longitude of ♂ [Ergo Longitudo ♂] — 17 37½ ♌

[1361] the rows carrying words are sub-heads printed within the table, in the second position only, in the same smaller type as the head.

[1362] the page is set in two columns divided by a printed vertical rule. All type on this page is roman.

[1363] the head is printed over the third position only.

• Latitude [Latitudo] — 2 9 B.[1364]

	Observation [Obſeruatio]	Alphonſ.	Pruten.
Longitude [Long.]	17 37½ ♌	15 10 ♌	18 0 ♌
Latitude [Lat.]	2 9 B.	1 51 B.	2 12½ B.

For the place of the same according to the proper process of calculation, for the same time. The place of ♂ falls in 17 0¼ ♌. [Pro eiuſdem loco ſecundum pro- / prium calculi proceßum ad idem / tempus. Incidit locus ♂ in 17 0¼ ♌.]

DIE 26 APRILIS.

By the old sextant. The distance between the occid. limb of ☾ and ♀, immediately after the setting of ☉: [Per Sextantem veterem. Diſtantia / inter occid. limbum ☾ & ♀, ſtatim poſt / occaſum ☉]

• H.7 M.51 — 46 58½
• 7 52½ — 46 58⅔
• 7 53⅓ — 46 58¾
• 7 55 — 46 59
• 7 56 — 46 59¼
• 7 59 — 47 0[1365]

When ♀ was H.4 M.35 from the meridian towards the setting, and H. 8 M. 4 on the greater clock, its north declination was 26 30¼ by the northern armillae. At the same time, 26 30 by the southern armillae. Repeated, 26 30¼ by the northern armillae. [Cum ♀ abeßet a merid. verſus occa- / ſum H.4 M.35 & in horologio maiori / H. 8 M. 4, fuit declinatio ipſius Bor. / 26 30¼ per Armillas Boreales. Eodem / tempore 26 30 per Armillas Auſtrales. / Repetita 26 30¼ per Armillas Boreales.]

The distance between the lower head of ♊ and ♀: [Diſt. inter infer. caput ♊ & ♀]

• H.9 M.6 — 16 49
• 9 8½ — 16 49⅙
• 9 10½ — 16 49

The distance between ♀ and the less bright shoulder of Erichthonius: [Diſtantia inter ♀ & humerum Erich- / tonij minus lucidum]

• 9 17 — 19 34
• 9 20 — 19 33½
• 9 23 — 19 34

Beside these three lines, in smaller type: for finding the latitude of ♀. [pro latitudine / ♀ cogno- / ſcenda]

[1364] *Diſt. inter* ♂ *&* ends the line that begins *Die 15 Aprilis*; the labels below are set in from the left and the figures stand in a column at the right.

[1365] the six lines are set as two groups of three side by side, divided by a short printed vertical rule. No head is printed over either group.

Moreover, ♀ was so high up to this point that it could not have introduced any perceptible refraction. [Fuit autem ♀ hactenus tam alta, vt / nullam ſenſibilem refractionem inge- / rere potuerit.]

	Between ♀ and the heart of ♌ [Inter ♀ & cor ♌]
8 39	53 7
8 42	53 7⅓
8 46	53 7½
8 47½	53 7
	Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]
9 31	34 9¾
9 33	34 10
9 35	34 9⅚
	Distance between ♂ and Spica ♍ [Diſt. inter ♂ & Spicam ♍]
9 48	56 42½
9 49½	56 42½
9 54	56 42⅔

1366

Declination of ♂ B. 16 8½ by the northern armillae. At H.10 25½′ the southern head of ♊ was H.6 M.0½ from the meridian towards the setting; from this, correct the clock. [Decl. ♂ B. 16 8½ per Armillas Bore- / ales. H.10 25½′ abfuit meridionale ca- / put ♊ a meridiano verſus occaſum / H.6 M.0½, hinc rectifica horologium.]

On 26 April, for the right ascension of ♀, from which ☾ was observed on the same day. [Die 26 Aprilis, pro Aſcenſione Recta / ♀ vnde ☾ eodem die obſeruata eſt.]

- At H.8 M.40, ♀ from the heart of ♌ [H.8 M.40 ♀ a corde ♌] — 53 7
- Declination of ♀ [Decl. ♀] — 26 30
- Declination of the heart [Decl. cordis] — 13 58
- Right ascension of the heart [Aſc. R. cordis] — 146 32
- Ang. difference of ascension [Ang. diff. aſcenſ.] — 55 27 12
- Therefore the right ascension of ♀ [Ergo Aſc. R. ♀] — 91 4 48
- Distance of ♀ from the lower head of ♊ [Diſt. ♀ ab inf. capite ♊] — 16 49
- Declination of the head of ♊ [Decl. cap. ♊] — 28 58
- Right ascension of the head of ♊ [Aſc. R. cap. ♊] — 109 57⅓
- Ang. difference of ascension [Ang. diff. aſcenſ.] — 18 48 56
- Therefore the right ascension of ♀ [Ergo Aſc. R. ♀] — 91 8 24[1367]

Let the right ascension be taken as 91 6, because it was then less exposed to refractions; once it has been brought back to the time at which ☾ was observed,

[1366] the head is printed over the second position only; the rows carrying words are sub-heads printed within the table, in the second position only, in the same smaller type.

[1367] in each group the first line begins at the column's left edge and the lines below it are set in; the figures stand in a column at the right.

you will be able to use it. [Ponatur Aſc. R. 91 6 eo quod minus / refractionibus tunc [recte: tunc erat — Corrigenda, p. 431] obnoxia, qua re- / vocata ad tempus obſeruatæ ☾ vti / poteris.]

The declination, however, hardly varies at all, since ♀re is near the greatest northern latitude and at the same time near the summer tropic. [Declinatio autem nihil fere variatur / ♀re exiſtente circa maximam latitu- / dinem Septentrionalem ſimul autem / Tropicum æſtiuum.]

Consider how much must be added here to the right ascension of ♀ for the parallax, which may be about 6ᴹ, as ♀ approaches the perigee of the epicycle. [Conſidera quantum hic addendum / ſit Aſcenſioni Rectæ ♀ pro parallaxi, / quæ circa 6ᴹ eße poteſt, ♀ perigæo / epicycli appropinquante.]

DIE 27 APRILIS.

At H.8 11, declination of ♀ B. 26 30¾ by the northern armillae. [H.8 11 Decl. ♀ B.26 30¾ per Arm. Bor.]

The distance between ♂ and ♀: [Diſtantia inter ♂ & ♀]

- 8 41 — 49 45¾
- 8 42½ — 49 46
- 8 43 — 49 45¾
- 8 45⅓ — declination of ♂ B. [Decl. ♂ B.] 16 1 by the northern armillae [per Arm. Bor.]
- 16 0¾ by the southern armillae [per Arm. Auſt.][1368]

___[1369]

	Distance of ♀ and the heart of ☋ [Diſt. ♀ & cordis ☋]
8 56½	52 5
8 58	52 5
9 0	52 5
	Between ♀ and the lower head of ☊ [Inter ♀ & inferius caput ☊]
9 8	15 48½
9 12	15 48½

[1370]

At 9 13⅔ the heart of ☋ was H.2 23¾ from the meridian towards the setting; from this the clock can be corrected. [9 13⅔ abfuit cor ☋ a merid. verſus / occaſum H.2 23¾, hinc poteſt ho- / rologium corrigi.]

[1368] the last line carries figures only, set under *16 1* of the line above; the words *per Arm. Bor.* and *per Arm. Auſt.* are in smaller type.

[1369] the page is set in two columns divided by a printed vertical rule. Some passages on the page are in italic type.

[1370] the head is printed over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type.

	Between ♂ and the lower head of ♊ [Inter ♂ & inferius caput ♊]
10 2	34 32⅔
10 5½	34 32⅔
10 8	34 32⅔
	Between ♂ and Spica ♍ [Inter ♂ & Spicam ♍]
10 17½	56 19⅚
10 19⅔	56 19⅚
10 21	56 19¾

[1371]

By the old sextant. [per Sextantem veterem.]

DIE 6 MAIJ.

Toward evening. The distance between ♀ and the heart of ♌ by the sextant △: [Ad Veſperas. Diſtantia inter ♀ & cor / ♌ per Sext. △.]

- H.9 38′ — 43 6⅓*
- 9 42 — 43 6¼

*At this moment of time the lower head of ♊ was H. 5 53 from the meridian towards the setting, by the southern armillae. (It crossed the meridian at H.3.46p.m.). [*Hoc temporis momento diſtabat / inferius caput ♊ a meridiano H. 5 53 / verſus occaſum per Armillas Auſtra- / les.(Tranſijtmeridianum H.3.46p.m.).]

At H.9 45, declination of ♀ B. 26 6½ by the southern armillae. [H.9 45 Decl. ♀ B.26 6½ perArm.Auſt.]

Note. At this time ♀ was near the limits of its greatest remoteness, from which its apogee and eccentricity can be investigated. [*Nota. ♀ fuit hoc tempore circa li- / mites maximæ ſuæ remotionis, vnde / ipſius Apogæum & Eccentricitas in- / quiri poteſt.*]

	Between ♀ and ♂ [Inter ♀ & ♂]
10 26½	44 25⅓ [recte: 25½ — Corrigenda, p. 431]
10 30	44 25½

Beside these two values, in body type: by the old sextant. [per Sext. / veterem.][1372]

At 10 33, the distance between ♀ and the heart of ♌ repeated: 43 4⅚. [10 33 repetita diſtantia inter ♀ & / cor ♌ 43 4⅚.]

Around these last observations the Alt. of ♀ was roughly 12° by the Radius. [Circa has poſtremas obſeruationes / fuit Alt. ♀ quaſi 12° per Radium.]

[1371] the head is printed over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type.

[1372] the head is printed over the second position only. The words *per Sext.* and *veterem.* stand to the right of the two values, one on each line.

At H. 10 39⅓ the lower head of ☊ was P. M. H. 6 M. 54 from the meridian, from which you will also be able to correct the time. [H. 10 39⅓ abfuit inferius caput ☊ a / merid. P. M. H. 6 M. 54, vnde etiam / poteris tempus corrigere.]

Note that it was observed among clouds. [Nota quod inter nubes obſerua- / tum ſit.]

On 6 May at H. 9⅔. The distance between ☿ and [Die 6 Maij H. 9⅔. Diſtantia inter ☿ &]

- the heart of ☋ [cor ☋] — 43 6¼
- Declination of ☿ B. [Declinatio ☿ B.] — 26 6½
- Angle diff. aſcenſ. [Angulus diff. aſcenſ.] — 44 16 47
- Aſc. R. of ☿ [Aſc. R. ☿] — 102 18 13
- Therefore the longitude of ☿ [Ergo Longitudo ☿] — 11 3 5♋
- Latitude [Latitudo] — 3 3 50B.

Let the apogee of ☿ and ☉ be taken as the same; with our precession of the equinoxes taken as 28° 4′, the place of ☿ is investigated for this day. [Ponatur idem Apogæum ☿ & ☉, / ſumpta noſtra præceßione æquinoc- / tiorum 28° 4′, indagatur locus ☿ ad / hunc diem.]

- Simple longitude of ☿ [Simplex longitudinis ☿] — $0^{\text{ſex}}$ 26°20′ 0″
- Apogee of ☿ [Apogæum ☿] — 1 7 48 30
- It would rather have been [Potius fuißet] — 1 7 48 0
- Eccentric anomaly of ☿ [Anomalia Eccentri ☿] — 5 18 31 30
- Equation of the eccentric, ad. [Æquatio Eccentri ad.] — 1 18 50
- Prop. minutes [Scrupula prop.] — 6 43
- Coequation of the anomaly of the eccentric [Coæquatio anom. ecc.] — 5 19 50 20
- Equated longitude [Coæquata long.] — 0 27 38 50
- Simple commut. (Tab. Prut.) [Simplex commut. (Tab. Prut.)] — 2 14 54 12
- Coæquat. commut. — 2 13 35 22
- Equation paral. [Æquatio paral.] — 45 6 56
- Excess [Exceßus] — 1 36 49
- Corresponding part [Pars congruens] — 10 50
- Absolute proſt. [Abſoluta proſt.] — 45 17 46
- Equated longitude [Coæquata long.] — 0 27 38 50
- ☿ from 1 ♈ [☿ a 1 ♈] — 1 12 56 36
- True precession [Præceßio vera] — 28 4 0[1]
- Longitude of ☿ [Longitudo ☿] — 1 41 0 36[1373]

Therefore the place of ☿ falls in 11 0½ ♋ on 6 May at H.9⅔ P. M. [Incidit ergo locus ☿ in 11 0½ ♋ die / 6 Maij H.9⅔ P. M.]

[1373] the eighteen lines are set in smaller type; the figures stand in four places at the right, and where a line has fewer figures they stand in the rightmost places (lines 5, 6, 11, 12, 13, 14, 17 of the list as given). In the first line the raised letters *ſex* follow the first figure, and degree, minute and second marks follow the next three. The parentheses in the ninth line are printed. The raised figure *1* after the seventeenth line's value is a printed footnote call.

From our calc. [Ex noſtro calc.]	From observation [Ex obſerv.]	Calc. Prut.	Calc. Alph.
Longitude [Long.] 11 0½♋	11 3 ♋	10 3 ♋	10 51 ♋
Latitude [Lat.]...	3 3⅝B.	3 6 B.	3 9B.

1374

DIE 7 MAIJ.

When ♀ was H. 5 29′ from the meridian towards the setting, and H. 9 49′ by the clock, the declination of ♀ by the southern armillae was 26°0′ B. [Cum ♀ abeßet a meridiano verſus / occaſum H. 5 29′ & per horologium / eßet H. 9 49′, fuit Declin. ♀ per Ar- / millas Auſtrales 26°0′ B.]

	Distance between ♀ and ♂ [Diſt. inter ♀ & ♂]
H.9 19	43 55¼
9 20	43 55⅓
	Between ♀ and the heart of ♌ [Inter ♀ & cor ♌]
9 33½	42 9⅔
9 35	42 9⅓
9 38	42 9⅓
9 41½	42 9⅓
9 55½	42 9¼

Beside the first two values, joined to them by a printed brace, in smaller type: At that time the Alt. of ♀ by the Radius was 20¼°. [Tunc fuit Alt. / ♀ per Ra- / dium 20¼°.][1375]

This evening it was clearer than on the previous one, and ♀ was at its greatest remoteness, so these are to be trusted more. [*Hoc veſperi erat ſerenius quam / antecedenti, & ♀ erat in maxima re- / motione, vnde his potius fidendum.*]

1 There is written in addition: »Rather 28 4½«. [Adſcriptum eſt »Potius 28 4½«.]

___[1376]

And its place can be compared from the distance from ♂, once this has been restored. [*Et conferri poteſt locus eius ex di- / ſtantia a ♂, hoc reſtituto.*]

	Between ♀ and the lower head of ♊ [Inter ♀ & inferius caput ♊]
10 4	6 31

[1374] the four positions are divided by three printed vertical rules. The row labels *Long.* and *Lat.* stand in the first position with its values; in the *Lat.* row the first position carries three spaced points in the place of a value.

[1375] the head is printed over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type. The brace stands to the right of *43 55¼* and *43 55⅓* only.

[1376] the page is set in two columns divided by a printed vertical rule. Some passages on the page are in italic type.

	Between ♀ and the lower head of ♊ [Inter ♀ & inferius caput ♊]
10 9	6 32

Beside these two values, joined to them by a printed brace, in smaller type: Not certain enough, because each star was near the horizon. [Non ſatis certa, / quod vtraque / ſtella horizonti erat vicina.]

	Between ♂ and Spica ♍ [Inter ♂ & Spicam ♍]
11 16	52 13½
11 20	52 13⅔

Beside these two values, joined to them by a printed brace, in smaller italic type: *From this let the place of ♂ be investigated, and from this, ♀.* [*Hinc inqui- / ratur locus / ♂ & ex / hoc ♀.*][1377]

At H.11 24½ the declination of ♂ was 14 22½ by the southern armillae, and at that time the heart of ♌ was H. 5 12⅔ from the meridian towards the setting, from which you will be able to correct the clock. The heart of ♌, however, was crossing the meridian at H. 12½ [recte: H. 6 12½ — Corrigenda, p. 431]. [H.11 24½ erat Declinatio ♂ 14 22½ per / Armillas Auſtrales, fuitque tum / temporis cor ♌ a merid. verſus / occaſum H. 5 12⅔, vnde poteris / horologium corrigere. Tranſibat / autem meridianum cor ♌ H. 12½.]

Investigation of the place of ♀ for 7 May. [Inquiſitio loci ♀ ad diem 7 Maij.]

- H.9½ Distance of ♀ from the heart of ♌ [H.9½ Diſt. ♀ a corde ♌] — 42 9½
- Declination of ♀ [Decl. ♀] — 26 0
- Declination of the heart of ♌ [Decl. cordis ♌] — 13 58
- Ang. diff. aſcenſ. — 43 13 55
- Aſc. R. of the heart of ♌ [Aſc. R. cordis ♌] — 146 32 5
- Therefore Aſc. R. of ♀ [Ergo Aſc. R. ♀] — 103 18⅙
- H.9⅓ Distance of ♀ from ♂ [H.9⅓ Diſt. ♀ a ♂] — 43 55¼
- Declination of ♀ [Decl. ♀] — 26 0
- Declination of ♂ [Decl. ♂] — 14 22
- Ang. diff. aſcenſ. — 45 23 7
- Aſc. R. of ♂ [Aſc. R. ♂] — 148 43 0
- Therefore Aſc. R. of ♀ [Ergo Aſc. R. ♀] — 103 19 53
- Put H.9 M.25: Aſc. R. [Pone H.9 M.25 Aſc. R.] — 103 19 0[1378]

Alt. 20°, Parall. alt. of ♀ 4½′, longitude 2′ 40″, latitude 3′ 40″. [Alt. 20°, Parall. alt. ♀ 4½′, Long. 2′ 40″, / Lat. 3′ 40″.]

- Reſp. longitude [Reſp. Long.] — 11 57 53♋
- Latitude [Lat.] — 3 1 53B.

[1377] in each of the two tables above the head is printed over the second position only.

[1378] the figures stand in up to three places at the right; where a line has two figures they stand in the first two places.

According to the N. reckoning, for the same time: [Iuxta N. rationem ad idem tempus]

- Longitude [Long.] — 12 0¼♋

From our calculation [Ex noſtro calculo]	From observation [Ex obſerv.]	Calc. Prut.	Calc. Alph.
Longitude [Long.] 12 0¼♋	11 58♋	11 0½♋	11 49♋
Latitude [Lat.]...	3 2B.	3 6½B.	3 11B.

1379

For the place of ♂ on 7 May, from which ♀ also was observed. [Pro loco ♂ Die 7 Maij, a quo etiam / ♀ obſeruata eſt.]

- H.11¼ Distance of ♂ from Spica [H.11¼ Diſt. ♂ a Spica] — 52 13½
- Declination of ♂ [Decl. ♂] — 14 22½ B.
- Declination of Spica [Decl. Spicæ] — 8 56½ [recte: 56¼ — Corrigenda, p. 431] M.
- Ang. diff. aſcenſ. — 47 7 40
- Aſc. R. of Spica [Aſc. R. Spicæ] — 195 51 40
- Therefore Aſc. R. of ♂ [Ergo Aſc. R. ♂] — 148 44 0
- Reſp. longitude of ♂ [Reſp. Longitudo ♂] — 25 55⅓♌
- Latitude [Latitudo] — 1 32⅔B.

DIE 11 MAIJ.

At H.9⅙, the northern declination of ♀ by the southern armillae: 25 33. [H.9⅙ Declinatio ♀ Borea / per Armillas Auſtrales 25 33]

DIE 12 MAIJ.

At H.9⅙, declination of ♀ B.25 23 by the southern armillae. [H.9⅙ Declin. ♀ B.25 23 per Arm. Auſt.]

Distance between ♀ and ♂ by the old Sext. [Diſt. inter ♀ & ♂ per Sext. veterem.]

- H.9 13½ — 41 28½
- 9 14 — 41 29
- 9 18½ — 41 28½
- 9 20 — 41 29¼

	Between ♀ and the heart of ♌ [Inter ♀ & cor ♌]
9 30	37 29¾
9 31	37 29¾
9 32½	37 30

[1379] the head row is set in smaller type; no rules divide the four positions. The row labels *Long.* and *Lat.* stand in the first position with its values; in the *Lat.* row the first position carries three spaced points in the place of a value.

Beside these three values, joined to them by a printed brace, in smaller type: At that time the Alt. of ♀ was 18 Gr. by the Rad. [Tunc fuit / Alt. ♀ 18 Gr. / per Rad.][1380]

The same distance of ♀ and the heart of ☋ repeated: [Repetita eadem diſt. ♀ & cordis ☋]

- 9 55 — 37 29¼
- 9 58 — 37 29⅙

	Between ♂ and Spica ♍ [Inter ♂ & Spicam ♍]
10 5	50 3
10 8	50 3

[1381]

The distance of the heart of ☋ from the meridian towards the setting was, at H. 10 10′, H. 4 31′ by the southern armillae. From this the true time can be found and the clock rectified. And a little later the declination of ♂, B. 13° 30¼′, was observed by the southern armillae. [Diſtantia cordis ☋ fuit H. 10 10′ a / meridiano verſus occaſum per Ar- / millas Auſtrales H. 4 31′. Hinc verum / tempus inquiri & horologium rectifi- / cari poterit. Et paulo poſt obſeruata / eſt declinatio ♂ B. 13° 30¼′ per Auſtra- / les Armillas.]

The declination of ♀, when it was near the horizon, was 25 25 by the same. [Declin. ♀ cum prope horizontem / eßet 25 25 per easdem.]

At H.10 18½′ the heart of ☋ was H.4 39 P.M. from the meridian. [H.10 18½′ Cor ☋a meridie H.4 39 P.M.]

DIE 17 MAIJ.

	Distance between ♀ and the heart of ☋ [Diſt. inter ♀ & cor ☋]
H.10 53	32 58⅔
10 55	32 59¾
10 58	33 0⅓

Beside these three values, joined to them by a printed brace: By the old Sext. △. [Per / Sext. / △vet.][1382]

At 11 4, declination of ♀ 24 40 B. by the southern armillae. [11 4 Decl. ♀ 24 40 B. / per Arm. auſt.]

At 11 10, distance between ♂ and Spica ♍: 47 44 by the old Sext. △. [11 10 Diſt. inter ♂ & Spicam ♍ / 47 44 per Sext. △ vet.]

At 11 30, declination of ♂ B. 12 38½ by the southern armillae. [11 30 Decl. ♂ B. 12 38½ / per Arm. auſt.]

[1380] the head is printed over the second position only.
[1381] the head is printed over the second position only.
[1382] the head is printed in smaller type over the second position only.

These observations are only moderate. [Hæ obſeruationes ſunt mediocres / tantum.]

___[1383]

DIE 18 MAIJ.

Toward evening. Distance between ♀ and the heart of ☋: [Ad Veſperas. Diſt. inter ♀ & cor ☋]

- H.9 M.43 — 32 11⅓
- 9 46 — 32 11

Beside these two values, joined to them by a printed brace: By the old sextant [Per Sext. / veterem]

At 10 15⅔, Decl. of ♀ B. 24 29½ by the southern armillae. [10 15⅔ Decl. ♀ B. 24 29½ / per Arm. Auſt.]

At 10 23, the distance between ♀ and the heart of ☋ repeated: 32 10½. [10 23 Repetita diſtant. inter ♀ & cor ☋ / 32 10½]

	Distance between ♂ and the heart of ☋ [Diſt. inter ♂ & cor ☋]
10 26	6 49
10 27	6 49
	Between ♂ and Spica ♍ [Inter ♂ & Spicam ♍]
10 31	47 16¾
10 33	47 17
10 34	47 16¾

Beside all five values, joined to them by one printed brace: By the old sextant. [Per / Sext. / vet.][1384]

At 10 40, Decl. of ♂ 12 27 B. by the southern armillae. [10 40 Decl. ♂ 12 27 B. / per Arm. auſt.]

At 10 46⅔ the heart of ☋ was H.5 18½′ from the meridian towards the setting by the southern armillae. From this the correction of the time can be derived. [10 46⅔ diſtabat cor ☋ a merid. ver- / ſus occaſum per Armillas Auſtra- / les H.5 18½′. Unde temporis cor- / rectio elici poteſt.]

For the place of ♂ on 18 May [Pro loco ♂ Die 18 Maij]

- Diff. Aſc. R. from the heart of ☋ [Diff. Aſc. R. a corde ☋] — 6 50 4
- Therefore Aſc. R. of ♂ [Ergo Aſc. R. ♂] — 153 22 9
- Diff. Aſc. R. from Spica [Diff. Aſc. R. a Spica] — 42 26 13
- Therefore Aſc. R. of ♂ [Ergo Aſc. R. ♂] — 153 25 27
- Aſc. R. of ♂, settled [Aſc. R. ♂ limitata] — 153 23 40
- Reſp. longitude of ♂ [Reſp. Longitudo ♂] — 0 50 46 ♍

[1383] the page is set in two columns divided by a printed vertical rule. Some passages on the page are in italic type; the whole right column is in italic.

[1384] the head is printed in smaller type over the second position only; the row carrying words is a sub-head printed within the table, in the second position only, in the same smaller type. The brace runs from the first row to the last, across the sub-head.

• Latitude [Latitudo] — 1 19 28 Sept.

DIE 14 SEPTEMBRIS.

On these two following days, the 14th and 15th, it was exceptionally clear, so much so that not a single small cloud was seen anywhere in the whole air; the stillness of the air was also exceptionally joined to its pleasantness. Therefore I myself, being present, carefully observed both the Sun — as is shown further in its own place — and some planets in the following way, and that in the subterranean observatory outside the castle, partly by the great subterranean armillae, partly by the trigonal sextant or the portable quadrant. [*His duobus ſequentibus diebus 14 / & 15 fuit apprime ſerenum, adeo vt / nulla nubecula vſpiam in toto aëre / conſpecta ſiet, erat etiam tranquilli- / tas aëris amænitati apprime con- / iuncta. Quare tam Solem, vt ſuo loco / vlterius patet quam aliquos Planetas / in hunc ſequentem modum diligen- / ter ipſemet præſens obſeruaui, id- / que in obſeruatorio extra arcem ſub- / terraneo, partim per Armillas Mag- / nas ſubterraneas, partim per Sex- / tantem Trigonicum vel Quadrantem / Portatilem.*]

First, in the morning. [*Primo, mane.*]

The lower head of ☊ *was distant from the meridian:* [*Diſtabat inferius caput* ☊ *a meridiano*]

• *H.4 3⅓ towards the rising* [recte: H.4 3½ — Corrigenda, p. 431] [*H.4 3⅓ verſus ortum*] — *45 6½*
• *4 6 as before* [*4 6 vt prius*] — *44 30*
• *4 11 as before* [*4 11 vt prius*] — *43 15*; *trust this one.* [*fide huic.*]

☋ *from the lower head of* ☊ *by the great subterranean armillae*[1⋆.⋆] [☋ *ab inferiori capite* ☊ *per Armillas / magnas ſubterraneas*[1].]

• *4ʰ35ᵐ Equatorial distance* [*4ʰ35ᵐ Diſt. æquatorea*] — *39 58*
• *4 38 The same distance* [*4 38 Eadem diſtantia*] — *39 56½*
• *4 47⅓ ♀ and the eye of* ♉ [*4 47⅓ ♀ & oculus* ♉] — *73 46*
• *The Alt. of* ♀ *was 26 partium.* [*Alt.* ♀ *erat 26 partium.*]
• *4 52 The same distance of* ♀ [*4 52 Eadem* ♀ *diſt.*] — *73 43½, better* [*melior*]
• *Alt. of* ♀ *27 p.* [*Alt.* ♀ *27 p.*]
• *4 56 The same distance* [*4 56 Eadem diſtantia*] — *73 44½, good* [*bona*]
• *Alt. of* ♀ *27½ p.* [*Alt.* ♀ *27½ p.*]
• *5 0 The distance the same* [*5 0 Diſtantia eadem*] — *73 47½*
• *5 4 The same distance* [*5 4 Eadem diſtantia*] — *73 47½, good* [*bona*]
• *Alt. of* ♀ *28 p.* [*Alt.* ♀ *28 p.*]

Use the distance 73 47, without any error. [*Vtere diſtantia 73 47 / abſque omni errore.*]

• *5 8 the declin. of* ♀ *appeared* [*5 8 viſa eſt declin.* ♀] — *14 9¼ bor.*
• *5 11 The same decl. of* ♀ [*5 11 Eadem decl.* ♀] — *14 9*
• *5 15* ♀ *and Aldeb.* [*5 15* ♀ *& Aldeb.*] — *73 45½*
• *5 24 — 73 49*
• *5 31 — 73 50*
• *Alt. of* ♀ *32 p.* [*Alt.* ♀ *32 p.*]
• *5 34 The Decl. of* ♀ *was* [*5 34 Decl.* ♀ *fuit*] — *14 8½*

• *Alt. of ♀ 32½ p.* [*Alt. ♀ 32½ p.*]
• *5 36 The same Decl.* [*5 36 Eadem Decl.*] — *14 8½*
• *5 38 Decl. of ♃* [*5 38 Decl. ♃*] — *21 21½B.*
• *Alt. of ♃ 53½ p.* [*Alt. ♃ 53½ p.*]
• *5 40 Decl. of ♃* [*5 40 Decl. ♃*] — *21 21*
• *5 42 The same* [*5 42 Eadem*] — *21 21*
• *5 45 between ♃ and ♀, by the æquat.* [*5 45 inter ♃ & ♀ / per æquat.*] — *67 1*[1385]

The middle of the ☉ was seen rising at H.5 59′; ♀ was then 46ᵖ22′ from the meridian. [*☉ medius oriri viſus eſt H.5 59′ / ♀ tunc abfuit a merid. 46ᵖ22′.*]

When the ☉ had risen by ½ a degree, its Decl. appeared as 0 14½, and that on the uppermost circumference; therefore the centre was on the equator. [*Cum ☉ ½ gradu ortus eßet, viſa eſt / ipſius Decl. 0 14½, idque in ſuprema / circumferentia, ergo centrum in / æquatore.*]

Then we observed ♀ from the ☉ in this way, as follows. [*Deinde ♀ a ☉ in hunc modum ob- / ſeruauimus vt ſequitur.*]

[1] The times that follow are corrected; error of the clock = + 12ᵐ. [Tempora quæ ſequuntur correcta ſunt; Error horologii = + 12ᵐ.]

___[1386]

6 36 Between ♀ and ☉ by the equator [*6 36 Inter ♀ & ☉ per æquatorem*] — 43 48½

6 40 The declination of the Sun as seen [*6 40 Solis viſa Decl.*] — 0 18

♀ from the Sun in degrees of the equator P. 43 M.50, and this is better. The altitude of ☉ was then 5½. [*♀ a Sole in gradibus æquatoris P. / 43 M.50 eſtque melius. Alt. vero ☉ / tunc erat 5½.*]

6ᴴ46ᴹ ♀ from ☉ 43 48½; altitude of ☉ 6½. [*6ᴴ46ᴹ ♀ a ☉ 43 48½, Alt. ☉ 6½.*]

7 14 ♀ from ☉ 43 47, with a single pinnule; altitude of ☉ 10¼[1]**.** [*7 14 ♀ a ☉ 43 47 vnico pinnacidio / Alt. ☉ 10¼*[1]*.*]

At noon on the following day the clock was running slower by 13 M. 20 S. over 4 days, and I corrected it. [*Horologium in meridie ſequenti / tardius mouebatur 13 M. 20 S. per / dies 4, idque correxi.*]

DIE 15 SEPTEMBRIS.

Again, all through the day and the preceding night the whole sky was very fine, clear and calm. And I observed the following myself, being present. First, to correct the instrument, the star in the Chair of Cassiopeia [Caßiopeæ] was seen at a distance of 33 7½ from the pole, lying obliquely; from which the greater subterranean armillae are well set in position. [*Rurſus erat toto die & nocte præ- / cedente admodum bene toto cœlo / ſerenum & tranquillum. Et hæc ſe- / quentia ipſemet præſens obſeruaui. / Primum pro correctione inſtrumenti / viſa eſt ſtella in Cathedra Caßiopeæ / in*

[1385] in the two lists above, the lines beginning *Alt.* stand indented between the timed lines, without a time; the words *melior*, *bona* and *bor.* stand on their own lines at the right, below the value they follow.

[1386] the page is set in two columns divided by a printed vertical rule. The whole of both columns is in italic type; the footnotes are in roman.

diſtantia a polo 33 7½ oblique ia- / cens, vnde Armillæ maiores ſubter- / raneæ bene ſe habent in ſitu.]

- *3ʰ30ᴹ Declination of* ☋ [*3ʰ30ᴹ Declinatio* ☋] — 21 21½B.
- *3 50½ Declination of* ♄ [*3 50½ Declinatio* ♄] — 4 3½
- *3 53½ The same declination of* ♄ [*3 53½ Eadem* ♄ *Decl.*] — 4 4
- *4 2* ♄ *and Aldeb. by the æquat.* [*4 2* ♄ *& Aldeb. per æquat.*] — 46 28
- *Altitude of* ♄ *26½ p.* [*Alt.* ♄ *26½ p.*]
- *4 2½* ♄ *and Aldeb., distance by the sextant vet.* [*4 2½* ♄ *& Aldeb. Diſt. / per Sext. vet.*] — 47 10
- *4 6* ♄ *and Aldeb. by the æquat.* [*4 6* ♄ *& Aldeb. per æquat.*] — 46 30
- *4 10* ♄ *and Ald.* [*4 10* ♄ *& Ald.*] — 46 33
- *4 14 The same* [*4 14 Eadem*] — 46 29¾
- *4 17½* — 46 31½
- *4 21* — 46 28
- *Altitude of* ♄ *25 p.* [*Alt.* ♄ *25 p.*]

This variation arose from the wide apertures of the pinnules, which should therefore be narrowed. [*Hæc varietas accidit propter am- / pla pinnacidiorum foramina, quare / limitanda.*]

- *4 19 Between* ♄ *and Aldeb.* [*4 19 Inter* ♄ *& Aldeb.*] — 47 8
- *4 25½ by the sextant Trig.* [*4 25½ per Sext. Trig.*] — 47 8¾
- *4 32½* — 47 9
- *Altitude of* ♄ *P.23½.* [*Altitudo* ♄ *P.23½.*]
- *4 37* ♄ *from Aldeb. by the equator (after the pinnules had been narrowed)* [*4 37* ♄ *ab Aldeb. per æquatorem / (poſt attenuata pinnacidia)*] — 46 32, *good* [*bona*]
- *4 38 Distance* [*4 38 Diſtantia*] — 47 9
- *4 41½ The same distance, æquat.* [*4 41½ Eadem diſt. æquat.*] — 46 32, *good* [*bona*]
- *Altitude of* ♄ *22 p.* [*Alt.* ♄ *22 p.*]
- *4 44½ Declination of* ♄ [*4 44½ Decl.* ♄] — 4 3½
- *4 48* ☋ *and the merid. head of* ☊, *by the sextant* △ [*4 48* ☋ *& merid. caput* ☊ */ per Sext.* △] — 36 50⅔
- *4 50½* ☋ *and the mer. head of* ☊, *by the great armillae on the equator* [*4 50½* ☋ *& mer. caput* ☊ *per Armil- / las magnas in æquatore*] — 40 1
- *Altitude of* ☋ *then 55½.* [*Alt.* ☋ *tunc 55½.*]
- *4 54 The same distance was* [*4 54 Eadem diſt. fuit*] — 40 2
- *4 57 The same on the equator* [*4 57 Eadem in æquatore*] — 40 0
- *4 59½ The same on the equator* [*4 59½ Eadem in æquatore*] — 40 0½[1387]

You can therefore use the distance 40 1 for about this time without any perceptible error. [*Potes itaque abſque omni ſenſibili / errore vti diſtantia circa hoc tempus / 40 1.*]

[1387]in the lists above, the lines beginning *Alt.* or *Altitudo* stand indented between the timed lines, without a time; the word *bona* stands on its own line at the right, below the value it follows; the values of the *4 37* and *4 50½* entries stand on a line of their own at the right.

- *5 0 ♃ was distant from the merid. head of ♊, by the sextant* [*5 0 diſtabat ♃ a merid. cap. ♊ / per Sextantem*] — 36 51, *twice* [*bis*]
- *5 2 Declination of ♃ observed* [*5 2 Decl. ♃ obſeruata*] — 21 22½
- *5 4 The same, as before* [*5 4 Eadem vt prius*] — 21 22½
- *5 9 Infer. ♊ and ♀, distance æq.* [*5 9 Infer. ♊ & ♀, diſt. æq.*] — 27 54
- *5 10 The same by the sextant* [*5 10 Eadem per Sext.*] — 29 48
- *5 12½* — 29 48
- *5 13 Equatorial distance* [*5 13 Diſt. æquatorea*] — 27 51
- *5 15½ Distance by the sextant* [*5 15½ Diſt. per Sext.*] — 29 48
- *5 17 That distance by the æquat.* [*5 17 Diſt. ea per æquat.*] — 27 50
- *Altitude of ♀ 29⅔.* [*Altitudo ♀ 29⅔.*]
- *5 20 Distance by the sextant* [*5 20 Diſt. per Sextantem*] — 29 48
- *5 23 ♀ from the mer. ♊ by the æquat.* [*5 23 ♀ a mer. ♊ per æquat.*] — 27 49
- *5 27 The same distance* [*5 27 Eadem diſt.*] — 27 51¾
- *5 31* — 27 50½
- *5 35* — 27 48[2]
- *5 38 Declination of ♀* [*5 38 Declinatio ♀*] — 14 0½
- *5 42* — 14 0½
- *5 44* — 14 0½
- *5 45 Between ♃ and ♀ by the portable quadrant the distance appeared* [*5 45 Inter ♃ & ♀ per Portat. Quadr. / viſa eſt diſtantia*] — 64 41¾
- *5 48 Declination of ♀* [*5 48 Decl. ♀*] — 14 0½
- *5 49 The same distance, by the portable quadrant* [*5 49 Eadem diſt. / per Portat.*] — 64 42
- *5 50 The declination of ♃ appeared* [*5 50 Declin. ♃ viſa eſt*] — 21 22½
- *5 51 Again between ♃ and ♀* [*5 51 Rurſus inter ♃ & ♀*] — 64 41⅔
- *5 54 The same distance* [*5 54 Eadem diſtantia*] — 64 42

And these distances between ♃ and ♀ were taken by the portable quadrant when ☉ was on the very point of rising. [*Atque hæ diſtantiæ acceptæ ſunt / per Quadrantem Portatilem inter ♃ / & ♀ cum ☉ iam iam vellet oriri.*]

[1] In codex V: »Note. The preceding observations of the day are not to be trusted much, because the instrument was corrected again«. [In codice V.: »Nota. Antecedentibus diej obſeruationibus non multum fidendum propter inſtrumentum rurſus correctum«.]

[2] In codex V: »And these must be restricted on account of the size of ♀, which introduces some variation«. [In codice V.: »Atque hæc veniunt limitanda propter ♀ magnitudinem, diuerſitatem aliquam ingerentem«.]

___[1388]

The ☉ was rising at the clock's Hour 6 M.2 S.45, roughly, and that with its middle above the mountains of Scania, to the east of here. The whole Sun had risen when the Hour was 6 3′ 55″. [*Oriebatur vero ☉ in Horologij Hora / 6 M.2 S.45 quaſi, idque*

[1388] the page is set in two columns divided by a printed vertical rule. The left column and the first paragraph of the right column are in italic type; the rest of the right column, from the rubric *DIE 20 SEPTEMBRIS A. M.* on, is in roman.

medius ſupra / montes Scaniæ hinc orientales. To- / tus vero Sol ortus Hora exiſtente / 6 3′ 55″.]

- *6ᴴ 3ᴹ Between ☋ and ♀ by the æquat.* [*6ᴴ 3ᴹ Inter ☋ & ♀ per æquat.*] — 67 55¾
- *6 5 The same by the equator* [*6 5 Eadem per æquatorem*] — 67 55
- *6 8* — 67 57
- *And the Alt. of ♀ was then 36ᵖ.* [*Fuitque tunc Alt. ♀ 36ᵖ.*]
- *6 10 Between ☋ and ♀* [*6 10 Inter ☋ & ♀*] — 67 54
- *6 13 The same distance* [*6 13 Eadem diſtantia*] — 67 55

This variation arose from the light of day, the Sun having risen. [*Hæc varietas accidit propter lu- / men diej, Sole orto.*]

You can, however, use 67 56 for the distance in right Aſc. of ♀ and ☋ at about Hour 6 without any perceptible error — or 55′, according as it agrees better with the quadrant; for we took the distances with the portable quadrant. [*Potes autem circa Horam 6 vti Di- / ſtantia Aſc. Rectæ ♀ & ☋ 67 56 abs- / que omni ſenſibili errore, vel 55′ / prout melius concordat cum Qua- / drante, nam diſtantias accepimus / per Quadrantem Portatilem.*]

- *6 17 Declination of ♀* [*6 17 Decl. ♀*] — 14 0 — *Alt. ☉*
- *6 23 Declination of ☉* [*6 23 Decl. ☉*] — 0 34¼ — 2¾
- *6 25½ The same* [*6 25½ Eadem*] — 0 34¼ — 3
- *6 29 The same* [*6 29 Eadem*] — 0 35½ — 3½
- *6 35 ♀ from ☉ by the æquat.* [*6 35 ♀ a ☉ per æquat.*] — 43 47¼ — 4⅓
- *6 37 Declination of ☉* [*6 37 Decl. ☉*] — 0 37⅔ — 4⅚
- *6 40 ☉ from ♀ by the æquat.* [*6 40 ☉ a ♀ per æquat.*] — 43 49 — 5⅙
- *6 42 The distance of ☉ from ♀ by the sextant was observed* [*6 42 obſeruata eſt Diſt. / ☉ a ♀ per Sext.*] — 45 50
- *6 42½ Declination of ☉* [*6 42½ Decl. ☉*] — 0 39½ — 5½
- *6 46 ♀ from ☉ by the æquat.* [*6 46 ♀ a ☉ per æquat.*] — 43 47
- *6 48 Declination of ☉* [*6 48 Decl. ☉*] — 0 40
- *6 49 ♀ from ☉, distance by the sextant* [*6 49 ♀ a ☉, / diſt. per Sext.*] — 45 48
- *6 51½ Declination of ☉* [*6 51½ Declinatio ☉*] — 0 40¼ — 6½
- *6 54½ Distance from ♀ by the æquat.* [*6 54½ Diſt. a ♀ / per æquat.*] — 43 44 — 7[1389]

But this last is not certain enough. [*Verum hæc vltima non eſt ſatis / certa.*]

6 56 ♀ from ☉ by the sextant 45 52½. Venus, however, could not be seen well through the sextant[1⋆.⋆] [*6 56 ♀ a ☉ per Sext. 45 52½ Venus / autem bene videri per Sextantem / non potuit*[1].]

And from these preceding observations, taken of ♄, ☋ and ♀ both against one another and against the fixed stars, their places can be determined exactly — and especially for the 15th day, because the observations of that day are more exact, the instrument and the other necessary things having been better corrected. [*Atque ex his*

[1389] in the list above the words *Alt. ☉* stand in smaller italic in the third position of the first line, above the single figures set in that position on the lines below. The line *Fuitque tunc Alt. ♀ 36ᵖ.* in the list before it stands indented between the timed lines, without a time.

antecedentibus ob- / ſeruationibus ♄, ♃, ♀ et inuicem et / ad fixas habitis eorum loca exacte / indagari poßunt, idque præſertim ad / diem 15 eo quod eius diej obſeruati- / ones ſint exactiores magis correcto / inſtrumento et cæteris neceßarijs.]

♀, moreover, is not far from its most remote distance from ☉. And ♄ is not far from ☌ ☉; the ☉ itself is near the equator. [*Eſt autem ♀ non longe a remotißima / a ☉ diſtantia. Et ♄ non longe ab ☌ ☉; / ipſe ☉ iuxta æquatorem.*]

DIE 20 SEPTEMBRIS A. M.

We took the distance of ☉ and ♀ by the Equator fixed to the greater subterranean armilla; the Alt. of ☉ by the least quadrant. [Diſtantiam ☉ & ♀ ſumpſimus per / Æquatorem Armillæ ſubterraneæ / maiori affixum. Alt. ☉ per Quadran- / tem minimum.]

	Equatorial distance [Diſtantia æquatoria]	Alt. ☉
7^{H} 4½	43 40	6½
7 7	43 41	7
7 15	43 28	
7 19	43 35	8½
7 33⅔	43 40	10⅛
7 45⅔	43 44	12
7 48½	43 40½	12½
8 1½	43 42	14
8 4⅔	43 40	14⅓
8 13⅓	43 44	15½
8 18	43 40	16
8 26⅓	43 40	17
8 35	43 40 nearly [fere]	17⅚
8 38	43 39¾	18⅓

1390

Meanwhile there was observed by the armillae: [Interea per Armillas obſeruata eſt]

	Declination of ♀ [Decl. ♀]	
7 41⅔	13 9 nearly [fere]	11½
7 51½	13 9 nearly [fere]	13⅙
8 9⅓	13 9	14⅚
8 46⅙	13 8	19

1391

Note that on this day the sky was almost entirely girdled with small white clouds, as though with a rather thin veil. Error of the clock: none. [Nota quod hoc die cœlum fere to- / tum candidis nubeculis quaſi velo / quodam tenuiori obcingebatur. Horo- / logij error nullus.]

[1390] the head row is printed in smaller type, over the second and third positions only.
[1391] the head is printed in smaller type over the second position only.

DIE 21 SEPTEMBRIS A. M.

Again, in the same way, we tracked down the distance of ☉ and ☿, and also the declination of ☿, roughly as follows. [Rurſum pari modo ☉ & ☿ diſtanti- / am itemque ☿ declinationem fere in / hunc modum venati ſumus.]

	Equatorial distance [Diſt. æquatorea]	Declination of ☿ [Decl. ☿]	Alt. ☉
$6^{H}35^{M}$	43 29		2¾
6 41	43 31⅙		3⅚
6 50½	43 34½	12 58¼	
6 55	43 35		5½
7 17⅓	43 36½		8½
7 20		12 58	
7 29⅔	43 37		9⅔
7 36	43 38		

1392

1 The remaining observations of the declination of the Sun are inserted above, p. 358 ſq. [Reliquæ obſeruationes declinationis Solis ſupra p. 358 ſq. inſertæ ſunt.]

---1393

- 7 45 — 43 39½ — 12
- 7 49 — 43 40
- 8 9⅓ — 43 38½ — 14⅔
- 8 21 — 43 38 — 16
- 8 41 — 43 31, roughly [quaſi]

Then ☿, obscured by ☉, ceased to be observable by sight. [Tum ☿ a ☉ obſcurata viſu obſeruari / deſijt.]

The same day, before dawn. [Eodem die ante diluculum.]

The distance between ♄ and Aldebaran [Aldeboram] was observed with the old sextant. [Diſtantia fuit obſeruata inter ♄ & / Aldeboram per Sextantem veterem.]

- H.3 M.11½ — 47 38⅙
- 4 2 — 47 38 — Alt. ♄ 28°
- 4 5¾ — 46 56 — by the equator [per æquator.]
- 4 8 — 47 38 — by the old sextant [per Sext. vet.]
- 4 18 — 46 55½ — equatorial [æquatorea]
- 4 22¼ — 46 55½ — in the same way. Alt. ♄ 21° [parimodo. Alt. ♄ 21°]
- 4½ — 44 37½ — by the sextant [per Sext.]
- shortly after [paulo poſt] — 47 37 — by the same [per eundem]
- 4 39 — 46 56 — equatorial [æquatorea]

Between ♃ and the merid. head of ♊ [Inter ♃ & merid. caput ♊]

1392 the head row is printed in smaller type over the second, third and fourth positions.

1393 the page is set in two columns divided by a printed vertical rule. Both columns are in roman type throughout.

- 4 45½ — 39 59 — by the equator [per æquator.]
- 4 50 — 40 0 — likewise equatorial [item æquatorea]
- 4 49 — 36 53 — by the sextant [per Sextantem]
- 4 53 — 40 0 — by the equator [per æquatorem]
- 4 57 Decl. ♃ — 21 22 — exactly [exacte]
- 5 0 — 36 50¼
- 5 7 — 36 51
- soon afterwards [mox deinde] — 36 52
- at the same instant [eadem [recte: eodem — Corrigenda, p. 431] / inſtante] — 36 52[1394]

Between ♀ and the M. head of ♊ [Inter ♀ atque M. caput ♊]

- 5 9 — 33 29¼ — distance by the æquat. [Diſt. per æquat.]
- Alt. ♀ 27⅜°
- 5 14 — 33 29 — equatorial [æquatorea]
- 5 19 — 33 30 — likewise æquat. [item æquat.]
- 5 23 — 33 30½ — equatorial [æquatorea]
- 5 24 — 35 0
- 5 27 — 34 59½
- 5 30 — 35 0⅔
- 5 32 — 24 59½ [recte: 34 59½ — Corrigenda, p. 431]
- 5 33½ Decl. ♀ 12 59, Alt. ♀ 31°.[1395]

Between the planets ♃ and ♀ [Inter ♃ & ♀ planetas]

- 5 45¼ — 73 30½
- 5 50 — 73 30, nearly [fere]
- 5 53 — 73 30½
- 5 46 — 70 12
- 5 48 — 70 11⅔
- 5 52 — 70 12[1396]

DIE 22 SEPTEMBRIS.

Before dawn. [Ante diluculum.]

H.2 36⅔′, Decl. ♄ Bor. 3 50, Alt. 32° [H.2 36⅔′ Decl. ♄ Bor. 3 50, Alt. 32°]

Between ♄ and Aldebaran [Inter ♄ & Aldeboram]

- 3 15 Distance [Diſt.] — 47 42
- 3 24 — 47 41
- at the same instant [eodem inſtanti] — 47 42
- 3 16 Distance, æquat. [Diſt. æquat.] — 47 1

[1394] the last four entries above — five printed lines, *5 0* to *eadem / inſtante* — are joined at the right by a brace carrying the words *Diſt. eorundem per Sextantem* — "the distance of the same, by the sextant".

[1395] the line *Alt. ♀ 27⅜°* stands indented below the *5 9* line, without a time. The four lines *5 24* to *5 32* are joined by a brace carrying the words *per Sextantem veterem* — "by the old sextant".

[1396] the first three lines above are joined by a brace carrying the words *Diſtantia æquatorea* — "equatorial distance"; the last three by a brace carrying *Per Quadr. portat.*

- 3 26½ — 47 1
- 3 29⅓ — 47 1
- 3 40 Distance again [Diſt. rurſus] — 47 41
- II — 47 42
- III — 47 41½
- 3 36 and 39, Decl. ♄ [3 36 / & 39 Decl. ♄] — 3 50½
- 4 18⅓ — 3 51[1397]

Between ♄ and the merid. head of ♊ [Inter ♄ & merid. caput ♊]

- 4 3⅓ Distance, æquat. [Diſt.æquat.] — 40 0
- 4 6⅔ — 39 59¾
- 4 28 — 39 59⅓
- 4 32 — 40 0
- 4 12 Decl. ♃ — 21 21⅓ — by the armillae [per / Armillas]
- 4 16 — 21 22 — nearly [fere]
- 4¼ Of the same [Eorundem] — 36 50⅔
- Distance, II [Diſt. II] — 36 51⅔
- III — 36 51⅔[1398]

Between ♀ and the mer. head of ♊ [Inter ♀ & mer. caput ♊]

- 4 37 Distance, æquat. [Diſt.æquat.] — 34 24
- 4 40 — 34 24⅚
- 4 45 — 34 24
- 4⅚ Distance of the same [Diſt. / eorundem] — 35 49
- At the same instant [Eodem inſtanti] — 35 49
- 4 51 Decl. ♀ — 12 47½ — Alt. ♀ 25¼[1399]

Between the planets ♃ and ♀ [Inter ♃ & ♀ planetas]

- 5 0 Distance [Diſt.] — 74 27½
- 5 3⅔ æquat. — 74 27½ — Alt. ♀ 27
- 5 5 — 74 27½
- 5 7¼ — 74 27⅔
- 5 18½ Distance [Diſt.] — 71 10
- 5 20½ of the same [eorun- / dem] — 71 9¾
- 5 23 — 71 9¾

[1397] the first three lines above are braced to the words *per Sext.*△ — "by the sextant △"; the lines *3 40*, *II* and *III* are braced to the same words. *3 36* and *& 39* stand on two lines joined by a brace to *Decl.* ♄. At the far right of the last two lines stand *Alt.* ♄ (level with *& 39*) and *20¼* (level with *4 18⅓*).

[1398] the last three lines above are braced to the words *Per Sext.*△ — "by the sextant △". *Armillas* stands alone at the right on the line below *4 12 … per*.

[1399] *4⅚ Diſt.* stands on a line of its own with no value; *eorundem 35 49* on the line below. Those two lines and *Eodem inſtanti* are braced to the words *per Sext. inter nubes* — "by the sextant, among clouds".

• 5 12 Decl. ♀ — 12 47 — by the greater subterr. armillae [per Armillas / ſubterr. maiores][1400]

DIE 23 SEPTEMBRIS.

Before dawn. [Ante diluculum.]

• H. 3½ Decl. ♄ — 3 48⅓ — Alt. ♄ 26 p.¼
• 3 43′ — 3 48¼ — 25 p.

___[1401]

Between ♄ and Aldebor. [Inter ♄ & Aldebor.]

• 3 50 Distance, æquat. [Diſt.æquat.] — 47 5
• 3 53⅓ — 47 5½
• 3 58½ — 47 5½
• Shortly after, declination of ♄ [Paulo poſt Decl. ♄] — 3 48 — Alt. 22 p.
• 4 37 Distance [Diſt.] — 47 47
• 4 39 — 47 45⅔
• 4 43 — 47 45
• Shortly after, more exactly [Paulopoſt, exactius] — 47 46[1402]

Between ☋ and the southern head of ♊ [Inter ☋ & merid. caput ♊]

• 4 23 Distance, æquat. [Diſt.æquat.] — 40 0½
• 4 29½ — 40 0⅔
• 4 44⅔ — 40 0¾
• 4 30⅙ Declination of ☋ [Decl. ☋] — 21 21½ — by the same armillae [per eaſ- / dem Armillas]
• 4 45 Simple distance [Diſt.ſimplex] — 36 49½
• 36 49½[1403]

Between ♀ and the southern head of ♊ [Inter ♀ & merid. caput ♊]

• 4 58⅔ Distance, æquat. [Diſt.æquat.] — 35 24½
• 5 4⅔ — 35 25⅓
• 5 10½ — 35 25½
• 4 57 Simple distance [Diſt.ſimplex] — 36 46½
• 36 46½[1404]

[1400] *Diſt.* on the *5 0* line and *æquat.* on the *5 3⅔* line stand on successive lines. The word *eorundem* is divided at a line end, *eorun-* on the *5 20½* line and *dem* on the *5 23* line. The three lines *5 18½* to *5 23* are braced to the words *per Q.Port. inter raras nubes* — "by Q.Port., among scattered clouds".

[1401] the upper part of the page is set in two columns divided by a printed vertical rule. Below it, a paragraph and a computation run across the full width; then a second pair of columns, again divided by a rule; then a line and a small table across the full width. The whole page is in roman type.

[1402] the last four lines above are braced to the words *Per Sext. Trig.*

[1403] the pair of lines *36 49½* is braced to the words *per Sext. Trig.*; the second *36 49½* stands on a line of its own with no time or label. The word *eaſdem* is divided at a line end, *eaſ-* on the *4 30⅙* line and *dem Armillas* on the line below.

[1404] the pair of lines *36 46½* is braced to the words *per Sext. Trig.*; the second stands on a line of its own.

Between the planets ♃ and ♀ [Inter ♃ & ♀ planetas]

- 5 21½ Distance [Diſtantia] — 72 7⅔
- 5 24 — 72 7⅓
- 5 25 — 72 7⅓
- 5 28½ Distance [Diſt.] — 75 28½
- 5 34⅔ æquat. — 75 28⅓
- 5 37⅓ — 75 28⅙
- 5 44⅓ Declination of ♃ [Decl. ♃] — 21 21
- 5 47⅔ Declination of ♀ [Decl. ♀] — 12 33[1405]

At hour 6 M. 14⅚ ☉ emerged with its upper limb, at 17⅔ᴹ with its hemisphere, and at M.21 with its lower limb. Alt. ♀ 27 p. [Hora 6 M. 14⅚ ☉ cum ſuperiori lim- / bo, 17⅔ᴹ cum hemiſphærio, M.21 cum / inferiori limbo emerſit. Alt. ♀ 27 p.]

Between the planets ☉ and ♀ [Inter ☉ & ♀ planetas]

At hour 7 M.17, when ☉ was at an altit. of 8 partium, the equatorial distance by the same subterranean armillae was 43 29. [Hora 7 M.17, cum ☉ eßet altit. 8 par- / tium, per eaſdem Armillas ſubterra- / neas diſtantia æquatorea 43 29]

- H.7 M.20⅔ — 43 28
- 7 23½ — 43 31
- 7 27⅔ — 43 32¼
- 7 40 — 43 32½

As for the clock, nothing doubtful remains: in 24 hours it had gone faster by only 1½ minutes, around noon — an error that is easily ignored. [De Horologio nihil ambigui relin- / quitur, nam in 24 horis tantum in 1½ / minutis circa meridiem celerius iue- / rat, qui error facile negligitur.]

For 23 SEPTEMBER of this year 85, when ♀ was near its greatest morning distance from ☉, its place was investigated in the following way. [Ad diem 23 SEPTEMBRIS huius anni 85, cum ♀ eßet circa maximam ſuam / a ☉ diſtantiam matutinam, inquiſitus eſt eius locus in hunc modum qui ſe- / quitur.]

- On day 22, H.17.0 P. M., September: Diff. of right ascension between ♀ and the southern head of ♊ [Die 22 H.17.0 P. M. Sept. Diff. Aſc. R. inter ♀ & merid. caput ♊] — 35 25½
- Northern declination of ♀ [Declinatio ♀ Borea] — 12 33½
- Right ascension of ♀ [Aſcenſio Recta ♀] — 145 23½

The result is longitude 23°28¼′ ♌, latitude 1°15′ M. [Provenit Longitudo 23°28¼′ ♌, Latitudo 1°15′ M.]

Check of the place of ♀ that was found. The distance between ♀ and the southern head of ♊ was found to be 36 46⅙, which agrees almost exactly with the observed distance; for that was 36 46½. The longitude and latitude of ♀ have therefore been found correctly. [Examinatio inuenti loci ♀. Diſtantia inter ♀ & meridionale caput ♊ inuenta / eſt 36 46⅙, quæ cum obſeruato [recte:

[1405] the first three lines above are braced to the words *Per Q. Portat.*; the last two are braced to *per eaſdem Armillas* — "by the same armillae". *Diſt.* on the *5 28½* line and *æquat.* on the *5 34⅔* line stand on successive lines.

obſeruata — Corrigenda, p. 431] propemodum convenit. Fuit enim 36 46½, ideo- / que long. & lat. ♀ recte inuentæ ſunt.]

For the place of ♀ according to our method. [Pro loco ♀ ſecundum noſtram rationem.]

- Simple motion in longitude of ♀ from 1 ♈ [Simplex motus longitu- / dinis ♀ a 1 ♈] — 2ſex43° 37′ 21″
- Place of the apogee, common with ☉ [Locus Apogæi / communis cum ☉] — 1 7 47 30
- Anomaly of the eccentric of ♀ [Anomalia Eccentri ♀] — 1 35 49 51
- Equation of the eccentric, sub. [Æquatio Eccentr. ſub.] — 1 59 49
- Proport. minutes [Scrupula proport.] — 31 6
- Simple anomaly of commutation [Simplex anom. commut.] — 3 40 46 29
- Equated anomaly of the eccentric [Coæquata anom. eccentri] — 1 33 50 2
- Equated longitude [Coæquata longitudo] — 2 41 37 32
- Equated commutation [Coæquata commutatio] — 3 42 46 18
- Parallax of the orb, sub. [Parallaxis orbis ſub.] — 45 7 55
- Excess [Exceßus] — 1 43 24
- Corresponding part [Pars congruens] — 53 35
- Absolute equation, sub. [Abſoluta æquatio ſub.] — 46 1 30
- Distance of ♀ from the I[a] ♈ [Diſt. ♀ a I[a] ♈] — 1 55 35 2 [recte: 1 55 36 2 — Corrigenda, p. 431]
- True precession of the æquin. [Vera præceßio æquin.] — 28 5
- Longitude of ♀ [Longitudo ♀] — 2 23 41 2[1406]

Therefore ♀ falls in 23°41′ ♌ on 23 September, H.5 A. M. [Ergo incidit ♀ in 23°41′ ♌ die 23 Sept. H.5 A. M.]

	From N. calculation [Ex N. calculo]	From obſeruat. [Ex obſeruat.]	Prut. calculation [Calc. Prut.]	Alphonſ. calculation [Calc. Alphonſ.]
Longitude [Longitudo]	23°41′ ♌	23°28′ ♌	23°16′ ♌	23°30′ ♌
Latitude of ♀ [Latitudo ♀]		1 27 M.	0 48 M	1 27 M.

1407

___1408

1406 in the first entry *ſex* stands raised after the *2*; in *I[a]* the *a* stands raised. Figures are set in up to four positions: *Pars congruens* has figures in the last two positions only, and *Vera præceßio æquin.* in the second and third only; *Scrupula proport.* uses the last two positions only.

1407 the head row is printed in smaller type.

1408 the first two paragraphs run across the full width of the page, in italic. Below them the page is set in two columns divided by a printed vertical rule. In each column the upper entries are in italic and the lower entries, from the second dated rubric on, in roman.

Note. Here ♀, *around its greatest morning distance [remotionem], disagrees with our calculation — with its apogee placed together with the Sun's apogee — by about 13 minutes [ſcrupulis quaſi 13], by which it is ahead of the computation itself. Therefore, since the prosthaphaeresis of the eccentricity* [eccentricitatis προσθαφερεσις; Greek: *prosthaphairesis*, the correction added or subtracted] *is nearly at its greatest at this time, I think that the error lies not so much in the placing of the apogee as in the fact that the ratio of the eccentricity has not been ascertained exactly enough [non ſatis exacte comperta ſiet]. This is made more probable by the fact that in this very year, when* ♀ *was near the limits of its greatest evening elongation, around 6 and 7 May, the observation agreed with our computation almost to the same moment [in eodem pene momento], assigning* ♀ *[attribuendo* ♀^{ri}*] an apogee in common with the Sun. At this time, moreover,* ♀ *had roughly its greatest eccentricity, whereas in the earlier case the eccentricity stood at roughly a middle value [quaſi medio modo]; but these matters must be examined more precisely in due course.*

Note.[1] *If we take the Alphonsine equation of the eccentric of* ♀ *[æquationem eccentricj* ♀$^{ri^s}$ *Alphonſinam], which is 2 10, the matter will fit well enough.*

DIE 5 OCTOBRIS.

		Diff. Aſc. R.
H. 12 18′	♃ *and the head of* ♈ *[*♃ *&* *Caput* ♈*]*	*40 19*
12 25		*40 20½*
12 30		*40 18*
12 38		*40 20⅔*

You can therefore use, without any perceptible error, the equatorial distance of ♃ *from the bright one of the head of* ♈ *[a lucida capitis* ♈*] at about this time: 40 20.*

- *12 47* ♃ *and infer.* ♊ *[*♃ *&* *infer.* ♊*] — 43 42*
- *12 53 — 43 29½*
- *1 2 declination of* ♃ *20 51, good [Decl.* ♃ *20 51 bona]*
- *1 6 — 43 36¾ æquat.*[1409]

These were observed by us roughly, ἐν πλάτει [Greek: *en platei*, "in breadth", i.e. broadly]. [*hæc fere* ἐν πλάτει *per nos obſeruata.*]

- *2 8* ♃ *and the head of* ♈ *[*♃ *&* *cap.* ♈*] — 37 42*
- *2 15 — 37 41½*
- *2 22 — 37 41½*
- *2 30* ♃ *from infer.* ♊ *[*♃ *ab infer.* ♊*] — 40 11½*
- *40 11*
- *40 11⅓*[1410]

[1409] the first two lines above are joined at the right by a brace to the words *Diſt. æquat.* — "distance, æquat.".

[1410] the first three lines above are joined by a brace to the words *Per Sext.* △ — "by the Sext. △"; the last three, of which the second and third carry no time, by a brace to *Per Sext.* — "by the Sext.", without the triangle.

- *3 5 ♃ and Aldeb. [♃ & Aldeb.] — 6 0*
- *repeated [repetita] — 6 1*
- *3 7 declination of ♃ 20 50 with one pinnule [Decl. ♃ 20 50 vno pinn.] — Alt. ♃*
- *20 51 with the other [altero] — 46⅔*[1411]

DIE 8 OCTOBRIS.

At about the 11th hour, declination of ♄: 3 20 north. [Circiter 11 horam Declinatio ♄ / 3 20 Borealis]

With the other pinnule: 3 20½. [Altero pinnacidio 3 20½]

Distance of the eye of ♉ from 90 gr. in æquat. [Oculus ♉ diſt. a 90 gr. in æquat.]	♄, however [♄ autem]	Diff. Aſc. R.
36 37⅓	84 51½	48 14⅙
37 29	85 42	48 13
38 9½	86 25	48 15½

1412

Take the declination as 3 20 north [Bor.] and the equatorial distance from Aldeb. as 48 15, and your error will be imperceptible. [Pone declinationem 3 20 Bor. & Diſtantiam æquatoream ab Aldeb. 48 15, & inſenſibiliter aberrabis.]

You can, moreover, compare this observation with the one made on 23 September, and from it derive the place of ♄ in ♌ with the mean place of ☉. [Hanc autem obſeruationem potes conferre cum ea quæ die 23 Septembris facta eſt, hincque colligere locum ♄ in ♌ medij loci ☉.]

DIE 10 OCTOBRIS.

In the evening. Between ♄ and the mouth of Pegasus [os Pegaſi]. [Ad Veſperas. Inter ♄ & os Pegaſi]

- H. 10 M. 7 distance, æquat. [Diſt. æquat.] — 53 39
- 10 13 — 53 38¾
- 10 18 — 53 39½
- 10 31 — 53 39¼
- 10 33 — 53 39½

Declination of ♄ north 3 16, with both. [Declin. ♄ Borealis 3 16 vtroque]

- Hour 10⅓, of the same [Hora 10⅓ eorundem] — 53 38
- simple distance [Diſt. ſimplex] — 53 38
- appeared by [apparuit per] — 53 37½
- the Sext. △ — 53 38

Between ♄ and Aldebaran [Aldeboram]

[1411] *Alt.* ♃ stands at the right end of the *3 7* line, and *46⅔* below it at the right end of the next line.

[1412] the three rows are joined at the right by a brace to the words *Inter nubes* — "among clouds". The head is set in smaller type than the rows.

- 10 47 distance, æquat. [Diſt. æquat.] — 48 25
- 10 50 by the armillae [per Armillas] — 48 24
- 10 55 subterra- [ſubterra-] — 48 24½
- 10 58 nean [neas] — 48 24
- 11 0 — 48 24¼
- 11 3 — 48 24[1413]

Again between ♄ and Aldeb. [Rurſum inter ♄ & Aldeb.]

- Hour 11¼, distance [Hora 11¼ Diſt.] — 49 11
- simple, by [ſimplex per] — 49 11½
- the Sext. △ — 49 11
- 49 11

[1] Added afterwards by Tycho. [A Tychone poſtea adſcripta.]

___[1414]

Between ♃ and the bright one of ♈ [Inter ♃ & lucidam ♈]

- 11 20 distance, æquat. [Diſt. æquat.] — 43 7⅚
- 11 25 by the armil- [per Armil-] — 43 7
- 11 30 lae, subterr. [las ſubterr.] — 43 7¾
- 11 32½ — 43 7⅝
- 11 45 declination of ♃, north [Decl. ♃ Bor.] — 21 15
- With the other pinnule [Altero pinnacidio] — 21 15⅙[1415]

The following, for ♄ in ☌ with the mean place of ☉, collated for 23 September and 10 October. [*Sequentia pro ♄ in ☌ medij loci ☉ ad diem 23 Septembris & 10 Octobris collata.*]

DIE 23 SEPTEMBRIS.

- H.4.0 difference of right ascension of ♄ and the eye of ♉ [Differentia Aſcenſionis Rectæ ♄ & oculi ♉] — 47 5½
- right ascension of the eye of ♉ [Aſcenſio Recta oculi ♉] — 63 5½
- right ascension of ♄ [Aſcenſio Recta ♄] — 16 0
- declination of ♄, north [Declinatio ♄ Borealis] — 3 48¼
- Hence the longitude of ♄ 16°11′48″♈, latitude 2°48′3″ M. [Hinc Longitudo ♄ 16°11′48″♈, Latitudo 2°48′3″ M.][1416]

	From observation [Ex obſeruatione]	From Pruten. cal. [Ex Pruten. cal.]	From Alphon. [Ex Alphon.]
Longitude of ♄ [Longitudo ♄]	16 11⅚ ♈	16 15 ♈	18 10 ♈
Latitude [Latitudo]	2 48 M.	2 48 M.	3 2 M.

[1413] the words *per Armillas ſubterraneas* — "by the subterranean armillae" — run down the label position of three successive lines, the word *ſubterraneas* divided at a line end.

[1414] the first four lines are set in two short columns divided by a printed vertical rule. From there to the foot the page runs across the full width.

[1415] *Armillas* is divided at a line end, *Armil-* on the *11 25* line and *las* on the *11 30* line.

[1416] a short rule stands under *63 5½*, above *16 0*.

DIE 10 OCTOBRIS P. M.

- H.11.0 difference of ascension of ♄ and Aldebaran [Differentia aſcenſionis ♄ & Aldeboram] — 48 24
- declination of ♄, north [Declinatio ♄ B.] — 3 16
- right ascension of ♄ [Aſcenſio Recta ♄] — 14 41½
- Hence the longitude of ♄ comes to 14°47′0″, latitude 2 47 40 M. [Hinc fit Longitudo ♄ 14°47′0″, Latitudo 2 47 40 M.]

	From observation [Ex obſeruatione]	Pruten. calc. [Calc. Pruten.]	Alphon. calc. [Calc. Alphon.]
Longitude of ♄ [Longitudo ♄]	14 47 ♈	14 45 ♈	16 39 ♈
Latitude [Latitudo]	2 47⅔ M.	2 48 M.	3 3 M.

For the time of ☍ of the simple motion of ☉ and the true ♄, from the two preceding observations. The daily motion of ♄ is found to be 4′50″. [Pro tempore ☍ ſimplicis motus ☉ & veri ♄ ex præcedentibus duabus obſeruationibus. Motus diurnus ♄ colligitur 4′50″.]

- Hence on 26 September, H.16.0 P. M., the true ♄ [Hinc Die 26 Septembris H.16.0 P. M. verus ♄] — 15 52 40 ♈
- simple motion of ☉ [Simplex motus ☉] — 15 36 27 ♎
- difference of motion [Differentia motus] — 16 13
- daily ☉ [Diurnus ☉] — 59 8
- daily ♄ [Diurnus ♄] — 4 50
- sum [Summa] — 1 3 58
- gives 24^{H}; q. 16 13. The result is H.6 M.5; when this is added to the earlier D.26 16 0, ♄ is in ☍ with the simple motion of ☉ on September 26^{D} 22^{H} 5^{M} P. M. [dat 24^{H}, q. 16 13. Proueniunt H.6 M.5, quo addito priori D.26 16 0 / ♄ in ☍ ſimplicis motus ☉ Sept. 26^{D} 22^{H} 5^{M} P. M.]
- At that time ☉ was, by mean motion, at 15 51 27 ♎, [Fuit tunc ☉ medio motu 15 51 27 ♎]
- and ♄, by true motion, in 15 51 27 ♈. [♄ vero motu in 15 51 27 ♈][1417]

But these must be examined again using the unequal daily motion of ♄ [$♄^{ni}$]. [*Sed hæc denuo per motum diurnum* $♄^{ni}$ *inæqualem ſunt examinanda.*]

A more accurate determination of the following observation.[1] [*Limitatio ſequentis obſeruationis accuratior*[1].]

If the equatorial distance of ♄ *and Aldeb. is taken as 47 5½, as the observations give it twice on that day, and the distance by the sextant [per Sextantem] as 47 46½, intermediate between those which were taken then, as it were [intermedia earum quaſi*

[1417] *Simplex motus* ☉ and *Differentia motus* stand at the right, the first on the line below *Hinc Die 26 Septembris …*; *Diurnus* ☉ *59 8* and *Diurnus* ♄ *4 50* stand at the left, level with *Differentia motus* and the line below it, joined by a brace to the word *adde* — "add"; a short rule stands under them, above *Summa 1 3 58*. The words ♄ *in* ☍ *ſimplicis motus* ☉ *Sept.* 26^{D} 22^{H} 5^{M} *P. M.* stand at the right on the line below *dat* 24^{H} ….

quæ tunc capiebantur], the angle BAC comes out as 47 4½, as nearly as possible. If, then, the mean of the two is taken, the angle of the equatorial distance will be exactly 47 5. This is subtracted from the right ascension of Aldebaran at that time, 63 3 32; to which [quibus] there corresponds the right ascension of ♄, 15 58 32, and hence the longitude 16 10 40 ♈. Further, if for the 4 days and 5 hours by which its ☍ with the simple ☉ was later [quibus ☍ eius cum ☉ ſimplici poſterior fuit], we subtract the daily motion accruing in the meantime, 21 — taking, that is, 5′ for each day, which agrees well enough — the ☍ of ♄ with ☉ will be in 15 49 40 ♈.

[1] What follows was written at the end of the observations of the planets for this year. [Sequentia ad finem obſeruationum planetarum hujus anni ſcripta ſunt.]

___[1418]

Investigation of the time of the apparent ☍ of ♄ with the simple ☉, from observations made from about the end of September to the beginning of October, sc. immediately before and after the term of the ☍ [☍ terminum]. [Indagatio temporis ☍ ♄ apparentis cum ſimplici ☉ ex obſeruationibus ſub finem Septembris ad initium Octobris ſc. proxime ante & poſt ☍ terminum habitis.]

- On 23 September, H.3 M.50, the equatorial distance between ♄ and Aldeb. [Diſtantia æquatorea inter ♄ & Aldeb.] — 47 5
- H.4 M.40, distance by the Sext. Trig. [Diſt. per Sext. Trig.] — 47 47
- declination of ♄ B. [Declinatio ♄ B.] — 3 48 0

Ascension R. of Aldebaran [Aldeboræ] 63 3 35, declination B. 15 36 [Aſcenſio R. Aldeboræ 63 3 35, Decl. B. 15 36]; and from this, by triangular computation [per ſupputationem triangularem], the angle of the ascensional difference is found to be 47 4⅚, agreeing with the one above [cum ſuperiori conueniens]. From it the ascension R. of ♄ at H. 4¼ in the morning [H. 4¼ matutina] is 15 58⅔. This corresponds, from the new tables [Reſp. ex tabulis novis], to longitude 16°10¾′♈, latitude 2°48 1/12′ M.

On 8 October, H.11 M.0 P. M., the equatorial distance of ♄ [♄^{ni}] and Aldebaran [Aldeboræ] was 48 15. Therefore the ascension R. of ♄ is 14 48⅗, declination B. 3 20, corresponding to 14°55⅓ ♈, latitude 2°47′0″ M. [Die 8 Octobris H.11 M.0 P. M. Diſt. æquatorea ♄^{ni} & Aldeboræ 48 15. Ergo Aſc. R. ♄ 14 48⅗, Decl. B. 3 20, reſp. 14°55⅓ ♈, Lat. 2°47′0″ M.]

On 10 October, H. 10⅔, the equatorial distance of ♄ from Aldebaran [ab Aldebora] was 48 25. A little earlier the equatorial distance of ♄ [♄^{ni}] and the mouth of Pegasus [Oris Pegaſi] was 53 39. The ascension R. of ♄, determined [limitata], 14 38½; declination 3 16. Corresponding longitude 14°44⅗′♈, latitude 2°46¾′ M. [Aſc. R. ♄ limitata 14 38½, Decl. 3 16. Reſp. Long. 14°44⅗′♈, Lat. 2°46¾′ M.]

[1418] the upper part of the page runs across the full width, in roman except for one italic line and the italic paragraph opening *N.B.* Below it the page is set in two columns divided by a printed vertical rule. The page carries no dated rubric before the column block.

From the first and last of these acronychal observations of ♄ [acronychijs ♄ obſeruationibus], taking its daily motion in the meantime as 4′50″ — as is derived by calculation from the given places of ♄ — the apparent ☌ of ♄ with the simple ☉ is found to have been on 26 September, H.21 M.38 P. M. The acronychal place of ♄ at this moment was in 15 50 20 ♈;

- *more corrected [emendatior] — 15 49 45*
- place of ♄ from the calculations of Copernicus [Locus ♄ ex calculis Copernici] — 15 52½ ♈
- Alphonsine [Alphonſinis] — 17 48⅓ ♈[1419]

N.B. If the angle of the ascensional difference from Aldebaran [ab Aldebora] on 23 September is retained as 47 5, as the armillae gave it at about the 4th hour in the morning, although they also had ½ minute more [cum & ½ minuto plus haberent], the ascension R. of ♄ comes out as 15 58⅗, to which the longitude 16 10 40 ♈ corresponds. But up to the 26th day, hour 21⅔, there are 4 days, 5⅔ hours, during which it went back [retroceßit] 21¼. If these are subtracted from the earlier place, the place at the ☌ itself will be 15 49 25 ♈. To this the latitude adds 20″ on account of its course [ob ductum] in its own circle, and so [recte: *vt ſit* for the printed *et ſic* — "so that the verified place … is" — Corrigenda, p. 431] *the verified place at the time of the ☌ is in 15 49 45 ♈.*

DIE 11 OCTOBRIS A. M.

Between ♄ and ♃ [Inter ♄ & ♃]

- $0^{H}24^{M}$ distance [Diſtantia] — 54 29⅓
- 0 28 equatorial [æquatorea] — 54 28¼
- 0 33 — 54 28⅔
- 0 36 — 54 28½
- 0 40 — 54 28⅙[1420]

Distance of ♄ and ♃ [Diſtantia ♄ & ♃]

- 0 58 — I — 55 52¼
- 1 0 — II — 55 52⅓
- 1 3 — III — 55 52¼[1421]

Between ♃ and the lower head of ♊ [Inter ♃ & inferius caput ♊]

- 1 28 — I — 37 35
- 1 30 — II — 37 34½
- 1 33 — III — 37 34½[1422]

Between the upper head of ♊ and ♃ [Inter ſuperius caput ♊ & ♃]

- 1 43 distance, [Diſt.] — I — 37 53¾ [recte: 37 52¾ — Corrigenda, p. 431]

[1419] the three lines above are set to the right, their figures standing under the figures of *15 50 20* ♈; the first, *emendatior 15 49 45*, is in italic, word and figures, and carries no sign; the third, *Alphonſinis*, stands under *ex calculis Copernici*.

[1420] the five lines above are joined at the right by a brace to the words *Per Ar- / millas* — "by the armillae".

[1421] the three lines above are joined at the right by a brace to *Per Sext.* △ — "by the Sext. △".

[1422] the three lines above are joined at the right by a brace to *Per Sext.* △ — "by the Sext. △".

- 1 47 equatorial [æquat.] — II — 37 53
- 1 51 — III — 37 52
- 1 54 — IIII — 37 52
- 1 58 — V — 37 52[1423]

2 5 Repeated: declination of ☽ 21 15½ Boreal. [Repetita Decl. ☽ 21 15½ Boreal.]

Meanwhile the instrument was set correctly by some fixed ones of Cassiopeia [fixas aliquot Caßiopeæ], observed towards the west. [Interea inſtrumentum iuxta fixas aliquot Caßiopeæ verſus occaſum obſeruatas eſt recte conſtitutum.]

Equatorial distance of ♀ and the lower head of ♊ [Diſtantia æquatorea ♀ & inferioris capitis ♊]

- 4 47 by the ar- [Per Ar-] — 53 37½
- 4 52 millae [millas] — 53 38
- 4 57 subterr. [ſubterr.] — 53 38½[1424]

Equatorial distance of ♀ and the heart of ♌ [Diſtantia æquatorea ♀ & cordis ♌]

- 5 14 by the ar- [Per Ar-] — 17 5½
- 5 17 millae [millas] — 17 5⅔
- 5 19 subterr. [ſubterr.] — 7 6
- 5 24 declination of ♀ Bor. [Decl. ♀ Bor.] — 7 30¼[1425]

Note. These observations are more exact [exquiſitiores] than those made on the 8th, and it was also [recte: *enim*, "for", for the printed *etiam* — Corrigenda, p. 431] *much clearer [ſerenius]; and from a comparison with those made on 23 September and on this night, the true motion of ♄ in ♂ ☉ can be investigated. ♀, however, when it was at its greatest morning distance from ☉.* [*♀ vero cum eßet in diſtantia maxima matutina a ☉.*]

___[1426]

On 11 October [Ad diem 11 OCTOBRIS], H.5.0 A. M., the place of ♀ was investigated in the following way. [inquiſitus eſt locus ♀ in hunc qui ſequitur modum.]

- H.5.0 A. M. Diff. Aſc. R. of ♀ and the lower head of ♊ [Diff. Aſc. R. ♀ & inferioris capitis ♊] — 53 38½
- Aſc. R. of ♀ [Aſc. R. ♀] — 163 36½
- Decl. ♀ — 7 30
- Hence the longitude of ♀ comes out as [Hinc prouenit Longitudo ♀] — 12 1⅓ ♍

[1423] the five lines above are joined at the right by a brace to the words *Per / Armill. / ſubterr.* — "by the armillae, subterr.".

[1424] the three lines above are joined at the right by a brace to the words *Alt. ♀ / quaſi / 22°* — "Alt. of ♀ about 22°".

[1425] the first three lines above are joined at the right by a brace to *Alt. ♀ 25°* — "Alt. of ♀ 25°"; the fourth line stands outside the brace. On the *5 19* line the value is printed *7 6*, its *7* standing under the second figure of the *17* above.

[1426] the page is set in two columns divided by a printed vertical rule.

• its latitude [Latitudo eius] — 0 0

	From observation [Ex obſeruatione]	Cal. Pruten.	Cal. Alphon.
Longitude [Long.]	12 1⅓ ♍	11 54½ ♍	12 5 ♍
Latitude [Lat.]	0 0	0 44 B.	0 5 B.

1427

DIE 18 OCTOBRIS.

• H.6⅙ [recte: H.6½ — Corrigenda, p. 431] distance between ♄ [Diſtantia inter ♄] — 21 44
• and the bright one of ♈ [& lucidam ♈] — 21 44½
• by the Sext. △ [per Sext. △] — 21 44

DIE 19 OCTOBRIS A. M.

• H.2 50[1] Diff. Aſc. R. of ♃ [Diff. Aſc. R. ♃] — 36 50⅛
• 2 56 and the lower head of ♊ [& infer. cap. ♊] — 36 50¼
• 3 0 by the subterranean armillae [per Arm. ſubterr.] — 36 50
• 3 2 Decl. ♃ B. 21 8, by the subterranean armillae [per Arm. ſubt.]

DIE 22 OCTOBRIS.

• 11ʰ21ᴹ distance by the Sext. △ [Diſt. per Sext. △] — 50 2⅝
• 11 24 between ♄ and [inter ♄ &] — 50 2¾
• 11 30½ Aldebaran [Aldeboram] — 50 2⅝
• 11 41 Decl. ♄ 2 55½ by the subterranean armillae; its Alt. 34⅔. [Decl. ♄ 2 55½ per Armillas ſubt. Alt. eius 34⅔.]

	The eye of ♉ from the Mer. towards the east [Oculus ♉ a Mer. verſus ort.]	♄ from the Mer. towards the west [♄ a Mer. verſ. occaſ.]	Equatorial distance [Diſtantia æquatoria]
11 55	27 17½	21 53	49 10½
12 0	25 23½	23 47½	49 11
12 4	24 57½	24 14	49 11½
12 7⅓	24 2½	25 9	49 11½

DIE 23 OCTOBRIS A. M.[2]

[1427] a single ♀ stands between the two row labels *Long.* and *Lat.*, belonging to both rows. The head row is set in smaller type.

	The lower head of ♊ from the Mer. towards the east [Infer. cap. ♊ a Mer. ad ortum]	♃ from the Mer. towards the east [♃ a Mer. verſus ortum]	Equatorial distance [Diſt. æquatoria]	Alt. ♃
1H31M	46 45½	4 54½	41 51	55
1 49	45 25½	3 33¼	41 52¼	55⅓
1 53	44 16½	2 23½	41 53	55½
2 1	42 24¾	0 32½	41 52¼	55½

2 6 Decl. ♃ B. 21 5½, also by the subterranean armillae. [per Armillas etiam ſubterraneas.]

Observation of ♀ the same night, before dawn. [Obſeruatio ♀ eadem nocte ante diluculum.]

	♀ from the Mer. towards the east [♀ a Mer. verſus ortum]	Canis Minor from the Mer. towards the west [Canis minor verſ. occaſum]	Equatorial distance [Diſt. æquatoria]	Alt. ♀
5 14	60 25⅙	6 23⅙	66 48⅓	18 55
5 17	59 40⅙	7 8	66 48⅙	19 20
5 20	58 55	7 54½	66 49½	19 55
5 22	58 17½	8 32½	66 50	20 10
5 28	56 59	9 51¾	66 50¾	20 40
5 31	Decl. ♃ [recte: ♀ — Corrigenda, p. 431] B.	3 1½		21½

1428

	♀ from the Mer. towards the east [♀ a Mer. verſus ortum]	The heart of ♌ from the Mer. towards the east [Cor ♌ a Mer. ad ortum]	Equatorial distance [Diſt. æquat.]	Alt. ♀
5 41½	53 37	23 55¾	29 41¼	22 20
5 44½	52 51	23 8⅔	29 42⅓	22 40
5 49	51 48½	22 16	29 42½	23 0
5 54	50 28¼	20 45½	29 42¾	23 45

- 6 18 between the heart of ♌ and ♀ [Inter cor ♌ et ♀] — 31 24
- 6 22 by the Sext. △ [per Sext. △] — 31 24[1429]

You may note that at about H.9 A. M. on the day immediately following this night the error of the clock was imperceptible, and so the times of the observations need no correction. [Notare poteris quod circa H.9 A. M. error horologij fuerit die proxime hanc noctem ſecuto inſenſibilis, ideoque tempora obſeruationum correctione non indigent.]

[1428] in the last line the words *Decl. ♃ B.* stand under the first value column and *3 1½* under the second; the third column is empty on that line and *21½* stands under *Alt. ♀*.

[1429] the two lines above are joined at the right by a brace to the figure *26*, which carries no label.

DIE 5 NOUEMBRIS A. M.

By the subterranean armillae. [Per Armillas ſubterraneas.]

H.o 0 Decl. ♃ 20 53 B.

	The lower head of ♅ from the mer. towards the east [Infer caput ♅ a mer. verſ. ortum]	♃ from the mer. towards the east [♃ a mer. verſus ortum]	Diff. Aſc. R.
0 13	55 25	11 55	43 30
0 17	54 34	11 4½	43 29½
0 37	49 49¼	6 20	43 29¼
0 40	48 30	5 0¾	43 29¼

- 0 30 the Decl. ♃ was repeated [fuit repetita Decl. ♃] — 20 52½ B.
- 0 35 distance between ♃ and the bright one [Diſt. inter ♃ & lucid.] — 37 42½
- of ♈, by the Sext. Trig. [♈ per Sext. Trig.] — 37 42
- 37 42½

It was moderately clear. [Erat mediocriter ſerenum.]

DIE 6 NOUEMBRIS.

- $5^{H}42^{M}$ between ♄ and [Inter ♄ &] — 22 42
- 5 50 the bright one of ♈ [lucidam ♈] — 22 42
- 5 51 Decl. ♄ Bor. — 2 39½

DIE 7 NOUEMBRIS, MANE.

- $0^{H}34^{M}$ Decl. ♃ 20 50½ B., Alt. 54⅚
- 0 55 — 20 50¾, good [bona]

[1] These times are corrected in the codex. [Hæc tempora correcta ſunt in codice.]

[2] In codex V. Tycho wrote in the margin: »Let these be referred above to 23 September«. [In cod. V. Tycho adſcripſit in margine: »Hæc referantur ſuperius ad 23 Septembris«.]

___[1430]

	The head of ♈ occid. [Caput ♈ occid.]	♃ orient.	Diſt. æquat.	Alt. ♃
0 38	35 30	4 36	40 6	
0 42	36 27	3 39⅔	40 6 40	55 0
0 47½	37 56 30	2 11 15	40 7 45	
		♃ occid.		
1 8	43 13 0	3 4 40	40 8 20	
1 13	44 23	4 15	40 8	54½
	Canis min. towards the east [Canis min. verſ. ort.]			
3 8	10 1¾	33 7½	43 9¼	

[1430] the page is set in two columns divided by a printed vertical rule.

	The head of ♈ occid. [Caput ♈ occid.]	♃ orient.	Diſt. æquat.	Alt. ♃
3 15	8 15	34 54½	43 9½	
3 19	7 24¾	35 44½	43 9¼	45⅔

1431

• 3 26 Declin. of Jupiter [Declin. Iouis] — 20 49½

Observation of ♀. [Obſeruatio ♀.]

• 6 14 Declin. ♀ Merid. — 3 14⅔ — Alt. 20½
• 6 17 repeated [repetita] — 3 14½
• 6 34 Diſt. between [Diſt. inter] — 48 41⅔ — Alt. 22
• 6 37 ♀ and [♀ &] — 48 41 — 22⅔
• 6 38½ the heart of ♌ [cor ♌] — 48 40⅔
• 6 40 — 48 41½

	The heart of ♌ towards occaſ. [Cor ♌ verſ. occaſ.]	♀ towards the east [♀ verſus ortum]	Diſt. æquat.	Alt. ♀
6 42½	6 27	39 27½	45 54½	23
6 45	7 5	38 51	45 56	
6 47	7 30	38 26½	45 56½	
6 49⅔	8 10	37 45½	45 55½	23⅔
6 54	9 19	36 37½	45 56½	24
6 56¾	9 56	36 0	45 56	
6 58⅛	10 23	35 32	45 55	24⅓
7 0	10 55	35 0	45 55	

• 7 7½ Decl. ♀ M. with one pin. [vno pin.] — 3 16½ — 25
• with the other pinnac. [Altero pinnac.] — 3 16⅔

DIE 9 NOUEMBRIS, MANE[1].

• $7^{H}47^{M}$ Decl. ♀ M. 4 9, Alt. ♀ 27¼
• 8 6⅓ — 4 8½

DIE 12 NOUEMBRIS, AD VESPERAS.

• $9^{H}47^{M}$ Decl. ♃ — 20 44 — Alt. 44¼
• 9 53½ between ♃ and [Inter ♃ &] — 36 39
• 9 56 lucid. ♈ — 36 39
• 9 57½ by the sextant [per Sext.] — 36 39[1432]

[1431] the rows carrying ♃ *occid.* and *Canis min. verſ. ort.* are sub-heads printed inside the table, each set over the column it relabels.

[1432] the three lines above are joined at the right by a brace to the words *bonæ, / Alt. / 45°* — "good, Alt. 45°".

	☿ from the mer. or. [☿ a mer. or.]	The head of ♈ occid. [Caput ♈ occid.]	Diſt. æquat.	Alt. ☿
10 0⅔	37 14	2 5	39 19	
10 5½	35 58	3 20½	39 18½	45⅔

- 10 26 Decl. ☿ — 20 43½

It was moderately clear. [Erat mediocriter ſerenum.]

DIE 15 NOUEMBRIS, MANE.

This night it was at times moderately clear. [Hac nocte fuit interdum mediocriter ſerenum.]

- $4^{H}37^{M}$ Decl. ☿ by the armillae subterr. [per Armillas ſubterr.]
- 20 40⅓ — Alt. ☿ 34

	Infer. head of ♊ occ. [Infer. cap. ♊ occ.]	☿ from the mer. occ. [☿ a mer. occ.]	Diſt. æquat.	Alt. ☿
4 44	21 45	66 39	44 54	
4 47	22 35	67 30	44 55	
	Can. min. occ.			
5 10½	28 46½	73 8	44 21½	26¼
	Inf. head of ♊ [Inf. cap. ♊]			
5 16	29 38	74 32½	44 54½	
5 18	30 6½	75 1	44 54½	25
5 21	30 49½	75 42½	44 53	
5 24½	31 51½	76 45⅓	44 54	

[1433]

- 5 4 Decl. ♀ 6 36, Alt. ♀ 8°
- 5 29½ Decl. ☿ 20 40¼, Alt. ☿23 45′

By the sextant [Per Sextantem]

- 5 36¾ Diſt. between [Diſt. inter] — 41 23½ — Alt. 22⅔
- 5 39½ ☿ and infer. [☿ & infer.] — 41 24¼
- 5 42½ head of ♊ [caput ♊] — 41 23½
- 5 46 Diſt. between [Diſt. inter] — 45 23
- 5 48½ ☿ and canem [☿ & canem] — 45 23
- 5 50½ min. — 45 22½
- 5 54 Decl. ☿ B. — 20 40½ — Alt. 19½
- 5 57 Decl. ♀ — 6 39 — Alt. 14¼
- 6 9½ Diſt. between [Diſt. inter] — 5 49 — 15⅔
- 6 12½ ♀ and [♀ &] — 5 50
- 6 18 Spica ♍ [Spicam ♍] — 5 50⅙ — 16⅓

[1433] the rows carrying *Can. min. occ.* and *Inf. cap.* ♊ are sub-heads printed inside the table over the first value column.

	♀ or.	The heart of ☋ occ. [Cor ☋ occ.]	Diſt. æquat.	Alt. ♀
6 23	45 13½	9 29½	54 43	
6 23½	44 41½	10 3	54 44½	17¼
6 28⅓	43 56	10 47	54 43	
6 33	42 50⅓	11 52½	54 42⅚	
6 36	42 4½	12 37	54 41½	18¼
6 39	41 18½	13 25½	54 44	
6 42	40 33	14 9	54 42	
6 45	39 38½	15 4½	54 43	

Observation of ☿ [Obſeruatio ☿]

- 6 51⅓ Declin. ☿ M. 13 33½,
- Alt. ☿ 5°, roughly. [Alt. ☿ 5° quaſi.]
- 6 52 between ☿ and [Inter ☿ &] — 25 22½
- 6 54⅙ Spica ♍ — 25 21⅓
- 6 55½ by the sextant [per Sext.] — 25 21¼
- 6 57⅓ Trig. — 25 23
- 6 58½ — 25 23
- 6 59⅙ — 25 22 — Alt. ☿ 5⅔

[1] Compare above, p. 375, among the observations of the Moon. [Cf. ſupra p. 375, inter obſeruationes Lunæ.]

___[1434]

- 7 2½ declination of ☿ [Decl. ☿] — 13 35 M.
- 7 4⅙ distance between ☿ [Diſt. inter ☿] — 25 24
- 7 6⅓ and Spica ♍ [& Spicam ♍] — 25 24 — Alt. 6½
- 7 25⅙ declination of ☿ M. [Decl. ☿ M.] — 13 36½

When ☿ emerged again from the clouds. [Cum rurſus ☿ e nubibus emergeret.]

- 7 28 distance between [Diſt. inter] — 20 51⅔ — Alt. ☿ 13½
- 7 30⅙ ♀ and ☿ [♀ & ☿] — 20 47 [Greek: ἐν πλάτει (en platei, "broadly", i.e. only approximately)] because of the dawn [propter auroram].
- 7 34 declination of ♀ M. 6 42, not certain enough [Decl. ♀ M. 6 42 non ſatis certa]
- 7 37 declination of ♀ repeated [Decl. ♀ repetita] — 6 44¼
- 7 42 with the other pinnac. [Altero pinnac.] — 6 44[1435]

7 44 ♀ from the merid. or. [♀ a merid. or.] 25 8½, for the clock [pro horologio]. The clock, however, was corrected at H. 4½ by the distance of the eye of ♉ from the merid. towards the west. [Fuit autem horologium H. 4½ correctum per diſtantiam oculi ♉ a merid. verſus occaſum.]

At this morning time ☿ appeared like a reddish star of the second magnitude, and, as it were, of a magnitude midway between 2 and 1. [Apparuit hoc tempore

[1434] the page is set in two columns divided by a printed vertical rule.

[1435] the two lines above are joined at the right by a brace to the words *Alt. ♀ 23 / bonæ* — "Alt. ♀ 23, good".

matutino ☿ tanquam rubicunda quædam ſtella ſecundæ magnitudinis & mediæ quaſi 2 & 1 magnitudinis.]

Computation of the motion of ☿ for the observations of 15 November in the morning. [Supputatio motus ☿ ad obſeruationes diej 15 Nouembris mane.]

- H.7.0 distance of ☿ from Spica ♍ [Diſt. ☿ a Spica ♍] — 25 23½
- declination M. [Declinatio M.] — 13 35
- declination of Spica [Declinatio Spicæ] — 8 56
- the angle of the diff. aſcenſ. [Angulus diff. aſcenſ.] — 25 28 5
- Aſc. R. of Spica [Aſc. R. Spicæ] — 195 52
- therefore the Aſc. R. of ☿ [Ergo Aſc. R. ☿] — 221 20 5
- Reſp. Long. 13 4½ ♏, Lat. 2 20⅗ B.
- refraction M. 9 [Refractio M. 9]
- parallax 4 [Parallaxis 4] — Reſp. in long. 3 35 ad.
- difference 5 [Differentia 5] — in lat. 3 30 ſub.
- therefore the true Long. 13 8 ♏, Lat. 2 17 B. [Ergo vera Long. 13 8 ♏, Lat. 2 17 B.][1436]

DIE 21 NOUEMBRIS AD VESPERAS.

- $6^{H}23^{M}$ between ♃ and [Inter ♃ &]
- the head of ♈ [caput ♈] — 35 29½ — Alt. ♃ 21⅔
- 6 25⅔ the same distance [Eadem diſt.] — 35 30⅔

The sky not being clear enough. [Cœlo non ſatis ſereno.]

- 6 29¾ declination of ♃ B. [Decl. ♃ B.]
- with one pin. [vno pin.] — 20 34¼
- with the other pin. [Altero pin.] — 20 34½ — Alt. ♃ 22¾
- 6 51½ the eye of ♉ [Oculus ♉]
- from the mer. [a mer.] — 73 12
- 9 34½ the bright one of ♈ occ. [Lucida ♈ occ.] — 3 12[1437]
- 9 42 between ♃ [Inter ♃]
- and the bright one of ♈ [& luc. ♈] — 35 29 — Alt. ♃ 47 2/8
- 9 47 the same distance [Eadem diſt.] — 35 29½
- 9 50 the same [Eadem] — 35 29
- 9 54 declination of ♃ [Declin. ♃] — 20 31⅛ — Alt. 48½
- 9 56 with the other pinnac. [Altero pinnac.] — 20 32
- 9 58 the distance repeated [Diſtantia repetita]
- between ♃ and [inter ♃ &]
- the bright one of ♈ [luc. ♈] — 35 28⅚
- 9 59⅔ the same repeated [Eadem repetita] — 35 28¾
- 10 1 the same distance repeated [Diſt. ead. repet.] — 35 28⅚
- 10 10½ distance between ♃ and [Diſt. inter ♃ &]

[1436] a short printed rule stands under *Parallaxis 4* only, above *Differentia 5*; the words *Reſp. in long. 3 35 ad.* and *in lat. 3 30 ſub.* stand to the right of these two lines.

[1437] the words *pro horo- / logio* — "for the clock" — stand at the right of the last two lines above.

- the infer. head of ♊ [infer. cap. ♊] — 42 21⅙ — Alt. 46 p.
- 10 12½ the same distance [Ead. dist.] — 42 18
- 10 14 repeated [repet.] — 42 17½
- 10 15¼ — 42 18
- 10 17 — 42 18 — Alt. ♃ 51⅙
- 10 27⅓ — 42 18

	Canis min. or.	♃ or.	Equatorial distance [Dist. æquat.]
10 38⅓	64 52	19 35⅓	45 16⅔
10 40	64 20	19 3	45 17

- 10 45 declination of ♃ repeated [Repet. Decl. ♃] — 20 31¾
- with the other pinnac. [Altero pinnac.] — 20 31½ — Alt. 52½
- 10 53½ between ♃ and [Inter ♃ &]
- the infer. head of ♊ [infer. cap. ♊] — 42 18
- the same [Eadem] — 42 17½
- repeated [repetita] — 42 17⅔

	Canis min. or.	♃ or.	Equatorial distance [Dist. æquat.]	Alt. ♃
10 56	60 40½	15 21¼	45 19¼	52½
11 0½	59 34¼	14 15⅓	45 18 55″	
11 8½	57 39½	12 21	45 18½	
11 10⅓	57 12	11 52⅔	45 19⅓	52½
	The bright one of the head of ♈ occ. [Lucida cap. ♈ occ.]			
11 14⅓	27 6	10 52	37 58	
11 16	27 33⅓	10 26¾	38 0¼[1]	
11 18⅔	28 5⅓	9 52¾	37 58¼[1]	
11 22	29 0	9 0	38 0	
11 24⅔	29 36	8 23¾	37 59¾	52⅔
11 29⅓	30 45	7 13¾	37 58¾	
11 35⅙	32 2⅓	5 58½	38 0[1]	
11 36¼	32 30	5 30⅓	38 0⅓	
11 38¼	33 0	5 1½	38 1½	
11 41½	declination of ♃ repeated [repetita Decl. ♃]	20 32 B.		54⅓
	The bright one of ♈ occ. [Luc. ♈ occ.]	♃ occid.		

	Canis min. or.	♃ or.	Equatorial distance [Diſt. æquat.]	Alt. ♃
12 41½	48 5	10 2	38 3	
12 47½	49 30¼	11 27⅔	38 2¾[1]	

1438

The variation in the observation of the equatorial distance of ♃ from the bright one of ♈ was produced by the nearness of the ☾ and some scattered clouds. [Varietatem obſeruationis in diſtantia ♃ æquatorea a lucida ♈ peperit ☾ vicinitas & raræ quædam nubes.]

[1] Thus in codex V. [Sic in codice V.]

___1439

DIE 22 NOUEMBRIS, AD VESPERAS.

- 9ʰ 9½ᴹ between ♃ and infer. [Inter ♃ & infer.] — 42 25⅙ — Alt. ♃ 45¼
- 9 11½ head of ♊ by [caput ♊ per] — 42 25
- 9 13 Sext. △ — 42 25
- 9 17 The same, reiterated [Eadem reiterata] — 42 25
- 9 20 — 42 25 — certain [certæ]
- 9 22 Declin. ♃ Bor. — 20 21 — by the subterranean armillae [per Armillas ſubterraneas].

	♃ orient.	The bright one of ♈ occid. [Lucida ♈ occid.]	Diſt. æquat.	Alt. ♃
9 31⅓	31 54¼	5 57½	37 51¾	
9 34½	31 6	6 44½	37 50½	47⅔

- 10 11½ Decl. ♃ — 20 30 B. — by the subterranean armillae [per Arm. ſubt.]
- 10 15 repeated [repetita] — 20 30¼, Alt. ♃ 52

	Canis min. or.	♃ or.	Diſt. æquat.	Alt. ♃
10 21	64 35½	19 9	45 26½	52
10 23½	64 0	18 34	45 26	
10 25	63 29	18 2¼	45 27¼[1]	
10 27½	63 1	17 34	45 27	52⅓
	The bright one of ♈ occ. [Lucida ♈ occ.]			
10 41½	23 52½	14 0	37 52½	52½

1438 the rows carrying *Lucida cap.* ♈ *occ.*, *Luc.* ♈ *occ.* and ♃ *occid.* are sub-heads printed inside the table, each set over the column it relabels. In the row *11 41½* the words *repetita Decl.* ♃ run across the first value column and *20 32 B.* stands under the second and third; *54⅓* stands under *Alt.* ♃. The raised figures [1] in four cells are Dreyer's footnote calls.

1439 the page is set in two columns divided by a printed vertical rule.

	Canis min. or.	♃ or.	Diſt. æquat.	Alt. ♃
10 47	25 9¼	12 41½	37 50¾	doubtful [dubia]
10 53	26 42¼	11 10	37 52¼	52⅔

1440

- 11 9½ Decl. ♃ B. — 20 30 — by the subterranean armillae [per Arm. ſubt.]
- 11 37 ♃ crossed the meridian. [tranſiuit ♃ per meridianum.]

	Canis min. or.	♃ towards the west [♃ ad occaſum]	Diſt. æquat.	Alt. Can. min.
11 40	44 54¾ Inf. head of ♊ [Inf. cap. ♊]	0 33½	45 28¼	29
11 46½	43 51	2 9½	46 0½	
11 49½	43 6½	2 54⅔	46 0⅙	
11 52⅓	42 23	3 38	46 1	
		about [fere]		

1441

DIE 23 NOUEMBRIS A. M.

- 5ʰ30ᴹ Decl. ♃ — 20 31¼
- 5 36 The heart of ☋ was from the meridian verſ. the west [fuit cor ☋ a merid. verſ. occaſ.] 7 32¾, which you will be able to note for correcting the clock [quod pro horologio corrigendo notare poteris].
- 5 41 Diſt. between ♃ and the infer. head of ♊ [Diſt. inter ♃ & infer. cap. ♊]
- by Sext. △ [per Sext. △] — 42 26
- 5 44 the same, repeated [repetita eadem] — 42 26[1442]
- 5 49 Decl. ♀ by the subterranean armillae [per Arm. ſubt.] — 10 3¼ M.
- Alt. ♀ 10¼.

	♀ or.	The heart of ☋ occ. [Cor ☋ occ.]	Diſt. æquat.	Alt. ♀
5 56⅙	50 50	12 54½	63 44½	11¼
5 59	50 9	13 34	63 43	

[1440] the row carrying *Lucida* ♈ *occ.* is a sub-head printed inside the table over the first value column; on the *10 47* row the word *dubia* stands where the altitude column's figures stand.

[1441] the row carrying *Inf. cap.* ♊ is a sub-head printed inside the table over the first value column; the word *fere* stands alone below the last row, under the figures of the third column.

[1442] the two values *42 26* are joined at the right by a brace to the words *Alt.* ♃ */ 17°*.

	♀ or.	The heart of ☋ occ. [Cor ☋ occ.]	Dift. æquat.	Alt. ♀
6 2⅓	49 27	14 16	63 43	12⅔
6 4	48 54½	14 50	63 44½	
6 7	48 12	15 34	63 46 doubtful [dubia]	13
6 25	Decl. ♀ repeated [Decl. ♀ repetita]		10 5	14
6 31	42 13¼	21 30½ Spica ♍ or.	63 43¾	
6 34	41 22½	26 51½	14 31	
6 37	40 39	26 8½	14 30½	16¼
6 40	39 51¼	25 20¾	14 30½	
6 43½	39 0	24 28¾	14 31¼	16½
6 46½	38 16⅓	23 42¼	14 34	doubtful [dubia]

1443

- 6 50 Declin. ♀ M. — 10 5½
- 6 53½ Declin. repeated [Declin. repet.] — 10 5½ M.
- 6 55 with the other pinnac. [Altero pinnac.] — 10 5½
- 6 56⅙ Dift. between [Dift. inter] — 14 21¼
- 7 0 Spica ♍ — 14 22
- 7 2 and ♀. [& ♀.] — 14 21¼
- 7 3 Repeated [Repetita] — 14 22[1444]

	♀ or.	Spica ♍ or.	Dift. æquat.	Alt. ♀
7 9¼	32 37	18 6	14 31	
7 11½	31 59	17 29	14 30	
		The heart of ☋ occ. [Cor ☋ occ.]		
7 16	30 48	33 0½	63 48½	19½
7 21	29 34½	34 15	63 49½	19⅔
7 23½	28 57	34 53	63 50	20

1445

- 7 35½ Decl. ♀. — 10 6½ M.

[1443] the word *dubia* under *63 46* is joined to that value by a brace; the line *6 25 Decl. ♀ repetita* is set inside the table, its words running across the first two value columns, *10 5* standing under the third head and *14* under the altitude head; the row carrying *Spica ♍ or.* is a sub-head over the second value column; on the *6 46½* row *dubia* follows *14 34* and stands where the altitude column's figures stand.

[1444] the last four values are joined at the right by a brace to the words *Per / Sext. △ / Alt. ♀ / 18°* — "By Sext. △, Alt. ♀ 18°".

[1445] the row carrying *Cor ☋ occ.* is a sub-head printed inside the table over the second value column.

• with the other pinnac. [Altero pinnac.] — 10 6½ — 21

	☉ from the meridian [☉ a meridiano]	Diſt. æquat. ☉ and ♀ [Diſt. æquat. ☉ et ♀]	Decl. ☉	Alt. ☉
8 37½	49 39	39 4½	22 2½	1½
8 42½	48 25	39 5¼	22 4	1⅔
8 46½	47 19	39 5	22 5	2½
8 48⅓	46 49½	39 5½		2⅔
8 55½	45 5	39 3¼	22 6¼	3½
8 59½	43 59	39 3½	22 7½	3⅚

At the meridian the clock was running 8 minutes slower than it should; it had been corrected on the preceding evening at H. 5½ by the fixed stars. [Horologium in meridiano 8 ſcrupulis iuſto tardius ibat, fuit veſperi præcedente H. 5½ per ſtellas fixas correctum.]

DIE 23 NOUEMBRIS.

In the evening. Observation of ♄. [Ad Veſperas. Obſeruatio ♄.]

• $6^{H}30^{M}$ Declin. ♄ B. — 2 28 — by the subterranean armillae [per Arm. ſubterr.]

[1] So in codex V. [Sic in codice V.]

___[1446]

• 6 33 distance between ♄ and the first of the wing of Pegasus [Diſt. inter ♄ & primam alæ Pegaſi] — 32 50
• 6 35 The same, reiterated [Eadem reiterata] — 32 50½
• 6 37 — 32 50
• 6 39 — 32 49½
• 6 40 — 32 49½[1447]

	The bright one of vult. occ. [Lucida vult. occ.]	♄ or.	Distance æquat. [Diſt. æquat.]	Alt. ♄
6 39½	57 14	22 32¼	79 46¼	33
6 44	58 28½	21 17	79 45½	
	59 24¾	20 21½	79 46¼	34½

• 6 53 Decl. ♄ — 2 28, Alt. Vult. 22⅔

Observation of ♃ on the same day. [Eodem die obſeruatio ♃.]

• 10 10 Decl. ♃ — 20 30 B., Alt. ♃ 52

[1446] the page is set in two columns divided by a printed vertical rule.

[1447] the five values are joined at the right by a brace to the words *Per / Sext.* △ — "By Sext. △".

- 10 12 distance between the infer. head of ♊ and ♃ [Diſt. inter infer. caput ♊ & ♃]
- 42 34
- 10 13⅙ The same [Eadem] — 42 34 — Alt. ♃ 52½
- 10 19½ The same [Eadem] — 42 34

	Canis min. or.	♃ or.	Distance æquat. [Diſt. æquat.]	Alt. ♃
10 20	63 53	18 19½	45 33½	
10 23⅓	63 6¼	17 31⅓	45 34 55″	
10 25	62 40	17 5	45 35	
10 28	61 51½	16 15½	45 36	
10 31	61 8	15 32½	45 35½	
10 32	60 36	15 1	45 35	53⅚

1448

- 10 58½ Decl. ♃ — 20 29½

	The bright one of the head of ♈ occ. [Luc. capit. ♈ occ.]	♃ or.	Distance æquat. [Diſt. æquat.]	
11 3¼	30 15	7 28	37 43	
11 9½	31 50¾	5 55	37 45¾	
11 13½	32 48¾	4 55½	37 44¼	
11 15⅔	33 21	4 24	37 45	
11 17	33 52½	3 51½	37 44	54

1449

- 11 21 between the bright one of ♈ and ♃ [Inter lucidam ♈ & ♃] — 35 14
- 11 28 The same, ♃ and the head of ♈ [Eadem ♃ & cap. ♈] — 35 15
- 11 31 The same [Eadem] — 35 14½

	Infer. head of ♊ or. [Infer. cap. ♊ or.]	♃ occ.	Distance æquat. [Diſt. æquat.]
11 45	43 5	3 4	46 9
11 48	42 16¾	3 53	46 9¾
11 51	41 39½	4 30½	46 10

DIE 24 NOUEMBRIS A. M.

- $6^{H}36^{M}$ Decl. ♀ B. — 10 29, Alt. ♀ 15¼

1448 on the *10 23⅓* row the figures *55″* follow *45 34* at ordinary spacing, in the space before the altitude column.

1449 this table prints three heads only; the figure *54* on its last row stands in a fifth position.

	♀ or.	Spica ♍ or.	Distance æquat. [Diſt. æquat.]	Alt. ♀
6 41	40 0	24 21	15 39	
6 42½	39 35½	23 57¼	15 38¼	
6 45	38 59	23 22	15 37	16
6 47½	38 19	22 41	15 38	

- 6 51⅙ Decl. ♀ repeated [Decl. ♀ repet.] — 10 29 — 17

	♀ or.	The heart of ♌ occ. [Cor ♌ occ.]	Distance æq. [Diſt. æq.]
6 56	37 49½	28 44	66 33½

Observation of ☿ [Obſeruatio ☿]
By Sext. △ [Per Sext. △] — Alt. ☿
- 7^{H} $1½^{M}$ distance between ♀ and ☿ [Diſt. inter ♀ & ☿] — 21 59½ — 3¼
- 7 3⅙ The same [Eadem] — 21 58
- 7 4⅓ between ♀ and ☿ [inter ♀ & ☿] — 21 59½ — 3⅛
- 7 5½ The same, repeated [Ead. repetita] — 21 57
- 7 6⅔ The same, reiterated [Ead. reiterata] — 22 1
- 7 7⅚ The same [Eadem] — 22 0
- 7 10½ distance between ☿ [Diſt. inter ☿] — 37 7
- 7 11½ and Spica ♍ — 37 7½
- 7 12½ The same, reiterated [Ead. reiterata] — 37 7¼ — 4
- 7 16⅔ Decl. ☿ by Arm. [per Arm.] — 17 44 — 4¼; not exact enough [non ſatis exacte].
- 7 18 Decl. repeated [Decl. repet.] — 17 40, almost exact [fere exacte].
- 7 20⅚ distance between ☿ and Spica ♍ [Diſt. inter ☿ & Spicam ♍]
- by Sext. △ [per Sext. △] — 37 7½ — Alt. ☿
- 7 24 between ☿ and [Inter ☿ &] — 45 35 — 5⅙
- 7 26 Arcturus [Arcturum] — 45 35
- 7 27½ The same, repeated [Ead. repetita] — 45 34½ — 5⅞ [recte: 5⅓ — Corrigenda, p. 431][1450]
- 7 30 The same [Eadem] — 45 36 — 5½
- 7 34 The same, repeated [Ead. repetita] — 45 37⅔, not exact enough [non ſatis exacte].

In these you can use the distance 45 36 without any perceptible error; and it may be that, having become higher, it shifted its place somewhat through refraction. [Potes in his vti diſtantia 45 36 absque omni ſenſibili errore, & fieri poteſt quod eleuatior factus nonnihil per refractionem locum mutauerit.]

Alt. ♀
- 7 44 Declin. ♀ — 10 31½ — 20⅝

[1450] the page prints the fraction in eighths, *5⅞*; the Corrigenda cite it as *5⅔* and correct it to *5⅓*. the three values *45 35*, *45 35*, *45 34½* are joined at the right by a brace to the word *bonæ* — "good"; the altitudes *5⅙* and *5⅞* stand above and below *bonæ*.

- 7 45 distance of ♀ from Spica ♍ [Diſt. ♀ a Spica ♍] — 15 36
- 7 48⅙ Decl. ♀ — 10 31⅔ — 21
- 7 51⅓ Decl. repeated [Decl. repet.] — 10 32 — 21½
- 7 55½ ♀ from the merid. [♀ a merid.] — 21 17½
- 8 1⅔ verſ. the east [verſ. ortum] — 19 56[1451]
- 8 15 The upper limb of ☉ was seen to rise [Superior limbus ☉ viſus eſt oriri]
- 8 16⅔ The Sun was half risen [Sol medius oriebatur]
- 8 19 The Sun was fully rising among clouds, yet not clearly enough visible. [Plane Sol oriebatur inter nubes, non ſatis tamen conſpicuus.]

	☉ from the mer. [☉ a mer.]	Distance æquat. ☉ and ♀ [Diſt. æquat. ☉ et ♀]	Decl. ☉	Alt. ☉
8 37½	49 39	39 4½		
8 40½			22 2½	1½
8 42½	48 25	39 5¼	22 4	1⅔
8 46½	47 19	39 5	22 5	2½
8 48⅓	46 49½	39 5½		2⅔
8 55½	45 5	39 3¼	22 6¼	3½
8 59½	43 59	39 3½	22 7½	3⅚

___[1452]

DIE 24 NOUEMBRIS MANE H. 7⅓.

- Distance of ☿ from Spica ♍ [Diſt. ☿ a Spica ♍] — 37 7½
- Declination of Spica [Declinatio Spicæ] — 8 56
- Declination of ☿ [Declinatio ☿] — 17 40
- Angle diff. aſcenſ. [Angulus diff. aſcenſ.] — 37 10
- Therefore Aſc. R. of ☿ [Ergo Aſc. R. ☿] — 233 2
- Reſp. longitude 25°1′35″ ♏, latitude 1°28′0″ B. [Reſp. Long. 25°1′35″ ♏, Lat. 1°28′0″ B.]
- At Alt. 5°, Refr. 10′0″ [In Alt. 5°Refr. 10′0″]
- Par. 4 0
- in longitude 3′35″ add. [in Long. 3′35″ add.]
- in latitude 4 45 ſubt. [in Lat. 4 45 ſubt.]
- Therefore the true longitude of ☿ [Igitur vera Longitudo ☿] — 25° 5⅙ ♏

[1451] the two values *21 17½* and *19 56* are joined at the right by a brace to the words *pro horologio corrigendo* — "for correcting the clock".

[1452] the page is set in two columns divided by a printed vertical rule.

• Latitude [Latitudo] — 1 23¼ B.[1453]

DIE 24 NOUEMBRIS, AD VESPERAS.

	The eye of ♉ or. [Oculus ♉ or.]	♄ occid.	Distance æquat. [Diſt. æquat.]
$9^{H}\ 9^{M}$	34 39	15 55	50 34
9 11	34 13½	16 21	50 34½

• 9 16½ distance of ♄ and Aldeb. [Diſt. ♄ & Aldeb.] — 51 35
• The same, ♄ and Aldeb. [Eadem ♄ & Aldeb.] — 51 34
• The same [Eadem] — 51 34
• distance between luc. ♈ and ♄ [Diſt. inter luc. ♈ & ♄] — 23 12
• The same [Eadem] — 23 12
• The same, reiterated [Eadem reiterata]
• by Sext. △ [per Sext. △] — 23 10¼
• Declination of ♄ [Declinatio ♄] — 2 28½

Observation of ☋ [Obſeruatio ☋]

• 10 16 declination of ☋ B. [Decl. ☋ B.] — 20 28

	Canis min. or.	☋ or.	Distance æquat. [Diſt. æquat.]	Alt. ☋
10 23	62 26	16 42½	45 43½	
10 26	61 40	15 55½	45 44½	53
10 29	60 55¾	15 12½	45 43¼	

• 10 32½ between ☋ and [Inter ☋ &] — 35 6½
• 10 34 lucid. ♈ — 35 8
• 10 40½ The same, repeated [Ead. repet.] — 31 6½
• 10 43 The same, reiterated [Eadem reiter.] — 35 6½[1454]
• 10 50⅓ between ☋ and [Inter ☋ &] — 46 34½
• 10 52½ Can. min. — 46 34½
• 10 55 declination of ☋ repeated [Decl. ☋ repet.] — 20 28 B.

DIE 13 DECEMBRIS.

In the evening [Ad Veſperas.]

• $8^{H}30^{M}$ declination of ☋ [Declin. ☋] — 20 6

	Super. head of ♊ or. [Super. cap. ♊ or.]	☋ or.	Distance æquat. [Diſt. æquat.]
	60 36	14 44½	45 51½
	56 42⅔	10 53½	45 49⅙

[1453] the lines *In Alt. 5°Refr. 10′0″ / Par. 4 0* and *in Long. 3′35″ add. / in Lat. 4 45 ſubt.* stand side by side on two printed lines, divided by a short vertical rule.

[1454] the four values *35 6½, 35 8, 31 6½, 35 6½* are joined at the right by a brace to the words *Incerta / per / Sext. / △* — "Uncertain, by Sext. △".

	Super. head of ♊ or. [Super. cap. ♊ or.]	☋ or.	Distance æquat. [Diſt. æquat.]
	56 1	10 11½	45 49½
	Luc. head of ♈ occ. [Luc. cap. ♈ occ.]		
9 47	32 39	2 30¼	35 9¼
	33 17	1 52¼	35 9¼

1455

• 9 50 declination of ☋ repeated [Declin. ☋ repetita] — 20 5¼ B.

Observation of ♄ [Obſeruatio ♄]

• Declination of ♄ [Declin. ♄] — 2 33

♄ occid.	Aldebaran or. [Aldebora or.]	Distance æquat. [Diſt. æquat.]	Alt. ♄
39 56	10 43	50 39	
40 9½	9 29½	50 39	
41 43½	8 55½	50 39	27
43 1	7 38	50 39	26⅓

1456

N.B. The times assigned by the clock are not quite right, for the clock was corrected at the setting of ☉ only ἐν πλάτει [Greek: ἐν πλάτει (en platei, "broadly", i.e. only approximately)]; therefore derive the true times of the observation from the distance of the fixed stars from the meridian. [N.B. Tempora Horologij aßignata non ſatis bene ſe habent, horologium enim ἐν πλάτει ad occaſum ☉ fuit correctum, ideoque ex diſtantia fixarum a meridiano vera obſeruationis tempora elice.]

DIE 17 DECEMBRIS A. M.

- $7^{H}32^{M}$ declination of ☿ Merid. [Declin. ☿ Merid.] — 18 40
- 7 32 declination of Spica ♍ [Decl. Spicæ ♍]
- with one pinnule [vno pin.] — 8 57
- with the other pinnule [Altero pinnacidio] — 8 57[1457]
- 7 42 distance of ☿ and Spica ♍ [Diſt. ☿ & Spicæ ♍] — 43 11
- 7 44 — 43 11 — Alt. ☿
- 7 54 distance æquat. [Diſt. æquat.] — 43 29¼ — 11⅓
- 7 57 ☿ and Spica ♍ [☿ & Spicæ ♍] — 43 27
- 7 58½ — 43 27
- 8 0 — 43 27 — 11½
- 8 1 declination of ☿ with one pinnule [Decl. ☿ vno pinn.] — 18 41½ [recte: 18 41⅓ — Corrigenda, p. 431]

[1455] the row carrying *Luc. cap. ♈ occ.* is a sub-head printed inside the table over the first value column.

[1456] this table has no time column; its first head stands over the first figures of each row.

[1457] the lines from *7 32* to *Altero pinnacidio 8 57* are joined at the right by a brace to the words *Alt. / Spicæ / 24¼* — "Alt. of Spica 24¼".

• with the other pinnule [Altero pinnacidio] — 18 41
• 8 6½ Spica ♍ was distant from the meridian [Diſtabat Spica ♍ a merid.]
• towards the west [verſus occaſum] — 15 32½
• 8 7⅓ Spica ♍ occid. — 15 48[1458]
• 8 11½ declination of Spica repeated [Decl. Spicæ repet.] — 8 57¼ M.
• with the other pinnule [Altero pinnacidio] — 8 57⅓

Not clearly enough visible because of the dawn. [Non ſatis conſpicua propter auroram.]

EODEM DIE 17 DEC. AD VESPERAS.

	Canis min. or.	♃ or.	Distance æquat. [Diſt. æquat.]	Alt. ♃
9 9½	53 35½	5 3½	48 32	
9 11⅙	53 9	4 36⅔	48 32⅓	
9 13	52 41½	4 9	48 32½	54½
9 19	51 26½	2 54	48 32½	54½

• 9 35½ declination of ♃ with one pinnule [Decl. ♃ vno pinnac.] — 20 2⅙
• 9 40 declination of ♃ with the other pinnule [Decl. ♃ altero] — 20 2
• 9 44 between ♃ and lucid. ♈ [Inter ♃ & lucid. ♈] — 32 31⅙
• 9 47 — 32 31¼
• 9 50½ distance of ♃ from the infer. [Diſt. ♃ ab infer.] — 45 21½
• 9 53½ [recte: 9 53⅔ — Corrigenda, p. 431] head of ♊ [capite ♊] — 45 21½

___[1459]

DIE 18 DECEMBRIS AD VESPERAS.

Observation of ♃ [Obſeruatio ♃]

• $6^{H}47^{M}$ Declin. of ♃ [Declin. ♃] — 20 0¼ B.

	♃ or.	The bright one of ♈ or. [Lucida ♈ or.]	Difference Aſc. R. [Diff. Aſc. R.]
6 58	37 45	3 22½	34 22½
7 1	37 3	2 40½	34 22½

N.B. All the times assigned are to be corrected. [N.B. Tempora omnia aßignata corrigenda ſunt.]

[1458] the label *Alt.* ♀ stands in smaller type at the right of the *7 44* line, over the figures *11⅓* and *11½* below it; the values *15 32½* and *15 48* are joined at the right by a brace to the words *pro / corrig. / horol.* — "for corrig. the clock".

[1459] the page opens with two columns divided by a printed vertical rule; a line across the full measure and a section heading follow; the rest of the page is again set in two columns divided by a rule.

OBSERUATIONES DISTANTIARUM STELLARUM FIXARUM ET LOCORUM PER ARMILLAS.

Observations of the distances of the fixed stars, and of places, by the armillae.

DIE 7 JANUARIJ.

The eye of ♉ from the mer. [Oculus ♉ a mer.]	The neck of ♌ from the mer. [Ceruix ♌ a mer.]	Difference Aſc. R. [Diff. Aſc. R.]
59 0	27 7⅓	86 7⅓
60 39	25 28	86 7
The right shoulder of Orion [Dext. hum. Orionis]	Arcturus	
48 29½	77 37	126 6½
50 45	75 21	126 6

1460

By the northern armillae. [per Armillas Boreales.]

- Distance between the bright shoulder of Orion and the eye of ♉ [Diſtantia inter lucidum humerum Orionis & oculum ♉] — 21 25, twice [bis]
- Between the left shoulder of Orion and the eye of ♉ [Inter ſiniſtrum humerum Orionis & oculum ♉] — I 15 47 — II 15 47
- Between Canis Major and the right shoulder of Orion [Inter canem maiorem et humerum Orionis dextrum] — I 27 0 — II 27 0
- Between the eye of ♉ and Canis Major [Inter oculum ♉ & canem maiorem] — 45 57⅓ — 45 57
- Between Canis Minor and the bright shoulder of Orion [Inter canem minorem & lucidum humerum Orionis] — 26 1
- Between Capella and the merid. head of ♊ [Inter Capellam & merid. caput ♊] — 34 17 — 34 17⅓ — twice [bis][1461]

These preceding observations were made with the sextant △. [Hæ præcedentes obſeruationes factæ ſunt per Sextantem △.]

DIE 8 JANUARIJ.

The bright one of ♈ from the mer. [Luc. ♈ a mer.]	The eye of ♉ verſ. the east [Oculus ♉ verſ. ortum]	Difference Aſc. R. [Diff. Aſc. R.]
28 35⅓	8 27	37 2⅓
29 43	7 20½	37 3½

[1460] this table has no time column; the row carrying *Dext. hum. Orionis* and *Arcturus* is a sub-head printed inside the table over the first two columns.

[1461] each entry above is set on two printed lines, the third on three. In the second and third entries the values are marked *I* and *II*. The last *bis* stands alone on a line at the right, under *34 17⅓*.

- Decl. of the first of the wing of Pegasus [Decl. primæ alæ Pegaſi] — 12 59½
- Decl. of the lower head of ♊ [Decl. infer. capitis ♊] — 28 57⅔
- Decl. of the bright one of ♈ [Decl. lucidæ ♈] — 21 26

By the northern armillae. [per Armillas Boreales.]

Distances by the sextant. [Diſtantiæ per Sextantem.]

- Between the head of ♈ and the eye of ♉ [Inter caput ♈ & ocul. ♉] — 35 32
- Between the bright head of ♈ and the bright one in the Pleiades [Inter lucidum caput ♈ & lucidam in Pleiadibus] — 22 56½
- Between the first in ♈ and the eye of ♉ [Inter primam in ♈ & oculum ♉] — 39 39¾
- Between the bright one below the horn of ♈ and the eye of ♉ [Inter lucidam infra cornu ♈ & oculum ♉] — 38 21
- Between the bright foot of Orion and Canis Major [Inter lucid. pedem Orionis & Canem maiorem] — 23 42

DIE 9 JANUARIJ.

In the evening [Ad Veſperas.]

Differences of Aſcenſ. R. by the northern armillae. [Differentiæ Aſcenſ. R. per Armillas Boreales.]

- Between the eye of ♉ and the first of the wing of Pegasus [Inter Oculum ♉ & primam alæ Pegaſi] — 81 54½
- Between the lower head of ♊ and the bright one of ♈ [Inter inferius caput ♊ & lucidam ♈] — I 83 57 — II 83 57
- Between the lower head of ♊ and the bright one of the lower horn of ♈ [Inter inferius caput ♊ & lucidam infer. cornu ♈] — I 86 58 — II 86 57¾
- Between the lower head of ♊ and the first of ♈ [Inter inferius caput ♊ & primam ♈] — I 87 5 — II 87 5
- Between the lower head of ♊ and the eye of ♉ [Inter inferius caput ♊ & oculum ♉] — I 46 48½ — II 46 48½
- Between the lower head of ♊ and the mouth of ♉ [Inter inferius caput ♊ & os ♉] — I 50 54 — II 50 54½
- Between the bright one in the head of ♌ and the eye of ♉ [Inter lucidam in capite ♌ & oculum ♉] — 77 24¾ — 77 25
- Between the heart of ♌ and the eye of ♉ [Inter cor ♌ & oculum ♉] — I 83 26¼ — II 83 26½
- Between the neck of ♌ and the eye of ♉ [Inter ceruicem ♌ & oculum ♉] — I 86 7⅓ — II 86 7¾

Distances by the sextant △. [Diſtantiæ per Sextantem △.]

- Between the tail of ♓ and the eye of ♉ [Inter caudam ♓ & oculum ♉] — I 44 14⅛ — II 44 14⅛
- Between the head of ♈ and the eye of ♉ [Inter caput ♈ & oculum ♉] — I 35 32 — II 35 32⅓, twice [bis]

- Between the eye of ♉ and the upper head of ♊ [Inter oculum ♉ & ſuperius caput ♊] — I 43 12 — II 43 12
- Between the eye of ♉ and the lower head of ♊ [Inter oculum ♉ & inferius caput ♊] — I 45 5½ — II 45 5
- Between the upper foot of the lower ♊ and the eye of ♉ [Inter ſuperiorem pedem inferioris ♊ & ocul. ♉] — I 29 8¾ — II 29 8¾[1462]

___[1463]

- Between Propus ♊ and the eye of ♉ [Inter Propum ♊ & oculum ♉] — I 24 3 — II 24 3
- Between the eye of ♉ and the tail of ♈ [Inter oculum ♉ & caudam ♈] — I 26 44¼ — II 26 44¼
- Between the head of ♈ and the topmost of the Hyades [Inter caput ♈ & ſupremam Hyadum] — I 33 9 — II 33 9
- Between the head of ♈ and the middle one of the Hyades [Inter caput ♈ & mediam Hyadum] — I 32 20 — II 32 21
- Between the head of ♈ and the lowest of the Hyades [Inter caput ♈ & infimam Hyadum] — I 32 8 — II 32 8
- Between the head of ♈ and the knee of ♉ [Inter caput ♈ & genu ♉] — I 29 5 — II 29 4¾
- Between the head of ♈ and the bright horn of ♉ [Inter caput ♈ & lucidum cornu ♉] — 44 43 — 44 43⅓
- Between the head of ♈ and the lower horn of ♉ [Inter caput ♈ & inferius cornu ♉] — 48 29 — 48 29
- Between the eye of ♉ and the heel of the foot of ♊ [Inter oculum ♉ & calcem pedis ♊] — 25 53 — 25 53⅓[1464]

DIE 10 JANUARIJ.

- In the morning. Difference of right ascension between the tail and the heart of ♌ [Mane. Diff. Aſc. R. inter caudam & cor ♌] — 25 20 — 25 20½

Toward evening. By the northern armillae. [Ad veſperas. Per Armillas Boreales.]

- Difference of right ascension between the eye of ♉ and the heart of ♌ [Diff. Aſc. R. inter oculum ♉ & cor ♌] — 83 29⅙ — 83 30 — 83 29⅙
- Difference of right ascension between the eye of ♉ and the neck of ♌ [Diff. Aſc. R. inter oculum ♉ & ceruicem ♌] — 86 9⅔ — 86 9½ — 86 10

Distances [Diſtantiæ]

[1462] in the right column each entry is set on two printed lines, the marks *I* and *II* standing before the first and second values; the entry for the bright one in the head of ♌ carries its two values unmarked. The *bis* after *35 32⅓* is set close in smaller type.

[1463] the page is set in two columns divided by a printed vertical rule. The page opens with no date rubric.

[1464] each entry above is set on two printed lines, a value standing at the right of each line; the entry for the head of ♈ and the knee of ♉ is set on one text line, its value marked *II* standing on a line of its own.

- Between Aldeb. and the bright one in the head of ♈ [Inter Aldeb. & lucidam in capite ♈] — 35 32 — 35 32½
- Between Aldeb. and Propus [Inter Aldeb. & Propum] — 24 2⅔ — 24 3
- Between Aldeb. and the heel of the foot of ♊ [Inter Aldeb. & calcem pedis ♊] — 25 52¾ — 25 53

DIE 14 JANUARIJ.

Toward evening. By the northern armillae. [Ad veſperas. Per Armillas Boreales.]

- Declination of the lower head of ♊ [Declinatio infer. cap. ♊] — 28 56¾
- Declination of the upper head of ♊ [Decl. ſuperioris cap. ♊] — 32 42½
- Declination of the bright one of ♈ [Decl. lucidæ ♈] — 21 28

DIE 15 JANUARIJ.

- Between the bright one of ♈ and the eye of ♉ [Inter lucid. ♈ & ocul. ♉] — 35 31⅓
- Between the bright one in the neck of ♌ and the lower head of ♊ [Inter lucidam in ceruice ♌ et inferius caput ♊] — I 35 59¾ — II 35 59¾
- Between the upper head of ♊ and the neck of ♌ [Inter ſuperius caput ♊ & ceruicem ♌] — I 39 0 — II 38 59⅚
- Between the lower head of ♊ and the heart of ♌ [Inter inferius caput ♊ & cor ♌] — 37 0⅓ — 37 0[1465]

DIE 21 JANUARIJ.

- Distance between the eye of ♉ and the lower foot of the lower ♊ [Diſt. inter oculum ♉ & infer. pedem inferioris ♊] — 31 29 — 31 29
- Between the eye of ♉ and the lower foot of the upper ♊ [Inter oculum ♉ & infer. pedem ſuperioris ♊] — 27 2 — 27 2

By the sextant △. [Per Sextantem △.]

- Between the two shoulders of Orion [Inter vtrumque hum. Orionis] — 7 30¾ — 7 30½
- Between the two feet of Orion [Inter vtrumque pedem Orionis] — 8 18 — 8 18
- Between Aldeb. and the star in the thigh of Hercules ♊ [Inter Aldeb. & ſtellam in femore Herculis ♊][1466] — 38 49 — 38 49
- Between Aldebaran and the star that lies midway between the thigh of Apollo and Hercules [Inter Aldeboram & ſtellam quæ media eſt inter femur Apollinis & Herculem] — 35 17½, twice [bis]
- Between Aldeb. and the star in the thigh of Apollo [Inter Aldeb. & ſtellam in femore Apollinis] — 31 2, twice [bis]

[1465] the last entry above carries no date of its own.

[1466] "Hercules" here is an old name for the following (southern) Twin of Gemini, Pollux, from the tradition that the Twins are Apollo and Hercules; it is not the constellation Hercules.

- Between Aldeb. and the star forming a △ with the thigh of ♊ [Inter Aldeb. & ſtellam conficientem △ cum femore ♊] — 39 1¾ — 39 1¾
- Between Aldeb. and the bright one in the elbow of Apollo [Inter Aldeb. & lucidam in cubito Apollinis] — 35 16 — 35 16
- Between Aldeb. and the left shoulder of Apollo [Inter Aldeb. & ſiniſtrum humerum Apollinis] — 42 0 — 42 0
- Between Aldeb. and the star in the back of Apollo [Inter Aldeb. & ſtellam in dorſo Apollinis] — 40 38¾ — 40 38¾
- Between Aldeb. and the right shoulder of Apollo [Inter Aldeb. & dextrum humerum Apollinis] — 42 48⅔ — 42 48⅔
- Between Aldeb. and the left shoulder of Hercules [Inter Aldeb. & ſiniſtrum humerum Herculis] — 44 38 — 44 38[1467]

By the northern armillae. [Per Armillas Septentrionales.]

- Declination of the eye of ♉ [Declinatio oculi ♉] — 15 35⅔
- of the heart of ♌ [cordis ♌] — 13 58
- of the hip of ♌ [coxæ ♌] — 22 46
- of the tail of ♌ [caudæ ♌] — 16 54
- of Arcturus [Arcturi] — 21 27[1468]

Differences of right ascension. [Differentiæ Aſcenſionis Rectæ.]

- Between the eye of ♉ and the heart of ♌ [Inter oculum ♉ & cor ♌] — 83 28 — 83 28
- Between the eye of ♉ and the neck of ♌ [Inter oculum ♉ & ceruicem ♌] — 86 9¼ — 86 9½
- Between the eye of ♉ and the tail of ♌ [Inter oculum ♉ & caudam ♌] — 108 46 — 108 46
- Between the eye of ♉ and the hip of ♌ [Inter oculum ♉ & coxam ♌] — 99 55
- Between Canis Minor and Arcturus [Inter canem minorem & Arcturum] — 99 49 — 99 48¾
- Between the lower head of ♊ and Arcturus [Inter inferius caput ♊ & Arcturum] — 98 10¼ — 98 9⅚ — 98 10[1469]

___[1470]

DIE 22 JANUARIJ.

- Distance between the eye of ♉ and the lower head of ♊, by the new Sext. [Diſtantia inter oculum ♉ & infer. caput ♊ per Sext. nouum] — 45 3⅔ — 45 4

[1467] the entry for the star midway between the thigh of Apollo and Hercules is set on three lines. Each *bis* is set in smaller type after its value.

[1468] the last four names are set in under *oculi*, the word *Declinatio* standing only on the first line.

[1469] in the first and last entries of this run the last value stands on a line of its own; the entry for the eye of ♉ and the hip of ♌ is set on one line with one value.

[1470] the page is set in two columns divided by a printed vertical rule.

- Between the eye of ♉ and the star in the thigh of Hercules [Inter oculum ♉ & ſtellam in femore Herculis] — 38 49 — 38 48¾
- Between the eye of ♉ and the middle one between the thighs of Apollo and Hercules [Inter oculum ♉ & mediam inter femora Apoll. & Herc.] — 35 17⅚ — 35 17¾
- Between the eye of ♉ and the thigh of Apollo [Inter oculum ♉ & femur Apollinis] — 31 2 — 31 2 — 31 2⅓
- Between the eye of ♉ and the bright one in the elbow of Apollo [Inter oculum ♉ & lucidam in cubito Apollinis] — 35 15¾ — 35 16
- Between the heart of ♌ and the hip [Inter cor ♌ & coxam] — 17 51
- Between the hip of ♌ and the neck [Inter coxam ♌ & ceruicem]
- by the new Sext. [per Sext. nouum] — 12 45
- by the old Sext. [per Sext. veterem] — 12 44
- Between the hip and the thigh of ♌ [Inter coxam & femur ♌] — 8 31¼[1471]

By the northern armillae, Diff. Aſc. R. [Per Armillas Sept., Diff. Aſc. R.]

- Of the eye of ♉ and the heart of ♌ [Oculi ♉ & cordis ♌] — 83 28⅓ — 83 28
- Of the eye of ♉ and the tail of ♌ [Oculi ♉ & caudæ ♌] — 108 45½ — 108 45
- Of Spica ♍ and Aldeb. [Spicæ ♍ & Aldeb.] — 132 45 — 132 44¾ — 132 45⅓[1472]

DIE 23 JANUARIJ.

- Distance between the two scales of ♎ [Diſtantia inter vtramque lancem ♎] — 9 8⅓

Declin. by the northern armillae [Declin. per Armillas Boreales]

- Of the heart of ♌ [Cordis ♌] — 13 57¾
- Of the neck of ♌ [Ceruicis ♌] — 21 54
- Of the bright one of Lyra [Lucidæ Lyræ] — 38 25

DIE 24 JANUARIJ.

- Between the bright shoulder of Orion and the lower head of ♊, by the new Sext. [Inter lucid. humerum Orionis & infer. cap. ♊, per nou. Sext.] — 33 15
- by the old Sext. [per Sext. veterem] — 33 16⅙ — 33 16 — 33 15½
- Between the eye of ♉ and the bright one in the foot of ♊ [Inter oculum ♉ & lucidam in pede ♊] — 29 8¾
- Between the eye of ♉ and the heel of the foot of ♊ [Inter oculum ♉ & calcem pedis ♊] — 25 53

[1471] in the first entry the words *in- / fer.* are divided across the line end and set close with the words around them (*oculum♉&in-*, *fer.caput♊perSext.nouum*); the third value of the entry for the thigh of Apollo stands on a line of its own.

[1472] in these three entries the first value stands on the entry's line and each further value on a line of its own.

- Between the eye of ♉ and the lower head of ♊ [Inter oculum ♉ & infer. caput ♊] — 45 5¼ — 45 4⅔ — 45 4½ — 45 5[1473]
- Between Canis Minor and the heart of ♌ [Inter canem minorem & cor ♌]
- by the old Sext. [per Sext. veterem] — 37 20 — 37 19 — 37 19
- by the new Sext. [per Sext. nouum] — 37 19⅛ — 37 19⅛
- Decl. of the lower head of ♊ [Decl. inf. cap. ♊] — 28 57⅓
- of the bright one of ♈ [Lucidæ ♈] — 21 27⅔
- Diff. Aſc. R. of both [Diff. Aſc. R. vtriusque] — 83 57 — 83 57[1474]

Diff. of right Aſcenſ. [Diff. Aſcenſ. Rectæ]

- Between the eye of ♉ and the heart of ♌ [Inter oculum ♉ & cor ♌] — 83 28⅓
- Between the eye of ♉ and the neck of ♌ [Inter oculum ♉ & ceruicem ♌] — 86 9⅔ — 86 10½
- Between the lower head of ♊ and Spica ♍ [Inter infer. cap. ♊ & Spicam ♍] — 85 48
- Between the heart of ♌ and Arcturus [Inter cor ♌ & Arcturum] — 62 37 — 62 37
- Declin. of the heart of ♌ [Declin. cordis ♌] — 13 57½
- of the lowest neck of ♌ [infimæ ceruicis ♌] — 18 43
- of the upper neck of ♌ [ſuperioris ceruicis ♌] — 21 5

DIE 9 FEBRUARIJ.

- Distance between the neck and the heart of ♌ [Diſt. inter ceruicem & cor ♌] — 8 15 — 8 15½

Not certain enough on account of the weather. [Non ſatis certa propter tempeſtatem.]

DIE 17 FEBRUARIJ.

- Between the neck and the heart of ♌ [Inter ceruicem & cor ♌] — 8 15¼, twice [bis]
- Between the neck and the lower head of ♊ [Inter ceruicem & infer. cap. ♊] — 35 59½ — 35 59½
- Between the heart of ♌ and the lower head of ♊ [Inter cor ♌ & infer. cap. ♊] — 36 58 — 36 58⅙, twice [bis]

DIE 19 FEBRUARIJ.

By the northern armillae. [Per Armillas ſeptentrionales.]

[1473] the words *per Sext. veterem* are joined by a printed brace to the three values *33 16⅙*, *33 16*, *33 15½*; the last two values of the entry for the lower head of ♊ each stand on a line of their own.

[1474] the two sets of values of the entry for Canis Minor and the heart of ♌ are each joined by a printed brace to the words *per Sext. veterem* and *per Sext. nouum*. These lines carry no date rubric of their own.

- Decl. of the bright one of the foot of Ericton. [Decl. lucidæ pedis Ericton.] — 28 10
- Of the heart of ♌ [Cordis ♌] — 13 59
- Diff. Aſc. R. between the lower head of ♊ and the first of the lower wing of ♍ [Diff. Aſc. R. inter infer. cap. ♊ & primam alæ inferioris ♍] — 62 21½ — 62 21⅛
- Diff. Aſc. R. between the lower head of ♊ and the third bright one of the lower wing of ♍ [Diff. Aſc. R. inter infer. cap. ♊ & tertiam lucidam alæ inferioris ♍] — 75 12 — 75 11½
- Distance between Schedar of Caßiop. and the upper one of its seat [Diſtantia inter Schedir Caßiop. & ſup. ſellæ eiusdem] — 4 58 — 4 58½

This one was uncertain on account of the clouds. [Hæc fuit incerta propter nubes.][1475]

___[1476]

DIE 17 MAIJ.

- Between Spica ♍ and the northern scale ♎ [Inter Spicam ♍ & borealem lancem ♎] — 27 34 twice

More often, however, now more, now less. [Sæpius tamen nunc plus, nunc vero minus.]

DIE 18 MAIJ.

- The same distance [Eadem diſtantia] — 27 33⅔ — 27 34 three times
- Between Spica and the southern scale ♎ [Inter Spicam & auſtralem lancem ♎] — 21 21¾ three times — 21 21⅔
- Between the two scales [Inter vtramque lancem] — 9 7 — 9 6¼ — 9 7

Not certain enough [Non ſatis certa][1477]

By the old Trigon. sextant [Per Sext. Trigon. veterem.]

DIE 10 OCTOBRIS.

- We set the Bend of Cassiopeia above [Poſuimus Flexuram Caßiopeæ ſupra] — 58 27¾
- and in that position Schedar [Schedir] of Cassiopeia appeared [& in tali ſitu videbatur Schedir Caßiop.] — 54 15⅓
- with the other pinnule [altero pinnac.] — 54 15⅙
- The topmost star of the Chair of Cassiopeia [Suprema cathedræ Caßiopeæ] — 56 51⅔
- with the other pinnule [altero pinnac.] — 56 52

[1475] in the two entries under *Diff. Aſc. R.* each is set on three lines, the values standing at the right of the second and third; the glyph ♍ of the first stands alone on its third line.

[1476] the page is set in two columns divided by a printed vertical rule.

[1477] the words *Non ſatis certa* stand on the second line of the entry for the two scales and are joined by a printed brace to its three values; *bis* and *ter* are set in smaller type after their values.

Towards the rising, from the pole [verſus ortum a polo][1478]

- The bright one in the front of Ursa Minor [Lucida in anteriore vrſæ minoris] — 75 52½
- with the other pinnule [altero pinnac.] — 75 52⅔
- The other, less bright one [Altera minus lucida] — 73 21¼ — 73 21½

Towards the setting, from the pole [verſus occaſum a polo][1479]

The following with the axis of the instrument towards the north. [Sequentia pro axe inſtrumenti verſus ſeptentrionem.]

- H. 7¼ The topmost of the front ones of Ursa Major [Suprema anteriorum vrſæ maioris] — 64 0
- with the other pinnule [altero pinnacidio] — 64 0⅓
- H. 7⅛ The lower of the front ones of Ursa Major [Inferior anteriorum vrſæ maioris] — 58 38 — 58 38½

when they were almost on the meridian. [cum eßent fere in meridiano.]

- H. 8½ The upper of the preceding ones of Ursa Major, with both pinnules [Superior ex præcedentibus vrſæ maioris vtroque pinn.] — 64 0
- H. 8¾ The lower of the front ones [Inferior anteriorum] — 58 38½
- H. 8⅝ The upper of the front ones, with both pinnules [Superior anteriorum vtroque pinn.] — 64 0
- H. 9.0 The same upper one, with both [Eadem ſup., vtroque] — 64 0
- H. 9¼ The lower one [Inferior] — 58 37⅝ — 58 37⅔

DIE 11 OCTOBRIS A. M.[1]

- The Bend of Cassiopeia [Flexura Caßiop.] — 54 17
- Schedar [Schedir —] — 58 29½
- The topmost one [Suprema —] — 56 53½

According to these, observed towards the setting, the instrument is correctly set up. [Iuxta has verſus occaſum obſeruatas inſtrumentum eſt recte conſtitutum.][1480]

- The bright front one of Ursa Minor [Lucida anterior vrſæ min.] — 75 52½
- with the other pinnule [altero pinn.] — 75 52¼
- The lower, less bright one [Inferior minus lucida] — 73 21½, with both [vtroque]

DIE 18 OCTOBRIS.

Toward evening. Declination. [Ad veſperas. Declinatio.]

[1478] a printed brace joins the five values from *58 27¾* to *56 52* to the words *verſus ortum a polo*, set at the right of the column.

[1479] a printed brace joins the four values from *75 52½* to *73 21½* to the words *verſus occaſum a polo*, set at the right of the column.

[1480] a dash is printed between the name and the values on the second and third lines above; the sentence that follows them is set in smaller type at their right and joined to the three lines by a printed brace.

- The Bend of Cassiopeia [Flexura Caßiop.] — 58 28
- Schedar [Schedir] — 54 16
- The topmost star of the Chair [Suprema cathedræ] — 56 52
- The head of Andromeda [Caput Andromedæ] — 26 48½
- The head of ♈ [Caput ♈] — 21 30
- with the other pinnule [altero pinn.] — 21 29⅔

Towards the rising [verſus ortum]

- The first in the tail of Ursa Major [Prima in cauda vrſæ maioris] — 58 16
- The middle one of the tail [Media caudæ] — 57 9
- The last one of the tail [Extrema caudæ] — 51 26½

Towards the setting [verſus occaſum][1481]

- H. 7½. The topmost of the front ones of the □ of Ursa Major [Suprema anteriorum □ vrſæ maioris] — 64 0
- with the other pinnule [altero pinn.] — 64 0¼
- The lower of the front ones of Ursa Major [Inferior anteriorum vrſæ mai.] — 58 38½
- H. 8.44 The bright one in the □ of Ursa Major [Lucida in □ vrſæ mai.] — 75 51½
- The following, less bright one [Sequens minus lucida] — 73 21
- with the other pinnule [altero pinn.] — 73 20½
- The eye of ♉ [Oculus ♉] — 15 37

By the sextant [Per Sextantem]

- Between the pole star and the bright one in the □ of Ursa Minor [Inter ſtellam polarem & luc. in □ vrſæ min.] — 16 34½ twice — 16 34 — 16 34⅔
- Between the bright one of Lyra and the Vulture [Inter lucid. Lyræ & Vulturem] — 34 12 — 34 12
- Between the mouth of Pegasus and the Vulture [Inter os Pegaſi & Vulturem] — 28 2 — 28 2¼

DIE 19 OCTOBRIS A. M.[2]

By the armillae. [Per Armillas.]

- The Bend of Cassiopeia [Flexura Caßiop.] — 58 27⅓
- The topmost star of the Chair [Suprema cathedræ] — 56 51½
- Schedar [Schedir] — 54 15½

Towards the setting [verſus occaſum]

- The first in the tail of Ursa Major [Prima in cauda vrſæ maioris] — 58 16
- The middle one of the tail [Media caudæ] — 57 8½

Towards the rising [verſus ortum][1482]

[1] Between H. 2 and H. 4. [Inter H. 2 et H. 4.]

[1481] each of the two groups above is joined by a printed brace to the words at its foot, set at the right of the column.

[1482] each of the two groups above is joined by a printed brace to the words at its foot, set at the right of the column.

[2] After H. 3. [Post H. 3.]
___[1483]

DIE 22 OCTOBRIS.[1]

- The topmost star of the Chair, declination [Suprema cathedræ, Decl.] — 56 51⅔
- The Bend [Flexura] — 58 27½

DIE 22 NOUEMBRIS.

By the subterranean armillae. [Per Armillas ſubterraneas.]

Diff. Aſc. Rectæ between the eye of ♉ and the bright one of the Vulture. [Diff. Aſc. Rectæ inter oculum ♉ & lucidam Vulturis.]

- I 130 22 — Alt. of the eye of ♉ 23⅓° [Alt. oculi ♉]
- II 130 21½
- III 130 22
- IIII 130 22½ — Alt. of the bright one of the Vulture 22½° [Alt. luc. Vult.]
- V 130 19 — uncertain on account of the ☾ [incerta propter ☾]
- VI 130 21⅚
- VII 130 21⅙
- Declination of the eye of ♉ [Decl. oculi ♉] — 15 37⅓ — its Alt. 26° [Alt. eius]
- with the other pinn. [altero pinn.] — 15 37¼
- Declination of the bright one of the Vulture [Decl. luc. Vult.] — 7 51½ — its Alt. 19¼ [Alt. eius]
- with the other pinn. [altero pinn.] — 7 51⅔

The eye of ♉ was then eastern, while the bright one of the Vulture was western. [Erat tunc oculus ♉ orientalis, lucida vero Vulturis occidentalis.]

- Diff. Aſc. R. of the lower head of ♊ and the eye of ♉ [Diff. Aſc. R. infer. capitis ♊ & oculi ♉] — I 46 51 — II 46 52½ — III 46 52½ — good [bonæ]
- Diff. Aſc. R. of the eye of ♉ and the bright shoulder of Orion [Diff. Aſc. R. oculi ♉ & lucidi humeri Orionis] — I 20 6 — II 20 5½ — III 20 5½
- Equatorial distance of the eye of ♉ and Canis Minor [Diſt. æquatorea oculi ♉ & canis minoris] — I 46 15 — II 46 15 — III 46 15½
- Equatorial distance of the eye of ♉ and the bright shoulder of Orion [Diſt. æquat. oculi ♉ & luc. hum. Orion.] — I 20 6¾ — II 20 6
- Equatorial distance of the eye of ♉ and Canis Minor [Diſt. æquat. oculi ♉ & canis minoris] — I 33 40½ — II 33 41 — III 33 40½
- Of the eye of ♉ and the bright foot of Orion, equatorial distance [Oculi ♉ & lucidi pedis Orionis diſt. æquat.] — I 10 38 — II 10 37 — III 10 38

[1483] the page is set in two columns divided by a printed vertical rule.

- Equatorial distance of the eye of ♉ and the bright one of the lower foot of ♊ [Diſt. æquat. oculi ♉ & lucidi pedis inferioris ♊] — I 30 19 — II 30 21 — III 30 20 — IIII 30 20[1484]

Distance between the eye of ♉ and Canis Minor by the sextant △. Hardly good. [Diſtantia inter oculum ♉ & canem minorem per Sext. △. Vix bona]

- 46 25⅓
- 46 25⅓

Declination by the subterranean armillae, when they were towards the rising. [Declinatio per Armillas ſubterr. cum verſus ortum eßent.]

- The bright foot of Orion [Lucidus pes Orionis] — 8 44¾ M.
- The first of the belt of Orion [Prima balthei Orionis] — 0 40¼ M.
- The second of the belt [Secunda balthei] — 1 31⅔ M.
- The third of the belt [Tertia balthei] — 2 13¾ M.
- The left shoulder of Orion [Iniſter humerus Or.] — 5 54 B.
- The right shoulder of Orion [Dexter humerus Or.] — 7 15 B.
- Canis Major [Canis maior] — 16 10 M.
- The lower head of ♊ [Inferius caput ♊] — 28 56 B.
- The upper head of ♊ [Superius caput ♊] — 32 41⅓ B.

Altit. of Canis Major 11°. [Altit. canis maioris 11°.]

DIE 23 NOUEMBRIS A. M.

Declination towards the setting. [Declinatio ad occaſum.]

- Of the bright shoulder of Orion [Lucidi humeri Orion.] — 7 17½, Alt. 11
- Of Canis Minor [Canis minoris] — 6 12½ — 23½
- Of the upper head of ♊ [Superioris capitis ♊] — 32 41¼ — 44
- Of the lower head of ♊ [Inferioris capitis ♊] — 28 57 — 42½[1485]

DIE 23 NOUEMBRIS.

Toward evening. [Ad Veſperas.]

- Distance between the bright one of the Vulture and the head of Ophiuchus [Diſtantia inter lucidam Vulturis & caput Ophiuchi] — 33 32⅙, Alt. of Ophiuchus 15¼ [Alt. Oph.]
- The same, repeated [Eadem repetita] — 33 31¼ — 33 32 — 33 32 — 33 31¾ — 14° — 33 31¾[1486]

Eye of ♉ or.	Vulture occ.	Equatorial distance	Alt. Vulture
50 15	80 6	130 21	12
49 52½	80 30	130 22½	

[1484] in the first entry above, a printed brace joins the values marked *II* and *III* to the word *bonæ*, set at the right of the column.

[1485] *Alt.* is printed only on the first line above; the second figure group of each later line stands at the right, beneath *Alt. 11*, with no word printed before it.

[1486] the figure *14°* stands at the right of the fourth value line of *Eadem repetita*, beneath *15¼*, with no word printed before it.

1487

By the sextant △. [Per Sextantem △.]

- Distance between Canis Minor and the eye of ♉ [Diſt. inter Canem minorem & oculum ♉] — 46 22½
- The same, repeated [Eadem repetita] — 46 23
- The same, reiterated [Eadem reiterata] — 46 22⅓
- Between the eye of ♉ and the right shoulder of Orion [Inter oculum ♉ & humerum dextrum Orionis] — 21 25½ twice
- The same distance, reiterated [Eadem reiterata diſt.] — 21 25½
- Between the left shoulder of Orion and the eye of ♉ [Inter ſiniſtrum humerum Orionis & oculum ♉] — 15 49
- The same distance, repeated [Eadem repetita diſt.] — 15 48⅚
- The same, reiterated [Eadem reiterata] — 15 49
- Between the first in the belt of Orion and the eye of ♉ [Inter primam in cingulo Orionis & oculum ♉] — 21 49
- The same distance, reiterated [Eadem reiterata diſt.] — 21 49
- The same [Eadem] — 21 50 approximately [fere]

[1] After H. 6 p. m. [Poſt H. 6 p. m.]

___1488

- Equatorial Diſt. of the eye of ♉ and Canis Minor occ. [Diſt. æquat. oculi ♉ & canis minoris occ.] — I 46 19 — II 46 18 — III 46 18
- Equatorial Diſt. between the eye of ♉ and the left shoulder of Orion occ. [Diſt. æquat. inter oculum ♉ & ſiniſt. humerum Orionis occ.] — I 12 41⅙ — II 12 39¼ — III 12 40 — IIII 12 38½
- Differ. Aſc. R. between Aldeb. and the right shoulder of Orion occ. [Differ. Aſc. R. inter Aldeb. & dextrum humerum Orionis occ.] — I 20 7⅚ — II 20 7½ — III 20 9¼ — IIII 20 8
- Differ. Aſc. R. of the eye of ♉ and the topmost in the belt of Orion [Differ. Aſc. R. oculi ♉ & ſupremæ in baltheo Orionis] — I 14 41½ — II 14 41 — III 14 40⅚

By the subterranean armillae.[1] [Per Armillas ſubterraneas[1].]

- Diff. Aſc. of the eye of ♉ and the middle one in the belt of Orion [Diff. Aſc. Oculi ♉ & mediæ in baltheo Or.] — I 15 47¾ — II 15 47½
- Diff. Aſc. of the eye of ♉ and the lowest in the belt of Orion [Diff. Aſc. oculi ♉ & infimæ in baltheo Orionis] — I 16 57 — II 16 59 — III 16 57⅚
- Diff. Aſc. R. of Aldeb. and the heart of ♌, towards the rising [Diff. Aſc. R. Aldeb. & cordis ♌ verſus ortum] — I 83 26⅙ — II 83 26½ — III 83 26⅓
- Equatorial Diſt. of Spica ♍ orient. from the meridian and the heart of ♌ occ. [Diſt. æquat. Spicæ ♍ orient. a mer. & cordis ♌ occ.] — I 49 16 — II 49 15⅚ — III 49 15 — IIII 49 16½

1487 the head row is printed in two lines, *Oculus ♉ or.*, *Vultur. occ.*, *Diſt. æquat.*, *Alt. Vult.*; the table is set in smaller type without rules.

1488 the page is set in two columns divided by a printed vertical rule.

- Diff. Aſc. R. of Spica ♍ or. and Canis Minor occ. [Diff. Aſc. R. Spicæ ♍ or. & Canis minoris occ.] — I 86 24½ — II 86 26 — III 86 25¼ — IIII 86 26
- Decl. of the head of Ophiuchus [Decl. capitis Ophiuchi] — 12 58 B.

Altitude 15¼ [Altitudo 15¼]

- Of the bright one of the Vulture [Luc. Vulturis] — 7 51½ B.
- Of the heart of ♌, by the subterranean armillae [Cordis ♌ per Arm. ſubt.] — 13 58 A.
- Of Spica ♍, also by the subterranean armillae [Spicæ ♍ etiam per Arm. ſubt.] — 8 55

Altitude 19¾ [Alt. 19¾]

DIE 24 NOUEMBRIS.

Toward evening. [Ad Veſperas.]

- Decl. of the head of Ophiuchus [Decl. cap. Ophiuchi] — 12 57½ — altitude 18⅙ [Alt.]
- Of the left shoulder of ♒ [Siniſtri humeri ♒] — 7 16½ — 18½
- Of the mouth of Pegasus [Oris Pegaſi] — 8 1½
- Of the right shoulder of ♒ [Dextri humeri ♒] — 4 13[1489]
- Diff. Aſc. of the head of Ophiuchus from the meridian towards occ. and of the bright one of the Vulture occ. [Diff. Aſc. capitis Ophiuchi a mer. ad occ. & Luc. Vult. occ.] — I 33 42 — II 33 42
- by the armillae [per Armillas] — III 33 42⅔
- IIII 33 43
- V 33 41½
- Diſt. between the head of Ophiuchus and the Vulture by the Sext. △ [Diſt. inter cap. Ophiuchi & Vulturem per Sext. △] — I 33 31 — II 33 31⅙ — III 33 31¼
- The same, repeated [Eadem repetita] — IIII 33 31½
- The same [Eadem] — V 33 31⅙

By the subterranean armillae. [Per Armillas ſubterraneas.]

- Equatorial Diſt. of the Vulture and the left shoulder of ♒ [Diſt. æquat. Vulturis & ſiniſtri humeri ♒] — 24 48 — 24 49⅙ — 24 45¼
- Equatorial Diſt. of the Vulture occ. and the mouth of Pegasus occid. [Diſt. æquat. Vulturis occ. & oris Pegaſi occid.] — I 28 18½ — II 28 19¼ — III 28 18¾
- Diſt. between the Vulture and the mouth of Pegasus by the Sext. [Diſt. inter Vulturem & os Pegaſi per Sext.] — 28 5
- The same, repeated [Eadem repetita] — 28 6
- Diff. Aſc. R. of the Vulture occ. and the bright one in the neck of Pegasus [Diff. Aſc. R. Vult. occ. & lucidæ in collo Pegaſi] — I 42 28 — II 42 32¼ — III 42 33½

[1489] *Alt.* is printed only on the first line above; the figure *18½* stands at the right of the second line, beneath *18⅙*, with no word printed before it.

• Diff. Aſc. of the Vulture and the first in the wing of Pegasus [Diff. Aſc. Vult. & primæ in ala Peg.] — I 48 23 — II 48 23¾

Diff. Aſcenſ. of the Vulture occ. and the eye of ♉ or. [Diff. Aſcenſ. Vulturis occ. & oculi ♉ or.]

• I 130 21 — altitude of the Vulture 22 [Alt. Vult.]
• II 130 17½ — altitude of the eye 25 [Alt.oculi]
• III 130 21½
• IIII 130 19½
• V 130 20½

Differ. Aſcenſ. of Canis Minor or. and the eye of ♉ or. [Differ. Aſcenſ. Canis minoris or. & oculi ♉ or.]

• I 46 16½
• II 46 16
• III 46 16¼

Differ. Aſcenſ. of the left shoulder of Orion or. and the eye of ♉ or. [Differ. Aſcenſ. ſiniſtri humeri Orionis or. & ocul. ♉ or.]

• I 12 39 — good [bona]
• II 12 36
• III 12 40¾

Uncertain because of the nearness of the eye of ♉ to the meridian. [incertæ propter vicinitatem oculi ♉ ad merid.][1490]

At H. 11 27′ 20″ the eye of ♉ passed through the meridian. It should have passed at H. 11 27′ 17″; so there is as yet no error of the clock. [H. 11 27′ 20″ tranſiuit oculus ♉ per meridianum. Deberet tranſire H. 11 27′ 17″, ergo nullus adhuc horologij error.]

DIE 25 NOUEMBRIS.

Toward evening. Equatorial Diſt. of the head of Ophiuchus occ. and the bright one of the Vulture occ.: I 33 39, altitude of the head of Ophiuchus 17; II 33 40. Not certain enough on account of the ☾. [Ad Veſperas. Diſt. æquatorea capitis Ophiuchi occ. & lucidæ Vulturis occ. I 33 39 Alt. cap. Oph. 17 II 33 40 Non ſatis certæ propter ☾.]

[1] Perhaps the preceding observations were made with the same instrument. [Fortaße præcedentes obſeruationes per idem inſtrumentum factæ ſunt.]

___[1491]

DIE 10 DECEMBRIS A. M.

Diff. Aſcenſ. of the bright one of the neck of ♌ occ. and Spica ♍ or. [Diff. Aſcenſ. lucidæ ceruicis ♌ occ. & Spicæ ♍ or.]

• 46 36¾
• 46 36½

[1490] a printed brace joins the values marked *II* and *III* above to the words *incertæ propter*, set at their right; the line *vicinitatem oculi* ♉ *ad merid.* follows beneath.

[1491] the page is set in two columns divided by a printed vertical rule.

DIE 17 DECEMBRIS A. M.

Differ. Aſcenſ. of the heart of ☋ occ. and Spica ♍ or. [Differ. Aſcenſ. cordis ☋ occ. & Spicæ ♍ or.]

- I 49 21 10
- II 49 21
- III 49 18⅓ — uncertain [incerta]
- IIII 49 20½
- Diſt. æquat. of the lowest of the neck of ☋ occ. and Spica ♍ or. [Diſt. æquat. infimæ ceruicis ☋ occ. & Spicæ ♍ or.] — I 49 42½ — II 49 42¼ — III 49 42⅓
- Diſt. æquat. of the head of Ophiuchus or. and Spica ♍ or. [Diſt. æquat. capitis Ophiuchi or. & Spicæ ♍ or.] — I 63 1½ — II 63 1½
- Diſt. æquat. of the right shoulder of Hercules or. and Spica ♍ or. [Diſt. æquat. dextri humeri Herculis or. & Spicæ ♍ or.] — I 47 12 — II 47 12
- Differ. Aſcenſ. of the head of Hercules or. and the heart of ☋ occ. [Differ. Aſcenſ. capitis Herculis or. & cordis ☋ occ.] — I 107 19 — II 107 18½
- Differ. Aſcenſ. of the head of Hercules or. and Spica ♍ or. [Differ. Aſcenſ. capitis Herculis or. & Spicæ ♍ or.] — I 58 0½ — II 58 1
- Declin. of the head of Ophiuchus [Declin. capitis Ophiuchi] — 12 57½ B.
- Decl. of the head of Hercules [Decl. capitis Herculis] — 14 56½ B.
- Decl. of the right shoulder of Hercules [Decl.dextri humeri Herculis] — 22 27 B.

They were then towards the rising. [Erant tunc verſus ortum.]

DIE 18 DECEMBRIS P. M.

- Diff. Aſcenſ. of the eye of ♉ or. and the bright one of the Vulture occ. [Diff. Aſcenſ. oculi ♉ or. & lucidæ Vulturis occ.] — I 130 22⅔ — II 130 22½ — III 130 21⅔

Diſt. between the infer. head of ♊ and the bright foot of Erichthonius, by the Sext. △ [Diſt. inter infer. caput ♊ & lucidum pedem Erictonij per Sext. △]

- 30 35⅓
- 30 35¼
- 30 35⅓

Altitude of the infer. head of ♊ 16½ [Altitudo infer. cap. ♊ 16½][1492]

DIE 25 DECEMBRIS.

Toward evening. Differ. Aſcenſ. of the head of ♈ occ. and the eye of ♉ occ. [Ad Veſperas. Differ. Aſcenſ. capitis ♈ occ. & oculi ♉ occ.]

- I 37 1½
- II 37 2⅚

[1492] a printed brace joins the three values above to the words *Altitudo infer. cap.* ♊ *16½*, set at their right.

- III 37 3
- IIII 37 2

Differ. Aſcenſ. of Canis Minor or. and the eye of ♉ occ. [Differ. Aſcenſ. canis minoris or. & oculi ♉ occ.]

- 46 15 20
- 46 15½
- Diſt. æquat. of the bright one of ♈ occ. and Canis Major or. [Diſt. æquat. lucidæ ♈ occ. & Canis maioris or.] — I 70 43½ — II 70 43⅔ — III 70 45 — IIII 70 42¼

Diſt. between the eye of ♉ and the bright one of ♈ [Diſt. inter oculum ♉ & luc. ♈]

- 35
- The same, reiterated [Eadem reiterata] — 35

By the Sext. Trig. [Per Sext. Trig.][1493]

- Diſt. between the eye of ♉ and Canis Minor [Diſt. inter oculum ♉ & Canem minorem] — 46 23
- The same by the Sext. △, repet. [Eadem per Sext. △ repet.] — 46 22¾

DIE 26 DECEMBRIS A. M.

	Declin. by the subterranean armillae	Altitude
Of the bright one of Lyra [Lucidæ Lyræ]	38 27⅔	40⅔
Of the tail of Cygnus [Caudæ Cygni]	43 52½	29
Of the breast of Cygnus [Pectoris Cygni]	39 0¼	

[1494]

The same day, P. M. [Eodem die P. M.]

- Decl. of the bright one in the shoulder of Erichthonius [Decl. lucidæ in humero Ericht.] — 44 47½
- With the other pinn. [Altero pinn.] — 44 48
- Decl. of the other in the shoulder of the same [Decl. alterius in humero eiuſdem] — 37 3½
- With the other pinn. [Altero pinn.] — 37 3½

When they were towards the rising from the pole. [cum eßent a polo verſus ortum.]

DIE 29 DECEMBRIS A. M.

Decl. of the bright one in the □ of Ursa Minor, 75 51, by the subterranean armillae, after they had been adjusted. [Decl. lucidæ in □ vrſæ min. 75 51 per Armillas ſubterraneas poſtquam eßent rectificatæ.]

The same day, toward evening. [Eodem die ad Veſperas.]

[1493] a printed brace joins the two values *35* above to the words *Per Sext. Trig.*, set at their right.

[1494] the head row is printed in smaller type, *Declin. per Armillas ſubterr.* on two lines and *Alt.*. The table is set without rules.

- Decl. of the greater in the □ of Ursa Minor [Decl. maioris in □ vrſæ minoris] — 75 51
- With the other pinn. [Altero pinn.] — 75 51½

It was not clear enough. [Non erat ſatis ſerenum.]

OBSERUATIONES STELLARUM FIXARUM ALTITUDINIS MERIDIANÆ.

Observations of the fixed stars at meridian altitude.[1495]

DIE 2 JANUARIJ.

By the Tychonic quadrant. [Per Quadrantem Tichonicum]

- Altitude of the pole star, max. [Alt. ſtellæ polaris max.] — 58 50 50
- Meridian altitude of the upper cap. of ♊ [Alt. mer. ſuper. cap. ♊] — 66 48
- lower cap. of ♊ [infer. cap. ♊] — 63 2⅔

DIE 3 JANUARIJ A. M.

Meridian altitudes by the Tychonic quadrant. [Alt. merid. per Q. Tichon.]

- Of the heart of ♌ [Cordis ♌] — 48 3
- Of the neck of ♌ [Ceruicis ♌] — 55 59

It was not clear enough. [Non erat ſatis ſerenum.]

Minimum altitude of the pole star [Alt. ſtellæ polaris minima]

- by the Portat. quadrant [per Q. Portat.] — 52 58 10
- by the new Sext. [per Sext. nouum] — 52 58½

DIE 7 JANUARIJ.

Toward evening. Altitudes towards the north. [Ad Veſperas. Altitudines verſus ſeptentrionem.]

The bright one in the □ of Ursa min. [Lucida in □ vrſæ min.]

- by the Portat. [per Portat.] — 41 45¼
- by the Rulers[1] [per Regulas[1]] — 41 45 48

The lower of the two preceding ones in the □ of Ursa min. [Infer. ex duabus præcedentibus in □ Vrſæ min.]

- by the Port. [per Port.] — 39 12⅛
- by the Rulers [per Regulas] — 39 12 6
- The eye of Draco, by the Port. [Oculus Draconis per Port.] — 18 35⅙
- by the Rulers [per Regulas] — 18 36¼
- The ear of Draco, by the Port. [Auris Draconis per Port.] — 17 30¾
- by the Sext. [per Sext.] — 17 30¾
- by the Rulers [per Regulas] — 17 33
- Minimum altitude of Lyra by the new Sext. [Alt. min. Lyræ per Sext. nou.] — 4 32

[1495] the page is set in two columns divided by a printed vertical rule.

Minimum altitude of the pole star [Alt. ſtellæ polaris min.]
- by the new Sext. [perSext.nou.] — 52 58½
- by the Portat. [per Portat.] — 52 58
- Altitude of Spica ♍ by the Tychonic one [Alt. Spicæ ♍ per Tichon.] — 25 8¾

DIE 8 JANUARIJ.

The outermost one of the tail of Ursa mai. [Extrema caudæ Vrſæ mai.]
- by the Port. quadrant [per Q. Port.] — 17 20⅔
- by the Rulers [per Regulas] — 17 22
- The bright one in the □ of Ursa min., by the Port. [Luc. in □Vrſæ min. per Port.] — 41 45⅙
- by the Rulers [per Regulas] — 41 44½

The following one in the □ of Ursa min. [Sequens in □ Vrſæ min.]
- by the Port. [per Port.] — 39 12½
- by the Rulers [per Regulas] — 39 13

By the Tychonic quadrant. [Per Quadr. Tichonicum]
- The bright one of ♈ [Lucida ♈] — 55 33½
- The bright one of Cetus [Lucida Ceti] — 36 30⅓
- The lower of the two in the side of ♉ [Inferior ex duabus in latere ♉] — 41 36
- The upper [Superior] — 42 19
- The bright one of the Pleiades [Lucida Pleiadum] — 59 56
- The foot of ♉ [Pes ♉] — 38 52
- The first in the arm of Orion [Prima in brachio Orionis] — 40 15
- The last in the arm of Orion [Poſtrema in brachio Or.] — 35 54
- The Sin. shoulder of Orion [Sin. humerus Orion.] — 40 0
- The first of the belt of Orion [Prima balthei Or.] — 33 25
- The second in the belt [Secunda in baltheo] — 32 33
- The southern horn of ♉ [Auſtrale cornu ♉] — 54 53½
- The third in the belt of Orion [Tertia in baltheo Or.] — 31 51⅔
- The bright shoulder of Orion [Luc. humerus Orionis] — 41 20[1496]

DIE 9 JANUARIJ.

Minimum altitude of the pole star [Alt. ſtellæ polaris minima]
- by the Portat. [per Portat.] — 52 58⅙
- by the Sext. [per Sext.] — 52 58 25

Altitudes towards the north. [Altitudines verſus ſeptentrionem.]
- The right knee of Cepheus, by the Port. [Genu dextrum Cephei per Port.] — 43 26½
- by the Sext. [per Sext.] — 43 27

[1496] *Inferior* and *Superior* are set on two lines, joined by a printed brace to the words *ex duabus in la- / tere* ♉ at their right; a second printed brace joins those words to the two values *41 36* and *42 19*.

The bright one in the □ of Ursa min. [Lucida in □ Vrſæ min.]
- by the Portat. [per Portat.] — 41 45¼
- by the Sext. [per Sext.] — 41 45½

The following one in Ursa min. [Sequens in vrſa min.]
- by the Portat. [per Portat.] — 39 13
- The seat of Cassiopeia, by the Sext. [Sella Caßiopeæ per Sext.] — 22 48½
- by the Portat. [per Portat.] — 22 48½

By the Tychonic quadrant. [Per Tichon. Quadrantem]
- The bright one of the lower horn of ♈ [Lucida infer. cornu ♈] — 52 50
- The bright one of ♈ [Lucida ♈] — 55 34
- The throat of Cetus [Faux Ceti] — 40 39
- The bright one in the tail of ♈ [Lucida in cauda ♈] — 59 35
- The bright one of Cetus [Lucida Ceti] — 36 30
- The foot of ♉ [Pes ♉] — 38 52
- The mouth of ♉ [Os ♉] — 48 39
- The forehead of ♉ [Frons ♉] — 48 48¼
- The eye of ♉ [Oculus ♉] — 49 41½

[1] Thus in codex C: 149180; 74590; 48° 14′ 12″, Alt. 41° 45′ 48″. [Sic in codice C: 149180 / 74590 48°14′12″, Alt. 41°45′48″.][1497]

___[1498]

- The left shoulder of Orion [Siniſter hum. Orionis] — 40 0
- The first of the belt of Orion [Prima balthei Or.] — 33 25
- The second [Secunda] — 32 33
- The third [Tertia] — 31 52
- The bright shoulder of Orion [Lucidus humerus Or.] — 41 20½
- Canis Major [Canis maior] — 17 55
- The bright one in the shins of ♊ [Lucida in tibijs ♊] — 50 45½
- The upper head of ♊ [Superius caput ♊] — 66 48
- Canis Minor [Canis minor] — 40 19
- The lower head of ♊ [Inferius caput ♊] — 63 2⅙
- The heart of ♌ [Cor ♌] — 48 3
- The neck of ♌ [Ceruix ♌] — 56 0
- The hip of ♌ [Coxa ♌] — 56 52
- The tail of ♌ [Cauda ♌] — 50 59

Alt. max. of the bright star in the □ of Ursa Minor [Alt.max. ſtellæ in □ Vrſæ min.lucidæ]
- by the portable quadrant [per Q. Port.] — 70 4 10

DIE 10 JANUARIJ AD VESP.

By the Tychonic quadrant. [Per Q. Tichonicum]
- The bright one of Cetus [Lucida Ceti] — 36 30

[1497] in the footnote, *149180* stands alone on the second line and *74590* begins the third, set under it; the marks of the two marked groups are printed close-set with the figures.

[1498] the page is set in two columns divided by a printed vertical rule.

- The first in the sole of Perseus [Iᵐᵃ in planta Perſei] — 65 0
- The other in the heel of Perseus [Altera in calce Perſei] — 64 40
- The mouth of ♉ [Os ♉] — 48 39
- The forehead of ♉ [Frons ♉] — 49 0
- The eye of ♉ [Oculus ♉] — 49 41
- The bright foot of Erichthonius [Lucidus pes Erichtonij] — 62 16
- The left shoulder of Orion [Siniſter humerus Orionis] — 39 57
- The first in the girdle of Orion [Prima in cingulo Orionis] — 33 25
- The second [Secunda] — 32 33
- The third [Tertia] — 31 51
- The bright shoulder of Orion [Lucidus humerus Orionis] — 41 20
- The foot of Canis Major [Pes canis maioris] — 16 18½
- The heel of the foot of ♊ [Calx pedis ♊] — 56 43
- The bright one in the feet of ♊ [Lucida in pedibus ♊] — 50 46
- Canis Major [Canis maior] — 17 55
- The foot of Canis Minor [Pes canis minoris] — 43 8
- The upper head of ♊ [Superius caput ♊] — 66 48
- The lower head of ♊ [Inferius caput ♊] — 63 2⅓
- Canis Minor [Canis minor] — 40 18⅚
- The bright one of Hydra [Lucida Hydræ] — 27 12
- The bright one in the head of ♌, the lower [Lucida in cap. ♌ infer.] — 59 44
- The star above the heart of ♌ in the mane of ♌, the lower [Stella ſupra cor ♌ in iuba ♌ inferior] — 52 50[1499]

Towards the north [Verſus ſeptentrionem]

The following one in the □ of Ursa Minor [Sequens in □ vrſæ minoris]

- by the portable [per Portat.] — 39 13
- by the Sext. [per Sext.] — 39 13¾
- The upper of the two small ones in the side of Draco, by the portable [Superior ex duabus parvis in latere Draconis per Portat.] — 42 51⅓
- by the Sext. [per Sext.] — 42 51½
- The tail of Cygnus, by the portable [Cauda Cygni per Portat.] — 9 50

The left shoulder of Cepheus [Siniſter humerus Cephei]

- by the portable [per Portat.] — 34 41¼
- by the Sext. [per Sext.] — 34 41¼

The bright one in the head of Cepheus [Lucida in capite Cephei]

- by the portable [per Port.] — 22 8
- by the Sext. [per Sext.] — 22 8

DIE 14 JANUARIJ.

By the Tychonic quadrant. [Per Quadrantem Tichonicum]

- The head of ♈ [Caput ♈] — 55 33½

[1499] *Prima*, *Secunda* and *Tertia* are set on three lines, joined by a printed brace to the words *in cingulo / Orionis* at their right; each keeps its own value.

- The bright one of Cetus [Lucida Ceti] — 36 30⅓
- The heel of Perseus [Calx Perſej] — 64 40
- The mouth of ♉ [Os ♉] — 48 39
- The star between the mouth and the eye of ♉ [Stella inter os & oculum ♉] — 48 53
- The eye of ♉ [Oculus ♉] — 49 41½
- The other foot of Erichthonius [Alter pes Erichtonij] — 66 30½
- The bright foot of the same [Lucidus pes eiusdem] — 62 16
- The breast of ♉ [Pectus ♉] — 45 20
- The first of the belt of Orion [Prima balthej Orionis] — 33 25
- The lower horn of ♉ [Inferius cornu ♉] — 54 54
- The third of the belt of Orion [Tertia balthej Orionis] — 31 52½
- The bright shoulder of Orion [Lucidus humerus Or.] — 41 20⅙
- Canis Major [Canis maior.] — 17 55
- The upper head of ♊ [Superius caput ♊] — 66 48⅔
- The foot of Canis Minor [Pes canis minoris] — 43 8½
- The rear head of ♊ [Poſterius caput ♊] — 63 2⅙
- Canis Minor [Canis minor] — 40 18⅚
- The bright one in the head of ♌ [Lucida in capite ♌] — 59 44
- The heart of ♌ [Cor ♌] — 48 3⅙
- The neck of ♌ [Ceruix ♌] — 56 0
- The hip of ♌ [Coxa ♌] — 56 52⅓
- The tail of ♌ [Cauda ♌] — 50 59
- The bend of Arcturus [Flexura Arcturi] — 54 36⅚
- Arcturus — 55 29
- The shoulder of Arcturus [Humerus Arcturi] — 62 58⅓
- The rear pan of Libra [Lanx libræ poſterior] — 26 20

Towards the north. By the portable one. [Verſus ſeptentr. Per Portatilem]

- The bright one in the □ of Ursa Minor [Lucida in □ vrſæ min.] — 41 45¼
- The star of 4 magn. in the tail of Draco [Stella 4 magn. in cauda Draconis] — 26 23
- The following one in the □ of Ursa Minor (not certain enough) [Sequens in □ vrſæ min. (non ſatis certa)] — 39 13¾
- The lower of the two preceding ones in the □ of Draco [Inferior ex duabus præcedentibus in □ Draconis] — 18 35¼
- The following one of the same, the lower, in the □ of Draco [Sequens ex ijsdem infer. in □ Draconis] — 17 31

Declinations of some stars from meridian altitudes [Declinationes aliquot ſtellarum ex altitudinibus meridianis]

- The bright head of ♈ [Lucidum caput ♈] — 21° 28′ 0″
- The lower horn of ♈ [Inferius cornu ♈] — 18 44 30
- The heel of the foot of ♊ [Calx pedis ♊] — 22 38 0
- The upper head of ♊ [Superius caput ♊] — 32 42 30

- The lower head of ♊ [Inferius caput ♊] — 28 57 0
- The eye of ♉ [Oculus ♉] — 15 35 30
- The heart of ♌ [Cor ♌] — 13 57 36
- The bright foot of Erichthonius [Lucidus pes Erichtonij] — 28 9 30
- The neck of ♌ [Ceruix ♌] — 21 54 30
- The tail of ♌ [Cauda ♌] — 16 54 0
- The hip of ♌ [Coxa ♌] — 22 47 0
- Arcturus — 21 23 0
- The bend of Arcturus [Flexura Arcturi] — 20 31 30

DIE 15 JANUARIJ.

- Morning. The minimum altitude of the pole star [Mane. Alt. ſtellæ polaris minima] — 52 58⅓
- The maximum altitude of the bright one in the □ of Ursa Minor [Alt. lucidæ in □ vrſæ minoris maxima] — 70 4¼

Toward evening. The altitude of the sixth in the tail of Draco [Ad Veſperas. Alt. ſextæ in cauda Draconis]

- by the new Sext. [per Sext. nou.] — 28 25
- by the Q. Portat. [per Q. Portat.] — 28 24½

The altitude of the seventh star in the tail of Draco [Alt. ſtellæ ſeptimæ in cauda Draconis]

- by the new Sext. [per Sext. nouum] — 32 10
- by the Q. Portat. [per Q. Portat.] — 32 9½

Not certain enough, on account of the weather. [Non ſatis certæ propter tempeſtatem.]

By the Tychonic Q. [Per Q. Tichonicum]

- The bright one among the unformed above ♈ [Lucida ex informi ſupra ♈] — 59 36½
- The bright one of Cetus [Lucida Ceti] — 36 30⅓
- The small one in Cetus [Parua in Cete] — 41 31½
- The other, following [Altera ſequens] — 42 19⅙
- The sole of Perseus [Planta Perſej] — 65 0
- The heel of Perseus [Calx Perſej] — 64 40½
- The breast of ♉ [Pectus ♉] — 45 21
- The mouth of ♉ [Os ♉] — 48 39
- The forehead of ♉ [Frons ♉] — 48 59
- The eye of ♉ [Oculus ♉] — 49 42
- The preceding foot of Erichthonius [Pes præcedens Ericht.] — 66 30⅔
- The bright foot of Erichthonius [Lucidus pes Ericht.] — 62 15¾
- The bright foot of Orion [Lucidus pes Orionis] — 25 21⅙
- The first of the belt [Prima balthej] — 33 25
- The second of the belt [Altera balthej] — 32 33
- The third of the belt [Tertia balthej] — 31 50

- The bright shoulder of Orion [Lucidus humerus Orionis] — 41 20⅓[1500]
- The rear foot of Orion [Poſterior pes Orionis] — 24 11⅚
- The bright one of Hydra [Lucida Hydræ] — 27 11 15
- The foot of ♌ [Pes ♌] — 45 49 50
- The lowest of the neck of ♌ [Infima ceruicis ♌] — 52 50¼
- The heart of ♌ [Cor ♌] — 48 3⅔
- The bright one of the neck of ♌ [Lucida ceruicis ♌] — 55 59 50

Towards the north [Verſus ſeptentrionem]

- The bright one in the □ of Ursa Minor [Lucida in □ vrſæ minoris] — 41 45¼
- The tail of Cygnus [Cauda Cygni] — 9 49½
- The bright one in the right arm of Cepheus [Luc. in dextro brachio Cephej] — 26 11⅓
- The bright one near the head of Cepheus [Luc. apud. caput Cephej] — 26 46½
- The bright shoulder of Cepheus [Luc. humerus Cephej] — 34 46

DIE 21 JANUARIJ.

- The eye of ♉ in the meridian [Oculus ♉ in merid.] — 49 41½

And it crossed the meridian at H. 7 14′24″. [Tranſiuitque meridianum H. 7 14′24″]

Towards the north, by the Q. Portat. [Verſus ſeptentrionem per Q. Portat.]

- The minimum altitude of the bright one in the □ of Ursa Minor [Alt. min. lucidæ in □ vrſæ minoris] — 41 45¼
- The minimum altitude of the following one in the □ [Alt. min. ſequentis in □] — 39 12 50

By the Tychonic Q. [Per Q. Tichonicum]

- The sole of Perseus [Planta Perſej] — 65 0
- The heel of Perseus [Calx Perſej] — 64 40⅙
- The breast of ♉ [Pectus ♉] — 45 21
- The star between the mouth and the eye of ♉ [Stella inter os & ocul. ♉] — 48 59½

DIE 23 JANUARIJ.

By the Tychonic Q. [Per Q. Tichonicum]

- The mouth of ♉ [Os ♉] — 48 39
- The jaw of ♉ [Mandibula ♉] — 48 59
- The eye of ♉ [Oculus ♉] — 49 41½
- The lowest in the pelt of Orion [Infima in exuvijs Orionis] — 35 47
- The bright foot of Orion [Lucidus pes Orionis] — 25 21¼
- The bright horn of ♉ [Lucidum cornu ♉] — 62 15
- The leading shoulder of Orion [Prior humerus Orionis] — 40 0⅚
- The lower horn of ♉ [Inferius cornu ♉] — 54 54

[1500] the page is set in two columns divided by a printed vertical rule.

- Propus ♊ — 56 38
- The heel of the foot of ♊ [Calx pedis ♊] — 56 43⅚
- The bright foot of ♊ [Lucidus pes ♊] — 50 45⅔
- The bright one in the lowest thigh of ♊ [Lucida in femore ♊ infimo] — 51 19
- The star in the side of ♊ [Stella in latere ♊] — 56 45⅙
- The foot of Canis Minor [Pes canis minoris] — 43 8⅓
- The upper head of ♊ [Caput ♊ ſuperius] — 66 48
- The lower head of ♊ [Inferius caput ♊] — 63 2⅔

___[1501]

- The left shoulder of Apollo [Iniſter humerus Apollinis] — 59 24
- Canis Minor [Canis minor] — 40 18⅓
- The heart of ♌ [Cor ♌] — 48 3½
- The neck of ♌ [Ceruix ♌] — 56 0

By the portable quadrant [Per Quadrantem portatilem]

- Alt. min. of the preceding one in the □ of Ursa Minor [Alt. min. præcedentis in □ vrſæ min.] — 41 45¼
- Alt. min. of the following one in the □ [Alt. min. ſequentis in □] — 39 13
- Alt. max. of that preceding one in the □ of Ursa Minor [Alt. max. illius præcedentis in □ vrſæ min.] — 70 4¼
- Alt. max. of the following one [Alt. max. ſequentis] — 72 36¾

The last one is not certain enough, on account of the dawn. [Vltima propter auroram non ſatis certa.]

DIE 24 JANUARIJ.

By the Tychonic quadrant [Per Q. Tichonicum]

- The sole of Perseus [Planta Perſej] — 65 0⅙
- The heel of Perseus [Calx Perſej] — 64 40
- The breast of ♉ [Pectus ♉] — 45 20⅓
- The mouth of ♉ [Os ♉] — 48 39
- The star between the eye and the mouth of ♉ [Stella inter ocul. & os ♉] — 48 58½
- The eye of ♉ [Oculus ♉] — 49 41⅓
- The foot of Erichthonius [Pes Erichtonij] — 66 30¼
- The star that precedes the bright foot of Orion [Stella quæ præcedit pedem lucidum Orionis] — 28 23⅔
- The bright horn of ♉ [Lucidum cornu ♉] — 62 15⅚
- The left shoulder of Orion [Iniſter humerus Orionis] — 40 0
- The lower horn of ♉ [Inferius cornu ♉] — 54 54
- The bright shoulder of Orion [Lucidus humerus Orionis] — 41 20¼
- The heel of ♊ (at Propus) [Calx ♊ (ad propum)] — 56 43⅙
- The bright foot of ♊ [Lucidus pes ♊] — 50 45⅓

[1501] the page is set in two columns divided by a printed vertical rule.

- The knee of the lower ♊, in a straight line above the bright foot of ♊ [Genu ♊ inferioris, in recta linea ſupra lucid. pedem ♊] — 59 32⅚
- The upper head of ♊ [Superius caput ♊] — 66 48
- The foot of Canis Minor [Pes canis minoris] — 43 8¼
- The lower head of ♊ [Inferius caput ♊] — 63 2⅔
- Canis Minor [Canis minor] — 40 18⅓
- The heart of ♌ [Cor ♌] — 48 3½
- The hip of ♌ [Coxa ♌] — 56 52⅔
- The tail of ♌ [Cauda ♌] — 50 59⅙
- The upper of the two rear ones in the □ of Corvus [Superior ex duabus poſterioribus in □ corvi] — 19 55
- The tip of the lower wing of ♍ [Extrema inferioris alæ ♍] — 34 56
- The navel of ♍, cing. [Vmbilicus ♍ cing.] — 39 46
- The tip of the upper wing of ♍ [Extrema ſuperioris alæ ♍] — 47 18½
- The star above the same one, in a straight line [Stella ſupra eandem in linea recta] — 53 50⅓
- Spica ♍ — 25 8⅓
- The star above Spica [Stella ſupra Spicam] — 35 39
- The star in the bend of Arcturus [Stella in flexura Arcturi] — 54 36⅔
- Arcturus — 54 28⅓
- The star in the foot of Boötes [Stella in pede Bootis] — 49 39
- The other in the shoulder of Arcturus [Altera in humero Arcturi] — 62 58
- The leading bright one in the pans of ♎ [Prior lucida in lancibus ♎] — 19 51⅙
- The rear one in the pans of ♎ [Poſterior in lancibus ♎] — 26 18½
- The bright one of Corona [Lucida Coronæ] — 62 16

By [the portable quadrant][1502]

- Alt. max. of the preceding one in the □ of Ursa Minor [Alt. max. præcedentis in □ vrſæ minoris] — 70 4⅓
- Alt. max. of the following one in the □ [Alt. max. ſequentis in □] — 72 36⅔

DIE 19 FEBRUARIJ.

The bright one of the upper foot of Hercules [Lucida ſuper. pedis Herculis]

- by the portable [per Portat.] — 50 45¼

The lower foot of the same [Infer. pes eiusdem]

- by the portable [per Port.] — 43 20⅙
- by the Sext. [per Sext.] — 47 20⅙
- In the groin of Canis Major [In inguine Canis maioris] — 8 22
- The navel of Hercules [Vmbilicus Herculis] — 51 17½

The back of Canis Minor [Dorſum can. min.]

[1502] the square brackets round the last three words of the line above are printed on the leaf; the call *1* stands after the closing bracket. The line reads: *Per*, then within printed brackets *Quadr. portatilem*, then the call.

- by the portable [per Port.] — 43 8
- by the Sext. [per Sext.] — 43 8
- Canis Minor, by the portable [Canis minor per Portat.] — 40 18⅔
- The topmost in the head of Hydra [Suprema in cap. Hydræ] — 41 53

The heart of ♌ [Cor ♌]

- by the Sext. [per Sext.] — 48 2⅓
- by the portable [per Port.] — 48 2⅓

DIE 26 APRILIS.

The Alt. of Spica ♍ in the merid. was [Alt. Spicæ ♍ in merid. fuit]

- by the Tychonic quadrant [per Q. Tichon.] — 25 8 50
- by the portable quadrant [per Q. Portat.] — 25 8 30

DIE 18 MAIJ.

- The Bor. of the pans of ♎, by the portable [Bor. lancium ♎ per Portat.] — 26 19

DIE 24 DECEMBRIS.

Toward evening. By the portable quadrant. [Ad Veſperas. Per Q. Portatilem.]

- Alt. min. of the first of the tail of Ursa Minor [Alt. min. primæ caudæ Vrſæ min.] — 24 9
- Alt. max. of the pole star [Alt. max. ſtellæ polaris] — 58 50 15
- Alt. min. of the middle one of the tail of Ursa Major [Alt. min. mediæ caudæ Vrſæ mai.] — 23 2
- Alt. min. of the last one of the tail of the same [Alt. min. extremæ caudæ eiusdem] — 18 23
- Alt. min. of the bright one of the square of Ursa Minor [Alt. min. lucidæ quadrati Vrſæ min.] — 41 46½

[1] These words are in cod. V; they are missing in codex C. [Hæc verba ſunt in cod. V; deſunt in codice C.]

DIE 26 DECEMBRIS P. M.

By the portable quadrant [Per Quadr. Portatilem]

- Altitude of the pole star, max. [Altit. ſtellæ polaris max.] — 58 50 15
- Altitude min. of the luc. of the □ of Vrſæ min. [Alt. min. luc. □ Vrſæ min.] — 41 45¼

DIE 29 DECEMBRIS A. M.

Altitude of the pole star, min. [Alt. ſtellæ polaris min.]

- by the Q. Poıtat. [?] [per Q. Poıtat.] — 52 58 50

The same day, toward evening [Eodem die ad Veſperas]

Altitude of the pole star, max. [Alt. ſtellæ polaris max.]

- by the Q. Portat. [per Q. Portat.] — 58 50½[1][1503]

[1503] the entries above are set in two columns divided by a printed vertical rule.

In this[2] year 1585, on the 14th day of December as it ran its course, three days after the winter solstice, at about the 7th hour of the evening reckoned from noon, with the ☾ standing in 14½ ♒ and the first decan [decuria] of ♌ rising, while the ☾ was at its setting, I set up a smooth round stone column [columnam lapideam teretem] as the foundation on which the revolving quadrant [Quadrans Volubilis] turns in the eastern turret of the subterranean observatory, for determining altitudes and azimuths exactly. [*Hoc[2] anno 1585 labente die 14 Decembris triduo poſt ſolſtitium hibernum, / hora exiſtente iuxta 7 veſpertinam a meridie, et ☾ in 14½ ♒ commorante, / aſcendente uero prima decuria ♌, ☾ in occaſu uerſante, poſui columnam / lapideam teretem pro fundamento in quo Quadrans Volubilis in turricula / orientali obſeruatorij ſubterranej conuoluitur pro altitudinibus et azimu- / tis exacte perueſtigandis.*]

[1] Written beside it in cod. V: "Therefore in the present year the distance of the pole star from the pole is 2° 55′ 50″." [Adſcriptum eſt in cod. V: »Eſt itaque anno inſtante diſtantia polaris ſtellæ a polo 2° 55′ 50″«.]

[2] From codex V. [E codice V.]

Addenda to the editor's notes [ADDENDA AD ANNOTATIONES EDITORIS]

On p. 194 col. 2 v. 1. Codex C gives "between the head of Aquila and Aquila" [»Inter caput Aquilæ et Aquilam«], which makes no sense. In its place we wrote, from codex V, "between the tail of Aquila and Aquila" [»Inter caudam Aquilæ et Aquilam«]. But these stars (ζ and α Aquilæ) are not 8½° apart; they are 12° 10′ apart. Among the stars of Aquila, the only two that are 8½° apart are the head (α) and the one Tycho calls "the one in the right arm of Antinous" [»Quæ in dextro brachio Antinoi«] (δ Aquilæ); by calculation these are 8° 30′ apart. It should be remembered, moreover, that Tycho had adopted the constellation of Antinous, which Ptolemy does not give as a separate one (as he had also adopted Coma Berenices [Comam Berenices]); and so the name of the star seems not to have occurred to the person who made the observation.

On p. 326, note. The word we could not read seems to be "belt" [»cingulo«]. But Hydra has no belt. Tycho calls the star "the one immediately preceding Crater" [»Cratera proxime præcedentem«]; i. e. 4 Crateris (Flamsteed), ν Hydræ (Bayer).

On p. 416 col. 2 v. 6–5 from the bottom. Codex V correctly gives the distance 43° 12′ (twice), as we found by calculation. Codex C gives 43° 22′.

CORRIGENDA.

- P. 7 v.27 for *additus o g.* leg. *additis v. g.* (i. e. *verbi gratia*)
- » 9 » 16 from the bottom, before *enim* add. *eſt*
- » 10 » 15 from the bottom, for *diſtantia* leg. *diſtantiæ*
- » 16 » 10 for *obſeruatione* leg. *obſeruationi*
- » 65 » 1 and 8–9 should have been written in upright letters
- » 66 » 6–15 should have been written in upright letters
- » 69 » 5–15 on the right-hand part of the page should have been written in sloping letters
- » 72 » 20 should have been written in sloping letters
- » 119 col.1 v.2–1 from the bottom, for *minutorum* leg. *minutum*
- » 120 » 1 » 20 from the bottom, *8 2 40* etc. should have been written in sloping letters
- » 120 » 1 » 2–1 from the bottom, *14 19 40* etc. should have been written in sloping letters. For ♓, ♊ should have been written
- » 123 » 2 » 19 for *Shedir* leg. *Schedir*
- » 125 » 2 » 3–2 from the bottom, for *longitudinem vtrarumque* leg. *longitudinis vtriusque*
- » 131 » 1 » 19 from the bottom, for *poßint* leg. *poßunt*
- » 131 » 2 » 18–19 *Alt.* ☉ *Mer.* etc. should have been written in upright letters
- » 131 » 2 » 2–1 from the bottom should have been written in sloping letters
- » 132 » 1 » 1–2 should have been written in sloping letters
- » 132 » 1 » 10 for *Viſio* leg. *Viſo*
- » 132 » 1 » 20 from the bottom, for *tria* leg. *duo*
- » 132 » 1 » 19 from the bottom, for *ſint* leg. *ſunt*
- » 138 » 1 » 17–6 from the bottom, *H. 3 3 50.... limbi* should have been written in upright letters, except the words »*Fuit autem... ab ortu*«
- » 140 » 1 » 12 for *6 58* leg. *5 58*
- » 141 » 1 » 9 after ☾ add. *fuit*
- » 141 » 2 » 12 from the bottom, for *35 14* leg. *33 14*
- » 142 » 1 » 11 after *occaſum* add. *& ſept.*
- » 142 » 2 » 3–1 from the bottom should have been written in sloping letters
- » 143 » 1 » 1–13 should have been written in sloping letters, except the words »*H. 4 9 20...56 57*«
- » 143 » 2 » 6–16 should have been written in upright letters
- » 143 » 2 » 12–10 from the bottom should have been written in sloping letters

CORRIGENDA.

- » 144 » 1 » 3–1 from the bottom and col. 2 v. 1–3 should have been written in upright letters
- » 169 » 2 » 1 from the bottom, for *20¼* leg. *20½*
- » 170 » 2 » 3 before *Horologium* add. *maius*
- » 170 » 20 for *trigone* leg. *trigono*
- » 171 » 6 from the bottom, for *concordat* leg. *accedat*
- » 172 » 23 for *fere* leg. *hæc*
- » 172 » 24 for *fere* leg. *tunc*
- » 172 » 2 » 15–1 from the bottom should have been written in upright letters
- » 173 » 1 » 28 for *fere locum* ♄ *datum* leg. *hæc locum* ♄ *dabunt*
- » 173 » 1 » 30 after *Epicycli* add. ☋
- » 173 » 2 » 14–16 *H. 5 44... fiebat* should have been written in upright letters
- » 173 » 2 » 16–18 *Sed... fiebat* should have been written in sloping letters
- » 174 » 1 » 12 for *30* leg. *15*
- P. 174 col. 1 v. 21 from the bottom, for *eadem* leg. *eandem*
- » 174 » 1 » 17 from the bottom, for *44¼* leg. *34¼*
- » 175 » 2 » 10 after *diebus* add. *præcedentibus*
- » 176 » 1 » 8 for *7¼* leg. *7½*
- » 176 » 1 » 2 from the bottom, for *7 48 40* leg. *7 48 0*
- » 176 » 2 » 2 for ♂^{ti} leg. ♂^{te}
- » 193 » 2 » 10–20 should have been written in upright letters
- » 195 » 1 » 4–7 should have been written in sloping letters
- » 195 » 2 » 4 from the bottom, for *NOUEMBRIS* leg. *DECEMBRIS*
- » 200 » 15 from the bottom, for *qui* leg. *quæ*
- » 201 col. 2 v. 13 from the bottom, for *peruenit* leg. *prouenit*
- » 202 in the drawing, the points F and S should have been joined by a straight line
- » 207 » 1 » 5 for *15* leg. *14*
- » 211 » 2 » 23 from the bottom, for *22 17 18* leg. *22 17 48*
- » 218 » 1 » 5 and 7, for ♉ leg. ♈
- » 231 » 1 » 10–12 *Solis Alt.* etc. should have been written in sloping words
- » 233 » 14 from the bottom, for *per Altitudinem maximam* leg. *pro Altitudine maxima*
- » 234 » 1 from the bottom, for *Murali* leg. *Murale*
- » 236 » 2 » 5 the words *non erat* etc. should have been written in sloping letters
- » 236 » 13 for *plerisque* leg. *vtrisque*
- » 236 » 14 for *dant* leg. *dantur*
- » 236 » 23 for *etiam* leg. *enim.*
- » 236 » 1 » 3 from the bottom, for *Ber* leg. *Per*
- » 240 » 2 » 19 for *40* leg. *41*
- » 240 » 2 » 5–4 from the bottom should have been written in upright letters

CORRIGENDA.

- » 242 » 2 » 4 add. *Alt. 41 56⅓*
- » 242 » 2 » 1 from the bottom (*ter repetendo* etc.) and
- » 243 » 2 » 1–14 should have been written in sloping letters
- » 243 » 2 » 1 for *obſeruatum* leg. *obſeruatus*
- » 244 » 2 » 6–1 from the bottom and
- » 245 » 1 » 1–11 should have been written in sloping letters
- » 248 » 1 » 1–21 should have been written in upright letters
- » 248 » 1 » 5 for ♊ leg. ♂
- » 250 » 1 » 10 after »*contigit*« the words are to be added: *partim propter vicinitatem* ☿ *ad Horizontem.*
- » 250 » 2 » 3 for *Nam* leg. *non*
- » 251 » 1 » 19 the words *propter Auroram* should have been written in upright letters
- » 251 » 1 » 21–11 from the bottom should have been written in upright letters
- » 251 » 1 » 4–1 from the bottom should have been written in upright letters
- » 251 » 2 » 1–4 should have been written in upright letters
- » 260 » 1 from the bottom, for *propoſitum* leg. *præſuppoſitum*
- » 261 » 4 from the bottom, for *vtriusque* leg. *huius*
- » 261 » 2–1 from the bottom, for *reddit diſtantiam* leg. *redit diſtantia*
- » 262 » 23 from the bottom, for *producta* leg. *reducta*
- » 262 » 6 from the bottom, for *quam die 4 habet* leg. *quæ die 4 fiebat*
- » 262 » 4 from the bottom, for *ducto* leg. *ducto*
- P. 264 col. 2 v. 16–18 the words *Cordis* etc. should have been written in upright letters
- » 266 » 1 » 6 for *42 21½* leg. *41 21½*
- » 266 » 1 » 7 for *42 22* leg. *41 21*
- » 266 » 2 » 16 for *area altitudinum* leg. *circa altitudin*em
- » 269 » 1 » 16 for *56 0* leg. *56 0½*
- » 269 » 1 » 19 for *recte* leg. *certa*
- » 274 » 1 » 17 for *56⅙* leg. *55⅙*
- » 274 » 2 » 14 for *48* leg. *40*
- » 275 » 1 » 10 from the bottom, for *29* leg. *29¼*
- » 275 » 2 » 21–16 from the bottom should have been written in upright letters
- » 275 » 2 » 2–1 from the bottom should have been written in sloping letters
- » 276 » 1 » 1–8 should have been written in sloping letters
- » 288 » 8 for *44⅔* leg. *41⅔*
- » 289 » 1 » 3 for *43⅓* leg. *43¼*
- » 289 » 1 » 20 for *alio* leg. *alia* (ſc. *obſeruatione*)
- » 292 » 1 » 15 from the bottom, the words »*fuit ſatis ſerenum*« (*hic* to be deleted) should have been written in sloping letters
- » 292 » 2 » 16 from the bottom, for *additæ* leg. *addita*
- » 297 » 2 » 6–14 should have been written in sloping letters

CORRIGENDA.

- » 299 » 11 from the bottom, for *H. 5* leg. *H. 5 M. 4*
- » 300 » 9 for *76 12* leg. *76 6*
- » 300 ibid. for *12 2* leg. *12 6*
- » 301 » 3–10 should have been written in sloping letters
- » 303 » 1 » 18–17 from the bottom, the words »*erat autem*« etc. should have been written in upright letters
- » 303 » 1 » 5 from the bottom, for *eam* leg. *terram*
- » 308 » 2 » 1–12 should have been written in upright letters
- » 309 » 2 from the bottom, for *correctum* leg. *certum*
- » 315 » 1 » 15 from the bottom, for *quosdam* leg. *quasdam*
- » 316 » 1 » 21 for *intra* leg. *infra*
- » 316 » 1 » 23 for *ſtellam* leg. *ſtellas*
- » 316 » 1 » 13 from the bottom, for *10 24 26* leg. *10 22 26*
- » 317 » 1 » 11 from the bottom, after *Horologium* add. *maius*
- » 319 in the note, 2 for *p. 31* leg. *p. 30*
- » 321 col. 2 v. 22 for *ala* leg. *extrema alæ*
- » 323 » 18 for *prodit* leg. *prodat*
- » 323 » 22 for *conſortem* leg. *conſuetam*
- » 325 » 1 » 9 *Lucida* etc. should have been written in sloping letters
- » 326 » 1 » 13 from the bottom, for *corui* leg. *tertia*
- » 329 » 2 » 12 from the bottom should have been written in upright letters
- » 330 » 2 » 20 for *52 58* leg. *52 58¼*
- » 331 » 1 » 24 for *inquam* leg. *itaque*
- » 332 » 1 » 16–18 should have been written in sloping letters
- » 333 » 2 » 19 from the bottom, for *35 2* leg. *35 3*
- » 334 » 1 » 4 from the bottom, for *cimento* leg. *cingulo*
- » 336 » 2 » 22 from the bottom, for *21 16½* leg. *21 26½*
- » 337 » 2 » 11 for *132 45* leg. *132 48*
- » 337 » 2 » 12 from the bottom, before *Altitudine* add. *ex*
- » 343 » 4 for *eodem* leg. *eadem*
- » 346 » 1 » 21 from the bottom, for *40 27½* leg. *40 27⅛*
- » 349 » 1 » 12 for *28* leg. *18*
- » 351 » 2 » 20–6 from the bottom should have been written in upright letters
- » 352 » 2 » 13–14 for *obſcurius* leg. *ſerenius*
- » 357 » 1 » 18 for *perutiles faciantur* leg. *faciunt* (first written was: *perutiles ſunt*)
- » 358 » 1 » 22 for *18¼* leg. *18*
- P. 358 col. 1 v. 14 from the bottom, for *25⅓* leg. *25¼*
- » 360 » 1 » 9 from the bottom, for *5 21⅓* leg. *5 21½*
- » 360 » 2 » 17 for *7 39* leg. *7 36*
- » 360 in the note, for *vtrisque* leg. *vtrinque*
- » 361 col. 1 v. 12 leg. *5 40⅔*

CORRIGENDA.

- » 363 » 12 for *15 43 33* leg. *15 43 13*, and under »Ephem. noſtræ« add. *15 43 33*
- » 363 » 2 » 1–4 *Has duas obſeruationes* etc. should have been written in upright letters
- » 363 » 2 » 14–8 from the bottom, *Ergo H. 8 Min. 21* etc. should have been written in sloping letters
- » 364 » 2 » 10 from the bottom, for *4 56* leg. *4 56⅔*
- » 365 » 1 at the day 10 Jan., in the margin of cod. V, Tycho himself added this: »☾ *die 12 intermedia fuit in maxima diſtantia Epiciclorum*«
- » 366 » 1 » 20 for *auferetur* leg. *auferatur*
- » 366 » 1 » at the end of the day 27 Febr., in cod. V, Tycho himself added this: »*Semidiameter* ☾ *accipiatur vtrobique ſcrupulorum 16*«
- » 366 » 2 » 12 for *2 31½* leg. *2 31*
- » 366 » 2 at the end of the day 26 Apr., in codex V, Tycho himself added this: »*Circa 7*^{mam} *Horam Horologium aberrabat 19 Min.*«
- » 371 » 1 v. 9–7 from the bottom leg. *quod per Armillas comperiebam intantum horologium ſpacio quaſi duorum dierum fuiße retardatum*
- » 372 » 2 » 6 for *20⅓* leg. *20½*
- » 373 » 2 » 16–19 should have been written in upright letters
- » 374 » 2 » 3–4 should have been written in upright letters
- » 376 » 1 » 22 from the bottom, for *35⅙* leg. *35¼*
- » 376 » 1 » 9 from the bottom, for *8 17* leg. *8 17½*
- » 376 » 1 » 8 from the bottom, for *45 46* leg. *45 56*
- » 377 » 1 » 8 for *45¼* leg. *45½* (corr. from *44¾*)
- » 377 » 1 » 10 for *38¼* leg. *9*
- » 377 » 2 » 9 for *ſerenum* leg. *ſerenius*
- » 377 » 2 at the end of the day 23Dec., in codexV, Tycho himself added this: »*Tempus correctum habita ratione* erroris *in circulo æquatorio*
- » 378 v. 14 for *19 47 8* leg. *19 47 B*
- » 378 » 20 from the bottom, for *M. 4* leg. *M. 14*
- » 378 » 13–12 from the bottom, the words ☾ *iuxta 90 Gradum* should have been written in sloping letters
- » 378 » 2 » 7 from the bottom, the words ☉ *erat in 19* ♓ should have been written in sloping letters
- » 379 in the note, the words »*Reuiſa eſt...*« should have been written in sloping letters
- » 381 v. 17–16 from the bottom, the words *Parallax. Longit.* etc. should have been written in sloping letters
- » 384 col. 2 v. 4 from the bottom, for *4 12 54* leg. *4 12 45*
- » 385 » 1 and col. 2 v. 1–10 should have been written in upright letters
- » 385 » 1 v. 10 for *Eſcheus* leg. *Eſchillus*
- » 385 » 2 » 14 for *2⅔* leg. *3⅜*
- » 385 » 2 » 10 from the bottom, for *12 2* leg. *12 0*
- » 388 » 2 » 2 for *3½* leg. *3⅓*

- » 390 » 1 » 3 from the bottom, for *5 58 38* leg. *5 57 38*
- » 391 » 4 (*in fixis... obſeruabatur*), v. 9–10 (*cum... epicycli*), v. 11–12 (*Abundat... inuentam*) should have been written in sloping letters
- P. 393 col.1 v.8 from the bottom, the numbers *11 52⅔* and *10 28½* should change places
- » 393 » 2 » 25 for ♃ leg. ♀
- » 393 » 2 » 20 from the bottom, for ♀ leg. ♃
- » 394 » 2 » 3 from the bottom, for 2⅔ leg. *3⅔*
- » 395 » 1 » 3 for *53⅓* leg. *53½*
- » 395 » 2 » 21 for *44 40 40* leg. *54 40 40*
- » 397 » 2 » 16–17 and v. 20–19 from the bottom should have been written in sloping letters
- » 398 » 2 » 24 for *16½* leg. *16⅓*
- » 399 » 2 » 19 from the bottom, after *tunc* add. *erat*
- » 400 » 1 » 13 from the bottom, for *25⅓* leg. *25½*
- » 401 » 1 » 17 for H. *12½* leg. H. *6 12½*
- » 401 » 1 » 4 from the bottom, for *56½* leg. *56¼*
- » 402 » 2 » 3 for *3⅓* leg. *3½*
- » 405 » 1 » 20 from the bottom, for *eadem* leg. *eodem*
- P. 405 col. 1 v. 9 from the bottom, for *24* leg. *34*
- » 406 » 16 from the bottom, for *obſeruato* leg. *obſeruata*
- » 406 » 2 » 7 from the bottom, for *35* leg. *36*
- » 407 » 2 » 14–20 should have been written in upright letters
- » 408 » 11 from the bottom, the words »*Sed hæc...*« should have been written in sloping letters
- » 408 » 3 from the bottom, for *ſi* leg. *ſi*
- » 409 » 24 for *præbuerint* leg. *præbuerunt*
- » 409 » 28 for *et ſic* leg. *vt ſit*
- » 409 » 1 » 6 from the bottom, for *53¾* leg. *52¾*
- » 409 » 2 » 6–5 from the bottom, for *etiam* leg. *enim*
- » 410 » 1 » 14 for *6⅙* leg. *6½*
- » 410 » 2 » 9 for ♃ leg. ♀
- » 414 » 2 » 21 for *5⅔* leg. *5⅓*
- » 415 » 2 » 23 from the bottom, for *41½* leg. *41⅓*
- » 415 » 2 » 1 from the bottom, for *53½* leg. *53⅔*

N. B. Nothing in codex L was written by Tycho himself. We were not allowed to inspect the volume of codex V that covers the year 1585 until the greater part of the observations of this year had already been set in type.

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___[1504]

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- (Axel Simmelkiær)

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- on the 6th day of the month of September [DIE 6 MENSIS SEPTEMBRIS]
- in the year 1923 [ANNO MCMXXIII]

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