

Pseudo-Māshā'allāh
On the Astrolabe

Part IV: *Practica*
Critical Edition
with English Translation
by

Ron B. Thomson

Version 1.6

Toronto, 2020

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TEXT AND TRANSLATION

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TEXT AND TRANSLATION

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[Chapter 36 – Chapter 47: *in preparation*]

Note: the page numbering (with occasional blank pages) is designed to display the Latin on the left and the corresponding English on the right when printed as a book.

[De practica
astrolabii]

[On the use of
the astrolabe]

The following manuscripts begin with the Prologue, line 1:

Bβ Bγ Bδ Bε Bε₁ Bζ Bη Bθ Bι Bκ Cγ Cδ Cε Cζ Cη Cι Dγ Dδ Dη Eα Eβ Eγ Eδ Eζ Eη Eκ Eμ Eρ Eτ
Eυ Fα Fβ Fζ Gα Kα Kδ Kε Kθ Lβ Lγ Lδ Lε Lζ Lη Lλ Lκ Lμ Mα Mδ Mη Mι Mλ Mν Mo Mτ Mu
Mφ Nα Nγ Oβ Oγ Oζ Oη Oι Oν Oξ Oρ Oσ Oτ Oυ Oχ Pα Pβ Pγ Pδ Pε Pζ Pθ Pι Pμ Pν Po Pρ Pσ
Pτ Pυ Pω Qβ Qγ Qδ Qε Qθ Qi Qλ Rα Rγ Sα Sβ Sδ Sη Sθ Si Sκ Sλ Tδ Vα Vβ Vγ Vi Vν Vπ Vρ Vτ
Vυ Vφ Vψ Wα Wβ Wθ Wi Wλ Wμ Xα Xγ Xδ

NOTE: Any irregular ordering of the capitula of the *Practica* in the various manuscripts is noted in the Introduction, "E. The Manuscripts of each Section".

1 INCIPIT PRACTICA ASTROLABII

1 Incipit ... astrolabii] *om.* Ββ Βδ Βε₁ Βζ Βθ Βγ Βε Βη Βα Βγ Βζ Βυ Βα Βε Βζ Βδ Βζ Βκ Βα Βλ Βτ Βα Βγ Βη Βυ Βσ Ββ Βγ Βι Βμ Βο Βτ Βε Βθ Βι Βγ Βα Ββ Βη Βι Βλ Βα Βυ Βφ Βτ Βθ Βλ Βγ; *faded* Εδ; Capitulum preambulum in usum astrolabii Βθ; Capitulum primum Βι; De nominibus instrumentorum astrolabii Κθ Οχ Ρζ Qμ Ρα Χα; De nominibus variorum instrumentorum Cδ; De usu astrolabii et primo epilog[*illeg.*] partes Ρε; De usu astrolabii et primus de nominibus instrumentorum eius Dγ; De utilitate astrolabii et primo epilogus. Rubrica Qδ; De utilitatibus astrolabii et usu eius Βι; Epylogatio nominum instrumentorum Βγ; Epilogus in usum et operationes astrolabii Wβ; Incipit canones astrolabii Cζ; Incipit epilogus in usum et operationes astrolabii Messehalle Εκ(Mesalle) Ετ Vβ(*add.* et aliorum); Incipit instrumenta et utilitas astrolabii Ρω; Incipit lectura astrolabii Sθ; Incipit liber de operatione astrolabii Λλ Vγ(*add.* De nominibus); Incipit opus astrolabii ad inveniendum gradum solis per diem mensis vel diei gradus circa primum huius secunde partis Εη; Incipit practica astrolabii Μι(*much later hand*) Οη(*add.* in marg. C. 1^m) Ου; Incipit practica astrolabii capitulum primum de nominibus instrumentorum astrolabii Fβ(*different hand*); Incipit practica astrolabii sive rememoratio Χδ; Incipit practica astrolabii sive(et primo Βε Wμ) rememoratio partium(instrumentorum Ρν) astrolabii Βε Dη Εβ Εη Fα Fζ Λγ Λη Λε Λμ Μδ Μο(*add.* *different hand* secundum Pthol' al') Μφ Οζ Οι Οξ Οτ Ρα Ρν Ρη Qγ Qλ Sδ Tδ Wα Wμ; Incipit practica astrolabii sive rememoratio partium astrolabii sive prologus in usum et operationem astrolabii Μν(*later hand*); Incipit practica astrolabii sive re[memoratio] p[ar]ciu astrolabii Ρθ; Incipit practica astrolabii (*add.* cum re) sive reme(*add.* memoratio)moratio par(*add.* ne parti)tium astrolabii(*add.* um ipsi astrolabii) Qβ¹; Incipit usus astrolabii Vν; Incipit utilitatis astrolabii Μν; Incipiunt canones astrolabii Εμ Κα; Incipiunt canones astrolabii et sunt 36. Et primo de nominibus instrumentorum eius Βη; Incipiunt utilitates tractatus astrolabii messallat Dδ; Pri[mo] pemoracio(!) in usum astrolabii Ρν; Prohemium Messehallath in practicam astrolabii feliciter incipit Κδ; Rememoratio partium astrolabii Cι Μη Ρδ; Sequitur astrolabium; Βκ Seq[ui]tur de usu astrolabii primo [*illeg.*]gat partes Wι; Sequitur modo tractatus et de utilitatibus astrolabii et de practica eius et primo de nominibus partium ipsius astrolabii Ευ; Sequitur nomina instrumentorum astrolabii cum ipsius usu et practica Ρσ; Utilitatis astrolabii Vη; [*illeg.*] astrolabium componedi primo [*illeg.*] nomina Οβ

¹ This odd title in ms Qβ stems from the fact that the normal title is repeated but intertwined.

THE USE OF THE ASTROLABE BEGINS

Nomina² instrumentorum sunt hec. Primum est armilla suspensoria ad

- 2 Nomina] Bγ Bδ Bε Bε₁ Bη Bθ Bι Cζ Cη Cι Dγ Dδ Eβ Eδ Eη Εκ Εμ Ερ Ετ Fα Gα Kα Lβ Lγ Lε Lζ Lη Lκ Lλ Lμ Mδ Mη Mι Mλ Mν Mo Mv Mφ Nγ Oβ Oγ Oζ Oη Oι Oρ Oτ Oυ Pα Pβ Pδ Pζ Pμ Po Pρ Pσ Pτ Pυ Pω Qθ Qi Qλ Sα Si Sκ Sλ Vρ Vφ Vψ Wα Wι Wμ; Comina Fζ; []mina Vτ; []omina Bζ Cδ Cε Dη Eζ Ev Fβ Mα Mτ Oσ Pθ Qβ Rα Sδ Sη Tδ Va Vβ Vι Vν Vπ Wλ Xα Xγ; [N]omina Bκ Eα Kε Lδ Nα Ov Oξ Pε Pι Pν Qγ Qδ Sβ Sθ Vυ Wβ Wθ Xδ; Oī'a Oχ; Oiā Kθ; [O]mina Eγ; [O]mnia Pγ; Omnia Cγ Oomina Bβ Vγ; Oomina *corr. to* Nomina Qε; *add. in marg.* Incipit practica astrolabii Fβ; *add. igitur* Bι Vρ Nomina ... hec] Instrumentorum astrolabii prima sunt nomina et ideo, ut cognitionem eorum habeamus, singula a parte tractare decrevi. Qua propter, si quis cupit ad perfectam astrologie scientiam devenire, omnia que in hoc parvo libello dixero peroptime perscrutetur. Quoniam scriptum est: non potest quis nisi per magnos labores ad magna premia devenire Kδ; Omnia instrumentorum nomina astrolabii Cγ instrumentorum] hocabulorum(?) Kγ; *corr. from* signorum Rα; *add.* astrolabii Bη Eζ(*interlin.*) Εκ Εμ Lβ(*interlin.*) Lδ Lλ Oγ Oη Oχ Pζ Pι Qi Sα Sβ Vβ Vγ Wω Xγ; *add.* astronomi Rγ; *add. in* astrolabio Kγ Ov sunt] *interlin.* Eζ sunt hec] [*illeg.*] astrolabii Eγ hec] *om.* Oσ Vυ; *interlin.* Pτ Primum] De armilla. Primum igitur instrumentum astrolabii Kδ Primum est] *om.* Kα; Primo Kγ Primum ... armilla] *om.* Bβ est] *om.* Cγ Si armilla] *and elsewhere* armila Cγ suspensoria] suspensora Cδ Wθ; suspensola Ev; *add. in marg.* id est pars qua suspenditur astrolabium Oι; *add.* per quod tenetur astrolabium Pι ad] *add.* aliquam Bκ Mλ Vν Vτ
- 2-3 ad ... altitudinem] et ex ea altitudo solis capitur Kδ

² While in many cases the opening word is quite clear, either as “Nomina” or “[N]omina” (with a space for a rubricated first letter and the “N” noted in the margin), some scribes seemed to have had problems. The writing of “nomina” is also susceptible to minim corruption. In some instances the initial “N”, written as an enlarged “lower case” character with a rounded top and possibly an added base-line, could have led later readers to interpret it, and copy it, as an “O”.

The names of the “instruments” [i.e., parts of the astrolabe] are these. First is the suspending ring³ for

³ See *Comp.*, Fig. 1; Cap. 2, note 3.

capiendam altitudinem, et dicitur arabice “alhantica.” Secundum est alhabor, id est, ansa que iungitur ei. Postea mater, rotula scilicet, in se continens omnes tabulas cum

3 capiendam] *add.* aliquam Ev altitudinem] *add. interlin.* solis in die et stellarum in nocte Lβ et ... arabice] *om.* Eη Sα; *marg.* Bε dicitur] *om.* Bε; notatur Rγ; *add.* tunc Bκ arabice] *adrabite corr. in marg. to arabice* Sι alhantica] *abuachia* Mv; *alachacia* Bθ Vπ; *alachcia* Ev; *alahahuacea* Pγ; *alahancia* Eα Oη; *alahnacia* Cζ Ov Po Pτ Qμ Vq; *alahicacia* Sλ; *alahuacia* Bζ Bη Bι Dγ Eζ Lζ Eμ Eρ Gα Oσ Pυ Qδ Sθ Vα; *alahuatia* Bε; Bκ Rα Vυ Xα; *alahucia* Mτ Oq; *alalontia* Sι; *alathnacia* Cδ; *alauacia* Eκ; *albariacha* Cγ; *alcantica* Sκ; *alchantica* Lκ; *alchantita* Bδ; *alhahuacia* Bγ Eτ Mλ Pε Wβ; *alhahuatia* Rγ; *alhahucia* Cη; *alhanacia* Mo; *alhanca* Pβ; *alhancia* Cε Kδ Pδ Pθ; *alhancica* Kθ Qι; *alhancca* Fβ; *alhanbica* Xδ; *alhintia* Pν; *alhintica* Bε Cι Dη Eβ Fα Fζ Kε Lβ Lγ Lδ Lε Lη Lμ Mδ Mη Mι Mυ Mφ Nγ Oγ Oζ Oι Oξ Oτ Oυ Pα Pμ Pρ Pσ Pω Qβ Qγ Qθ Qλ Sδ Sη Tδ Vι Wα Wλ Wμ Xγ; *alhintita* Vψ; *alhatita* Dδ; *alhauaga* Vν; *alhaunca* Eη; *alhuatia* Eδ; *alhucia* Oβ; *allahiraacha* Mα; *allahirac* Wθ; *allahiraca* Vγ; *allahiracca corr. to allahiracha* Vβ; *allahiracta* Pζ; *allahiraeca* Lλ Oχ Qε; *allahu[illeg.]* Sβ; *allantacica* Nα; *alphaitia* Vφ; *alphancia* Kα; *arathacia* Vτ; *alruana* Pι; *illeg.* Eγ; *in alhanthabuth* Bβ *alhan~]* *add. interlin* *in al'* *alahuacia* Vβ *before Secundum]* *add.* De ansa Kδ; *add. in marg.* 2^m Wα *Secundum est]* *Deinde* Cγ *Secundum ... alhabor]* *om.* Pσ *est,]* *om.* Bη Oχ Qε Vν Vτ; *dicitur* Vφ *alhabor]* *illeg.* Eγ; *alaahoraa* Wθ; *alabor* Bζ Bκ Eα Lζ Mλ Qδ Vτ; *alahabor* Mo; *alahoi* Bη Eμ; *alahor* Oη Oρ Oσ Vα Vυ; *alahoy* Cζ; *alanoy* Sι; *alantabor* Mτ; *alathora* Cγ; *albahor* Wλ; *alcantabor* Nα; *alhab9* Oβ; *alhabor* Bβ Bθ Cε Cη Cι Dδ Eδ Gα Kγ Kδ Kθ Mη Mν Mυ Mφ Ov Pγ Pδ Pε Pθ Pι Pο Pυ Pτ Pκ Vι Vπ Vφ Vψ Wβ Wι Xγ; *alhabos* Eτ; *alhaboz* Bγ; *alhalka* Vν; *alhancabor* Fβ Qθ; *alhintaboe* Pα; *alhintabor* Bδ Bε Dη Eβ Eη Fα Fζ Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mι Nγ Oγ Oζ Oι Oξ Oτ Oυ Pβ Pμ Pν Pω Qβ Qγ Qλ Sδ Tδ Xδ; *alhintitabor* Wμ; *alhintobor* Qι; *alhatabor* Pρ Sη Wα; *alhintabor* Kε; *allabo* Bε; *alabor* Bι Dγ Eκ Eρ Rα Xα; *corr. from allaboriaa* Sβ; *allabora* Vγ; *allahaor corr. to allahor* Sθ; *allahor* Sλ; *allahora* Lλ Oχ; *allahoraa* Mα Pζ Qε Vβ; *allator* Vq; *alphabor* Ev; *alphontabox* Kα; *alrahor/anahor* Cδ; *habor corr. to ^{alla}habor* Eζ; *add. interlin.* *allachora/allahiora* Qμ *alhabor, id est]* *om.* Sα *id est]* *om.* Vψ; *cum* Sλ; *et* Pγ; *videlicet* Pι

3-4 id est ansa] *interlin.* Kε

4 que] quem Kδ iungitur] *coniungitur* Cγ Eγ Oγ; *add.* bii Pυ ei] *om.* Kθ Oχ Vν; *add.* Tertium Mυ Vι; *add. illeg.* Wλ *Postea]* *Deinde est* Kε; *Et deinde* Kδ; *add. in marg.* 3^m Wα *mater]* *autem* Lλ; *in* Sθ; *materiorla(?)* Pι; *add.* que Cγ Eγ Mα Oχ Pζ Qε Wθ; *add.* id est Nγ *mater ... scilicet]* *aca quo(?)* Vγ; *motreclans* Cδ; *mat' cula scilicet* Kδ *rotula scilicet]* *om.* Pι; *rotoclas* Sθ; *rotulans aīng* Sλ; *rotulas* Bζ Bη Bι Bκ Cζ Eγ Eμ Lζ Lλ Mα Mλ Oη Ov Oρ Oσ Oχ Pζ Qε Qι Sα Sβ Sι Vα Vβ Vγ Vν Vτ Vυ Wθ; *rotulla* Dδ; *add.* ōs Qε *scilicet]* *om.* Gα Kα Kε Lμ Mτ Oβ Pρ Pσ Qθ Sβ Vq Wλ Xδ Xγ; *que* Tδ *in se]* *om.* Gα Mτ Pι; *interlin.* Pτ; *ansa* Pβ; *en se* Wλ; *iuste* Sη *continens]* *continet* Mα Oχ Qε; *que continet* Rγ *omnes]* *om.* Mι Mo Mτ Nγ Oξ Oχ Sλ; *add.* sive Vβ(*add. interlin.* φ *id est)* *tabulas]* *om.* Bη Bκ Cζ Cδ Eγ Eμ Oη Oχ Pζ Sι Sλ Vγ Vτ Oσ Sα Sβ Sθ Vα Vν Wθ

measuring an altitude, and it is called “the halqa”⁴ in Arabic. Second is the habs,⁵ that is, the ring which is joined to it.⁶ Next the mother,⁷ that is a small disk, containing in itself all the plates with

⁴ *Comp.*, Fig. 1. For *al-halqa* see *Comp.*, Cap. 2, note 25.

⁵ *Comp.*, Fig. 1. For *al-habs* see *Comp.*, Cap. 1, note 14.

⁶ *Comp.*, Cap. 2, note 3.

⁷ *Comp.*, Cap. 1.

- 5 aranea cui coniungitur margolabrum⁸ scilicet in 360 gradus divisum. Tabule autem ab hac contente signantur tribus circulis quorum minor est circulus Cancri, et medius
- 5 aranea] *add. interlin.* id est alagacrabuz(?) Pτ cui] *om.* Bη; *interlin.* Qλ; *add.* aranee Mι Nγ coniungitur] adiungitur Cγ Eγ Rγ; iungitur Bκ Cδ Cζ Dη Eμ Kα Mα Mι Mτ Nγ Oη Ov Oχ Sα Sβ Sθ Vα Vv; iungitur *corr. to* coniungitur Mη margolabrum] margo.labrum Mα Qε; margo labrum Bκ Cε Oχ Pε Pζ Sλ Vα Vγ Vv Wθ; margo labri Cγ; a margolade Bδ; margo astrolabii Sι; margo astrolabii vel margolabium Bη Cζ Eμ Oη; margolabrum Rγ; margolabium Dγ; magrolabrum Mι; mugrolabrum Nγ; *add.* id est limbus Oι(*interlin.*) Oξ(*marg.*) Oτ(*interlin.*) Qλ(*interlin.*); *add. in marg.* al' limbus Ov scilicet] *om.* Bη Bι Cζ Dδ Eμ Kα Kε Pq Mτ Vv; id est Kδ; id est librer qui est Mι Nγ; vel limbus Vτ; *add.* limbus qui adequatur rethi Wλ; *add.* vel labium Sβ; *add. interlin.* limbus Lβ scilicet ... divisum] divisum in 360 Sι in] *om.* Bκ Oβ 360] ccclx Oχ Pζ; 365 *corr. to* 360 Pω; 16 Tδ gradus] *om.* Bε Qθ; *interlin.* Kθ; divisiones Bθ Ev Vπ; gradibus Qδ Tδ; partes Bη Cζ Oη; *om.* Nα divisum] de istis Mι Nγ; divisis Qδ Tabule] Que sunt Bζ; Rotulle Cγ autem] *om.* Bε₁ Vα ab] *om.* Cζ Oη; in Fa Mι Nγ
- 6-7 ab hac] *om.* Sα
- 6 hac] *om.* Oq; *add.* mater Dη Mι Nγ; *add.* scilicet mater Lδ Oγ contente] *om.* Bη signantur] fignarantur Vφ; fignicatur Dγ; figurantur Bβ Bθ Bι Cδ Cη Eγ Kθ Lζ Lλ Mα Mλ Nα Oχ Pζ Qε Qθ Sη Vβ Vγ Vv Vπ Vv Wθ Wι Pε; signatur Kα Lκ Mη Pδ Qι; sig^a Mv; *illeg.* Lμ Oβ; significatur Dδ; significantur Eδ Mτ Oη Po Qδ Xα; signurentur Pγ tribus] 3 *some*; tres Oη circulis] *add.* ex Sβ quorum] quibus Mα Oχ; quolarum Bδ; *add.* ciculorum Dδ quorum ... circulus₂] *om.* Eτ Pγ minor] *illeg.* Eγ; maior Vv; primus et minimus Bη Cζ Eμ; primus [*illeg.*] Vτ minor ... medius] b^{or} est Sη est₁] *om.* Kε Pq Qβ; dicitur Dδ circulus₁] capitis(?) Eγ; motus capitis Lλ Mα Oχ Pζ Vγ Qε Sβ Wθ; m' id est motus capitis Cγ; tropicus Mτ Cancri] *interlin.* Vτ et] id est Qι medius] *add.* est Bγ Bθ Bι Bκ Cη Dδ Eκ Mλ Mv Nγ Ov Oq Pq Vv Vπ; *add. illeg.* Cι; *add.* veo Cγ
- 6-7 quorum ... Capricorni] quibus mime Sλ

⁸ Most mss write this as one word, although it does not seem to be recorded as such in any dictionary. Since *margo* and *labrum* are almost synonymous, CJMD suggests that these should be treated as two words, with *labrum* as a gloss on *margo*.

the rete to which is joined a marginal lip thus divided into 360 degrees.⁹ The plates moreover contained by this are inscribed with three circles of which the smaller is the circle of Cancer, and the middle one the

⁹ *Comp.*, Cap. 1.

circulus equinoctialis, et maximus circulus Capricorni. Postea almucantharat,¹⁰ qui sunt circuli in medietate superiori descripti quorum quidam sunt integri, quidam apparent

- 7 circulus,] *om.* Βκ Εκ Λζ Μλ Μτ Να Ον Ρτ Vτ; vero Arietis et Libre id est Cγ; *add.* eorum Βη; *add.* est Sθ; *add.* est circulus Οη; *add.* in *marg.* id est circulus Arietis et Libre desc'bit equinoctial~ Ου circulus equinoctialis] vero Arietis et Libre Λλ Μα Οχ(*om.* vero) Ρζ Qε Sβ Vγ Wθ et] id est Qι maximus] maior Λλ {Μα} Οχ Ρζ Qε Sβ Vγ Vv; maiorem Cγ; *add.* eorum Οβ Οι Οσ Qμ; *add.* eorum est Βη Βθ Βκ Cζ Εκ Εμ Ευ Λζ Μλ ΟηβSθ Vα Vπ Vτ Vυ; *add.* est Dδ Μι Pδ Vv; *add.* motuum capitis circuli Eγ; *add.* motum vel circuli continet Cγ; *add.* vero Rγ circulus²] *om.* Εκ Να; articulus Pγ; motum continet Λλ Μα Οχ Ρζ Qε Sβ Vγ; vero tropicus Μτ Capricorni] *add.* DE ALMUCANTARACH Kδ; *add.* per extremitatem tabularum Sι; *add.* in *marg.* In alio libro: quibus minor est motus capitis Cancri, medius vero Arietis et Libre, et maior motum continet Capricorni Vβ Postea] *interlin.* Qι; Deinde Μτ; Post sunt Eα; *add.* circuli Βγ; *add.* circulus Cη Ετ Pγ Wβ; *add.* sequitor Kδ almucantharat] *illeg* Xγ; alhuutatr *corr.* to alhuutantrat Lβ; almacantaraz Oσ; almicantarat Βκ Cδ Eγ; almicantarat *corr.* to almicantharath Eδ; almicantarath Lδ; almicantaraz Οη; almicanterat Ον; almicantharat Pσ; almicantharath Pο; almicanthrat Wλ; almicantrat Kα; almicantrath Kε Μτ; almicantratus Oβ; almicatharath Kθ; alminchant^c Λκ; almu^{ath} Pι; almucancarath Wθ; almucancharath Βθ Fβ; almucancharath Dγ Pα Pθ; almucantar[*illeg.*] Εκ; almucantarach Ευ Sη Sι Vο Vτ; almucantarath Cζ Λλ Lμ Οχ Ρζ Qε Qθ Vα; almucantarath Βι Cε Eα Eη Γα Να Ογ Ορ Pδ Pω Qι Sβ Vβ Vγ; almucantaraz Λζ Sλ; almucant^az Sθ; almucantha'th Ββ; almucantharach Qμ Vπ; almucantharaht Βε; almucantharak Rγ; almucantharat Βζ Λε Μα Οι Ρτ Pγ Qβ Sκ; almucantharath Βγ Cη Eβ Eρ Eτ Fα Fζ Lγ Lη Μο Μυ Μφ Οζ Οξ Οτ Ρμ Pν Pο Qβ Qδ Qλ Rα Sδ Tδ Vι Vν Wα Wβ Wι Wμ Xα; almucantharatz Dη; almucanthrath Eζ; almucantrarach Kδ; almucantrath Sα; almucatarach Bδ; almuchantarath Pυ Vψ; almuchantaraz Eμ; almuchantharat Ου Pε Xδ; almuhantharath Βε; almuscantarath Pβ; almut' Dδ; almutantarach Mv; almutantaraz Mλ Vυ; almutantherach Μι Nγ; almutantharath Mη; almutantrat Cγ; almuthantharad Vφ
- 8 circuli] *om.* Kα Μλ descripti] *om.* Μυ Μφ Οχ Vι Wα Wθ; scripti Qι quidam₁] *add.* autem Bζ quidam ... integri] *om.* Bδ Fζ sunt] *om.* Βη Cγ Cδ Cζ Eγ Εκ Εμ Λζ Μα Μλ Οβ Οη Ορ Οχ Ρζ Qε Sα Sθ Sι Sλ Vα Vγ Vν Wθ; twice Eβ; *interlin.* Vβ integri] perfecte/perfecti Dδ; *add.* apparent Vv quidam₂] *marg.* Eζ; *rep.* Vψ; quedam Bδ; qui Λκ; *add.* autem Bζ Eδ Oχ; *add.* ut Vγ; *add.* vero Qε Pζ Wθ apparent] *om.* Dδ Lμ Vv

¹⁰ My choice of a Latin spelling is somewhat arbitrary – witness the large number of variants. I have used the form established in the *Compositio*. See *Comp.*, Cap. 13.

equatorial circle [i.e., the celestial equator], and the greatest the circle of Capricorn.¹¹ Next the almucantars, which are circles drawn in the upper middle of which some are complete, others appear

¹¹ *Comp.*, Cap. 7.

imperfecti quibus prior est orizon, et dividit duo emisperia. Centrum autem inferioris

- 9 imperfecti] imfecti Nα; perfecti VQ; *add.* de Vγ; *add.* ex Mι Nγ Sβ quibus] quilibet Sι; quorum Mτ; *add.* circulis Dδ quibus ... emisperia] *om.* Pι prior] primus Mλ est] *om.* Bη Bκ Cγ Cδ Cζ Eμ Lζ Lλ Mα Mλ Mυ Mφ Oη Oρ Oχ Pζ Qε Sα Sβ Sθ Sλ Vα Vι Vν Vρ Vτ Wθ; scilicet Vγ; *add.* in Lμ et ... emisperia] *om.* Wλ et] *om.* Vι Wθ; *interlin.* Lβ; qui Eζ(*marg.*) Eυ Gα Vπ Vφ dividit] *illeg.* Xγ; dividerit Mη; dividens Oγ; dividens/s? Oβ {Rα} Xα; dividu VQ; *add.* enim Bδ Bε Cε Dδ Dη Eβ Eη Fα Fβ Fζ(?) Kα Kδ Lγ Lε Lη Lκ Lμ Mδ Mo Mτ Mφ Oζ Oξ Oυ Pα Pβ Pδ Pμ Pν Pρ Pσ Pω Qβ Qγ Qθ Qλ Sδ Tδ Vι Vψ Wα Wμ Xδ duo] ii/2 *some*; 20 Qθ; enim Qδ; *add.* enim Mι Nγ; *add.* *interlin.* id est nocte et die Kε emisperii] *add.* A Dγ; *add.* in *marg./interlin.* id est tantum cclorum in duo cingena Kθ autem] *rep.* Cγ inferioris] inferior Mτ; in superiori Oι; interioris Bβ Bγ Bε Cη Eτ Kθ Pγ Pε Wβ Wι; *add.* *interlin.* interioris Lβ Oν; *add.* partis Mι Nγ

incomplete;¹² the first of them is the horizon,¹³ and it divides the two hemispheres.¹⁴ The centre, moreover, of the lowest

¹² *Comp.*, Cap. 13.

¹³ *Comp.*, Cap. 13.

¹⁴ I.e., above the horizon and below the horizon.

10 almucanthatrat cenith capitum nominatur. Deinde sunt azimuth, qui sunt partes

- 10 almucanthatrat] *om.* Oχ; abnitarath/abnutarath Vταlmi^{ath} Kε; almicantarath Bκ Cδ; almicantarath Lδ; almicantaraz Oη; almicanterath Ov; almicanthatrat Eδ Pσ; almicanthatrath Pο; almicanthatrat Wλ; almicanthatrat Kα; almichant' Lκ; almichanthatrach Kθ; almu^{ath} Pι; almucancarath Gα; almucancarath Qθ; almucanchar~ Bη; almucancharath Pα Pθ; almucant^h Sα; almucant^z Sθ; almucantarath Cζ Eγ Eκ Λλ Λμ Oο Oσ Pζ Qε Vα; almucantarath Nα Sη Sι Vο; almucantarath Bθ Bι Eα Eη Eυ Kδ Mδ Oγ Qγ Qi Qμ Sβ Vβ Vγ Wι; almucantaraz Mλ Lζ Oσ Sλ; almucanthat Cε Pγ Pω; almucanthat^h Xα; almucanthatrath Bε; almucanthatrach Rγ; almucanthatrat Bζ Eβ Lγ Lη Mα Oι Sκ Xδ; almucanthatrath Cη Ci Dγ Eζ Eο Eτ Fβ Lβ Lε Mo Mv Mφ Oζ Oξ Oτ Pδ Pμ Pν Pρ Pτ Pυ Qβ Qδ Qλ Rα Sδ Tδ Vι Vν Vπ Wβ Wμ Xγ; almucanthatratz Dη; almucanthatrath Bβ Bγ; almucantroch Oβ; almucatarath Bδ; almucatarath Wθ; almuchancharaz Eμ; almuchanthatrath Vψ; almuchanthatrat Ov Pε; almuha[nthara]th Bε; almuī' Mτ; almuscantarath Pβ; almut' Dδ; almutantarath Mν; almutantaraz Vν; almutanterath Mi Nγ; almutanthatrat Cγ; almutanthat Mη; almutanthatrath Vφ; *add.* dicitur esse Cδ; *add.* est Sι; *add.* est zenith regionis et Bε; *add. in marg.* almicanthat' arabice dicitur. Latine autem progressionis solis in hore Kε cenith] cenit Bη Cη Dγ Eγ Eο Fα Kκ Kα Nγ Pβ Pζ Pθ Pμ Pν Qi Si Qε Sβ Vν Wι; cen^c Fζ; cent Lγ Mα; cenyth Kε; chenith Xγ; coanch Bδ; zenith Dδ Pρ Pσ Sα Vφ; zenich Lκ; zenit Cγ Wθ; zenith *many* cenith capitum] *twice* Tδ capitum] capitis Mτ; captio Mη; *add.* sive Sι nominatur] *om.* Cd; *rep.* Bζ; dicitur Eκ Sλ Deinde] Postea Mτ sunt₁] *illeg.* Eγ; *om.* C Cδ Eκ Mν Oχ Pε Pτ Qε Si Sλ Wλ; est Bα Bε₁ Bξ Bι Cη Dγ Eδ Eζ Eμ Eο Eτ Gα Nα Ov Oσ Pγ Pο Pυ Qδ Rα Sβ Sη Sθ Vγ Vο Vτ Wι Xα; etiam Bη Bθ Bκ Cζ Lζ Λλ Oη Mα Mλ Oβ Pζ Sα Vα Vβ Vν Vπ Vυ Wθ; super Mδ azimuth] alsumuth *and add. interlin.* vel azimuth Sβ; alzemut Cγ; asimut Qε; asimuth Oο Vτ; assumucht Mi Nγ; assumut Oχ Wθ; atimuth Vν; atzemutz Pβ; azim' Ov; azimuch Bβ Bδ Cε; azimud Eκ; azimut Bζ Bκ Cδ Kα Lβ Lε Lζ Lκ Λμ Oη Oσ Pω Qi Sλ Vα; azinn^t Oξ Pζ; azmut Mτ; *add.* vero he' mns(?) Cγ qui] que Oη qui sunt] *om.* Eκ Mi Nγ; *add.* etiam Wθ sunt₂] *om.* Bζ Pι Rγ; sibi Dγ Qδ
- 10-11 cenith ... almucanthatrat] *om.* Eυ nominatur ... intersecantes] *marg.* Nγ qui sunt partes circulorum] circuli Kε; circuli partes Bδ Bε Cε Ci Dδ Dη Eβ Eη Fα Fβ Fζ Kα Kδ Lγ Lδ Lε Lη Lκ Λμ Mδ Mη Mτ Mv Mφ Oγ Oζ Oξ Oτ Ou Pα Pβ Pδ Pθ Pμ Pν Pρ Pσ Pω Qβ Qγ Qθ Qi Qλ Sδ Sκ Tδ Vι Xδ Vψ Wα Wμ partes circulorum] per Cζ Oη

almucantar is called the overhead zenith.¹⁵ Next are the azimuths which are parts

¹⁵ *Comp.*, Cap. 13.

circulorum almucanthatat intersecantes. Post quas sunt hore, in medietate inferiori descripte. Inter horas vero due sunt crepusculorum linee. Postea linea medii celi que est

- 11 circulorum] *del.* Εμ; circulos Βη almucanthatat] almi^{ath} Κε; almicangtarach Κθ;
 almicantarath Βκ Cδ; almicantarath Lδ; almicantaraz Οη; almicanterath Ου; almicanthatat
 Εδ Ρσ; almicanthatath Ρο; almicanthatat Wλ; almicanthatat Κα; almicantrech Οβ; almicant'
 Lκ; almicancarath Γα Qμ; almicanthatath Ρα; almicantarach Βδ Ση Σι Vο Vτ;
 almicantarach Ργ; almicantarath Cζ Εκ Λλ Οχ Ρζ Qε Wθ; almicantarath Βζ Βι Εα Εη Κδ
 Λμ Μδ Να Ογ Ρδ Ρω Qδ Qi Sβ Tδ Vα Vβ Wα ; almicantaraz Lζ Μλ Οσ Σλ; almicant^{az}
 Sθ; almicanterath Εα; almicanthat Fα Oζ Pγ; almicanthat~ Βη; almicanthatath Ρτ;
 almicanthatath Βε;
 almicanthatat Fβ Lβ Lγ Lη Μα Οι Οτ Ου Ρυ Χδ; almicanthatath Ββ
 Βγ Cη Dγ Εβ Εζ Εο Fζ Lε Μο Μυ Μφ Οξ Ρμ Ρν Ρο Qβ Qγ Qλ Ρα Sδ Vγ Vi Vπ Wβ Wi
 Wμ Χα Χγ; almicanthatath Dη; almican^{ut} Qθ; almicanthatath Ρε Vψ; almicanthataz Εμ;
 almicanthatath Ρθ; almicanth Βε; almi-Μτ; almi^{rat} Εγ Vν; almicanthatath Ρβ;
 almi^t Dδ; almicanthatath Μν; almicanthatat Οο; almicanthataz Vυ; almicanthatath Mi Nγ;
 almicanthatat Cγ; almican^a Σα; almicanthat' Mη; almicanthatath Vφ; almicanthatat *corr. to*
 [*illeg.*]cantarath Ρι Post quas] Deinde Μτ; Postea Ρι Wλ; Primum quod Εα
 quas] hoc Βε Dδ; quos *many* sunt hore] super hec Cγ hore] qdic Οβ; *add.*
 inequales 12 plarum (?) Να; *add. interlin.* id est linee horaire Κε in] *om* Βζ
 medietate] medi.... Vψ; mediate Βδ Μο Ρδ; *add.* plarum Ση; mediate *corr. to*
 medietate Οι; *add. interlin.* id est in nocte Κε inferiori] *om.* Ββ Κδ; in superiori Ευ Ργ
 Vπ; *add.* inferiori Χδ; *add.* parte Cζ Ρι; *add.* parte tabule Σι
- 12 descripte] *om.* Vφ; *add.* Inter has sunt due linee que ostendunt ortum aurore in matutino
 et occasum luminis in nocte. Sed iste due linee in quibusdam astrolabii ponuntur inferiori
 quadam parte in quibusdam in superiori. Mo Inter] In Κα; *add.* has Mo Inter ...
 linee] *om.* Κδ Wβ horas vero] quas Οβ; quas vero Βδ; horas 15 Lε; quas horas vero
 Mη horas vero due] vero duas(*expunged*) horas Ρα vero] *om.* Ββ Βδ Βε₁ Βκ Cη
 Dη Ετ Κθ Lζ Mη Μλ Μο Να Οβ Ον Ρα Ργ Ρε Qθ Qi Sβ Ση Vν Wι; *illeg.* Tδ; *interlin.* Βγ;
 autem Εκ; 15 Ρβ vero due] et Μτ due] 2 *many*; *om.* Βζ Εο Γα Wθ Χα; *interlin.*
 Vφ; duas Ρυ; duo Mi; side Κα sunt] *om.* Cε Mη Ρτ Postea] Deinde Μτ
 linea] *om.* Οβ; alinea Να; est linea Εκ; medii Σα celi] *marg.* Oζ que est]
om. Εκ
- 12-13 est linea] *om.* Βδ

of the circles intersecting the almucantars.¹⁶ After these are the hours, marked in the lower middle area.¹⁷ Within the hours are indeed the two twilight lines.¹⁸ Afterwards the line of the middle of the sky¹⁹ which is

¹⁶ *Comp.*, Cap. 15.

¹⁷ *Comp.*, Cap. 16.

¹⁸ *Comp.*, Cap. 21.

¹⁹ *Comp.*, Cap. 12.

linea descendens ab armilla per centrum in oppositam partem astrolabii, cuius medietas a centro in armillam dicitur “linea meridiei”; et alia dicitur “angulus terre” et “medie

- 13 linea] *interlin.* Lβ; *om.* Bε Cε Dδ Dη Eβ Eκ Fα Fβ Fζ Kα Lγ Lδ Lη Mτ Mυ Mφ Oζ Oξ Oτ Oυ Pα Pβ Pμ Pν Pρ Pω Qβ Qι Sδ Tδ Vι Wα Wμ Xδ; L.M.A.A. Vψ descendens] ascendens Bδ ab] *om.* Oξ; de Kα armilla] armilla Sη per centrum] *twice* Mν; *om.* Qβ; per medium centri Eδ in] ad Sκ(*interlin.*) oppositam] positam Vψ partem astrolabii] *om.* Pω astrolabii] *om.* Bη Bκ Cγ Cδ Cζ Eγ Eμ Lζ Lλ Mα Mι Oη Oν Oρ Oχ Pζ Qε Sα Sβ Sθ Sι Sλ Vα Vν Vτ Vυ Wθ astrolabii cuius] *om.* Nγ medietas] *add.* est Sι
- 14 a] ad Vτ; in Pρ centro] polo Oγ; *add.* scilicet Vγ in] *om.* Pρ; versus Wλ dicitur.] *twice* Eν; *om.* Cε; *add.* medii celi Pι linea] medii celi hoc est Qθ; *add.* medii celi id est Lμ; *add.* sunt Pι linea meridiei] medii celi linea sive meridiei Qβ meridiei] meridionalis Oγ; medii celi Cζ Eγ Eμ Mτ; medii celi hoc est in meridiei Kε Po(*om.* in); medii diei Bη Bκ Cγ Cδ Eκ Lλ Mα Mι Oρ Nγ Oσ Oχ Pζ Qε Sι Sλ Vβ(*add.* *interlin.* al’ meridiei) Vγ Vν Vυ Wθ; *add.* vel linea ecessionis vel angulus Qμ; *add.* in marg. vel medii celi Oι alia] aliud Eα; aliter autem Kε; *add.* medietas Dδ Sα Sλ; *add.* medietas vero Mτ; *add.* *interlin.* modiens Cδ; *add.* *interlin.* scilicet medietas Vβ alia dicitur] almuri Oρ dicitur.] *om.* Cγ Eκ Kε; *add.* linea Eγ; *add.* *interlin.* linea scilicet Vβ angulus] anguli Rγ Sλ Vβ Wθ terre] *add.* scilicet linea sub clavo vesu erram Qμ et.] sive Vγ; vel Mτ Pι Qμ; *add.* linea Cζ Eμ Vτ

the line descending from the ring through the centre to the opposite part of the astrolabe, of which the half from the centre to the ring is called the “midday line” and the other is called “the angle of the earth”²⁰ and “midnight

²⁰ In the sphere, the angle (along the midday colure through the poles) between the plane of the horizon (through the centre of the earth) and the opposite (the south) pole is equivalent to the latitude (“angle of the earth”) of the observer, that is, the latitude of the astrolabe plate.

15 noctis." Post hec et sequitur alhantabuz, id est aranea, in qua sunt signa cum zodiaco constituta, stelle quoque fixe, in quo via dicitur esse solis. Et quicquid fuerit infra

15 Post hic] Postea Bθ Cγ Eζ Lζ Mτ Oη Rγ Vv Vπ Vτ Post ... sequitur] Deinde est Mτ et] *om.* Bζ Bθ Bι Bκ Cγ Lζ Pζ Vv Vq Vτ Vφ; est Wλ; etiam Bβ Lλ Mα Mo Oβ Oq Pδ Rα Vα Vβ Vv Wθ; vero Bη Cζ Eμ Oη et sequitur] *om.* Bε Bη Dη Eβ Eη Fα Fβ Kε Kδ Lβ Lγ Lε Lη Lκ Lμ Mα Mo Mv Mφ Oγ Oζ Oξ Oτ Ou Pα Pβ Pδ Pθ Pμ Pν Pq Pσ Pω Qβ Qγ Qθ Qi Sδ Sk Tδ Vι Vπ Wα Wμ Xδ; *interlin.* Lβ Oi; etiam Cι Pτ Qδ Vψ Xγ et ... est] *om.* Bδ Dδ alhantabuz] Bε Cε Eβ Eη Fα Lγ Lδ Lη Lμ Mδ Mη Oγ Oζ Oτ Pθ Pμ Pω Qβ Qi Wμ; *illeg.* Xγ; abhantabuz Mv; alabanthabuth Vπ; alacabut Cδ; alacaburz Sλ; alagagabuch Dγ Qδ; alagagaburth Bε; alagagbuch Pτ; alahantabuth Bθ Qμ; alancabut Mα Oχ Vv Wθ; alancabuth Vβ; alanchabuz Oσ; alangabut Oq; alanganbut Vα; alanhabuz Cγ; alankabuz Vv; alantabach Nα; alantabuch Bζ Vτ; alantabunt Mι Nγ; alantabuth Cζ Oη Pυ Si; alantanith Mτ; alanthabuth Eμ; alatabus Kε; alaucabud Eκ; albantabuch Mv; alcantabuth Eα; alcauabuz Sθ; alhancabuch Gα Oβ; alhancabut Eγ; alhancabuz Qθ; alhanchaboth Kθ; alhanchabuth Ou; alhantabor Lκ; alhantabuch Kδ Pε Rγ; alhantabum Pq Vψ; alhantabur Pν; alhantaburz Ou; alhantabus Pσ; alhantabut Wα Po Sη; alhantabuth Dη Eδ Eζ Eτ Lβ Oi Pi Rα Vφ Wβ Xα; alhantabutz Fβ Fζ Lε Mφ Oξ Pα Pβ Qγ Qλ Tδ Vι; alhantarbuch Ev; alhantbuz Sκ; alhantabuth Bβ Bγ Cη Eq Mo Wi Pγ; alhantabuz Cι Xδ; alhantibus Wλ; alhathabuz Pδ; alhuscabuch *and add. interlin.* alagagabuth Sβ; allanancabuz Pζ; allancabut Lγ Qε; allancibut Vγ; allantabuz Bι Vq; almutantabuz Bκ Lζ Mλ; alphantaboc Kα alhantabuz ... est] *om.* Sα id est] *om.* Pγ; dicitur Pσ; et Vq; mediu Pε(*and del.*); sive Mτ id est aranea] *om.* Eγ Lλ Mα Mι Nγ Oχ Vγ Qε Wθ; *interlin.* Sβ; *marg. later hand* Pζ aranea] recte scilicet Cγ qua] quibus Gα; quo *some* signa] *om.* Lκ cum] *om.* Bθ Pμ; in Bβ Cγ Eγ zodiaco] zodiatho Cγ; zodyac Bβ Fβ

16 stelle quoque fixe] *om.* Cγ Dη Vγ; cum stellis fixis Eκ; stelle [*illeg.*] Oβ; et stella fixe Sλ quoque] a Kα fixe] *marg.* Sκ; *add.* zodiaci Cδ quo] qua Kε Mτ Nα Vv; quibus Vφ; *add. interlin.* zodiaco Lβ in quo] in qua esse Bε in quo ... fuerit] ei quoque sint Bδ via] *om.* Qi Wλ; viam Cζ; etiam Oη; *add.* etiam Eμ dicitur esse] est Vτ esse] *om.* Cγ Eγ Oβ Si Vγ Vv; via Cζ Oη solis] *add.* et stelle fixe Dγ; *add.* scilicet extremitas exterior zodiaci Qμ; *add.* stelle quoque fixe Cγ Vγ Et] Etiam Mτ; Item Pi; *add.* infra Nα quicquid] quidquod Bβ fuerit] sit Dη fuerit infra] *illeg.* Wλ infra] in Xα; intra Cτγ; inter Oη Si; in term Vπ; *add. interlin.* id est in [*illeg.*] Kθ

16-17 Et ... septentrionale] *marg.* Ou

[line].” After this there also follows the hantabuz,²¹ that is the spider [i.e., the rete] in which the signs are set in order with the zodiac, likewise the fixed stars, in which the path of the sun is said to be.²² And whatever

²¹ For *alhantabut* (or *alhanthabuth*), العنكبوت (al-^ʿankabūt) – spider-web, i.e., rete – see *Comp.*, Cap. 11, line 14 and note, and Kunitzsch, *Glossar*, no. 1, pp. 515-517.

²² *Comp.*, Cap. 10 and 11.

motum capitis Arietis et Libre, ex hoc zodiaco, dicitur esse septentrionale; quod autem extra meridianum dicitur. Sequitur almuri, quod “ostensor” dicitur latine, denticulus

- 17 motum] *corr. to* locum Lβ; medius Mτ; *add. interlin.* id est circulum Oτ motum capitis] circulum Dη Arietis] *om.* Vι et] in Bβ Libre] *add.* usque ad finem Virginis et dicitur signa septentrionalia. Meridionalia vero a principio Libre usque ad finem Piscium Mo ex hoc] ex horrum Vψ; in Mτ; in hoc Pι ex hoc zodiaco] *om.* Pσ Rγ; secundum meridionem infra sub dictum Kα ex ... esse] dicitur [*illeg.*] zodiaco Wλ hoc] *om.* Oη zodiaco] zodiatho Cγ; zodyaco Lκ dicitur esse] *om.* Cη Eκ Eτ Eυ Pγ Pυ; *add. interlin.* Bγ; *add.* sol Pβ esse] *om.* Bζ Bη Bι Cγ Cζ Dγ Eα Eγ Eδ Eζ Eμ Eο Gα Kε Kθ Lλ Lζ Mα Mι Mλ Mν Mτ Nγ Oβ Oη Oν Oο Oσ Oχ Pε Pζ Pι Pο Pω Pτ Qε Qμ Rα Sα Sθ Sλ Vα Vν Vβ Vγ Vπ Vο Vυ Vφ Xα Xδ Xγ Wθ Wι; *add. interlin.* Sβ septentrionale] *add.* eam Eυ septentrionale ... autem] *om.* Mι Nγ quod] ex Oν quod autem] et quidquid Eκ; qui autem est Nα autem] *om.* Bι Vο Vτ; *add.* est Mυ Mφ; *add.* ex alia parte Oβ; *add.* fuerit motum Dδ
- 18 extra] *add.* dicitur Bε Eγ; *add.* circulum Capricorni Vι; *add.* dicitur esse Dη meridianum] *add.* applicatur Cδ; *add.* appuarsi(?) Oσ dicitur₁] *marg. later hand* Pζ; *om.* Bβ Bγ Bζ Bε₁ Bη Bι Cγ Cζ Cη Dγ Eδ Eζ Eκ Eο Eτ Eμ Eυ Gα Kθ Lζ Lλ Mα Mι Mλ Mν Mo Nγ Oη Oν Oο Oσ Oχ Pγ Pε Pο Pτ Pυ Qε Rα Sβ Sθ Sι Sλ Vα Vβ Vγ Vν Vπ Vο Vτ Wθ Wι Xα Xγ Xδ; appellatur Cδ Vυ; fuerit dicitur Oβ; *add. in marg.* id est a capite Libre in finem Piscum dicitur meridiana pars Kε Sequitur] *om.* Eο; Deinde Mo; Deinde est Mτ Vι; Postea Oξ; Postea est Bδ Bε Bη Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mν Mφ Oγ Oζ Oι Oτ Oυ Pα Pβ Pδ Pθ Pν Pο Pσ Pω Qβ Qγ Qθ Qi Qλ Sδ Sι Sk Tδ Vι Wα Wμ Xδ Sequitur ... dicitur₂] *om.* Pμ almuri] abmiuri / abmuiri Sι; azimuth Pο quod] id est Eκ; qui Bθ Cγ Mι Wθ; vel Mτ; *add.* est Eα Xα ostensor] *add.* gradus Sλ dicitur₂] *om.* Eκ; *add.* est Cδ; *add.* et Mτ latine] *om.* Eγ; *twice* Xδ; *add.* sive Dη Kθ; *add.* vel Pζ; *add.* vel meridor Vτ; *add.* videlicet Pι denticulus] centiculus Mι Nγ; deciculus Pβ
- 18-19 sequitur ... relictus] *om.* Vψ denticulus ... est] Deinde Sα
- 18-Cap. 2: 3 quod ... et] *missing* Rγ (*the bottom half of fol. 74 has been torn out, although a few of the missing lines can be found on a wedge, now fol. 73bis, as restored in 1974*)

from the zodiac²³ would be within [the circle] of the beginning of Aries and of Libra is said to be to the north; what, however, [would be] outside is called southern. There follows the *muri*,²⁴ which is called “the indicator” in Latin,

²³ Again, we should really be referring to the ecliptic (a circle) rather than the zodiac (a band).

²⁴ *Comp.* Cap. 1 and 11. For *almuri* see note to *Comp.*, Cap. 1, line 5.

scilicet, extra circulum Capricorni, in alhantabuz relictus. Deinde almehaur, id est,

- 19 scilicet] *om.* Bδ Kε Mτ Pι PϞ; *superscr.* Cδ; graduum Nα; id est Bζ Oη Pβ Vα
 circulum] tiens(?) a capite Eδ Capricorni] *add.* extra Xδ In] *om.* Eδ Oβ Po
 Wβ In alhantabuz] *om.* PϞ alhantabuz] *illeg.* Eκ Mα Mη; agen alengabuth/ageu
 aleugabuth Bε₁; ahangabuth Pτ; alaacobut Qε; alahantabuth Bθ Vπ; alaiancia Sθ;
 alancabuch Nα; alancabut Wθ; alancabuth Mτ Vβ; alancabuz Pζ Vv; alanchabuc Bη;
 alanchabuz Oσ; alangabat OϞ; alanganbut Vα; alaniabuz Bδ; alantabut Vv; alantabuth Cζ
 Eυ Oη Sι; alantabuz Bκ Cδ Lζ Mλ; alanthabuth Eμ; alanthabuz Cγ; alantibut Sλ; alcanbut
 Eγ; alchanthabuth Pγ; alegabuth Gα; alengabuth EϞ Qδ Rα Xα; alentabuch Vτ;
 aleu| gabuch Dγ; aleugabut Bζ; alhancabuc Sβ; alhanfabuch Sη; alhantabor Tδ; alhantabus
 Pν; alhantabus Wλ; alhantabut Pσ; alhantabuth Bβ Dη Eα Eδ Eζ Eτ Kδ Lβ Mv Ov Pι Po
 Qλ Qμ Vφ; alhantabutz Qι; alhantabuv Lδ; alhantabuz Bε Eβ Fα Fβ Fζ Lγ Lε Lη Lμ Mδ
 Oγ Oζ Oι Oξ Oτ Ov Pβ Pμ Pω Qβ Qγ Qθ Sδ Sκ Wμ Xδ; alhant[?]buz Cε; alhanthab Lκ;
 alhanthabuth Bγ Cη Mo Wι Pε; alhanthabutz Pα; alhanthabuz Cι Pδ; alhantibz Dδ;
 alhantibz *corr. to* alhantibiz Kε; alhatabuz Pθ; allancaburh VϞ; allancabut Lλ Oχ Vγ;
 allancabuzh Bι; alliancabuth Oβ; alphantaboc Kα; altabubuth Mv Mφ Vι; altabuth Wα;
 almthaur Vψ; almuthabuth Wβ; anantabut Mι Nγ; hathantibuz Eη; *add. interlin.* id est
 aranea Oυ; *add. interlin.* id est in rethe Kθ; *add. interlin.* id est rethe Wβ relictus] de
 relictus *or* derelictus Mτ; lictus Ov; *add.* que Vτ deinde] postea Eκ; *add.* est Dη
 almehaur] *illeg.* Mα Sη; abmehaur Po; abnehaur Eζ; ahmehaur Pτ; ahnehair Lμ;
 albutair Sι; almahahun Qδ; almahau' Oβ; almahir PϞ; almanuch Eυ; almathaur Sθ;
 almauach Vτ; almcaur Bη; almchaur Mη; almeahir Xδ; almear Mτ; almeaur Eα Eκ;
 almeauth Vα; almebaur Bδ; almebuara Wθ; almechuar Nγ; almedir Oγ; almehae Bζ;
 almehahur Kδ; almehair Bε Eη Fα Lβ Lγ Lδ Lε Lη Lκ Mδ Oζ Oι Oξ Oτ Ov Pα Pβ Pμ Pν
 Pσ Pω Qβ Qγ Qλ Sδ Tδ Xγ; almeham Cε Dγ Dδ Dη; almehant Mv; almehar Fβ VϞ;
 almehatur Gα; almehaur Cδ Eδ EϞ Mι Mo Oσ Pδ Pθ Pι Pυ Qθ Rα Sκ Vυ Vφ Vψ Wα Xα;
 almehaut Bε₁; almehayr Mv Mφ Vι; almehuar Bι Pζ Qε Sβ Vβ(*add. interlin.* al' almehaur);
 almehuhar Lλ Vγ; almehur Eβ; almena^{bu}th Bγ; almenar Ov; almenat Cζ; almenath Bθ Cη
 Eτ Vπ Wι; almenhar Eγ; almeriar Bβ; almeris Nα; almethan Kα; almethaur Qι;
 almeuach/almenach Pγ Wβ; almeuair *or* almenair Oχ; almeuar Kθ; almeuath Pε; almeur
 Sλ; almhair Cι; almicur Eμ; almihair Wμ; almohayr Kε; almthaur OϞ Wλ; almmumchache
 Bκ; almmumehaur Lζ Mλ; almmumehaura Vv; alnehair Fζ; alnithnar Cγ; alnitur Oη; *add. in
 marg.* almenath Lβ id est] *om.* Vv Wθ; quod est PϞ; scilicet id est Sι

that is a small tooth, outside the circle of Capricorn, extending from the hantabuz.²⁵
 Next [is] the mehour,²⁶ that is,

²⁵ The rete (see above, note to line 15). See *Comp.*, Cap. 11.

As Laird and Fischer point out in their edition of the text of Pèlerin de Prusse, this phrase makes more sense modifying the muri, indicating that the muri is on the rete, rather than modifying the mehour in the next sentence, although it too can be said to be in the rete. *Pèlerin de Prusse on the Astrolabe*. Text and translation of his *Practique de astrolabe*, ed. Edgar Laird and Robert Fisher, Medieval and Renaissance Texts and Studies 127 (Binghamton: Medieval and Renaissance Texts and Studies, 1995), p. 84.

²⁶ The centre of the rete and plates: *al-miḥwar* / المحور. See Kunitzsch, *Glossar*, no. 28 (pp. 533-534/79-80).

- 20 foramen quod est in medio rethis, in quo est axis retinens tabulas climatum, in quam intrat alferaz, id est, “equus” restringens araneam cum rotulis, quasi cuneus. Et in alia parte matris sunt duo circuli equationis solis quorum unus continet numerum dierum
- 20 foramen] *add.* in medio rethe et climatum Sk quod est] *om.* Bε₁ Kε Lμ Qθ est] *om.* Vα in₁] *om.* Ev Oχ rethis] *twice* Lμ; arietis Wθ; rectic Cγ; rectis Mα Vq; rete Pζ; retis Cδ Ek Eq Lζ Lλ Mλ Nα Nγ Oq Si Sk Sλ Vγ Vv Vτ Vψ; rhethis Kα; *add.* relictus Kε Qθ axis] assis Mι Nγ; axila Oξ; clavus Vγ; pars Mλ; *add.* id est alihitop Dη; *add. interlin.* id est clavus Oτ retinens] continens Bβ tabulas] tabellas Bε₁ Eμ Eq Lλ Mo Oη Oq Pζ Pv Sβ Vβ Vq Vφ; rolulas Cγ climatum] circuli maluſi Bβ in quam] *om.* Wθ; quod Sα; *corr.* to quot Lβ quam] qua Kα Vv; quod Bβ; quo Bθ Cγ Dη Kε Mδ; quem Bη Bι Cι Oη Pγ Pζ Po Qβ Qδ Si Vβ
- 21 intrat] ingrat Mτ; intret Cδ; net-ia est Vv alferaz] alfarast Gα; alfarat Cγ Eγ Mα; alfarum Pγ; alfat Oβ; albebach Eδ; alferac Po; alferae Eζ; alferam Bη Ev Vq Wθ; alferas Bε₁ Oη Rα Xα; alferase Eq Vφ; alferatz Vv; alferaz Bθ Bι Bκ Cδ Cζ Eμ Eτ Lζ Lλ Mι Mλ Nγ Oι(*add. interlin.*) Ov Oσ Pζ Qε Sθ Sλ Vα Vγ Vπ Vv; alferax Vτ; alfezar Oq; alforas Eα; alforase Pι; alforath Dη Nα; alphaeraz Cη; *corr.* to alphas Bζ; alpharat Mv; alpharich Kθ; alphas Sβ; alpherat Dγ Sη; alpherath Bβ; alpheraz Bγ Oχ Pε Pv Vβ Wβ Wι; alphas Si; *corr.* to alphera Lβ alferaz id est] *om.* Bε Dδ Ek Kε Sα; unus Bδ Cε Cι Eβ Eη Fα Fβ Fζ Kα Kδ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mo Mτ Mv Mφ Oγ Oζ Oξ Oτ Ov Pα Pβ Pδ Pθ Pμ Pv Pq Pσ Pτ Pω Qβ Qγ Qδ Qθ Qi Qλ Sδ Sk Tδ Vι Vψ Wα Wλ Wμ Xγ; *add in marg.* alfaram Xδ; *add. interlin.* id est alphas arabice Kε id est ... restringens] *obliterated by repair* Pε equus] *om.* Ek; equus many; *add.* T uneq Ev; *add.* id est caballus Kα; *add.* retinens et Qθ; *add.* vel cuneus Bθ Vπ Vτ restringens] *marg.* Mτ; destringens Mι Nγ; retringens Oη araneam] *add.* restringens Kε Lμ Pσ cum] *om.* Kα rotulis] *om.* Dδ; totulis Vυ quasi] *om.* Nα; id est Sη Vv; *add.* tenens Qδ quasi cuneus] *om.* Mλ Vτ; .q. Si cuneus] *om.* Xδ; omeus Bζ; tunes Pε; tuneus Vφ Et] *add. in marg.* DE DORSO ASTROLABII Fβ; *add. interlin.* ex Sk alia] altera many ille Cη Pε
- 22 parte] *om.* Pγ; *add.* walzathore id est Dη matris] *add.* in dorso Mτ; *add.* scilicet in dorso Vτ duo] *om.* Sλ; 2 many; 360 Kα equationis] equatoris Wθ solis] *om.* Lκ; ☉ Vι; *add.* exterius Bβ Bγ Cη Eα Eδ Eζ Eτ Kθ Lβ(*interlin.*) Mv Oβ Pγ Qμ Wι quorum] *om.* Ek; maior Mτ unus] *add. interlin.* circulus Oτ
- 22-23 numerum ... circulus] *om.* Wλ

a hole which is in the middle of the rete, in which is the axis [i.e., pin] holding the plates of the climates [i.e., the various latitudes], into which the faraz,²⁷ that is, the “horse,” like a wedge, enters fastening the rete with the plates.²⁸ And on the other side of the mother [i.e., the back of the astrolabe] are two circles for the equation of the sun,²⁹ one of which contains the number

²⁷ *al-faras* [the wedge]: see *Comp.*, Cap. 6, line 1 and note.

²⁸ See *Comp.*, Cap. 6.

²⁹ “Equation of the sun” (also known as the “equation of time”): the relating of the position of the sun along the ecliptic to the day of the year. This not the meaning of the phrase in more technical astronomy where “the equation of the sun” means converting the sun’s mean motion to true motion. See Francis S. Benjamin, jr. and G. J. Toomer, eds., *Campanus of Novara and Medieval Planetary Theory. Theorica planetarum* (Madison: University of Wisconsin Press, 1971), pp. 41-42.

anni 365, et scribentur sub eo nomina mensium. Et alius circulus gradus signorum et infra eum scribuntur nomina signorum. Postea quarta capiende altitudinis. Postea

- 23 anni] *add.* scilicet Cζ Dη Eκ Eμ Kθ Lζ Mτ Oη Oσ Sλ Vα Vν Vυ; *add.* scilicet inferior Cγ Eγ; *add.* solaris Cδ 365] *om.* Pι; CCCLXV Lκ Oχ Qε Sβ; 36 et dies Bβ; 305 Oβ; *add.* dies Bη Cζ Eμ Kθ Oη scribuntur] inscribuntur Eγ; scribuntur Bη Bθ Cι Dδ Fα Mδ Qδ; scribuntur Mo sub eo] *om.* Bδ Cζ Wθ; *add.* latinorum Eγ eo] *om.* Cε; hoc Dη Mτ nomina] *add.* latinorum Lλ Mι Pζ Nγ Wθ mensium] *om.* Sλ; signorum Eα Eδ Mν Oβ alius circulus gradus signorum] *om.* Bη Cδ Cζ Eα Eμ Lζ Mλ Nγ Oη Oρ Oσ Sα Sθ Sι Vα Vν Vρ Vυ; alius circulus enim graduum signorum Pρ; alius circulus] *add.* etiam Lδ; *add.* est Oγ) continens gradus signorum Dη Lδ Oγ; alius circulus continet gradus signorum Lβ; alius continet signorum gradus Kθ Pι; alius continet numerum graduum signorum 360 Cγ Eγ; alius signorum gradus Bβ Bγ Bε₁ Bθ Bι Cη Dγ Eδ Eζ Eκ Eτ Eυ Gα Mν Pγ Pε Pο Pτ Pυ Vβ Vπ Vτ Wι Xα Xγ; alius signorum gradus 360 Lλ Mα Mι Nα Oχ(ccclx) Pζ Qε(ccclx) Sβ(ccclx) Sη Vγ Wθ; alius signorum graduum Eρ Mo Qμ Vψ; aliorum signorum gradus Bζ Rα; alius signorum super/supra Ov; circulus graduum signorum Kε et] *om.* many³⁰; *add.* etiam Lλ
- 23-24 nomina ... eum] *om.* Mτ Et₂ ... signorum] *om.* Bκ Sλ alius ... nomina] *om.* Oβ
- 24 infra eum] *om.* Vτ; in quo Kε Pσ Qβ; in quem Qθ; inferior eum Xα eum] *om.* Cγ; quem Bε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kα Kδ Lβ Lγ Lδ Lε Lη Lκ Mδ Mν Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pδ Pθ Pι Pμ Pν Pρ Pω Qγ Qι Qλ Sκ Tδ Vι Vψ Wα Wμ; eorum Mν Qμ Pο; etiam Oχ; A quod Xδ; quod Cε; *add.* etiam Mα Mι Nγ Pζ Qε scribuntur] signantur Kα; conscribuntur Cγ; scribantur Bθ nomina] etiam Wθ Postea₁] Deinde Lζ Mτ Oχ; seu quadratum id est Kδ; *add.* cum Fζ; *add.* sequitur Lβ; *add.* est Bβ Bγ Bδ Bε Cγ Cε Cι Dη Eβ Eγ Eη Fα Fβ Kδ Kε Lδ Lε Lη Lκ Lμ Mδ Mη Mτ Mυ Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pδ Pθ Pμ Pν Pρ Pω Qγ Qδ Qθ Qλ Sη Tδ Vι Wμ Xδ; *add.* qui Vτ; *add.* scribuntur sub eo Eα Postea₁ ... altitudinis] *om.* Nα Pτ Vψ quarta] 4^a some; iii^a Qε; carta Sα; quadra Bθ Vτ; *add.* id est 4 Lκ; *add.* in marg. id est ad capiendum altitudinem solis t stellarum Lβ capiende] accipienda Cγ Mι Nγ; accipiende Cδ Eγ Lλ Mα Pζ Qε Sβ Sκ Sγ; accipiente Wθ; capienda Bβ Oβ; *add.* interlin. accipiende Vβ altitudinis] altitudines Cζ Postea₂] Deinde Bη Bκ Cγ Cδ Cζ Eγ Lλ Mα Mι Mλ Mτ Nγ Oη Oυ Oσ Pζ Qε Sα Sβ Sθ Sι Sλ Vα Vβ Vγ Vν Vτ Vυ Wθ; *add.* est Vψ

³⁰ Generally “et” is missing when “quem” is substituted for “eum” in line 24; “and within it are written...” becomes “within which are written...”.

of the 365 days of the year, and the names of the months will be written below it.³¹ The other circle [contains] the degrees of the signs, and within it are written the names of the signs.³² Then [there is] a quarter for measuring an altitude.³³ Then a square, whose

³¹ *Comp.*, Cap. 2.

³² *Comp.*, Cap. 2.

³³ *Comp.*, Cap. 2.

- 25 quadrans, cuius latera in 12 puncta divisa sunt. Sequitur regula, que circumvoluitur in dorso astrolabii, in qua sunt tabule perforate, ad capiendum altitudinem solis in die,
- 25 quadrans] cadrans Pτ; quadrans Vψ; quadrantis Cγ; *add.* scilicet Vπ cuius] cuiuslibet Pε; cum Gα; scilicet cui Bβ Bθ latera] alt^oa Eδ; *add.* cuius Lκ in] *om.* Bθ 12] xii / duodecim *some*; ii Oq; tix Kα; av Sθ; 20 Bζ; *add.* in marg. partes dividi punc. quodli et latus parte et boca partes illius divisiones puncto vel digiti umbre recte vel umbre verse Lβ puncta] *om.* Cδ Cζ Lζ Mι Mλ Nγ Oη Oq Pσ Sλ Vv; partes Mτ Pι Si(*marg.*) divisa sunt] *illeg.* Eκ; dividi possunt Bζ Bη Bθ Bι Bκ Cζ Dγ Eδ Eζ Eμ Eρ Ev Gα Lζ Mλ Mv Mo Oβ Oη Ov Oq Os Pι Po Pσ Pτ Pv Qδ Rα Sη Sθ Si Sλ Vα Vv Vπ Vρ Vτ Vφ Xα; dividi possunt postremo Cδ; dividitur Cγ; dividuntur Eγ Lλ Mα Mι Nγ Oχ Pζ Qε Sβ Vγ Wθ; *add.* cuncta Mι Nγ; *add.* quodlibet latus per se et vora partes illud divisionem partam vel diniti umbra recta vel versa Pι sunt] *om.* Pγ; possunt Qμ *before* Sequitur] *add.* Postea Bε Sequitur] Similiter Si; *add.* tunc alidada id est Dη Sequitur regula] Similiter tabulla Mτ regula] *add.* in marg. al' alidada Ov Po(alidada) que] *om.* Oq circumvoluitur] circumrolunter volunter Pθ; voluitur Cδ Sλ; voluntur Mτ in₂] a Mα
- 25-26 puncta ... astrolabii] *om.* Sα
- 25-27 Sequitur ... nocte] *om.* Kδ
- 26 astrolabii] *add.* scilicet dicitur alidada Oγ qua] quo Bδ sunt] *add.* *interlin.* alhidada Lβ; *add.* alhidada id est due Pι tabula] regula Mδ; tabele Sβ; tabelle Bε₁ Eρ Oβ Oq Oχ Pζ Pv Qε Rα Sα Sη Sθ Vα Vβ Vφ Xα; tabulle Cγ; *add.* ad capiendum Oγ; *add.* septentrional' que autem Mι Nγ; *add.* in marg. al' pinule Ov perforate] *om.* Eγ Sλ; *marg.* Vφ; *inserted after "solis"* Eα; per foraminem Cγ capiendum] accapiendam Vγ; capiendam Lλ; sumendam Bη Cζ Oη altitudinem] latitudinem Wθ; *add.* perforate scilicet Sλ; *add.* scilicet Cδ solis] *om.* Mv Mφ Nα Vι in die] *om.* Kθ die] *add.* et Bβ Bδ Cδ Dγ Mδ Mη; *add.* et in Pγ; *add.* u^ctīō(?) et altitudinem Cζ
- 26-27 tabule ... nocte] *om.* Pω

sides are divided into 12 points.³⁴ The rule is next, which rotates on the back of the astrolabe on which are perforated vanes for taking the altitude of the sun in daytime and of the

³⁴ *Comp.*, Cap. 3.

27 stellarum in nocte.

27 stellarum] *add.* fixarum Bε nocte] *add.* et hoc per foramina Eκ; *add.* Explicit Bζ³⁵ Gα; *add. in marg.* Verte tria folia et habebis residium videlicet “Cum vis scire gradum solis” Lκ[*text skips from fol. 133^r to fol. 136^r*]; *add.* huc usque diximus de compositione astrolabii modo de eius utilitatibus est dicendum Vα; *add.* eum/cum dicendum Vα; *add.* Nota que pars astrolabii que est versus recte horatur facies rpms/[*illeg.*] astrolabii alia partis opposita parti superscriptem vocata [*illeg.*] sive dorsum Cγ mss Bε₁ ends; mss Oq Pω Sα discontinued³⁶

³⁵ In ms Bζ the Prologue is found at the end of the other material, hence the “Explicit” at this point.

³⁶ These mss, from this point on, show extensive variation or revision. They might be later classified as a entirely different text. I will return to these mss when I have finished editing all the capitula.

stars at night.³⁷

³⁷ *Comp.*, Cap. 5.

[CAPITULUM 1]. DE GRADU SOLIS INVENIENDO CAPITULUM

1 *mss* Cα Eλ Eο Mγ Mπ Oφ Pξ Pφ Qζ Qη Vξ Zα *begin*

om. Bδ Bζ Bκ Cα Cγ Cδ Cε Cη Dδ Eα Eγ Eκ Eλ Eο Eυ Kε Lζ Lκ Mα Nα Oβ Oσ Oχ Pγ Pι Pμ Pσ Qε Qη Qi Sβ Sθ Si Sλ Vα Vν Vτ Vυ Wθ Wλ Xγ; *faded* Eδ (*four lines*); *Accepte* gradu solis inveniundo per die suum et econverso Cζ; *Ad* inveniendum gradum solis Lμ Qε; *Ad* inveniendum gradum solis in dorso astrolabii Bι (*add. in marg.* 1^m c); *Ad* inveniendum gradum solis per diem mensis Pτ; *Canones* astrolabii Pξ; *Capitulum* ad inveniendum gradum solis per diem mensis vel diem per gradum Vξ; *Capitulum* primum. *De* inveniundo loco solis Mλ; *De* divisione gradus per diem et econverso Sδ (*add.* C. 2); *De* gradu solis inveniundo per diem mensis (suum Bη Eμ) et econverso Bη Eμ (*marg. and add.* 1^{us}) Qδ; *De* gradu solis inveniundo per regulam super diem mensis et econverso Mδ; *De* gradu solis per diem mensis et e converso inveniende Vφ (*add. in marg.* 1^m); *De* inventione gradus solis Dγ Mι Nγ; *De* invencione gradus solis et diei mensis Pο Qμ; *De* inventione gradus solis in die et stellarum in nocte Lγ; *De* inventione gradus solis per diem Dη; *De* inventione gradus solis per (et Eζ) diem mensis Eζ Lε Tδ; *De* (Sequitur de Vψ) inventione gradus (*interlin.* Mη) solis per diem mensis et econverso Bε Bθ Cι Eβ Eη Fα Fζ Kδ Lβ Lδ Lη Mη Mφ Oγ Oζ Oι Oξ Oτ Pα Pδ Pθ Pν Pυ Qγ Qλ Sκ Vβ Vπ Vψ Wα Wμ Xδ; *De* inventione vero motus solis similiter et diei mensis Zα; *Hic* secuntur canones ad operandum cum astrolabio; *capitulum* primum de gradu solis inveniundo per suum et econverso Oη; *In* quo gradu cuiuslib et signi sit sol Fβ (*different hand*); *Incipit* liber de operatione astrolabii et primo ad [*cut off*] gradum sol[is] Pζ; *Incipit* opus astrolabii ad inveniendum gradum solis per diem mensis et per gradus Mγ; *Incipit* opus astrolabii ad inveniendum gradum solis per diem mensis vel diei per (*interlin.*) gradum Eο; *Incipit* practica astrolabii Mτ; *Incipit* practica astrolabii et primo ad inveniendum gradum solis per diem mensis vel diem per gradum Bγ (*later hand*); *Incipit* practica astrolabii per lineam superscriptam Qζ; *Incipit* secunda pars de modo operandi per astrol'. *Capitulum* primum, *De* gradu solis habendo per diem et diem mensis econverso per dorsum Oφ; *Incipiunt* operationes astrolabii Gα; *Inventio* gradus solis Lλ (*add.* 2.) Oν Vγ; *Inventio* gradus solis in dorso astrolabii per diem mensis Mν Mυ (*add.* et econverso) Vι (*add.* et econverso) Wβ; *Invencio* gradus solis per diem mensis datam (*om.* Pβ Qβ Rα Xα) et econverso Oυ (*add.* sic habetur) Pβ Pε Qβ Rα Sη Wι Xα; *Inveniundo* gradus solis per diem mensis datum et econverso Bβ Kθ; *Modus* inventionis gradus solis in dorso astrolabii Vο; *Prima* practica. *De* inventione gradus solis per diem mensis et econverso Kα; *Primum* capitulum. *Inventio* gradus solis mensis astrolabii Eτ; *Qualiter* inveniantur gradus solis per diem mensis et econverso Pο; *Sequitur* usus astrolabii utilis valde Pφ *add. in marg.* *Nota* de usu astrolabii Qμ

1-19 *De ... ostendet] om.* Sα

[CHAPTER 1]. CHAPTER ON FINDING THE DEGREE OF THE SUN

Cum volueris scire gradum solis, pone regulam super diem mensis presentis, et gradus a summitate eius tactus erit gradus solis – qui cuius signi sit videbis – et eum

- 2 Cum] Cumque V ι ; Et cum P ϕ S ι ; Quandu L μ ; Quia B δ ; Si C α ; *add.* igitur B κ K δ volueris] vis *some* scire] *om.* E β ; *interlin.* O γ gradum] gradus K δ ; graduum S κ solis] *interlin.* W β ; *add.* ignotum V ν ; *add.* in zodiaco X α regulam] rigulam N γ ; *add.* scilicet(*om.* L β P ι P ρ) in dorso astrolabii L β (*marg.*) O ι (*interlin.*) P ι P ρ ; *add.* *interlin.* scilicet allidadam Q μ super] sub V τ ; *corr.* to supra D δ diem] *add.* presentem L β (*interlin.*) S β mensis] *interlin.* B ι ; *om.* C α D γ G α P ν presentis] *om.* E \circ M \circ ; *repeat* C α ; de quo queris D η ; *add.* *x-line gloss* O η
- 3 gradus₁] signus V τ a] in C α D η M τ ; super O γ eius] *om.* C α O ν ; cuius M ν ; eiusdem P ι ; vel M ι N α tactus] *om.* C ζ ; *illeg.* B η ; *interlin.* M τ ; contactus C α N κ P ι Q ζ ; regule S ι ; tantus V τ ; *corr.* from tactrar K ϵ ; *add.* et equale V π ; *add.* in circulo signorum P ι ; *add.* regule B θ B κ O ν ; *add.* *interlin.* id est gradus signorum L β gradus₂] *om.* C ϵ V τ ; tactus X δ gradus solis] *om.* B δ ; *add.* *interlin.* gradus M τ solis] *om.* P γ qui] *om.* V τ ; id est gradus O η ; quem L λ M α O χ P ζ W θ ; quere M ι N γ ; quod S λ ; *add.* gradus D δ Q μ qui ... sit] in eius signo sicut C γ sit] *om.* E τ P τ S κ X γ X δ ; fuerit B ϵ O ϕ ; *add.* statim D η videbis] videbitur B β ; *add.* per lineam subscriptam D η et eum] *om.* X δ ; aliquam M ϕ ; cumque M ν ; etiam eum M γ V ν eum] *om.* D η F ζ ; *twice* Z α ; alium P τ X γ ; enim M λ Q ζ ; gradus P ι ; tunc Q η ; *corr.* to gradus L β ; *add.* gradum C α V ϕ ; *add.* *interlin.* scilicet gradum V β

When you wish to know the degree of the sun [along the ecliptic], set the rule [or alidade] on the day of the current month, and the degree touched by its tip will be the degree of the sun – you will see which sign this is – and

ex alia parte nota in zodiaco in rethi. Notabis etiam nadir eius, quod est similis gradus

4 ex alia parte nota] a parte nota aliqua(alia Sλ; autem Vα) Pφ Sι Sλ Vα; a parte(*add. interlin.* ex alia Eμ) nota aliqua(*add. parte* Bκ) notabis Bη Bκ Eμ Vυ; a parte(*add. interlin* vel ex altera quia in matre) nota aliquam(*expunged*) Oφ; a parte nota quam altera parte notabis Lζ; ex alia nota a^{ca} notabis Sβ; ex alia nota notabis Mη; ex alia parte a parte nota alia notabis Dγ; ex alia parte aliqua nota alia(*add. interlin. [illeg.]* Bι) notabis Bι Qε Sθ Vφ Wθ; ex(*om.* Eλ; a Cδ Oη; in Mι Nγ) alia parte(*om.* Eκ; perte Oη) nota(notam Vτ; *erasure and add. interlin.* astrolabii Lβ; *add. erasure* Eζ) Bβ Bγ Bθ Cδ Cη Eζ Eη Eκ Eλ Eτ Eυ Kθ Lγ Lμ Mι Mπ Nα Nγ Oγ Oζ Oη Ov Pγ Sη Vπ Vτ Wβ Wι; ex alia parte nota alia(a^a Vξ) Eδ Mv Po Vξ; ex alia parte nota(notam Qδ) alia(a^a Wθ; a^{ca} Sβ) notabis Pτ Qδ Sβ Xγ; ex alia parte(*add. in rethis eum* Eφ) nota aliqua(*del.* Eo) Eα Eγ Eo Eφ Mα Vφ Wθ Xα; ex(a Cζ Oσ; *add. aliqua(expunged)* Pθ) alia parte(*add. interlin.* scilicet in rethi Vβ) nota(notam Lε) aliqua(a^a Wθ) notabis(*add. in zodiaco in rethis* Eα) Cζ Cι Eα Kδ Lε Lγ Lλ Mo Oσ Oχ Pδ Pζ Pθ Rα Sκ Vβ Vψ Wθ; ex alia parte nota altera Bζ; ex alia(aliqua Cε) parte(*om.* Cε) nota(notam Fζ Pμ Qβ Sδ Tδ Xδ; *corr. from nomina* Lκ; *add. et* Pμ) notabis Bδ Cε Dη Fζ Lκ Oι Oξ Pμ Pξ Qβ Sδ Tδ Xδ; ex alia parte notabis Wλ Zα; ex alia parte notam aliam notabis Qδ; ex alia parte notam nota Qη; ex alia parte [*erasure*] notabis Pυ; ex altera parte Pι; ex altera parte nota(*add. and expunged* nota) Oυ; *add. in marg.* alia Wα; *add. and del.* notabis Wα) Bε Dδ Eβ Fα Kα Lδ Lη Mδ Oβ Oξ Oτ Pφ Pσ Qγ Qθ Wα Wμ; ex altera parte(*twice* Mτ) notabis(noctis? Qι); Cα Mτ Qζ Qι Vι; ex altera parte notam(nota nota Mυ; nota Cγ Mφ) aliqua Cγ Gα Mυ Mφ; ex altera parte notam(*interlin.* Kε) notabis Fβ Kε Pα Pβ Pν Qλ; ex illa parte nota Pε; ex illa parte nota aliqua notabis Vγ; nota aliqua Mγ Mλ; notabis nota aliqua Vν in₁] *om.* Sβ in zodiaco] *om.* Pι Sη Wλ; eum in zodiaco Qζ; in zodiacho Mτ; *add. interlin* in rethi Bι Oφ; *add. interlin.* et rethis Kε; *add. interlin.* scilicet in rethi Vβ; *add. interlin.* scilicet retis Sβ in₂] *om.* Gα Lκ Oβ Qη Vφ; scilicet Bζ Eo(*add. interlin.* in) Rα Sβ Xα in rethi] *om.* Bη Bθ Bκ Cα Cγ Cδ Cε Cζ Dγ Eα Eγ Eδ Eζ Eκ Eλ Eμ Eυ Lζ Lλ Mα Mγ Mη Mι Mλ Mv Mo Nγ Oη Oσ Oχ Pζ Po Pτ Pυ Pφ Qδ Qε Qμ Sδ Sι Sθ Sλ Tδ Vα Vβ Vγ Vν Vξ Vπ Vφ Vτ Vυ Wθ Xγ rethi] rechi Wα; rete Vψ; rethis Bζ Oβ Qζ Qη Xα; reti Kδ Oι; retis Rα Vφ; rthethi Kα Notabis] *om.* Bκ Lζ; Nota Eκ; Notaberis Bβ; super Dη; *corr. to* No^{u2} Lβ etiam] *om.* Bκ Dη Lγ; *erased* Lβ; et Lζ Mυ Vι Vτ; et forabis Ov; *add. in* Nγ nadir] *illeg.* Xγ; gaudair Sκ; gnadair Cι Mη Pδ Pθ; gnadayr Vψ; gnadir Cε Dδ; nadair Dη Eβ Eδ Eμ Eυ Eζ Eτ Fα Fβ Lβ Lγ Lη Mv Mφ Oζ Oι Ov Oξ Oτ Ou Pα Pμ Ov Pξ Po Pσ Pυ Qβ Qγ Qι Qλ Sδ Sη Tδ Vβ Vι Vν Vπ Vφ Vυ ; nadar Ov; nadare Mυ; nadayr Bγ Bκ Fζ Lε Lζ Pε Oσ Pγ Pτ Qδ Qη Wι; nadayz Cη; nadhir Cδ; nadir Bε Cζ Eα Eγ Eη Eλ Eo Eφ Gα Kδ Kε Kθ Lκ Lλ Lμ Mα Mγ Mλ Mo Nα Oβ Oη Oφ Oχ Pβ Pζ Pφ Pφ Qε Qζ Qθ Rα Sβ Sθ Sι Sλ Vγ Vτ Vφ Wβ Wμ Xα Zα; nadyr Cα Lδ Mδ Pι Vξ Wλ; nadyrth Xδ; nardir Bδ Dγ; nadire Vα; nardix Mι Nγ; natair Bθ; navcidit Bβ; vadair *corr. to* nadair Wα(*add. in marg.* gnadair); *add. solis* Kα Wθ; *add. in marg.* id est opositio Sι eius] cuius Vα; *om.* Cε Pι; *add. etiam* Xα; *add. id est oppositum* eius Cγ; *add. in oppositum* est Eγ quod] qui Bζ Cγ Dδ Lζ Lκ Mγ Mι Nα Nγ Qμ Vν Vπ Xα Xγ est] erit Cγ Eγ Mι Nγ Oχ Pζ Vγ est similis] *om.* Wα similis] *om.* Cζ Mλ Mφ Oη Pφ Vι; *illeg.* Eη; *interlin* Oφ; simul Cη Kα; solis Dη gradus] *om.* Cγ; gradu Oβ; gradui Mγ Pδ Pυ Qδ Vγ Vξ; *add. eius* Oγ; *add. and del.* medii celi Vγ

[continued opposite]

note it on the zodiac [i.e., the ecliptic] on the rete on the other side [of the astrolabe].
And you will note its nadir, which is a similar degree of the 7th sign.¹

4-5 Notabis ... signi] *om.* Mτ

4-6 eius ... ostendet] *illeg.* Eη

¹ This is not the normal meaning of “nadir”, i.e., the point in the celestial sphere vertically opposite the overhead zenith. Here the “nadir” of a point or position means the opposite point 180° across the sphere. In this capitulum it means the same degree as the sun but in the opposite sign. Beginning with (and including) the sign in which the sun was found and counting around the zodiac/ecliptic, the opposite sign will be the seventh sign.

5 septimi signi. Diem quoque mensis per gradum solis invenies; posita enim regula super gradum solis diem quesitum ostendet.

5 septimi] 7/ 7ⁱ / 7^{mi}/vii *many*; à Bβ; alii Fβ; alius opposita Lκ; alterius Qη; oppositi Pζ; *add.* notabis diem Cγ signi] opponitur/oppositur signus alii Gα; *add.* abeo Dη; *add.* computando illud signum in quo est Cα; *add.* id est signi oppositi Mφ Vι; *add.* in signi oppositi Mυ; *add.* notabis Eγ; *add. interlin.* oppositi Oφ; *add. in marg.* id est signi oppositi Wα; *add. illeg.* Zα Diem] Dicit Vυ quoque] *corr. from* quousque Sκ et Pι; quam Kα; quo Mι Nγ; *add.* gradus Wθ; *add.* solis Mυ mensis] *om.* Oγ; *rep.* Cα; *add. interlin.* econverso Wβ per] *marg.* Kδ gradum] gradus Oφ Pθ Rα solis] *interlin.* Eμ; *om.* Pγ invenies] *om.* Cα Wα; *add.* econversion Pι posita] *nondo* (= *nondum?*) Lκ; positum Xα posita enim] *corr. to* econverso u3 ponitur Lβ enim] *illeg.* Eγ; *om.* Cδ Oφ Pφ Sι Xα; *interlin.* Qμ; *es corr. in marg. to* enim Sκ; igitur Cγ; in Oχ regula] *om.* Xα; 12(*deleted*) Pβ

5-6 enim ... ostendet] *om.* Oη

6 super] supra Dδ Pφ Vυ gradum] gradus Bζ Eo Kδ solis] *om.* Dη diem] *rep.* Qλ; dies Eμ Eo Mγ Mλ Oφ Pφ Vυ; *add.* tibi Cγ Eγ Lλ Mα Mι Oχ Sβ Vγ diem ... ostendet] *om.* Cδ quesitum] *marg.* Qζ quesitum ostendet] ostendit Mτ; que sit Kα Wμ; que sit quod notus erit Vτ; que sint ostendet Pμ; quesitus erit Cζ Eμ Pφ Sι; quesitus notus erit Bζ Mγ Mλ Oφ(*notus interlin.*); quesitus noctis erit Eo; quis sit ostendet Dη; *add. 2.5 line gloss* Cζ ostendet] ostendit Vα; noctis o[ste]n[de]t Eo; notus erit Vυ; *add.* De gradu solis Qη; *add.* econverso Kδ

And you also find the day of the month from the degree of the sun, for the rule, when placed against the degree of the sun, will show the day you have sought.

[Comment:

The calendar and zodiac circles around the rim on the back of the astrolabe enable the true motion of the sun along the ecliptic to be linked to the day of the year, and vice versa. This can then be used to set the rete on the front.]

CAPITULUM 2]. DE ALTITUDINE SOLIS ET STELLARUM INVENIENDA

Cum vis altitudinem solis scire, suspende astrolabium de manu tua dextra per

- 1 De ... invenienda] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Lζ Lκ Mα Mπ Mτ Nα Oβ Oσ Oυ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qi Sβ Si Sλ Vα Vν Vτ Vυ Wθ Wλ Xα Xγ; *marg.* Eμ; *faded* Eδ; *illeg.* VQ; Ad inveniendum altitudinem solis EQ Mλ Vξ(*add.* in gradibus); Ad inveniendum altitudinem solis in qualibet Eo Mγ Pτ(*add.* hora); Ad inveniendum altitudinem solis et stellarum Lμ Oφ Qθ; Capitulum 2^m. De altitudinis solis vel alterius rei habenda in dorso per regulam Qδ; Capitulum secundum de altitudine solis et stellarum accipienda Oη; De(Sequitur de Sη) acceptione altitudinis solis et cuiuslibet alterius per astrolabium Bβ Kθ Pε Sη Wι; De altitudine solis Lλ(*add.* 3.) Mι Nγ Pζ; De altitudine solis accipienda Bθ Cι Kδ Mη(*accipiendi*) Pδ Pθ Pυ Sθ(*marg.*; *add.* et stellarum) Sκ Vβ Vπ(*add.* Rubrica) Vψ; De altitudine solis vel stelle accipienda per astrolabium Mν Mυ Vι; De altitudine solis vel stelle per astrolabium Eτ Wβ; De invenienda altitudine solis per astrolabium Rα Xα; De invenienda altitudine solis Qμ; De inventione altitudinis solis Dγ Eζ; De inventione hore et ascendentis Kα; Doctrina de modo accipiendi altitudinem solis vel alterius rei Bι(*add.* in *marg.* 2^m c^m); Inventio altitudinis solis et stellarum Lδ Oγ Oτ; Invenio altitudinis solis et stellarum per astrolabio Qβ; Inventio altitudinis solis in qualibet hora Bγ(*later hand*); *add.* C. 3 Sδ; *add.* in *marg.* 2^m/2^{us} Eβ Qζ Vφ De] *om.* Wα et stellarum] *om.* Vγ et ... invenienda] *illeg.* Vφ stellarum] *add.* fixarum Pβ invenienda] *om.* Oν Zα; accipienda Bη Eμ; hunda Dη; venienda Oυ; *add.* Capitulum Cη Mo
- 1-6 De ... fixas] *illeg.* Eη
- 2 Cum] Sum Oυ vis] volueris *many*; *interlin/marg.* Wα; *add.* inventionem Mτ vis scire] quesieris Bη Bκ Cα Cγ Cδ Cζ Eγ Eκ Eμ Lζ Lλ Mα Mγ Mι Mλ Nγ Oη Oν Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Sλ Vα Vβ Vγ Vν Vξ Vτ Vυ Wθ scire] *interlin.* Bγ; *om.* Eδ Eζ Eτ Kθ Mν Pγ Po Qμ VQ; habere Bθ Nα Pτ Pυ Qδ Sη Vπ Wι Xγ; hore Wλ; invenire Bδ Bε Cδ Dδ Eβ Fβ Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mυ Mφ Oγ Oζ Oi Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ PQ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Tδ Vι Wα Wμ Xδ Zα solis] *add.* et stellarum Bδ Bε Bη Cζ Ci Dη Eβ Eμ Fα Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Mδ Mη Mπ Mτ Mυ Mφ Oγ Oζ Oη Oi Oξ Oτ Oυ Oφ(*interlin.*) Pα Pβ Pδ Pθ Pμ Pν Pξ PQ Pσ Qβ Qγ Qζ Qη Qθ Qi Qλ Sδ Sκ Tδ Vι Vψ Wα Wμ Xδ Zα; *add.* et stellarum fixarum Dδ; *add.* id est per gradus elevatur centrum solis ab orizonte tuo Eν; *add.* vel stellarum Wβ astrolabium] strolabium Pβ; *corr. from.* astrolabium Sκ de] in Cα Kε Mτ Oγ Pγ Sκ; *add.* de Nα manu] *add.* *interlin.* id est per manum Eδ tua] *om.* Bε Dη Fα Fζ Lγ Lδ Lε Lη Lκ Mδ Mπ Mυ Mφ Oξ Oτ Oυ Pα Pβ Pι Pμ Pν Pξ PQ Pσ Qβ Qη Qi Qλ Sδ Tδ Vι Wα Wμ Xδ Zα; *interlin.* Eo dextra] *om.* Nα Xγ; *add.* in sinistram Kα
- 2-3 per ... armillam] *interlin.* Pτ

[CHAPTER 2]. ON FINDING THE ELEVATION OF THE SUN AND THE STARS.

When you wish to know the elevation of the sun, suspend the astrolabe from your right hand using

eius armillam, et sinistro tuo latere soli opposito, subleva vel depone regulam, donec radius solis per utriusque tabule foramen transeat; quo facto, vide quot gradus a linea

- 3 eius] *om.* Εκ armillam] armilam Cγ et] *add.* in Bδ Bε Bθ Dδ Dη Eβ Fα Fβ Fζ Kα Lγ Lδ Lε Lη Mδ Mπ Mτ Oζ Oι Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Qβ Qζ Qη Qθ Qι Σκ Tδ Vυ Xδ Zα tuo] *om.* Bη Pι; ductus Kα soli] *om.* Kδ; twice Xα; eius Bκ; sibi Vτ; sole Vξ opposito] apposito Cα subleva] snaileva/suaileva(?) Sθ vel] et Wμ depone] deprime Mτ Pγ Pε Qζ Wβ Bβ Bγ Bε Bι Cη Dδ Dη Eλ Eτ Fα Kα Kε Kθ Rγ; pone *corr.* to depone Oι; *add.* depone Fα; *add.* vel deprime Cζ Oη; *add. interlin.* al' deprime Oφ regulam] rigulam Nγ; *add. interlin.* scilicet in dorso astrolabii Oι
- 4 solis] *om.* Bδ Pξ; solie Vτ per] *om.* Vτ utriusque tabule foramen] ambo foramina tabule Bδ Bε(tabularum) Dδ Dη Eβ Fα Fβ Fζ Kε Lγ Lδ Lε Lη Lμ Mδ Mπ Mτ(*om.* tabule) Mυ Mφ Oγ Oζ Oι Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Tδ Vι Vυ Wα Wμ Xδ(tabule *corr.* to tabelle) Zα tabule] *om.* Dγ Pε Pυ Qδ Rγ; *interlin.* Bι; tabelle Bη Cγ Eγ Eκ Eμ Oη Qε Sβ Sθ Vα Vβ Vγ Wθ; *add.* vel tabelle Mι foramen] foramina Cα Rα Vρ Vυ Xα Xγ; foraminem Eυ transeat] *om.* Dγ Qδ; transierat Kα; intra Mι Nγ; intrant Bη; intret Bζ Bθ Bι Bκ Cα Cγ Cδ Cζ Eα Eδ Eζ Eλ Eκ Eμ Eο Eρ Eυ Gα Lζ Lκ Lλ Mα Mγ Mλ Mν Oη Oν Oσ Oφ Oχ Pζ Pι Pο Pτ Pφ Qε Qη Qμ Rα(*interlin.*) Sβ Sθ Sι Vα Vγ Vν Vξ Vπ Vρ Vτ Vυ Vφ Wθ Wλ Xα Xγ; *add.* vel [*illeg.*] Zα; *add. interlin.* intret Lβ; *add. interlin.* al' intret Vβ quo] hoc Kε quo facto] tunc Vγ quo ... vide] et per Qη quo ... quot] Et tunc per quod Lκ vide] fide Mν; vede Mπ; videas Qι Vπ; *add.* per Dη Zα quot] *om.* Gα; quod Mν Mπ Σκ Wλ gradus] gradibus Bζ Bη Bκ Cα Cγ Eγ Eλ Eμ Eο Eυ Lζ Lλ Mγ Mι Mλ Mο Nγ Oν Oσ Pζ Pτ Pφ Sβ Sθ Sλ Vα Vν Vξ Vπ Vρ Vυ Wλ; *corr.* to gradibus Lβ; *add. interlin.* al' gradibus Vβ a] *om.* Bδ a linea] alenina Mπ; alia Bβ Mν
- 4-5 a ... orientali] *om.* Mν

its ring, and with your left side away from¹ the sun, raise or lower the rule [alidade] until a ray of the sun passes through the pin-holes of both the vanes; having done this, see how many degrees

¹ For “*oppositus*” Gunther writes “towards the sun.” However, it makes no difference if the observer’s left or right side is toward the sun or away from the sun. One angles the alidade so that the sun’s rays pass through both pin holes, and one can then read the altitude of the sun along the edge, whether the alidade is angled from the upper left to the lower right (the observer’s left side toward the sun), or from the upper right to the lower left (the observer’s right side toward the sun).

- 5 orientali elevatur regula, et illa est solis altitudo. Similiter facies in nocte, per stellas fixas.
- 5 orientali] occidentali Kθ; orgencali Mπ; *add.* id est a linea illa qua transit a puncio Arietis per centram astrolabii cuspido Ev elevatur] allevatur Bβ regula] rigula Nγ et] quia Dη illa] *om.* Bδ Bε Cη Cι Dδ Eβ Eτ Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lε Lη Lμ Mδ Mτ Mυ Mφ Oζ Oι Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Sκ Tδ Vι Vψ Wα Wβ Wμ Xδ Zα; *illeg.* Eη Oξ Vτ; hoc Dη; idem numerus Lδ; ille numerus Oγ; ista Mπ Nα; *add.* [*illeg.*] Lδ illa est] *om.* Pγ illa ... altitudo] illi ostenderit altitudinem solis Pδ et est] *repeat* Bδ est] erit Cγ Kθ Lκ Lλ Mα Oχ Qε Vγ similiter] *om.* Lκ; solis Xα facies] *fac many; om.* Pσ Qθ; *interlin.* Qζ; facias Bη Kδ; *add. illeg.* Zα in] de Kδ Mo Vτ; *om.* Cα Eκ Rα Xα per] sic de Lκ
- 5-6 similiter ... fixas] *om.* Oυ per ... fixas] de altitudine stellarum fixarum deprimendo vel sublevando regulam quousque videris stellam cuius altitudinem vis scire per utrumque foraminem et habebis altitudinem eius Rγ; de stellis fixis Dη Qη; per stellam id est fixam Cζ; per stellam fixam Mλ Oφ(*add. interlin.* vel stellas fixas) Sι Vv
- 6 fixas] *om.* Eδ Mo Mτ Pξ Sθ; *add. illeg.* Bκ; *add.* cum oportunum fuerit Kδ; *add.* et cetera Pι; *add.* et per planetas si possu³ sed non tabulum quia locus ipsarum variatur Bζ; *add.* facies per stellas fixas Mπ; *add.* Nota quod hoc facilius(melius Oγ) fiat. Si retro tendantur candele ut melius videantur tabulo Lδ Oγ; *add.* per spiendo foramina et cetera Oβ; *add.* quacumque Oη; *add.* visas per foramina² Zα; *add.* 3-line gloss Cζ

² These words were added by Gunther to his Latin text, based on the version published as an addendum to Georg Reisch, *Margarita Philosophica Nova*, printed by Johann Grüniger (Strasburg, 1515). See John Ferguson, "The *Margarita Philosophica* of Gregorius Reisch. A Bibliography," *The Library. Transactions of the Bibliographical Society*, ser. 4, 10 (1929) 194-216.

the rule is raised above the eastern line, and that is the altitude of the sun. You will do the same thing at night using the fixed stars.

[Comment:

Suspend the astrolabe from its ring so that it is vertical, then adjust the rule with its sighting vanes toward the sun or star so that the sun's rays pass through the two (smaller) holes in the vanes or so that the star can be seen when looking through the two (larger) holes in the vanes. The degree of elevation can then be noted, as the point at which the rule intersects with the graduated rim of the astrolabe.]

[CAPITULUM 3.] DE INVENTIONE HORE INEQUALIS ET SIGNI ASCIDENTIS.

- 1 De ... ascendentis] *ms* Qα *begin; om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Cζ Cη Dδ Eα Eγ Eκ Eν Gα Lζ Lκ Mα Mτ Nα Oβ Oσ Oχ Pγ Pι Pξ Pσ Pφ Qα Qε Qζ Qη Qi Rγ Sβ Si Vα Vν Vτ Vυ Wθ Xγ; *faded* Eδ; *illeg.* Eη Kα Kε; Ad habendam altitudinem solis et ascensionem Mγ; Ad havendum certitudinem hore et ascendentis Vξ; Ad habendum horam et ascendens Pτ; Ad inveniendum altitudinem solis et ascendentis Eo Eo; Ad inveniendum horam diei et noctis et ascendentis Qθ; Ad inveniendam horarum diei vel nocte vel ascendentis Lμ; Ad sciendum certitudinem hore et ascendentis Dγ; Ad sciendum hore et ascendentis per gradum solis Bθ Cι(gradus) Eβ; De certitudine horarum Mπ; De certitudine hore et ascendentis invenienda(*om.* Oφ) Lδ Oγ Oτ Oφ; De habenda hora et ascent~ Mλ; De hora diei et gradu ascendentis per astrolabii Eτ; De hora diei et noctis et gradu ascendentis inveniundo per astrolabium Oν; De horis diei et noctis capiendum. Cap. 3^m Oη; De hora diei vel noctis cum gradu ascendentis Mν; De hora diei vel noctis et gradu ascendentis eius Mυ; De hora diei vel noctis et gradu ascendentis inveniundo Vι Wβ; De horis assōitur(?) in die Mι Nγ; De horis diei et noctis accipiendis Eμ(*marg.; add. in marg. 3^{us}*) Sθ(*marg.*); De horis diei et noctis accipiundo et gradu ascendentis Bη; De(4. De Lλ) horis et ascendente in diei Lλ Pζ Vγ; De invenienda certitudinem hore et ascendentis Bι(*add. in marg. 3 c^m*); De inventione ascendentis per gradum solis Sκ; De inventione certe hore et ascendentis Eζ Po Qμ; De inventione certe hore et gradus ascendentis Rα; De inventione horarum et ascendentis Tδ; De inventione hore et ascendentis Dη; De inventione(*add. solis Pv*) hore(horarum Lε) et ascendentis per gradum solis Eβ Fα Kδ Lβ Lγ Lε Lη Mδ Mη Mo Mφ Oζ Oi Oξ Ov Pα Pβ Pδ Pθ(*add. Rubrica et cetera*) Pμ Pv Pv Qγ Vβ Vπ(*add. Rubrica*) Vψ Wα(*om. De*) Wμ Qλ Sδ(*add. C. 4*) Vφ(*marg.*) Xδ; De inventione hore inequalis et signi ascendentis Zα; De inventione hore naturalis et gradus ascendentis per altitudinem solis et stelle Sη; De inventione hore vel et gradu ascendentis per altitudinem solis vel stelle Bβ Wι; De invencione hore inequalis et gradu ascendentis per altitudinem solis vel stelle Pε; De inventione stelle fixe hore et gradus ascendentis Xα; Inveniencio certitudinis hore et ascendentis Fζ Qβ(*add. Capitulum*); Inventio certa horae et ascendentis de die vel de nocte Bγ(*later hand*); Qualiter inveniatur hora et ascendens per gradum solis Pq; *add. in marg. 3 Qζ* inequalis ... ascendentis] *illeg.* Cη

[CHAPTER 3.] ON FINDING AN UNEQUAL HOUR AND THE SIGN WHICH IS RISING¹

¹ The use of *ascensio* and *ascendere* in the *Practica* refers to the point on the horizon where the sun, or a star or planet, or the beginning (or end) of a sign (or another point on the ecliptic) crosses or rises above the horizon in the east. Similarly *occasus* and *occidere* refer to the setting of such objects or points on the horizon in the west. I have avoided the use of “ascendent” and “descendent” in English, preferring “rising” and “setting”.

Si autem vis scire certitudinem hore et ascendentis, pone gradum solis super

- 2 Si autem] Cum Bζ EΛ autem] *om.* Εκ Οφ Ρι Ρξ Ρφ Qα St Vγ Vv Vτ Vψ vis] volueris *many* scire] *om.* Bη Cγ Eγ Eμ Mι Nγ Oχ Qε; *add. and del.* altitudinem Sη certitudinem] *om.* Ρι; altitudinem Eυ(*add. interlin. inequalis*) Ργ; certitudinaliter Lκ; per altitudinem Qη hore] horam diei Ρι; per horam altitudinem Lκ; *add. descendens* Sβ; *add. naturalis* Rγ; *add. inequalis* Kδ Nα; *add. per astrolabium* Vι; *add. scilicet equalis* Cζ Oη Sη; et] signi Bβ Zα; vel equalis Pθ; *add. etiam* Cη Cι Mv; *add. gradum* Rγ; *add. gradus illeg.* St; *add. and del.* facies Sθ hore et ascendentis] horas transactas de die Qη ascendentis] ascendens Lκ; ascendentes Cζ; assendentis Mι N; asuncio Pε; *add. hore* Bη; *add. interlin. altitudinis* Lβ pone] ponere Mλ gradum] gradus Mτ solis] *add. id est pone gradum signi in quo gradus est sol* Cα; *add. illius diei* Eυ; *add. illeg.* Zα super] id est per gradum solis computa numerum Ρτ Xγ; in Ρι

However, if you wish to ascertain with certain knowledge the hour and the [sign] which is rising [at that time], set the degree of the sun [i.e., its position along the ecliptic on the rete]

almucantherat altitudinis ex parte orientis, si fuerit ante medium diem, aut ex parte

- 3 almucantherat] albimutantarach(?) Sι; almantra Lκ; alm^{at} Kε; almiacatharath Eζ;
 almicantarach Oβ; almicantarath Pσ; almicantaraz Cδ Oη; almicantherat Oυ; almicantherat
 Qζ; almicantrat Kα; almicatharath Pο; almichancarach Mγ; almirarat Vτ; almith Qη;
 almkatarach Sη; almu[illeg.] Gα; almucacharath Pα; almucacharat Wλ; almucaharatz
 Dη; almucaht' Fα Lμ Qθ; almucahtar' Oσ; almucahtarach Bδ Vρ; almucahtarat Eγ Eκ Lλ
 Oχ Pζ Qα Qε Vγ Wθ; almucahtarath Bη Eα Eη Eλ Fβ Kδ Lδ Mπ Oγ Pξ Pρ Pυ Pφ Qγ Qμ
 Rα Sβ Tδ Vα Vβ Vπ; almucahtaraz Cζ Lζ Sλ; almucaht^{ar}z Sθ; almucahtera' Cα;
 almucahteraht Oυ; almucahterat Mι; almucahterath Nα Oφ Qι; almucaht' Pγ Pθ;
 almucahtarach Cι Kθ Pτ Wβ; almucahtarak Rγ; almucahtarath Eδ Fζ Mα Oτ Oυ Sκ Zα;
 almucahtarath Bβ Bγ Bζ Bθ Bι Cη Dγ Eβ Eο Eρ Eτ Eυ Lγ Lη Mη Mλ Mo Mυ Mφ Oζ Oξ
 Pδ Pυ Qβ Qδ Qλ Sδ Vι Vυ Wμ Wι Xα Xγ; almucahterath Mτ; almucahterath Mδ;
 almucahterath Pμ Wα; almucahterath Cε; almucahterath Vξ; almucahterath Vψ Xδ;
 almucahterath Lε Pε; almu^{rath} Pι; almucahterach Pβ; almucahter Dδ; almucahterach Mυ;
 almucahteraz Vυ; almucahterath Nγ; almucahterath Cγ; almucahter Lβ; almuth Bε;
 almucahteraz Eμ; almucahterath Vφ; *add.* h Sη; *add.* sue Cα altitudinis] *om.* Vγ;
 altitudinem Mγ; super similem altitudinem similiter sol fuerit levatus in illa hora Pι; *add.*
 lune(!) Qβ; *add.* solis Eκ; *add.* sue Bδ Bε Dδ Dη Eη Eλ Fα Fβ Kδ Kε Lδ Oβ Oγ Oζ Oξ
 Oυ(*marg.*) Pα Pβ Pξ Pρ Pσ Vι Wα Qζ Qθ Tδ Zα; *corr. to (later hand)* scilicet ante meridiem
 accepisti solis altitudinem Lβ ex parte] *marg.* Lκ orientis] horientis Mι Nγ;
 oriente Tδ; *add. illeg.* Lμ; *add. 2.5-line gloss* Cα fuerit] *om.* Cα Oσ Pι; altitudo sit Bβ
 Bγ Cη Eτ Kθ Pε Pγ Rγ Wα Wι; *add.* altitudo accepta Bι(*interlin.*) Vρ ante] an Vρ; *ms*
 Pε *ends* medium diem] meridiem Bβ Bγ Bε Bθ Bκ Cη Dη Eτ Eυ Gα Kθ Lβ Lζ Lκ Mπ
 Mτ Oβ Oν Pγ Qη Vα Vπ Vτ Wι Wλ Zα; *add.* accepisti altitudinem solis(*om.* Oσ Pι Vυ)
 Cα(*add.* solis) Oσ Pι Vυ; *add.* et cetera Pτ Xγ aut] *add.* super almucahterā sue
 altitud[inis] Cα; *add.* super almucahter' altitudinis Oσ; *add.* super almu^{rath} Pι; *add.* super
 almucahteraz altitudinis Vυ ex parte] *om.* Qα
- 3-4 medium ... post] *om.* Bδ Mν Nα ante ... post] *om.* Mγ ante ... diem] in die ante
 meridiem Vγ aut ... diem] *om.* Bδ; *marg.* Qι aut ... altitudinem] *om.* Mυ Mφ
 Vι

on the almucantar of the altitude on the side of the east, if the altitude be before noon,
or on

occidentis, si post medium diem accepisti altitudinem; et super quam horam ceciderit

- 4 occidentis] occidente Tδ; *om.* Gα; *corr. from orientis* Qε si] *interlin.* Qα; *add.* altitudo sit accepta Bβ Bγ Cη Eτ Kθ Pγ Rγ Wβ Wι; *add.* etiam Vγ; *add.* fuerit Bκ Gα Lζ Mλ Mπ Mτ Oη Oν Oφ Pφ Qα Qη Vν Vξ Vτ Vφ Xα Xδ Zα; *add. and del. fuerit* Cδ Kε Wθ
 medium diem] meridiem Bβ Bε Eα Eγ Eλ Lβ Lκ Mτ Oβ Oφ Pι Qη Vγ(*add. illeg.*) Vτ Wλ Zα(*add. celi*) diem] *om.* Mλ; *marg.* Sι; *add.* quod Oη; *add.* ubi Qη accepisti altitudinem] *om.* Bβ Bγ Cη Eτ Mπ Oφ Pγ Pφ Rγ Qα Wβ; altitudo accepta Bε Bζ Eο Lζ Mγ Mλ Vν Vτ; *add. solis* Cα Kδ(*marg.*); *add. interlin. va...cat* Sι et super] *rep.* Qδ
 super] supra Bβ quam] *marg.* Kδ; *add. partem ex parte* Lκ horam] *illeg.* Wθ; gradu Bζ; horarum Bγ Bδ Bε Bθ Bκ Cα Cγ Cδ Cι Eγ Eδ Eη Eκ Eρ Kα Kδ Lγ Lε Lζ Lλ Mα Mδ Mη Mι Mλ Mν Mo Mπ Mν Mφ Nγ Oβ Oζ Oι Oν Oξ Oσ Oτ Oυ Pα Pβ Pδ Pτ Pζ Pθ Pι Pμ Pν Pξ Po Pρ Pσ Qα Qβ Qγ Qδ Qε Qθ Qλ Rα Sβ Sδ Sθ Sι Sλ Tδ Vα Vγ Vι Vπ Vυ Vψ Wα Wβ Wι Wλ Wμ Xα Xγ Xδ; horarum *corr. from horam* Eτ; horum Pυ; *add. interlin. inaequalem* Eυ; *add. interlin. vel horarum* Eμ ceciderit] *om.* Qλ; *marg.* Qι

the side of the west, if you have taken the altitude after midday; and upon whichever hour

5 nadir gradus solis illa est hora presens; et signum quod fuerit ex parte orizontis

- 5 nadir] nadar Oγ; gnadair Cε Cι Mη Pδ Pθ; gnadayr Vψ; gnadir Dδ; gnadir *corr. to* nadir Mπ; guadair Σκ; nadair Bι Dη Eβ Eδ Eζ Eμ Eτ Eυ Fα Fβ Lγ Lε Lζ Lη Mφ Oζ Oι Oξ Oτ Oυ Pα Pμ Pν Pξ Pο Pσ Pυ Qγ Qδ Qλ Qμ Sδ Sη Tδ Vβ Vι Vν Vπ Vρ Wα; nadar Xγ; nadayr Bγ Fζ Mγ Oσ Pγ Pτ Qβ Wι; nadayz Cη; nadire Vα; nadyr Cα Cδ Pι Qη Qθ Vξ Xδ; nardir Bδ Mι Nγ; nadire Mυ; vadair Mν; *add. a punctus oppositus* Bκ; *add. id est oppositum* Cγ Fβ Pα(*interlin.*) Sβ Vβ(*interlin.*); *add. interlin. id est in quartus oppositus* Lζ gradus] *om. Lκ Oγ Pφ; corr. in marg. to id est opositum gradum* Sι solis] *add. i^a Cα Cι; add. and del. et signum* Qε; *add. interlin. illa* Bγ; *add. vel regula ponitur directe super signum solis* Oγ illa] *om. Bβ Bε Eτ Kθ Lβ Mπ Pδ Rγ Wι; suprascr. Bγ; illeg. Eη; ipsa* Qα; *ista* Kε Mτ Qζ; *talis* Lκ illa ... presens] *marg. Pζ; om. Eδ Eζ Mν est] illeg. Eη Eλ; erit* Bβ Bγ Cγ Eγ Eτ Kθ Lβ Lδ Lλ Mι Nγ Pγ Rγ Sβ Wι hora] *om. Bβ; add. illa* Lκ; *add. inequalis* Cα(*add. 19 lines concerning planets*) praesens] *large erasure follows* Pυ; *add. horas(hora* Eυ) noctis indicabit gradus Eκ; *add. Horas(Hora* Eυ Qα) vero(*om. Eκ; autem* Nα Sβ Sη) noctis indicabit tibi(*om. Eκ Oβ*) gradus solis Bη Bθ Bι(solis *interlin.*) Bκ Cγ(*add. 2.5-line gloss*) Cδ Cζ Dγ Eκ Eλ Eμ Eο Eρ Eυ Gα Lζ Lλ Mα Mγ Mι Mλ Mο Nα Nγ Oβ(*add. 5-line gloss*) Oη Oι(*marg.*) Oσ Oχ Pζ(*marg.*) Pι Qα Qδ Qε Qη Rα Sη Sθ Sι(*add. va...cat*) Vα Vβ Vγ Vν Vξ Vπ Vρ Vυ Vφ Wθ Xα; *add. quod queris* Qμ signum] *add. sive gradus signi* Lδ Oγ; *add. per illud(istud* Cζ) quod dicit hic scies certitudinem ascendentis Cζ Oη fuerit] *om. Wβ; erit* Eκ; *est* Lκ Rγ ex] *in* Cγ Eγ Lλ Wθ ex parte] *om. Pφ; marg. Sι; in* Bζ Mγ Mλ Oφ(*interlin.*) orizontis] *om. Cγ Cδ Eγ Sλ Wλ; orizontis* Bβ Dδ Eκ
- 5-6 est ... orientali] estia Kα orizontis orientali] *illeg. Eτ; orizonte orientali* Eο Mγ Mλ Oφ Vν; orizonte orientali Eδ; orizontis(*expunged*) orientali Pτ; orizontis in linea orientali Mο; orientali in linea orizontis Wμ; orientali linea orizontis Oι; orientalis orientis Kδ Sη; orientalis orizonte Tδ; oriente orientali Bζ Wτ; orientis(*add. and expunged* linea orizontis) Lβ; orientis orientali Vυ Wθ; orientis orientalis *corr. to* orizontis orientalis Lζ

the nadir of the degree of the sun falls that is the present hour; and the sign which would be on the east side of the horizon [i.e., toward the eastern horizon]

orientali est oriens, id est, ascendens; quod vero in occidentali occidens. Quod vero

- 6 orientali] *illeg.* Nα; *om.* Qδ; orientalis Bβ Bθ Bι Cδ Eζ Ek Eλ Eρ Lγ Lκ Lμ Mτ Ov Ou Pα Pθ Qβ Qζ Sι Vι Vξ Vπ Wβ; orient Oβ; *add.* accipi[*illeg.*] almucant' ex parti orientali Qα est₁] erit Cγ Eγ Mι Nγ Oφ Oχ Pζ Qε Vζ Zα; *add.* signum Pι oriens] orientis Lλ id est] *interlin.* Cγ; et Bκ Pι; vel Lκ id ... ascendens] *om.* Rγ; et precedens Pγ quod₁ ... occidens] *om.* Cγ Pξ vero₁] *add.* ceciderit Vξ; *add.* ex parte Lβ; *add.* and delete fuerit Cδ in] ex in Pγ occidentali] *rep.* Cα; *add.* linea Dδ Eη Fα Fβ Fζ Kε Lδ Lε Lη Lμ Mδ Oγ Oι Oξ Oτ Ov Pα Pβ Pμ Pν Pρ Qβ Qγ Qζ Qι Sδ Sι(*marg.*) Tδ Wμ; *add.* erit Dη Eλ Mι Nγ Qε; *add.* linea est Kα Mτ Qθ Vξ; *add.* fuerit Sι; *add.* locum Bε; *add.* occidentis Pφ; *add.* *interlin.* scilicet linea Oφ; *add.* *interlin.* scilicet orizontis Oι occidens] *om.* Vτ; accidentis est occidens Oφ; *add.* est Bβ Bι Bκ Ek Eo Gα Kε Lβ Lζ Mγ Mλ Mν Mφ Oβ Ov Pφ Qζ Rγ Sθ Vβ Vι Vν Vξ Vτ Wα Xα Zα; *add.* est sive cadens Bθ Ev Vπ Zα; *add.* sive cadens Eλ occidens ... vero₂] *illeg.* Nα vero₂] *om.* Mν Wθ; autem Cγ Eγ Ek Mι Nγ Pζ Qε; non Pγ; *add.* in occidentali Xα; *add.* *interlin.* autem Vβ
- 6-7 Quod₂ ... celi₁] *om.* Vρ

is rising, that is, ascending; moreover, that one toward the west is setting. And what indeed

cecidert in linea medii celi est in medio celi, et eius nadir angulus terre.

- 7 ceciderit] *om.* Vψ; acciderit Kθ; erit Εκ; est Pι ceciderit ... celi₂] in medio(medii Eγ) celi linea erit in medie celi Cγ Eγ medii celi] *twice* Eα; medii Εκ; medii circuli Lκ; medii diei Lλ Mι Nγ Pζ Qε Vβ(*corr. to celi*) Sβ(*add. interlin. scilicet celi*) Wθ; medio celi Cγ; meridiei celi Wλ; meridionali Dη; meridionalis id est in medio celi Mτ Pσ Qζ Qθ; meridionalis id est(cum Mv; *add. in Lμ*) medii celi Bδ Bε Cε Cι Dδ Eβ Eη Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Lμ Mδ Mη Mπ Mv Mφ Oγ Oζ Oι Oξ Oτ Oυ Oχ Pα Pβ Pδ Pθ Pμ Pν Pξ Pρ Qβ Qγ Qι Qλ Sδ Sκ Tδ Vι Vψ Wα Wμ Xδ; meridionali illud Zα; *add. id est in linea meridiei Cα est] om. Fζ Qι Vι Zα; erit Cγ Dη Lλ Mα Mι Nγ Qε Sθ(**add. u)* Vγ est ... celi₂] *om.* Eδ Eζ Mv Mo Po Pv Qδ Ra Vτ Xα in₂] *om.* Lμ Ov Pγ Xδ medio celi] *illeg.* Mα; gradus medii celi Ov; medii celi Xδ; medio Oβ; medio celo Bβ Bδ Bη Bθ Bι Cε Cη Dγ Eλ Eμ Eυ Kθ Mδ Mγ(cello) Mλ Oσ Oφ Pγ Pτ Pφ Qα Rγ Sη Vβ Sβ Sι Sλ Vα Vν Vξ Vπ Vρ Vυ Vφ Wι Wλ Xγ; medium celi Kδ(*marg.*) Kε Mτ Qζ Qθ Zα; *add. est Lβ Lδ Lε Mη et ... terre] marg. Vυ nadir] illeg. Mα; nadir corr. to nadair Eo; guadair Sκ; gnadair Cε Cι Mη Pδ Pθ; gn[a]dayr Vψ; gnadir Dδ Mπ; nadair Bι Dη Eβ Eδ Eζ Eμ Eτ Eυ Fα Fβ Lγ Lε Lζ Lη Oζ Oι Oξ Oτ Oυ Oχ Pμ Pν Pξ Po Pσ Pv Qβ Qγ Qμ Sδ Vβ Vι Vν Vπ Vρ; nadar Oγ Xγ; nadayr Bγ Cδ Dγ Fζ Oσ Pγ Pτ Qδ Tδ Wι; nadays Cη; nadire Vα; nadyr Cα Mδ Qη Vφ Xδ; nardir Bδ Mι Nγ; nazare Mv; vadir Mγ Mv; vadir corr. in marg. to gnadair Wα; *add. est Dγ Bζ Bθ Cγ Cε Dδ Eβ Eη Εκ Eυ Lμ Mη Mλ Mo Mπ Mτ Mυ Oβ Oζ Ov Oφ Pα Pβ Pδ Pθ Pι Pμ Pν Pξ Pρ Pσ Pτ Pφ Qα Qβ Qγ Qζ Qη Qθ Qι Qλ Sδ Sι Sκ Tδ Vι Vν Vξ Vπ Vψ Wα Wβ Wμ Xγ Xδ Zα; add. est in Bγ(interlin.) Eλ Vτ; add. erit Dη Lλ; add. id est oppositum est Fβ; add. interlin. id est opposito Pα angulus] in angulo] Rγ terre] add. altera est supple altitudo solis sive gradus Fβ; add. suple(supple Mπ Qβ; suppe Xδ) altitudo solis sive gradus Fζ Lβ Lγ Lε(**and del.*) Mπ Oι Oξ Oυ Pβ Pμ Pν Pσ Qβ Sδ Xδ; *add. illeg. Mα; add. Cap. 21 and 22 Lκ**

falls on the line of the middle of the sky is in the middle of the sky and its nadir, the
“angle of the earth.”¹

¹ See Prologue, line 14, and note.

Et si ceciderit inter duo almucanthat, vide differentiam numeri inter

- 8 *before Et] add. AD CORRIGENDUM GRADUS ALMICHANCARACH(ALMU^{RATH} VΞ) IMPERFECTI MΥ VΞ; add. AD CORRIGENDUM GRADUS [illeg.] EΘ; add. DE INVENIENDA HORA VEL ASCENDENTE CUM GRADUS SOLIS CAD^T INTER 2 MΛ; add. in marg. DE PROPORZIONE ALTITUDINIS DΥ Et si] interlin. BΥ; Si vero Vυ; add. altitudo CΥ EΥ Lδ Lλ Mι NΥ OΥ Oι(interlin.) Oχ Pζ Qε Sβ Sθ Vβ VΥ Wθ; add. altitudo solis Oβ Pα(interlin.); add. gradus solis Gα Vφ Wλ; add. vero altitudo solis sive gradus Sη; add. interlin. scilicet gradus solis Pθ Zα; add. marg. scilicet altitudo solis Oυ; add. marg. altitudo sive gradus solis Sι Et ... inter] marg. Sκ*
- Et ... duo] Suppleo Kα ceciderit] add. gradus solis Eκ Eλ Kδ inter] super Pφ Vφ inter duo] rep. Pθ inter₁ ... inter₂] super Dδ duo] 2 / 2° some; ii Oβ; om. Nα; duas Cζ DΥ Eο(interlin.) Lλ MΥ Oη Oσ Oφ Oχ Pφ Qα Qι Sβ Sθ Sι Vβ VΥ Vυ Vρ Vτ Wθ XΥ; duos Mo Pζ Qε; tres corr. in marg. to 2 Po; 3 et PΥ Vα almucanthat] abumintarath Sι; almicanct^{am} Qζ; almicanct' Oβ; almicantharath Pσ; almicantharaz Bκ Cδ Oη; almicanth Cε; almicantharath Po; almicanthrat Wλ; almicathrath Eζ; almichancharach MΥ; almichanth Lκ; almikauthrat Qη; alm^{trai} Kε; almuc' Mτ; almucancarach Sη; almucancarath Vρ; almucancharath Pα; almucanrath Vτ; almucant' Lμ Qα Qθ; almucant^{ar3} Sθ; almucantarach Bδ; almucantarath Qι; almucantarak RΥ; almucantarath Bη Eκ Lλ Oχ Pζ Qε VΥ Wθ Zα; almucantarath Bι Eα Eη Eλ Fβ Kδ Lδ Mδ OΥ Pρ Pφ Qμ Sβ Tδ Vβ; almucantarathorum Vα; almucantaraz Cζ Eμ Lζ Oσ Sλ; almucantera~ Cα; almucantherath Oυ; almucanth' Eβ PΥ Pδ; almucanthatrac QΥ; almucanthatrach Bθ Cι Kθ Pτ Wβ; almucanthatrat Eδ Fα Mα Oζ Oι Oτ Oυ Pθ Sκ; almucanthatrach Bβ BΥ Bζ Cη DΥ Eο Eρ Eτ Fζ Lβ LΥ Lε Lη Mη Mλ Mo Mυ Mφ Oξ Pμ Pυ Pσ Qβ Qδ Qλ Rα Sδ Vι Vυ Vξ Vπ Wι Wμ Xα XΥ; almucantherath Oφ; almucantorath Pξ; almucantrath Gα Mτ; almucanthatrach Vφ Xδ; almucanthatratz Dη; almucanthatrat Wα; almu^{rath} Pι; almuscan^{arat} EΥ; almuscantarath Pβ; almutantarach Mυ; almutantaraz Vυ; almutantherath Mι NΥ; almutanthat CΥ; almutanthatrat Vφ; almuth Bε; al'tarat Kα
- vide] add. quid Qη differentiam] illeg. Nα; add. utriusque Mτ Qζ differentiam ... inter₂] quid denominatur per unius Qη numeri] marg. Mτ Sβ; interlin. Kε; om Bδ(lacuna) Bη Bι DΥ Eδ Eλ Eτ Mλ OΥ Vυ inter₂] om. Eο Oι; in Cι
- 8-9 vide ... almucantarath] om. Bζ Dε Oχ PΥ Vτ
- 8-16 Et ... superius] rewritten in 68 lines Cα (ff. 50^v-51)

And if it has fallen between two almucantars, observe the difference of the number between

almucanthatrat precedentem et altitudinem solis, et denomina ipsam differentiam de

- 9 almucanthatrat] abumitantarach Sι; almi~ Oβ; almicact^{am} Qζ; almicantarath Pσ;
 almicantaraz Bκ Cδ Eμ Oη; almicantharath Eζ; almicanthrat Wλ; almicantrat Kδ;
 almicatharat Pο; almichancarach Mγ; almichanth Lκ; almihanth Bε; almikrouth~ Qη;
 almcnc^{raz} Lζ; alm^{trat} Kε; almuc' Mπ; almucan Pφ; almucancarach Sη; almucancarath Pα Vρ;
 almucan^{rath} Eτ; almucant' Eβ Lη Lμ Qα Qθ; almucantar' Oσ; almucantarach Bδ;
 almucantarach Qι; almucantarak Rγ; almucantarath Bη Eκ Λλ Pζ Qε Vγ Wθ Zα;
 almucantarath Bι Eα Eλ Eη Fβ Fζ Kδ Lδ Mδ Oγ Pξ Pρ Pσ Pυ Qγ Sβ Sλ Vα Vβ Vψ;
 almucantaraz Cζ; almucant^{az} Sθ; almucanterahz Oν; almucanterath Nα Oφ; almucanth
 Kθ Lβ; almucanth' Cι Fα Oζ Pδ; almucanthatrach Bθ Pτ Vξ Wβ; almucanthatrat Eδ Mα Oι
 Oτ Pθ Sκ; almucanthatrach Bβ Bγ Cη Dγ Eο Eρ Eυ Lγ Lε Mη Mλ Mo Mυ Mφ Oξ Pμ Pν
 Qβ Qδ Qλ Qμ Rα Sδ Tδ Vι Vπ Wι Wμ Xα Xγ; almucanthatrach Gα Mτ; almuchantar' Dη;
 almuchantarath Xδ; almuchanthorath Wα; almuchatarath Oυ; almu^{rath} Pι Vν;
 almuscantarach Pβ; almut Dδ Eγ; almutantarach Mν; almutantaraz Vν; almutantrat Cγ;
 almutantherach Mι Nγ; almuthanthatrat Vφ precedentem] *om.* Gα; presentem Oγ
 et₁ ... solis] *om.* Mν Vν; in sequentem Qη altitudinem] *eo altitudinem* Rα; *add.*
 gradus Eκ; altitudinem solis] almicantrat sequentem Kα solis] *om.* Bζ Bη Bθ Bι Bκ
 Cγ Cδ Cζ Dγ Eγ Eδ Eζ Eμ Eο Eρ Eυ Lζ Λλ Mα Mγ Mι Mλ Oβ Oη Oν Oσ Oφ Oχ Pζ Pμ
 Qα Qε Qμ Rα Sβ Sθ Sλ Vα Vβ Vγ Vξ Vρ Vυ Wθ Xα; *interlin.* Sι; *add. one-line gloss* Cζ
 denomina] denominabis Eο Mλ Vτ; nomina Pυ; nota Mι Nγ ipsam] *om.* Bβ Cη
 Pγ Rγ; *interlin.* Wι; *illam* Bγ(*interlin.*); *add. and del.* *illam* Eζ differentiam] *om.* Eζ Mδ
 Mν; *add. inter* Bε Eη Xγ; *add. interlin.* graduum Wι de] *om.* Wθ; et Cγ Pν
- 9-10 altitudinem ... longitudinem] *om.* Mπ de ... longitudinis] *om.* Dδ; graduum Cζ;
 ipsum Dδ; vel usque numerum(?) Differentiam de numero altitudinis Qη

the preceding almucantar and the altitude of the sun, and compare this difference with

10 numero longitudinis almucanthat, quod est 6 si almucanthat continet 6

- 10 numero] *add.* graduum Bη longitudinis] *illeg.* Lμ Mα Nα; altitudinis Cι Mλ Mτ Qβ Vξ Sδ Vτ; altitudinis *corr. in marg. to* longitudinis Vυ; graduum Eμ Oη; illius Eγ; magnitudinis Xγ; unius Cγ Lλ Mι Nγ Oχ Pζ Qε Sβ(*add. in marg. longitudinis*) Sθ Vγ Wθ; *add.* ab Pq; *add.* et Sκ almucanthat₁] alimutantarach Sι; almicant^{am} Qζ; almicant~ Oβ; almicantarath Eζ; almicantaraz Cδ Oη; almicanthatrath Pο; almicanthatrath Wλ; almicanthatrath Kα; almichancarach Mγ; almichanth Lκ; almi^{rath} Pσ; almi^{raz} Bκ; almith Qη; alm^{trat} Kε; almu Pφ; almu^{ant} Eγ; almuc' Mπ; almucancarach Sη Vq; almucancharath Pα; almucanrath Vτ; almucant Εκ(*cut off*); almucant' Eβ Lη Lμ Oζ Qα Qθ Rγ; almucantarach Bδ Bθ; almucantarah Qι Qμ; almucantarat Bη Lλ Oχ Pζ Sλ Vγ Qε; almucantarath Bι Eα Eλ Fβ Kδ Lδ Mδ Oγ Qγ Qδ Sβ Vα Vβ Vν; almucantaraz Cζ Eμ Oσ; almucant^{az} Sθ; almucanterath Nα Ov Oφ; almucanth' Cι Fα Lβ Mλ Pγ Pδ; almucanthatrath Dη; almucanthatrath Pτ Wβ; almucanthatrath Eδ Fζ Mα Sκ; almucanthatrath Bβ Bγ Bζ Cη Dγ Eγ Lγ Lε Mο Mυ Mφ Oι Oξ Oτ Pμ Pν Pq Pv Qβ Qλ Rα Sδ Tδ Vξ Vπ Wι Wμ Xα Xγ; almucanthatrath Gα Mτ Pξ; almucath Eη; almuch Kθ; almuch' Pθ; almuch'a~ Eο; almuchantarath Ov Vψ; almuchanth Cε; almuchanthatrath Xδ; almuchanthatrath Vι Wα; almuc^{raz} Kζ; almu^{rath} Eτ Pι; almuscantarach Pβ; almut Dδ; almutantarach Mν; almutantaraz Vυ; almutanthatrath Mι Nγ; almutanthatrath Cγ; almuth Bε; almutanthatrath Mη; almutanthatrath Vφ; almutanthatrath Eο quod] qui Bη Cγ Eμ Mι Nγ Oη Pζ Vπ quod ... almucanthat₂] *marg.* Pο quod ... continet] *om.* Xα 6₁] sex / vi some; sextum Wβ; *illeg.* Vψ; 16 Wθ; 60 Eυ; idem Sλ; *add.* gradus Bγ(*interlin.*) Bη Bθ Eλ Eυ Kα Lζ Ov Qδ Sη Vq Vπ; *add. and del.* gradus Pι; *add.* quod Sη; *add.* scilicet Cδ Cζ Bη Bθ Bκ Eμ Eν Nα Oη Oι(*interlin.*) Ov Oσ Pζ(*marg.*) Vυ 6₁ ... continet] *om.* Mο Pυ si] *om.* Bδ Wβ; id est si Eυ almucanthat₂] alimutantarach Sι; almicant^{am} Qζ; almicantarath Pο(*marg.*) Pσ; almicantaraz Cδ Oη; almicanthatrath Wλ; almicanthatrath Kα; almichancarach Mγ; almichanth Lκ; almi^{raz} Bκ; almith Qη; alm^{trat} Kε; almu Pφ Xδ; almuatharath Eζ; almuc' Fα Mπ; almucan^{ath} Qμ; almucanc' Sη; almucancarach Vq; almucancharath Pα; almucanrath Vτ; almucant' Eβ Lη Lμ Oζ Qα Qθ Rγ; almucantarach Bδ Bθ; almucantarah Qι; almucantarat Bη Εκ Pζ Zα; almucantarath Bι Bζ Eα Eλ Fβ Kδ Lδ Mδ Oγ Oι Pξ Qδ Sβ Vα Vβ Vν; almucantaraz Cζ Eμ Oσ; almucanterath Ov Oφ; almucanth Eη Lβ; almucanth' Cι Mλ Pγ Pδ Pθ; almucanthatrath Dη; almucanthatrath Wβ; almucanthatrath Eδ Fζ Sκ; almucanthatrath Bβ Bγ Cη Eγ Lγ Lε Mυ Mφ Oξ Oτ Pν Pq Qβ Qλ Rα Sδ Tδ Vι Vξ Vπ Wι Wμ; almucanthatrath Gα Mτ; almuch Kθ; almuch'a~ Eο; almuchantarath Ov Vψ; almuchanth Cε; almuchanthatrath Wα; almuc^{raz} Lζ; almu^{rath} Eτ Pι Qγ; almuscantarach Pβ; almut Dδ; almutantarach Mν; almutantaraz Vυ; almuth Bε Dγ; almutanthatrath Vφ; almutanthatrath Mη; *add.* quod est sex Pγ continet] *om.* Eδ Eζ Gα Mν Pζ Pο Rα Sβ; contineant Oη Sι Vα Vυ; contineat Oφ Qμ; sit Qη 6₂] sex some; unum Vτ
- 10-11 quod ... gradus₂] *illeg.* Oβ si ... 6] *om.* Xγ si ... 3₁] *om.* Pτ si ... gradus₂] *om.* Nα 6₂ ... continet] *marg.* Pι
- 10-12 si ... 3] *marg.* Sβ si ... aliis] *om.* Cγ Eγ Lλ Mα Mι Mγ Nγ Oχ Qε Sλ Vγ Wθ; *marg.* Pζ

the longitudinal number² of the almucantar, which is six if the almucantar comprises 6

² I.e., the number of longitudinal degrees between each pair of almucantars.

gradus et 6 gradus; quod si almucantarath contineat 3 gradus et 3, denomina partem

- 11 gradus₁] *om.* Mv Mφ Qα Vι Wα; graduum Gα; signa Fζ Qι et 6 gradus] *om.* Bβ Bε Bζ Bη Bθ Bι Cζ Dγ Dη Eη Eλ Eμ Eο Eρ Ev Kα Kδ Kε Kθ Lδ Lμ Mγ Mλ Mτ Nα Oγ Oζ Oη Oφ Pζ Pμ Pρ Pφ Qγ Qζ Qη Qθ Rγ Sη Si Vβ Vν Vξ Vπ Vρ Vτ Wβ Wλ Xδ Zα; *del.* Sκ Vφ gradus₂] *om.* Bγ Cη Eτ Pγ Pι Wι quod] et Dγ Rγ; ne Vρ; vel 3 Qη quod si] *om.* Lε Mπ Tδ; *add. in marg.* “Quod si almucantarath” usque ad litteram exclusuram “Postea scito motum almuri” est addita tamen utilis et bona Vβ quod ... 3₁] *marg.* Eζ(*later hand*) quod ... 3₂] *om.* Qζ Vξ; 3 gradus Kα; et si contineat 3 Mλ; et si 3 gradus Bδ Bε(*add. et cetera*) Cε Cι Eα Eβ Eδ(*om. si*) Eη Fα Fζ Kδ Kε Lβ Lδ Lε Lη Lκ Lμ Mδ Mη Mo Mv Nφ Oγ Oζ Oι Oξ Oτ Ov Pα(*add. interlin.* almucancharat contineat) Pβ Pδ Pθ Pv Pρ Qγ Qδ Qθ Qi Qλ Sη Sκ(*add. in marg.* continet) Vι Vφ Vψ Wα Wμ Xδ Zα; et si 3/tres Mτ Pξ; et 3 Mv; et 3 gradus Eζ Eλ Pο Pv Rα Sβ Xα Xγ; et 3 gradus et 3 gradus Qμ; si vero 3 gradus Eρ; vel 3 gradus Vτ si] *om.* Oβ almucantarath] *illeg.* Nα; abimutantarach Si; almichancarach Mγ; almicantarath Cδ; almicantaraz Oη; almith Qη; almi^{raz} Bκ; alm^{raz} Lζ; almu^{atath} Eτ; almuc^p Eζ(*later hand*); almucan Pφ; almucancarath Vρ; almucant’ Qα Rγ; almucantarath Bη Eκ Pζ; almucantarath Bζ Bθ Bι Fβ Vα Vβ; almucantaraz Cζ Oσ; almucanterath Oφ; almucanteraz Ov; almucanth’Pγ; almucanthar’ Dη; almucantharach Wβ; almucantharath Bγ Cη Ev Lγ Qβ Tδ Vπ Wι; almucantharaz Eμ; almuch Kθ; almucha’ Eο; almu^{rath} Lε Pι Sδ Vν; almut Dδ; almutantaraz Vν; almuth Bβ Bε Dγ almucantarath ... 3₁] *om.* Kα contineat] contineant Cζ Pζ Pι Vα; continet Vν; sit Qη; *add. et si* Tδ 3₁] *interlin.* Bγ; sex Vα et 3₂] *om.* Bη Bι Bκ Dη Fβ Kα Kθ Lγ Lδ Mπ Oβ Pζ Pι Qβ Qη Rγ Sδ Vα Vρ; et si 3 Nα; *add.* gradus Cδ Cζ Dγ Bζ Bθ Eζ Eκ Eμ Eο Ev Lζ Mγ Mλ Nα Oη Ov Oσ Oφ Pτ Pφ Vβ Vν Vπ Vν; *add.* numerus quibus possunt almicantaraz cressere Oη 3₂] tres some denomina] denominabit Eο Mλ Oφ Pφ Vν; denominabut Dγ; nomina Kα; *add. half-line gloss* Cζ

degrees and 6 degrees; but if the almucantars comprise 3 degrees and 3, compare the part

illorum de 3; et sic de aliis. Postea scito motum almuri ab initio primi almucantharat

- 12 illorum] illam Eα; illarum Cδ; ipsorum Bθ Kε Qζ Vπ; istorum Vξ de 3] *om.* Eλ
 3] tribus/3^{bus} *some; add.* gradibus Dη Kε et ... aliis] *om.* Sβ sic de aliis] *illeg.*
 Bη Lμ Rγ Vφ; aliis Vι; *marg.* [cut off] de aliis Mτ; cetera Bε Kα Zα; de aliis Eν Pι; et tribus
 Bβ; *add.* numerus quibus possunt almicantaraz crescere Cζ; *add.* half-line gloss Cζ
 Postea] Deinde Eκ scito] cito Eσ; scias Qη; *add.* introytum id est Cγ; *add.* in
 t^uiiiia Eγ scito ... almucantharath] *om.* Kα motum] *om.* Kδ; gradum Kε Lμ Mτ
 Qζ; motu Rγ; *add.* quod in limbo describit movendo ipsum gradum solis ab initio
 precedentis almucantharat ad eius finem et Bζ almuri] *om.* (*i.e., lacuna*) Bδ; albmuri
 Sι; almmuri Oβ; almurei Mν; almury Lδ; *add.* interlin. id est denticuli Oι initio] fine
 Dγ Mλ Vτ; *add.* id est que est tota in denominatione illorum graduum quos pertransunt
 almuri in motu suo ab inicio Oη primi] *om.* Eλ Nα; 1ⁱ Lμ; precedentis Dγ Mλ Vτ
 almucantharat] alm^{at} Bη Kε; almicant^{am} Qζ; almicantarath Pσ; almicantaraz Cδ Oη;
 almicantharath Eζ Pο; almicanthrat Wλ; almichancarach Mγ; almichanth Lκ; almi^{raz} Bκ;
 almit~ Oβ; almitantarach Sι; almith Qη; almuc' Mπ Oζ; almucan^{ath} Qμ; almucancarach Sη;
 almucancarath Vσ; almucancharath Pα; almucanrath Vτ; almucan^{raz} Oν; almucant' Fα Lη
 Lμ Qα Qθ; almucantar~ Sβ; almucantarach Bδ Bθ Pτ; almucantarach Qι; almucantarak Rγ;
 almucantaras Nα; almucantarath Lλ Oχ Pζ Qε Sλ Vγ Wθ; almucantarath Bζ Bι Eα Eλ Fβ
 Gα Kδ Lδ Mδ Oγ Oυ Pξ Pφ Qγ Vα Vβ; almucantaraz Cζ Eμ Lζ Oσ Sθ; almucanth' Cι Dγ
 Eβ Eη Lβ Mλ Pγ; almucanthar' Dη; almucantharach Wβ; almucantharat Eδ Fζ Mα Oτ Pυ
 Sκ Zα; almucantharath Bβ Bγ Cη Eσ Eν Lγ Lε Mο Mυ Mφ Oι Oξ Pδ Pμ Pν Pρ Qβ Qδ Qλ
 Rα Sδ Tδ Vι Vν Vξ Vπ Wι Wμ Xγ; almucantrath Mτ; almuc' ath Xα; almuch Kθ; almuchan
 Xδ; almuchantarath Vψ Wα; almuchanth Cε; almuchantharat Pθ; almucha^r Eο; almu^{rat}(?)
 Eγ; almu^{rat} Eτ Pι; almuscantarach Pβ; almut Dδ; almu^{ta} Oφ; almutantarach Mν;
 almutantaraz Vυ; almutanterach Mι; almutantherach Nγ; almutantrat Cγ; almuth Bε;
 almuthanth' Mη; almuthantharat Vφ; *illeg.* Eκ; *add.* In quo est altitudo Oβ Pμ; *add.* interlin.
 in quo est altitudo [*illeg.*] Pα

of them with three, and so for the others. Then observe the movement of the indicator-muri from the beginning of the first almucantar

usque ad initium secundi de gradibus marginis; et pone super illorum partem denominatam ab eis, secundum proportionem differentie dicte, ex 6 vel de 3

- 13 ad] *om.* Eζ; *add.* finem eius inter gradus marginis et pone almuri super partem illorum et cetera usque ad Pμ [initium] numerum Cγ et ... partem] et super rem illorum pone *illeg.* Eη [secundi] 2ⁱ Lμ; *illeg.* Nα; id est secundus Bι(*interlin.*); sequenti Eλ Vτ; *add.* almucanthat Zα; *add.* almuri his(?) contrat Kα; *add.* gradus Qη; *add.* quota sint ipsa differentia numeri primi almicantaraz usque ad initium secundi Oη [de] *om.* Eα Mν Po; in *corr.* to de Eζ [gradibus] gradus Mν Oφ; gradus *corr.* in *margin.* Mτ; gradus altitudinis Eα; *add.* in Mι [marginis] magnis Pφ Vι; marginibus Wβ; *add.* id est limbi Kθ Lδ Oγ; *add.* *one-line gloss* Cζ [pone] *twice* Qι; *add.* almuri Cζ Eμ(*interlin.*) Eλ Kδ Oβ Oη Pθ Rγ Vτ; *add.* id est almuri Qζ; *add.* scilicet almuri Bθ Ev Vπ; *add.* notam Bδ Be Dη Eβ Fa Fζ Kα Kε Lβ Lγ Lδ Le Lη Lκ Lμ Mδ Mo Mπ Mτ Mν Mφ Nα Oγ Oζ Oι Oξ Oτ Ou Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Sη Si(*margin.*) Tδ Vι Wα Wμ Xδ Zα [super] si per Bδ; *add.* eos Dγ Mλ Oφ(*interlin.*) [illorum] *illeg.* Nα; eorum Ev; illam Mδ; ipsorum Mτ; istorum Qζ Vξ; *add.* graduum Lδ Oγ [partem] notam Dδ; *add.* illorum Eρ; *add.* pone numerum Fβ; *add.* *interlin.* id est almuri Kε; *add.* *interlin.* notam Qη; *add.* *two-line gloss* Cζ
- 14 ab eis] et aleis Vτ [eis] eius Pγ; *add.* gradibus Mν Vι [secundum] *add.* differentiam Xα [proportionem] *add.* diem Oβ [differentie] *rep.* Eλ [dicte] *om.* Mα Pι; denotate Qα; predictae Cγ Lγ Mι Nγ Oχ Pζ Qε Sβ Sθ Vα Wθ [ex] de Bζ Bη Cζ Ek Eλ Eμ Eo Kε Mγ Pφ Qζ Qη Vν Vξ Vτ; in Oχ; *corr.* to de Wι [6] sex / vi *some* [vel] idem Oφ Pφ Sι [de] *om.* Bι Cι Kδ Oβ Oγ Pθ Qα Qη Qμ Vα Vν Xδ; ex Bθ Dδ Pι Vπ Vρ [3] tribus / 3^{bus} *some*
- 14-15 vel ... gradibus] *om.* Cγ Eγ Lλ Mα Mι Nγ Oχ Pζ Qε Sθ Sλ Vγ Wθ; *interlin.* Sβ; *illeg.* Rγ (*damaged*)

as far as the beginning of the second [almucantar] along the degrees on the margin, and place on the part of them compared with them,³ according to the proportion of the said difference, from 6 or from 3

³ If the sun's altitude falls between two almucantars, place the sun's position for that day on each of those two almucantars and note the positions of the indicator-muri along the rim. Divide that arc along the rim according to the proportion of the sun's altitude to (or between) the two almucantars, place the muri on that point of division, and then the sun will be in the correct position for reading off the time.

degrees; and then you will have the exact degree between the two almucantars; and then consider

eas horas et cetera, sicut dictum est superius.

Si⁴ illud idem in nocte scire desideras, accipe altitudinem alicuius stelle in

- 16 eas] *om.* Cγ Dγ Eγ Eλ Kα Kθ Lλ Mα Mγ Mι Mλ Nγ Ov Oχ Pζ Pt Qε Sβ Sθ Vγ Vν Vυ Wθ; has Mτ; illas Cε eas horas] eam horam Cζ Eμ Oη; *add.* supra quam cecederit gradus solis vel nadir gradus solis et illa est presens hora diei vel noctis Oη et cetera] *om.* Bβ Bη Dγ Dη Kδ Mυ Oβ Pt Qη Vν Vξ Vυ Vψ Xγ; astedece (?) Eλ; et est Eα cetera] *om.* Gα Mγ Mλ Oξ Qθ; alius Vτ; *add.* 32 line gloss Cζ sicut] *illeg.* Bη; ut Ek est] *om.* Vq; *add.* tibi Dγ Mγ Mλ Vν superius] *om.* Bκ Gα Mι Nγ Vγ; prius Eρ Oσ Qα Vυ Zα; prius superius Vπ Vτ
- 17 before Si] *add.* AD HABENDUM HORAM ET ASCENSIONEM SIVE ASCENDENTEM PER STELLAS IN NOCTE Vξ; *add.* AD HABENDUM HORAM VEL ASC[END]ENS IN NOCTE PER STELLAS Mλ; *add.* AD HABENDUM HORAS ET ASCENDENS IN NOCTE PER STELLAS Eρ; *add.* AD INVENIENDUM HORAS ET ASCENDENS IN NOCTE PER STELLAS Eo Gα; *add.* AD INVENIENDUM HORAS ET ASCENSIONES IN NOCTE PER STELLAM Mγ; *add.* DE EODEM IN NOCTE Mι Nγ Pζ Vβ; *add.* DE PREDICTIS IN NOCTE Vγ; *add.* 5. DE PREDICTIS INVENTIONE Lλ; *add.* DE SCIENDE PROPORZIONE IN ALTITUDINIS IN NOCTE Dγ; *add.* ITEM DE EODEM IN NOCTE Oχ; *add.* ITEM DE INVENTIONE ASCENDENTIS PER STELLAS FIXAS IN RETHI POSITAS DE NOCTE CERTITUDINALITER. Oφ Si] *om.* Cγ Oχ; Et Oβ; Sed Oη Xα; Sed si Oσ; *add.* etiam Eλ; *add.* vero Cδ illud] *om.* Ov Pι; istud Cα Vυ illud idem] i^d Wλ idem] *om.* Gα Lδ Oγ; *interlin.* Sβ; *add.* etiam Bζ Bη Bκ Cζ Eμ Eo Lζ Lλ Mα Mγ Oη St Vα Vυ; *add.* facies Cγ in₁] *om.* Wι; de Dδ Ek in nocte] *marg.* Qθ; *add.* etiam Wθ; *add.* si Cγ scire] videre Wθ scire desideras] consideras Pτ; queras Ek desideras] consideras Kα Mo; volueris Cδ Lβ Pβ accipe] tunc Pι; *add.* id(?) Bε alicuius] *om.* Sλ; ipsius(*expunged*) Pν; *add.* gradus Vτ stelle] *marg.* Sκ; *add.* fixe Bζ Bη Bθ Bι Bκ Cα Cγ Cδ Cζ Dγ Eγ Ek Eλ Eμ Eo Eρ Eτ Ev Gα Lβ(*marg.*) Lζ Lλ Mα Mγ Mι Mλ Mo Nα Nγ Oβ Oη Oi(*marg.*) Ov Oσ Oφ Oχ Pγ Pζ Pt Pτ Pυ Pφ Qα Qδ Qε Qη Rα Sβ Sη Sθ St Sλ Vα Vβ Vγ Vν Vπ Vρ Vτ Vυ Vφ Wθ Wλ Xα Xγ in₂] *om.* Cε

⁴ A minority of mss treat this as the beginning of a new chapter; hence the added titles in some.

these hours, etc., as was said above.

If you were to wish to know the same thing at night, take the altitude of any star marked on

alhanabuz descripte, que transit ex parte orientis vel occidentis, et pone cacumen

- 18 alhanabuz] *illeg.* Xγ; abmimatantarach(?) Sι; ailancabut/allancabut Vγ; alaantibuz Pζ;
 alacantabuz Sλ; alahantabuth Oβ; alancabud Eκ; alancabut Eγ Mα Mγ Mλ Qα;
 alancabuth Oη Vβ; alancabuut Wθ; alanca•cabut Sη; alanchabuch Dγ; alanchabuth Eμ;
 alanctabuz Cδ; alangabut / alanganbut Vα; alantabur Bκ Cα; alantabut Bζ Eο Mι Nγ Vν
 Vυ; alantabuth Bθ Cζ Eα Vπ; alantabuz Bδ Dδ Lζ Lη Oι; alanthabut Bη; alanthabuth Qη;
 alanthabuz Cγ Oσ; alcantabuth Qδ; alcatabuth Bι; alcuthabuth *corr. in marg. to*
 alahancabut Vφ; alencabuth Mο Pτ Pυ Rα Vρ Xα; alentabuch Eρ; aletabuch Vτ; alhanbuth
 Pγ; alhancabuch Oν; alhancabutz Qι; alhancabuz Cε; alhanchabuch Kθ; alhankabuth Mτ
 Pι; alhanab^t Fα; alhanabm Pρ Vψ; alhanabur Pν; alhanabus Wλ; alhanabut Oχ;
 alhanabuch Wβ; alhanabuth Bγ Dη Eδ Eζ Eλ Eυ Kδ Kε Lβ Mν Pο Qζ Qμ Vξ Wι Zα;
 alhanabut/z Pα; alhanabuz Bε Eβ Eη Fβ Fζ Lγ Lδ Lε Lμ Mδ Mυ Mφ Oγ Oζ Oξ Oτ Oυ
 Pβ Pθ Pμ Pξ Pσ Qβ Qγ Qθ Qλ Tδ Vι Wα Wμ; alhanabuz Mπ; alhanthabuth Bβ Cη Eτ;
 alhanthabuz Cι Mη Pδ Sκ; allaancabut Qε; allancabunt Sθ; allancabut Lλ Sβ; allancabuz
 Sδ; almicabuth Gα; alphanabuz Kα; halantabut Oφ; halhanabut Xδ; almichanth Lκ;
 almucantarath Pφ; aranea Nα; *add. interlin. illeg.* Sη; *add. et rethi* Oβ; *add. id est aranea* Oι;
add. id est rethi Bβ Bη(*interlin.*) Fβ(*interlin.*) Kθ(*interlin.*) Mπ(*interlin.; rete*) Qι Vβ(*interlin.*)
 descripte] *om.* Cζ Eμ Oη; describe Mυ Mφ Vι; *add. ex(in Dη) parte illa* Bδ Dζ Dη Eβ
 Eη Fα Fβ Fζ Kα Kε Lβ(*and del.*) Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mτ Mυ Mφ Oγ Oι Oξ Oτ Oυ
 Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qη Qθ Qι Qλ Sδ Tδ Vι Wα Wμ Xα que] qua *some*;
 quo *some*; qui Sκ que transit] *om.* Dγ Eλ Mλ Vν Vτ; *add. interlin. scilicet* Oι ex]
 in Pρ orientis] *add. si est ante medium noctem* Kα vel] et Cγ Eδ; *add. ex parte*
 Bδ Bε Bζ Dδ Dη Eβ Eη Eμ Fα Fβ Fζ Kα Kε Lγ Lδ Lε Lη Lκ Lμ Mπ Mτ Mυ Mφ Oγ Oζ Oη
 Oι Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Tδ Vι Wα Wμ Xδ Zα
 occidentis] *add. si post* Kα cacumen] accumen Nα Vτ; acumen Cδ Dγ Mλ Wα;
 alumen Eλ; cacmum Eο(*and add. in marg. al' cacumen*)

the hantabuz [i.e., rete] which crosses from the east or the west, and place the cacumen [i.e., tip of the star-pointer]

ipsius stelle in almucanthatrat sue altitudinis, et gradus solis indicabit tibi horas noctis,

- 19 ipsius] *illeg.* Mγ; *om.* Cγ Dη Eγ; illius Bβ Bγ Bθ Cα Cδ Cη Dδ Eτ Eυ Kε Kθ Lδ Mι Mπ Mτ Oγ Oν Oφ Pγ Pμ Pφ Qδ Rα Sη Sλ Vξ Vπ Wβ; istius Oβ; ius [= illius *or* ipsius] Vι
 ipsius stelle] *om.* Bη Cζ Eμ Oη stelle] *om.* Kα; *marg.* Mτ; *add.* fixe Qμ; *add.* in
 altitudinem Kθ almucanthatrat] *illeg.* Nα; alm^{at} Kε; almicant' Oβ; almicantarath Pσ;
 almicantaraz Bκ Cδ Oη; almicanterth Oν; almicanthatrat Po; almicanthatrat Wλ;
 almicanthatrat Kα; almicanthatrat Mτ; almicanthatrat Eζ; almichancarach Mγ; almichanthat Lκ;
 almi^{ctam} Qζ; almitantarach Sι; almith Qη; almu Bη; almuc' Mπ Pθ Sκ; almucancarach Sη;
 almucancarath Vο; almucanthatrat Vτ; almucant' Eβ Fα Lβ Lη Lμ Qα; almucantar~ Sβ;
 almucantarach Bθ; almucantarath Eκ Lλ Oχ Pζ Qε Qθ Sλ Vα Vγ Wθ; almucantarath Bδ Bζ
 Bι Eα Eη Eλ Eο Eυ Fβ Fζ Kδ Lγ Lδ Mδ Oγ Oι Oυ Pξ Pφ Qμ Vβ Vπ; almucantaraz Oσ Sθ;
 almucanthatrat Cα; almucanthatrat' Cι Dγ Mλ Oζ Pγ Pδ Vι; almucanthatrach Pτ Wβ;
 almucanthatratz Dη; almucanthatrat Mα Pυ Zα; almucanthatrat Cη Mo Mυ Mφ Oξ Oτ Pα
 Pμ Pν Pο Qβ Qδ Qι Qλ Tδ Vν Vξ Wι Wμ Xα Xγ; almucanthatrat Eδ; almucanthatrat Gα;
 almuchantarath Vψ Xδ; almuchantaraz Eμ; almuchant'at Lε; almuchanthat Kθ;
 almuchanthatrat Wα; almuchara^t Eο; almuc^{rath} Pι; almuc^t Cε; almu^{rat} Eγ; almu^{rath} Eτ Qγ
 Rα Sδ; almu^{raz} Lζ; almuscantarach Pβ; almut Dδ; almutantarach Mν; almutantaraz Vυ;
 almutanterach Mι Nγ; almuth Bε Oφ; almuthantarath Bβ Bγ; almuthanthat' Mη;
 almuthanthatrat Vφ; almutrantar Cγ; *add.* ca't Lμ sue] illius Mπ; *illeg.* Zα sue
 altitudinis] *add.* accepte Mo; *add.* accepte per regulam in dorso matris Bδ Bε Dδ Dη(*om.*
 matris) Eβ Eη Fα Fβ Kα Kε Lβ Lγ Lδ Lε Lη Lμ Mδ Mπ Mφ Oγ Oζ Oι Oτ Oυ Pα Pβ Pμ Pο
 Pσ Qβ Qγ Qδ Qζ Qθ Qλ Sκ(*marg.*) Wα Wμ Xδ; *add.* accipe in dorso matris Mτ; *add.* accipe
 per regulam in dorso matris Mυ Pν; *add.* in *marg.* si vero fuerit in medio celi stella illa
 dimittes eam Oσ gradus] gradibus Oχ solis] *om.* Eο Oυ Pι Vφ; *add.* et ipse Mτ
 indicabit] ostendit Pι tibi] *om.* Eκ Vν Vο; *add.* gradus solis Cα horas]
 hora seu horas Kα; *add.* inequales Cα
- 19-20 noctis ... horas] *om.* Wθ

of this star on the almucantar of its altitude, and the degree of the sun will indicate to you the hours [or hour] of the night,

20 sicut nadir eius horas diei; de aliis fac omnibus, ut dictum est superius.

20 sicut] *om.* Pγ; *twice* Σκ nadir] gaudair Σκ; gnadair Cι Mη Pδ Pθ; gnadayr Vψ; gnadir Dδ Mπ; nadair Bι Dη Eα Eβ Eδ Eμ Eτ Eυ Fα Fβ Lβ Lγ Lε Lζ Lη Mν Mφ Oζ Oι Oν Oξ Pα Pμ Pν Pξ Pο Pσ Pυ Qα Qγ Qλ Qμ Sδ Sη Vβ Vι Vν Vπ Vρ Xγ; nadayr Bγ Cδ Fζ Oσ Pγ Pτ Qβ Qδ Tδ Wι Xδ; nadayz Cη; nadire Vα; nardir Bδ Mι Nγ; nadyr Cα Mδ Oφ Pι Qη Qθ Vξ Vφ Wλ; nazare Mυ; vadair Mγ; vadir *corr. in marg. to gnadair* Wα; *add. in marg. id est oppositum* Oυ eius] *om.* Oν Wλ; *interlin.* Cδ; eiusdem Dη horas] hora Vρ; *interlin.* Bγ Oι Wβ; *om.* Bβ Bδ Bε Cι Cε Cη Dδ Eα Eβ Eδ Eζ Eη Eτ Fα Fβ Fζ Kα Lβ Lγ Lδ Lε Lη Lμ Mδ Mη Mλ Mν Mο Mπ Mυ Mφ Nα Oγ Oζ Oξ Oτ Oυ Pα Pβ Pγ Pδ Pθ Pμ Pν Pξ Pο Pρ Pσ Pτ Pυ Qβ Qγ Qδ Qθ Qι Qλ Sδ Sη Σκ Tδ Vι Vψ Wα Wι Wμ Xγ Xδ Zα; *add. inequales* Cα horas diei] *illeg.* Kθ diei] *om.* Bβ Eκ Eο; dies Eμ; in Qμ; *add. id est si ceciderit cacumen stelle inter duos(duas Oη) almucantaraz(almicantaraz Oη) equabis sicut prius* Cζ Eμ(*interlin.*) Oη; *add. et non tuum indicabit tibi gradus solis horas inequales noctis sed etiam equales* Cα aliis] illis Wθ; *add. autem* Cα; *add. etiam* Bη Bθ Bκ Cζ Eμ Eτ Eυ Lγ Mα Mγ Mι Oχ Pζ Qα Qε Sβ Sλ Vα Vβ Vγ Vν Vπ Vυ Wθ; *add. etiam diebus* Eγ; *add. etiam horis* Dγ Mλ aliis ... omnibus] de partibus horarum fac Pι fac] *om.* Bε Eη Eκ Eρ Vι; *illeg.* Sι; facies Bκ; sit Bι fac ... superius] *om.* Vρ omnibus] *om.* Dγ Eκ Fβ Gα Mλ; etiam diebus Cγ; etiam horis Oφ Pφ Vτ; horis Mγ Sι Vν; otum(?) Bδ ut] *om.* Mπ ut ... superius] *illeg.* Vι; isto modo Bκ; sicut de in superius est Bθ Kθ; sicut dictum est Mι Nγ Wβ; sicut dictum est superius Bζ Bι Cα Cδ Cε Cι Eλ Eο Eρ Lλ Mα Mγ Mη Mλ Mο Oσ Oφ Oχ Pδ Pθ Pι Pτ Pυ Pφ Qα Qδ Qε Sβ Sθ Σκ Vα Vβ Vγ Vν Vπ Vτ Vυ Vφ; sicut dictum est in superioribus Bβ Bγ Cη Dγ Oν Pγ Wι; sicut dictum est prius Wθ; sicut dictum superius Bι Kδ Pζ; sicut distinctum est superius Mν Pο Qμ; sicut supradictum est Lζ; sicut supra dictum est Vψ; ut dictum est Eκ Mτ(*add. sq*) Xα; ut dictum est prius Bη Cζ Eμ Oη Qη; ut dictum superius Xδ; ut predictum est superius Lδ; ut supradictum est Cγ Eγ Oγ; *add. x a Po; ms Qα ends*⁵

⁵ Ms Qα jumps to Cap. 37.

just as its nadir [showed] the hours [or hour] of the day; for all others do as was said above.

[Comment:

Having observed the altitude of the sun (Cap. 2) move that day's position of the sun (along the ecliptic on the rete) (Cap. 1) to the almucantar for that altitude, on the east if in the morning and on the west if in the afternoon. Lay the ruler on this point and examine the point on the ecliptic opposite to it, that is, the nadir of the sun. The time will be where the nadir lies between the unequal hour lines in the bottom segment of the astrolabe.

If the altitude lies between two almucantars, work proportionately.

The same can be done at night using the altitude of a star (if it is engraved on the rete). In this case, the position of the sun along the ecliptic (and not its nadir) will indicate the unequal hour of the night.

Note: obviously, if the sun's altitude is measured in the morning, the sign (in which the sun is that day) will be rising or ascending; and if measured in the afternoon, the sign will be setting.]

[CAPITULUM 4.] DE CREPUSCULO VESPERTINO ET MATUTINO

Cum volueris scire finem crepusculi vespertini et initium matutini, vide cum

- 1 De ... matutino] Bθ Bι Cη Eβ Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Mδ Mo Oζ Pα Pμ Qγ Qλ Tδ Vπ Vψ Xδ; *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Ev Eu Kε Lζ Lκ Mα Mτ Nα Oβ Oσ Ou Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qi Sβ Sθ Si Sλ Vα Vν Vτ Vυ Wθ Wλ Xγ; *faded* Eδ; Ad habendum finem et initium crepusculi Mλ; Ad inveniendum crepusculum Dη; Ad inveniendum crepusculum vespertini et initium(*om.* Vξ) matutini Lμ Qθ Vξ; Ad inveniendum horam crepusculi Eo Eρ Gα Mγ; Ad inveniendum horam crepusculi matutini et vespertini Bγ [*Later hand*]; De crepusculis Mι; De crepusculo Nγ; De crepusculo in altitudine et vespertino Cι; De crepusculo vespertino et matiotu(!) matutino Wα; De crepusculo vespertino et matutino (*or* matutino et vespertino) Mη Mφ Oξ Pβ Pδ Pθ Pv Pρ Pv Sδ Sη Sκ Vψ Wμ; De fine crepusculi et cetera Mπ; De fine crepusculi sequitur Qη(*l ter hand*); Capitulum 4^m. De fine crepusculi vespertini et finis Qδ; De fine crepusculi vespertini et initio matutini(*ma* Wι) Bη(*add. in marg.* Canon 4^{us}) Bι(*add. in marg.* 4^m c) Cζ Eη Eμ(*add. in marg.* 4^{us}) Kθ Lδ Oγ Oη Oτ Pζ(*marg.*)Vβ Wι; De fine crepusculi vespertini et matutini et initio Lλ; De fine et initio crepusculi vespertini et matutini Vγ; Invenio cepusculi finis matutini et inicium matutini Po Qμ; Inventio finis crepusculi et initium matutini Mυ(*later hand*) Qβ; Inventio finis crepusculi matutini initii vespertini Dγ; Inventio finis crepusculi vespertini cum mat~ Wβ; Inventio finis crepusculi vespertini et initium matutini Eζ Eτ Ov Oφ(*add. in marg.* De finem crepusculi vespertini sciendo) Rα Vι; Inventio finis crepusculi vespertini et initium matutini per lineam crepusculi per 18 almutanter Mν; Inventio finis per lineam crepusculi vespertini et matutini initii Xα; Inventio finis vespertini crepusculi et initium maturini Pτ; Modus accipiendi finem crepusculi vespertini et initium matutini Vρ; Si volueris scire finem crepusculi et matutini Bβ; *add. in marg.* 4 Qζ; *add. in marg.* 4^m Vψ matutino] meridiano Kα; *add.* Rubrica Vπ
- 2 Cum] Dum Bδ; Si Pι; *add.* autem Bκ volueris] *add.* etiam Ev Vπ finem] *om.* Vτ; *add.* gressi Eα vespertini] *om.* Dγ Pξ; *interlin.* Bε; vertini Nγ et] vel Pι Vτ initium] *om.* Lη; *marg.* Pι; *add.* crepusculi Zα; *add.* vespertini Eδ matutini] *add.* aurore Eλ; *add.* et aurore Vτ

[CHAPTER 4.] ON THE EVENING AND MORNING TWILIGHT

When you wish to know the end of evening twilight and the beginning of early morning [twilight], observe when

venerit gradus solis ad lineam crepusculi occidentalis; tunc est finis eius; et cum ad orientalem, est initium crepusculi.

- 3 venerit] eveneris Kδ; fuerit Oγ Xδ; pervenerit Cα Oσ Vυ; *add. and del.* dies Gα solis] *om.* Cι Mη Mλ Wθ ad₁] et Eο Pq; *add.* horam Bζ lineam] finem Eγ; horam Mγ; *add.* horam Eο crepusculi] *add.* circuli Eκ; *add.* vespertini sive Eλ; *add.* vespertini vel Vτ occidentalis] occidentalem Bβ; vespertini Pι; *corr. from* occidentalem Bγ; *add.* quam Bη Cζ Eμ; *add.* quare Vπ; *add.* quare esse Vτ; *add.* quia Bθ Eλ; *add.* quoniam Oη occidentalis tunc] *om.* Cα tunc] *illeg.* Xγ; *om.* Bι Bκ Cα Cγ Eδ Eο Eρ Lζ Mγ Mι Mλ Mν Mo Pγ Pζ Pο Pτ Pυ Pφ Rα Sβ Sι Vα Vβ Vq Vι Vν Vξ Vυ Wθ Wλ Xα; *interlin.* Bγ Vψ; ibi Cδ Sλ; quam tunc Cζ; quare tunc Eυ; qui tunc Wι(*marg.*) tunc est] *om.* Bζ Eζ Gα; *illeg.* Pι; erit Lλ Mα Nγ Oχ Pξ Qε Sθ Vγ; et Dγ; et erit Eγ; interem Eκ; tunc erit Oφ(*add. in marg.*) est] *om.* Pδ cum] *om.* Kα; o Pτ; venerit Pξ; *add.* venerit Bζ Cγ Dγ Eγ Eλ Eο Mγ Mλ Pδ Vξ Vτ cum ad] tunc Wλ ad₂] *om.* Fζ Xδ; *add.* lineam Eμ(*interlin*) Oη
- 4 orientalem] horizontalem Mι; lineam orientalem crepusculi Cζ; orientalis Oη; *add.* lineam pervenerit Qμ; *add.* tunc Cε Dη Eβ Eη Fα Fβ Fζ Kδ Kε Lβ Lγ Lδ Lκ Lμ Mδ Mη Mτ Mυ Mφ Oγ Oζ Oξ Oτ Pα Pδ Pθ Pμ Pν Pξ Pq Pσ Qβ Qγ Qζ Qθ Qι Qλ Qμ Sδ Sκ Tδ Vι Vψ Wα Wμ Xδ Zα; *add. interlin.* crepusculi Eμ est] *om.* Oβ; erit Cγ Lλ Mα Mι Nγ Oχ Qε Sθ Vγ; *add. interlin.* erit Vβ; *add. in marg.* al' erit Oφ est ... crepusculi] linea est initium Kα initium] *om.* Eα crepusculi] *marg.* Oι; *interlin.* Kε; *illeg.* Pξ *om.* Bδ Bε Cε Cι Eβ Eζ Eη Fα Fβ Fζ Kδ Lγ Lδ Lη Lε Lμ Mδ Mη Mν Mo Mφ Mπ Mτ Oγ Oζ Oξ Oτ Pα Pδ Pθ Pμ Pο Pσ Pυ Qβ Qγ Qδ Qθ Qλ Sδ Sκ Tδ Vι Vτ Vψ Wα Wμ Xδ Zα; et c. Eδ; *add.* matutini Bβ Dη Eτ Kθ Lκ Pι Wβ Pγ; *add.* matutine sive orientalis Sλ; *add.* occidentalis Bη; *add.* orientalis Bζ Bθ Bι Bκ Cα Cγ Cζ Dγ Eγ Eκ Eλ Eμ Eο Eρ Eυ Gα Kε Lζ Lλ Mα Mι Mλ Mγ Nγ Oβ Oη Oι(*marg.*) Oν Oσ Oφ Oχ Pζ Pτ Qε Qη Pφ Qμ Rα Sβ Sθ Sι Vα Vβ Vγ Vξ Vπ Vq Vν Vυ Vψ Wθ Wλ Xα; *add.* orientalis id est aurore Vτ; *add.* orientalis sive aurore Eλ; *add.* orientalis sive matutini Cδ; *add. illeg.* Xγ

the degree of the sun comes to the line of the western twilight; then this is its end; and when [it comes] to [the line] of the eastern [twilight], it is the beginning of [morning] twilight.

5 Vel¹ sic; vide quam nadir solis venerit ad 18 gradum almucantharat in oriente,

- 5 *before Vel] add. ALITER IDEM Cη; add. ALIUS MODUS Bβ; add. DE EODEM Sη Wι; add. DE EODEM ALITER ATQUE MELIUS Mλ; add. DE EODEM ALITER ET MELIUS. CAPITULUM Wβ; add. DE EODEM ET MELIUS ET CETERA Kθ; DE EODEM SCILICET MELIUS Pυ; add. DE EODEM SED MELIUS Bθ Pδ Vπ(add. RUBRICA); add. ITEM DE EODEM ALIO MODO ET MELIUS Vβ; add. ITEM DE EODEM ALITER Eτ; add. in marg. quod idem modus est melior Lδ Vel sic] Aliter de eodem Ov; add. in marg. Istud capitulum “Vel sic” et cetera est additum Vβ sic] om. Bζ Kα Mη; add. de eodem melius Wι; add. et melius Eλ Vξ Vτ vide quam] *illeg.* Xγ; cum Bδ Bε Cι Dδ Eβ Eη Fβ Fζ Kα Kδ Lε Lκ Lμ Mδ Mη Mπ Mτ Mφ Nγ Oγ Oζ Oι Oξ Oφ Oτ Pα Pβ Pθ Pι Pμ Pν Pξ Pρ Pσ Qβ Qγ(interlin.) Qζ Qθ Qι Qλ Sδ Sδ Tδ Vφ Vψ Wα Wμ Xδ Zα; vide cum Bζ quam] *interlin.* Pο; quando Ov Pυ Vβ nadir] gaudayr Sκ; gnadayr Cε Cι Mη Pδ Pθ; gnadayr Vψ; gnadayr Dδ; nadair Bδ Bθ Dη Eβ Eδ Eζ Ev Fα Fβ Lβ Lγ Lε Lη Mυ Mφ Oζ Oι Oξ Oτ Pα Pμ Pξ Pν Pο Pρ Pσ Pυ Qβ Qγ Sδ Sη Vβ Vι Vπ Xγ; nadar Eτ Oγ; nadayr Bγ Eα Fζ Mλ Pγ Pτ Qδ Tδ Wι Xδ; nadayz Cη; nadir *corr. to* nadair Wα; nadyr Mδ Pι Vξ Vφ; naidar Bδ; narctir Nγ; nardir Mι; gradus Mν; add. gradus Eλ solis] *om.* Cε ad] *om.* Qι 18] 18^m *some*; decimoctam Kθ; 8 Pμ gradum] *om.* Kε Oγ; gradus Kδ Lμ almucantharat] almicancrath Mτ; almicanrath Vτ; almicanaraht Bζ; almicanrarath Kδ Lδ Pξ Pσ; almicanraraz Ov; almich Kθ; almichantaratz Dη; almichanth Lκ; almi^{tra} Kε; almuc’ Mπ; almucan^{at} Vφ; almucan^{rac} Qγ; almucan^{rath} Mλ; almucant’ Eβ Fα Lη Lμ Qθ; almucantarach Bδ Bθ; almucantarath Zα; almucantarath Eα Eλ Ev Fβ Mδ Oγ Pφ Qι Vβ; almucant^{at} Qζ; almucanterath Nα; almucanth Eη; almucanth’ Lβ Oζ Pγ Pδ Pθ; almucanth’th Vι; almucanth Oφ Tδ; almucanthar’ Cι; almucantharach Wβ; almucantharat Fζ Oτ Sκ; almucantharath Bγ Cη Eτ Lε Mυ Mφ Oι Oξ Ov Pα Pμ Pρ Pτ Pυ Qβ Qδ Qλ Sδ Vξ Vπ Wι Wμ Xγ; almucantha^t Pν; almucantrat Kα; almucath Eζ; almuchanch Cε; almuchantarath Vψ Xδ; almuchantharath Wα; almu^{rat} Eδ; almu^{rath} Pι Pο; almuscantarach Pβ; almut Dδ; almutantarach Mν; almutanterach Mι Nγ; almuth Bβ; almuthanth’ Mη; almuth Bε; lalmucancarach Sη in] versus(?) Pξ oriente] *corr. in marg.* Pι; adunte(!) Vτ; occidente Vι; add. tunc Kε(interlin.) Vφ*
- 5-6 in ... almucantarath] *om.* Qζ; quia sol 15 gradus lucet ante se 2 partes Mι
- 5-7 Vel ... levis] *add. in marg.* Mλ Vφ; *om.* Bη Bι Bκ Cγ Cδ Cζ Dγ Eγ Eκ Eμ Eο Eρ Gα Lζ Lλ Mα Mγ Oβ Oη Oσ Pζ Pχ Qε Qη Rα Sβ Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Vψ Wθ Wλ Xα; *rewritten in 10 lines Cα; rewritten in marg. in 11 shorter lines by later hand Qμ*

¹ A minority of mss treat this as the beginning of a new chapter; hence the added titles in some.

Or thus: see [when] the nadir of the sun shall have come to the 18-degree almucantar in the east;

erit finis crepusculi vespertini; et cum venerit ad 18 gradum almucanthat in occidente, erit initium crepusculi matutini, quod est levius.

- 6 erit] *om.* Bδ Vπ; est Oφ Vβ(*add. interlin. erit*) Vφ; *add.* sicut Sκ finis] *corr. in marg. from* sicut Mη vespertini] *om.* Ev Oγ; *om. /space* Bδ et ... almucanthat] *om.* Qδ et ... occidente] *precedes 5-6* (vel ... crepusculi) Ev 18] 18^m *some*; decimocto Pσ; 16 Pρ; 19 Qθ cum ... almucanthat] *om.* Mo Vφ gradum] *om.* Oγ; gradus Kδ Lμ; *add.* ad Sη; *add.* in Bζ almucanthat] *om.* Lδ Ov; almi^{at} Kε; almicancrath Mτ; almicantar' Dη; almicantarath Kδ Pσ; almicarath Vτ; almich Kθ; almichanth Lκ; almu Oξ; almu' Mπ Oζ; almu^a Cε; almuancarach Sη; almu^{rath} Lε; almu' Eβ Fα Lη Qθ; almuantarach Bδ; almuantaraht Bζ; almuantarath Lγ Zα; almuantarath Eα Eλ Fβ Mδ Oγ Qι Tδ Vβ Vφ; almuanterath Nα; almu' Cι Lβ Lμ Pγ Pδ Pθ Vι; almuantarach Wβ; almuantarath Fζ Oτ Qλ Sκ; almuantarath Bγ Cη Mo Mv Mφ Oi Pα Pμ Pν Pρ Pτ Pυ Qβ Sδ Vξ Vπ Wι Wμ Xγ; almuantath Eη; almu' Eζ; almu' Xδ; almuantath Vψ; almuantath Wα; almu^{rath} Mλ; almu^{rat} Eδ; almu^{rath} Eτ Pι Qγ; almuantarach Pβ; almu' Dδ; almu' Mη; almuantath Mv; almu' Nγ; almu' Kα; almu' Bβ; almuth Oφ; alth Bε; *add.* quare sol 15 gradus lucet ante se et post Nγ
- 6-7 finis ... erit] *om.* Pζ vespertini ... crepusculi] *om.* Ev
- 7 erit] *om.* Mo; est Bβ Bγ Bζ Cη Dη Eτ Kθ Mλ Mv Nα Ov Po Pτ Sη Vξ Vπ Wι Xγ; et Bδ; hoc Kα; iste modus Dη initium] finis Oφ; *add.* vespertini Eα initium ... matutini] crepusculum matutinum Vτ quod] et hec Bβ Bγ Cη Eα Eδ Eζ Mλ Mv Nα Pγ Pτ Vβ(hoc) Vξ(hoc) Wα Wι quod ... levius] *om.* Bζ Pι Vτ Zα; de omnibus [*illeg.*] sicut dictum est superius fac Xγ; et hoc est melius dicitur Mo; et hoc melius Bθ Ev Qδ Vπ Vφ est] *om.* Pγ Vξ; erit Cι Dδ Eβ levius] levis Cη Pγ; levus Bβ; melius Dη Nα Pυ Sη; melius quare levius precedente Bγ; *add.* et cetera Bβ; *add.* et melius precedente Eδ Eζ Mλ Mv Ov Po; *add. interlin.* al' melius Vβ

this will be the end of the evening dusk; and when it shall have come to the 18-degree almucantar in the west, it will be the beginning of the dawn twilight, which is easier [to perform].

[Comment:

When the place of the sun on the ecliptic for that day reaches the twilight line (or the twilight almucantar) in the west, the evening twilight is over and full night begins; when it arrives at the twilight line in the east, night ends and dawn begins.

Since working with the sun's position below the horizon might be difficult, the second method is to work with the opposite position (its nadir) above the horizon. Thus twilight ends at night when the nadir of the sun's position crosses the 18° almucantar in the east; and dawn begins when the nadir of the sun's position crosses the 18° almucantar in the west.]

[CAPITULA 5.] DE INVENTIONE ARCUS DIURNI ET NOCTURNI

Si vis scire arcum diei et noctis, pone locum solis, id est, gradum in quo est,

- 1 De ... nocturni] *om.* Bδ Bε Bζ Bκ Cα Cγ Cε Cδ Dδ Eα Eγ Eκ Eλ Eν Kε Lζ Lκ Mα Mτ Nα Oβ Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Sβ Sθ Si Sλ Vα Vν Vτ Vυ Wθ Wλ Xγ; *illeg.* Eζ; *faded* Eδ; Ad extrahendum arcum diei vel noctis per gradum solis Eo Mγ Vξ; Ad habendam arcum diei vel noctis solis alterius Pτ; Ad inveniendum arcum diei et (vel Mυ Qθ Vi) noctis Eτ Mυ (*later hand*) Qθ Vi Wβ (*add. Capitulum*); Ad inveniendum arcum diei sive noctis per astrolabium niimoiuur Mν; Ad inveniendum arcum diei vel noctis per gradum solis Eρ Gα; Ad inveniendum arcum diurnum vel nocturnum Mλ; Ad (7. Ad Lλ) sciendum arcum diei et (idem Lμ) noctis Lλ Lμ Vγ; Capitulum 5^m. De arcu diurno vel nocturno habendo Qδ; De arcu diei Mτ; De arcu diei et (sive Vβ) noctis Pζ Vβ Vψ; De arcu diei et (vel Eη) noctis inveniundo Eη Lδ Oγ Oτ; De invencione arcum diei vel noctis gradum solis vel alterius Sη Wι; De invencione arcus diei et noctis Dη; De invencione arcus diei et noctis per locum solis Po Qμ; De invencione arcus diurni et nocturni Oζ; De inventianda quantitate arcus diurni sive nocturni per r^{ms} Bι (*add. in marg. 5 c^m*); De quantitate arcus diei et noctis et mora stellarum super terram Bη (*add. in marg. 5^{us}*) Cζ Eμ (*add. in marg. 5^{us}*) Oη; Inventio (Inventione Dγ) arcus diei vel noctis per gradum solis Bγ (*later hand*) Dγ Oφ (*add. in marg. De sciendo arcum diei et noctis*); Invencio arcus diurni et nocturni Mo; Inventio arcus (archus Xα) diurni sive nocturni solis vel stellarum Rα Xα; Modus inveniendi quantitate arcus diurni et nocturni Vρ; Scientia arcum diei et noctis. Capitulum Q; Scientia inveniendi arcum diei et noctis Ov; Si volueris scire arcum diurnum vel nocturnum Bβ; *add. in marg. 6 Qζ; add. in marg. 5^m Vψ arcus] (and elsewhere) archus Xδ diurni] diei Pα Zα; dierum Mδ et] sive Bθ Pυ Vπ et nocturni] om.* Sκ; atque noctis Zα *add. Rubrica Cη Vπ*
- 2 Si] Cum Eλ Mι Nγ Qη Wθ vis] volueris *many* diei diurnum Kδ et] vel Bβ Dγ Gα Mτ Pι noctis] nocturnum Kδ; *add. and del.* per locum solis Qμ locum] *om.* Mα; gradum Cγ Eγ Kε Mτ Oβ Pξ Pσ Pτ Qζ Qη; *add. interlin.* id est gradus Vβ locum ... est²] gradum in quo sol fuerit in ista die Eλ solis] *om.* Nα Pγ id est] et Vγ Wλ; in Nγ Vτ; primi Eν id est gradum] *om.* Cγ Kε Mτ Pσ; *interlin.* Qζ; in primo gradu Pρ id est ... est] *om.* Pξ id est ... super] fuerit Bζ gradum] *add. solis* Nα Sη Vξ; *add. interlin.* diem Oι quo] *add. sol* Cγ Eγ Oβ Qζ (*interlin.*) est₂] *interlin.* Mτ; erit Lδ; est sol Cζ Oγ Qμ; fuerit Bη Bι Bκ Cα Cγ Cδ Cζ Dγ Eγ Eμ Eo Lζ Lλ Mα Mγ Mι Mλ Nγ Oη Ov Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Sλ Vα Vβ Vγ Vρ Vν Vτ Vυ Wθ; *add. isto dic* Vτ; *add. sol* Bη Cζ Eκ Eμ Gα Mι Nγ Oι (*interlin.*) Oφ (*interlin.*) Pι Pτ Qη Wλ Zα; *add. interlin.* in zodiaco Bγ

[CHAPTER 5.] ON FINDING THE ARC OF THE DAY AND OF THE NIGHT.

If you want to know the arc of the day and of the night, set the place of the sun, that is, the degree in which it is,

super primum almucanthat in oriente; et nota locum almuri inter gradus limbi. Post

- 3 super] *om.* Cζ Ev Pγ; *interlin.* Mπ primum] *om.* Dη Eo Mλ Oφ; *interlin.* Pτ; *add.* id est orizontem Vψ primum ... locum] *margin.* Pτ almucanthat] orizontem Dη; almi^{at} Kε; almicancaraz Ov; almicancrath Mτ; almicanrath Vτ; almicantarath Eζ; almicantarath Kδ Lδ; almicantaraz Cδ Oη; almicath Pσ; almich Kθ; almichanth Lκ; almic^{raz} Lζ; almi^{raz} Bκ; almuc' Cε Mπ; almucancarach Sη; almucancarath VQ; almucan^{at} Bη; almucancharath Mo Pα; almucan^{rath} Rα; almucant' Eβ Fα Lη Lμ Qθ; almucantar~ Sβ; almucantarach Bδ Bθ; almucantarath Cα Eκ Pζ Qε Sθ SA Vγ Wθ Zα; almucantarath Bζ Bι Eα Eη Eλ Gα Lλ Mδ Oγ Pξ Po Pφ Qi Qμ Vα Vβ; almucantaraz Cζ Oσ; almucant^{at} Qζ; almucanterath Nα; almucanth' Ci Lβ Mλ Oζ Pγ Pθ Qβ; almucanthatrach Vπ Wβ; almucanthatrat Eδ Mα Oτ Sκ; almucanthatrath Bβ Bγ Cη EQ Ev Fβ Fζ Lγ Mv Mφ Oi Pμ Pv Pq Pv Qδ Qλ Sδ Tδ Vv Vξ Wι Wμ Xα Xγ; almucanthatraz Eμ; almucantha^t Oξ; almucantha^t Vι; almucanthat Kα; almuca^{rath} Lε; almucanthatrat Oχ; almuch' Eo; almuchan Xδ; almuchancarath Mγ; almuchanthatrath Ov Vψ; almuchanth' Pδ; almuchanthatrath Wα; almucth Oφ; almu^{rat} Eγ; almu^{rath} Eτ Pι Qγ; almuscantarach Pβ; almut Dδ; almut' Mη Oβ; almutanthatrath Mv Sι; almutanthatraz Vv; almutanthatrach Mι Nγ; almuth Dγ Qη; almuthanthatrat Vψ; almutranthat Cγ; alth Bε in oriente] *om.* Cη Eτ Pγ Pξ Qη; *interlin.* Bγ; in occidente Vι; in orientem Fζ; in orizonte Lβ et] *add.* loca Kα nota] *om.* Bε; notate Cζ; notato Eμ Oη locum] *add.* in Pφ almuri] alamuri Oβ; almury Lδ; *add.* ex ei Mv; *add. and del.* eundem in ipsis gradibus Mδ almuri inter] almucanthat Kα inter] et Eδ; in Pι; intra Lκ Mv Pμ inter gradus] in gradibus Bζ Bι Bκ Cγ Cδ Cζ Dγ Eγ Eκ Eλ Eμ Gα Lλ Mα Mγ Mλ Nα Nγ Oη Oi Ov Oσ Oφ Oχ Pζ Qε Sβ Sη Sθ SA Vα Vβ Vγ Vv VQ Vτ Vv Wθ; in gradu Pφ Rα; in gradum Sι; in ipsis gradibus Cα gradus] gradum Ci Fβ Kδ Lκ Mη Oβ Ov Pv Pq Vπ limbi] labri Bκ Cα Lζ Mι Mo Nγ Oσ Po Qε Rα Sβ Sθ SA Wθ; labri sive limbi Cγ; labtii Vv; lymbi *some*; sriori(?) Sι; *add. interlin.* al' labri Vβ; *add. interlin.* id est limbum [*illeg.* = astrolabii?] Bγ
- 3-4 almuri ... locum] *om.* Qη post hec] pone Sι post Qλ post hoc *some*; postea *some*
- 3-5 post ... gradibus] *om.* Oχ

on the first almucantar in the east; and mark the place of the indicator-muri among the degrees of the rim. After

hec move gradum solis usque ad occidentem; et nota etiam locum eiusdem in ipsis gradibus; et motus eius ab una nota in aliam est arcus diei. Reliqua vero pars circuli est

- 4 move] morie Sθ; *pone corr.* to move Qη; *add.* rethe et Qβ gradum] locum Qε gradum solis] almuri Lλ Mι Nγ Sβ Wθ; *add. interlin.* in al' almuri Vβ solis] *om.* Wλ; *interlin.* Bε usque ad] ad Bε Bη Cε Eλ; super EQ; *add. in marg.* almucantharath Oι occidentem] *add.* donec gradus solis cadat super ultimum almacantaraz ex parte occidentalis Cζ Oη et ... eiusdem] et positione eum sub primam almuri in occidente et tunc quod nota gradum almuri Cα nota] notato Cζ Eμ nota etiam] notent Qι etiam] *om.* Eκ Fβ Mτ Pι; in *corr. in marg.* to etiam Sκ locum eiusdem] *add. interlin.* almuri Bη; *add. interlin.* scilicet almuri Vβ; eiusdem Qη; locum [*illeg.*] (*add. interlin.* almuri) Xγ; locum almuri Bζ Dγ Eλ Eο Kε Mγ Mλ Oχ Qε Vv Vξ Vτ Wμ; locum almuri eiusdem (*or* eiusdem almuri) Bδ Cγ Dδ Dη Eβ Eγ Eη Eκ Fα Gα Kθ Lβ Mα Mv Mφ Nα Oβ Oι Ov Pι Qβ Qμ Sη Vι Wλ; locum almuri eundem Bγ Fβ Fζ Kα Lγ Lδ Lε Lη Lκ Mδ Mπ Oγ Oζ Oξ Oτ Pα Pβ Pμ Pν Pξ Pρ Qγ Qλ Sδ Tδ Wα Xδ Zα; locum almuri [*illeg.*] eundem Pσ; locum almuri et eundem Qι; locum almuri in lymbo Lμ Mτ Qζ Qθ; locum eius Pγ Wθ; locum eundem Cδ Cε Cη Cι Eτ Kδ Mη Pδ Pθ Sκ Vψ; locum huius almuri Bβ ipsis] *om.* Bζ Bη Cζ Dγ Eκ Eλ Eμ Eο Mγ Mλ Oη Oφ Pφ Sι Vv; eiusdem Sβ; hiis Mι Nγ; primis Pρ; temperis Bδ
- 4-5 et ... gradibus] et illud considera locum almuri in gradum limbi Bε
- 5 gradibus] gradu Pφ; *add.* limbi Cα Cζ Eκ Eμ(*interlin.*) Oβ Oη Pι et] *add.* subtrahe Pτ Xγ motus] motum Sθ eius] *om.* Bη; *corr. interlin.* to gradus eius Vψ; *add. interlin.* scilicet almuri Lζ una] *om.* Mλ nota] *om.* Pι; hora Oγ; natura *corr. in marg.* to nota Sκ; *corr. from* nonan Mη; *add.* usque Oσ Pτ Xγ in] ad Dη Mγ Mη(*interlin.*) Mλ Mπ Qη; usque ad Cα; *add. interlin.* ad Vβ aliam] *add.* notam Bδ Eβ Eη Fα Fβ Fζ Kε Lβ Lγ Lη Lκ Lμ Mδ Mπ Mv Mφ Oγ Oζ Oι Oξ Oτ Ov Pα Pμ Pν Pξ Pρ Pσ Qα Qβ Qζ Qθ Qι Qλ Sδ Tδ Wα Xδ Zα; *add.* notam secundo signatum versus dextro a parte Cα est₁] *om.* Fζ Pμ; erit Cγ Lλ Mα Mδ Mι Nγ Oχ Pζ Qε Sθ Vγ arcus (*and elsewhere*)] archus Xα diei] *add.* horarum equalium Cα; *add.* scilicet que nota est super orizontem Mφ; *add.* similiter que nota est super orizontem Mv Vι pars] *add.* est Lβ circuli] alii Cα; eius Dη; totius Lζ(*interlin.*) est₂] *om.* Pτ; *illeg.* Mα; erit Cγ Lλ Mι Nγ Oχ Pζ Pτ Sθ
- 5-6 reliqua ... diei] *om.* Vβ

this move the degree of the sun until it comes to [first almucantar in] the west, and also note its place among these degrees; and its motion from one mark to another is the arc of the day. On the other hand, the remaining part of the circle is

arcus noctis, quia illa duo continebunt 360 gradus, que est quantitas diei et noctis.
Et similiter facies de stellis fixis, si volueris scire earum moram super terram.

- 6 quia] et ΕΛ Οβ; qui Cγ Λλ Μι Νγ Οχ Ρζ Vγ; quod Sθ quia ... 360] *rep. and del.* Bδ
quia ... noctis] *om.* Γα Μν Vψ illa] *om.* Εγ Λλ Ρζ Οχ Qε Sβ Sθ Vγ Wθ; *illeg.* Οβ;
illi Kε; ista Nα Ρι Qη; *add.* secundo Qη duo] *om.* Bκ Λζ; 2 / 2° *some*; secundo Si;
zodiaco Kα; *add.* arcus Ελ Vτ; *add.* coniuncta Bθ Εν Vπ continebunt] *illeg.* Si;
continent Dγ Ελ Ρφ 360] CCCLX Lκ Οχ Qε Sβ; 36 Cα; 38 Οβ; CCCC LX Sθ
gradus] *om.* Εζ Λδ; *ms* Wθ *ends* que] qui Cγ Ρα; quod Oγ que est] *illeg.*
Cε est] sunt Cγ quantitas] *ms* Kι *begins*
- 7 similiter] *om.* Bθ Vπ facies] fac Kι Qζ; facias Lκ de] cum Ελ fixis] *add.* in
nocte Ζα si v[oluer]is] *interlin.* Μτ volueris] *om.* Εκ; vis many scire] *om.*
Bζ Cζ Dγ Εο Kα Μλ earum] horarum Bβ; *add.* ea Vπ earum moram] *om.* Οβ
moram] *om.* Οη; nomina Kδ; *add.* arcum Qι; *add.* sub terra et Qη terram] *add.* et
sub terra Bη Bθ Bι Bκ Cγ Cδ Cζ Dγ Eγ Eκ Ελ Εμ Εο Ερ Εν Bζ Γα Λζ Μα Μγ Μι Μλ Νγ
Οβ Οη Οι(*margin.*) Ον Οσ Οφ Οχ Ρζ Ρι Ρφ Qε Qμ Ρα Sβ Sθ Si Sλ Vα Vβ Vν Vξ Vπ Vτ Vυ
Vψ Xα; *add.* ponendo cacumen stelle super orizontem sicut gradibus solis Μτ; *add.*
ponendo cacumen stelle super orizontem et operare similiter cum gradum solis KεKι Λμ
Qζ; *add.* scire Fζ; *add.* vel sub terra VQ; *add.* 19 lines Cα; *add.* later hand 4 lines in *margin.* Qμ

the arc of the night, since these two will contain 360 degrees, which is the quantity of the day and the night. And you will do similarly for the fixed stars, if you wish to know their duration above the earth.

[Comment:

Place the sun's position on the ecliptic on the first almucantar (i.e., the horizon) to the east, and then to the west. Use the indicator-muri to find the two corresponding degrees along the rim and the number of degrees between them is the "arc of the day". The remainder of the circle will be the "arc of the night."]

[CAPITULUM 6.] DE QUANTITATE HORARUM DIEI INEQUALIUM

Si volueris scire quantitatem horarum inequalium diei, divide arcum diei per

- 1 De ... inequalium] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Nα Oβ Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Rγ Sβ Sθ Si Sl Vα Vν V Vτ υ Xγ; *faded* Eδ; *illeg.* Eζ; Ad faciendum quantitatem horarum per arcum diei vel noctis Mγ; Ad inveniendum quanto pars hore inequalis habeat Lμ Qθ; Ad sciendum quantitatem horarum diei inequalium et equalium per arcum diurnum Dη; Ad sciendum quantitatem horarum inequalium diei et noctis Pτ; Ad sciendum quantitates horarum per arcum diei et noctis(*add.* inequalium Eo) Eo Eρ Vξ; Capitulum 6^m. De quantitate horarum diei vel noctis inequalium Qδ; De quantitate horarum equalium diei et noctis et quot horas habeant dies. Capitulum 4^m Oη; De invenienda quantitate horarum inequalium diei et noctis Mλ; De inventione horarum inequalium per arcum solis Vψ; De quantitate horarum diei inequalium habenda Fβ Oγ Oτ; De quantitate horarum inequalium et numero equalium(inequalium Pζ) Mι Pζ(*marg.*); De quantitate horarum inequalium diei et noctis Bη(*add. in marg. 7*) Cζ Eμ(*add. in marg. 7^{us}*) Eτ; De quantitate horarum inequalium diei(*om.* Vγ) et(*add. de Vγ*) numero equalium Lλ(*add. 8.*) Nγ Vγ; De quantitate horarum inequalium diei vel noctis habenda(*om.* Kθ; Rubrica Vπ) Bθ Kθ Pυ Vπ; De quantitate hore inequalis Oν; Inventio horarum inequalium Eζ; Inventio quantitatis horarum inequalium Dγ Po Qμ; Inventio quantitatis horarum inequalium per arcum diei Oφ(*add. in marg. De sciendo quantitatem horarum inequalium diei*); Inventio quantitatis horarum inequalium per arcum diei vel nocte Bγ(*later hand*); Modus inveniendi quantitatem horarum inequalium Vρ; Scientia quantitatem horarum inequalium Qβ; Si vis invenire quantitatem horarum inequalium Bβ; *add. in marg. 6 c^m Bι; add. in marg. 6^m Vψ; add. in marg. 7 Qζ* diei] *om.* Eη Kα Lη Mπ Vι Wι Zα; *add. vel noctis Mυ Rα Xα* inequalium] *interlin.* Vβ; inequale Fζ; *add.* Capitulum Mo; *add.* habenda Lδ Vβ; *add. sive noctis.* Capitem Wβ; *add. sive noctis in [illeg.] Mν; add. vel noctis Vι; add. vel noctis hora Pδ*
- 2 *before* Si] *add. 50 lines* Oη Si] Cum Bη Bθ Bκ Cγ Cδ Eγ Eλ Eo Lζ Lλ Mα Mγ Mι Mλ Nγ Oν Pζ Pφ Oσ Oφ Oχ Qε Qη Si Sl Vα Vβ Vγ Vπ Vτ Vυ; Cum autem Cζ Eμ Oη volueris] *vis many* scire] *om.* Eδ Eρ Po Qδ Qμ Rα Vα Xα; *interlin.* Vψ quantitatem] *interlin.* Eζ horarum] *om.* Sλ diei.] *om.* Eλ Pν Pρ; dierum Cγ Eγ Eμ arcum] *add. circuli* Pβ diei.] *om.* Vτ; diurnum Cζ Eμ Oη per] in Lκ Vυ
- 2-5 *rewritten as 17 lines* Cα

[CHAPTER 6.] ON THE QUANTITY [I. E., LENGTH] OF THE UNEQUAL HOURS OF THE DAY

If you wish to know the quantity/length of the unequal hours of the day, divide the arc of the day by

12, et habebis numerum graduum hore diurne; quem si subtraxeris de 30, remanebit numerus graduum hore nocturne, quia hora inequalis nocturna cum hora inequali diurna facit 30 gradus in omni die, qui sunt due hore equales.

- 3 12] *illeg.* Eζ; *marg.* Mη; XII Lκ Oχ Qε Sβ Sθ; duodecim Mα Pζ Pφ; 22 Bβ; [*lacuna*] Sλ; *add.* qui est numerus horarum inequalium tam diei quam noctis et Qμ habebis] habemus Pτ Xγ graduum] *add.* cui [*illeg.*] Eν; *add.* qui respondent Bθ Bκ Lζ Oν Vπ hore diurne] diurne (?) Bβ; hore vel horarum diei Bε; hore vel horarum diurnarum Bδ Dδ Eβ Eη Fα Fβ Fζ Kα Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mτ Mυ Mφ Oγ Oζ Oι Oξ Pα Pβ Pμ Pν Oτ Oυ Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Vι Wα Wμ Xδ; horarum diurnarum Dη Zα; *add. interlin.* scilicet inequali Lζ diurne] *om.* Sθ; *add.* inequali Bκ quem si] et Pι; quam si Dη Kδ Mγ; que Qδ; quod Qι; quos Bκ Eγ Lλ Mι Nγ Oχ Pζ Qε Sβ Sθ Vγ; quos si Bθ Eν Vπ subtraxeris] *illeg.* Eγ Mα Wβ; delebis Bκ; demas Cδ; minues Lλ Mι Nγ Oχ Pζ Qε Sβ Sθ Vγ; subtraas Sι; subtrahas Bε Bθ Eκ Eρ Gα Mo Oν Pγ Pι Pυ Qδ Rα Sη Vβ Vπ Vρ Vψ Wλ Xα Xγ; subtraheris Fβ Sκ; subtrahas Bι; subtrahens Wα; subtraheris Qμ; subtrahas Eν Nα Oφ Pφ; subtrahis Bβ Bγ Cη Mν Po Wι; subtrahis Dδ Eη Eτ Oβ; *add. interlin.* al' minues Vβ de] *illeg.* Eγ; a many 30] xxx Lκ Oχ Qε Sθ; triginta Bβ; *corr. in marg. from 9030* Mη
- 3-4 quem ... nocturne] *om.* Bη Cγ Cζ Eζ Eμ Oη Oσ Sλ Vα Vυ; aliud quod remanet erit quantitas hore nocturne Oν; quos delebis ex 30, et quod remanet erit quantitas(*add. interlin.* gradibus) hore nocturne Lζ; *add. in marg.* Cδ; *illeg. in marg.* Pτ remanebit numerus] et que remanet erit quantitas Bκ; habebis numerum Bζ Dδ Eλ Eο Mγ Mλ Vν remanebit ... nocturne] habebis gradum nocturnum Vτ
- 4 graduum] *om.* Fα; *add.* unius Cδ hore] *add.* sua Bκ Lζ(*interlin.*) nocturne] media Qδ; noctis Cδ quia] et Bθ quia ... nocturna] *om.* Vγ quia ... cum] et Vπ hora₁] *om.* Vρ inequales] et inequales Pρ; *add. illeg.* Wμ nocturna] *om.* Eγ; diurna Cγ Sλ nocturna ... inequali] *marg.* Bθ; *om.* Lλ cum] et Cδ hora₂] *om.* Vψ
- 5 diurna] nocturna Cγ Sλ; *add.* unius diei naturlis sit vincte(?) Qμ facit] *om.* Mυ Mφ Vι; constituntur Bε; fac Qη Zα; faciunt Mι 30] xxx Lκ Oχ Qε Sθ; 300 Vυ gradus] [*lacuna*] Sλ in] *om.* Lκ omni die] ordine Mι Nγ die] *om.* Qθ qui] que Mτ Oγ Pφ; quo Kα qui ... equales] que etiam valent duas horas equales Dη due] *om.* Pδ Vα; *interlin.* Oφ; 2 many; *illeg.* Pι; [*lacuna*] Sλ; secunde Bβ; 12 Qι; 3 Pν equales] equalibus Eτ; inequales Mo Zα; inequales in die Pι; *add.* "cum hora inequali nocturna" et cetera ad lineam priam nō(?) Vπ; *add.* et cetera Kθ; *add.* et noctis Eτ; *add.* 1-line gloss Zα; *add. later hand 11 lines in marg.* Qμ

12, and you will have the number of the degrees of a daytime hour; if you subtract this [number] from thirty, the number of degrees of the nighttime hour will remain, since an unequal nighttime hour with an unequal daytime hour amounts to 30 degrees in the whole /every day, which are two equal hours.

Si¹ horas diei volueris querere equales, divide arcum diei per 15, et habebis numerum horarum equalium; similiter in nocte.

- 6 *before Si] add. illeg. Eζ; add. AD HABENDUM HORAS DIEI EQUALES ET NOCTIS Mλ; add. AD INVENIENDAS HORAS DIEI EQUALIS Lμ Po Qθ Qμ; add. DE HORIS DIEI EQUALIBUS SIVE NOCTIS Mν Wβ; add. (CAPITULUM 7^m Qδ) DE HORIS DIEI VEL NOCTIS EQUALIBUS Rα Qδ; add. DE HORIS EQUALIBUS Mπ Ov; add. DE HORIS EQUALIBUS DIEI Lκ; add. DE HORIS EQUALIBUS DIEI SIVE NOCTIS Mν Vι; add. DE HORIS EQUALIBUS HABENDIS PER ARCUM DIEI VEL NOCTIS Oφ; add. DE INVENIENDO HORAS DIEI EQUALES Dγ; add. DE INVENTIONE HORARUM DIEI EQUALIUM Bι(**add. in marg. 7 c^m) Pβ; add. DE INVENTIONE HORARUM EQUALIUM Vψ Zα; add. DE NUMERO HORARUM EQUALIUM DIEI VEL(AL' Pυ) NOCTIS Bθ Pυ Vβ Vπ; add. DE QUANTITATE CONSTITUET(om. Cζ) HORARUM EQUALIUM DIEI ET NOCTIS ET QUOT HORAS HABET(HABIAT Cζ) QUALIBET(QUILIBET Cζ) DIERUM. Cζ Eμ(marg.; add. in marg. 6^{us}); add. DE QUANTITATE HORARUM DIEI(om. Mη Mo Xδ) EQUALIUM(INEQUALIUM Fζ) Cι Eβ Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Mδ Mη Mo Mφ Oζ Oι Oξ Ov Pα Pδ Pθ Pμ Pν Pρ Qγ Qλ Sδ Sκ Tδ Xδ Vψ Wα Wι Wμ; add. DE QUANTITATE HORARUM EQUALIUM DIEI ET NOCTIS ET QUOT HORAS QUILIBET HABEAT Bη(**add. in marg. 6); add. INVENTIO HORARUM EQUALIUM Eο Eρ Lδ Kθ(**add. dierum equalium [illeg.] Oγ Vξ; add. MODUS INVENIENDI HORAS EQUALES Vρ; add. SI VIS HORAS DIEI EQUALES IN ASTROLABII Bβ; add. in marg. De horis diei equalibus Oφ Si] add. autem Bη Bκ Cα Cγ Cδ Cζ Eγ Eμ Lζ Lλ Mα Mι Nγ Oη Oσ Oχ Pζ Qε Sβ Sθ Sλ Vα Vβ(interlin.) Vγ Vν; add. in marg. 7^m Vψ; add. in marg. 8^m Qζ horas] numerum horarum Bη Cζ Eμ Oη diei.] om. Eκ volueris] velis Lκ querere] habere Eκ; inquerere Cζ Eμ Oη Wψ; scire Bε Bη Rρ Oβ Pι Pξ Qη Vγ Vξ Xδ; scire et querere Cα; scire querere Xα; investi' [illeg.] Eλ; corr. to scires Qζ equales] equalium Cζ Eμ Oη divide] om. Mλ Vτ diei.] diurnum Bε 15] illeg. Dδ; xv Lκ Oχ Qε Sθ; 24 Vτ*
- 6-7 *These lines precede line 1 Bκ Cζ Cι Eμ Oη Si ... nocte] om. Dη*
- 7 *numerum] twice Pι; add. graduum Vτ numerum ... equalium] om. Vξ horarum] om. Lλ Sλ Vγ; horam horarum Cε; add. interlin. diei Oφ equalium] om. Eκ; diei Oη; unequalium Cε; add. diei Bβ Bε Cι Dδ Eα Eβ Eη Fα Fβ Fζ Kα Kδ Kε Kι Lβ Lγ Lη Lκ Lμ Mδ Mη Mτ Mυ Mφ Nα Oι Oτ Ov Pβ Pδ Pζ Pθ Pρ Qζ Qθ Qι Qλ Sδ Sκ Tδ Vι Vψ Wα similiter] per hoc erit Pξ; scilicet Sλ; add. fac Bε Eκ; add. facies Cα Cδ Cγ Eγ Pσ Vψ; add. etiam Dγ Mλ Rγ similiter in nocte] om. Zα; similiter facies de arcu noctis Pι nocte] octe Vα; add. de arcu nocturno Kα; add. qeras per arcum noctis earum numerum Bγ(later hand); add. dividendo arcum nocte Oβ; add. dividendo arcum nocte per 15 gradus Vξ; add. divides arcum noctis Qη; add. et cetera Xα; add. per arcum noctis Bζ Bθ Dγ Eλ Eο Eυ Mγ Mλ Pτ Vν Vπ Vτ Vψ Wλ Xγ; add. per arcum nocturnum Gα; add. Nota per gradum solis in [illeg.] hore noctis sed per nadir eius hore diei super et hoc in astrolabio Qζ; add. 4-line gloss Mτ Zα; add. later hand 4 lines in marg. Qμ*

¹ As indicated by the added titles (or sometimes by an enlarged initial capital) many mss treat this as a separate capitulum.

If you wish to find out /know about the equal hours of the day, divide the arc of the day by 15 and you will have the number of equal hours; similarly in the night.

[Comment:

If you know the arc of the day, it can be divided by 12 to give the length of an unequal daylight hour.

Subtracting the length of a daylight unequal hour from 30 will give the length of a night-time unequal hour.

Dividing the arc of the day by 15 will give the number of equal hours in the day and similarly for the number of equal hours in the night.]

[CAPITULUM 7.] DE PARTE HORE PRETERITA INVENIENDA PER ALMURI

Cum transierit pars hore et volueris scire quota pars hore sit, scito numerum

- 1 De ... almuri] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Dη Eα Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Nα Oβ Oν Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qι Rγ Sβ Sθ Sι Sλ Vα Vν Vξ Vυ Xα Xγ Wλ; *illeg.* Eγ Eζ Lλ; *faded* Eδ; Ad habendum partem hore diei vel noctis transactam Mλ; Ad inveniendum partem hore preteritam vel futuram Bι(*add. in marg.* 8 c^m); Ad inveniendum quota pars hore fuerit Lμ Qθ; Ad inveniendum quota pars hore transacta sit Pο Qμ; Ad sciendum quota pars hore sit transacta Qβ; Ad sciendum quota pars hore transierit Dγ; Ad sciendum quota pars hore transierit vel futura sit ad huc Bγ(*later hand*); Capitulum 8^m. Ad habendum quota pars hore naturli(?) sit transacta Qδ; De hora invenienda preterita per almuri Mν; De inventione parte hore die vel noctis transacta Rα; De parte Mπ; De partibus horarum Zα; De proportione cuius vis partis hore ad suam horam Mι Nγ Pζ(*marg.*) Vβ(*add. id est de parte preterita hore invenienda per almuri*) Vγ; Inventio quota pars hore alicuius sit preterita Kθ Sη(*later hand*) Wι; Modus inveniendi partem horarum preteritarum Vο; Quota pars diei sit transacta de horis transactis Eη; Quota pars diei vel noctis transierit ultra horis perfectis omne tempore Oη; Quota pars hore diei vel(et Bη) noctis transierit vel et horas perfectas omne tempore Bη(*add. in marg.* 8) Cζ Eμ(*add. in marg.* 8^{us}); Quota pars hore sit transacta de horis transactis Lδ Oγ Oτ; Quota pars hore transierit vel [*illeg.* = futura?] sit Pτ; Quota pars ipsius hore sit transacta Oφ(*add. in marg.* De sciendo partem horarum preteritarum hore pertransacta hore transacte); Quota pars transacta erit vel futura Eο; Si vis scire quota pars hore est elapsa Bβ; Scias quota pars hore transierit vel futura sit Eο; Ut scias quota pars hore transierit vel futura est Mγ; *add. in marg.* 9^m Qζ parte] *om.* Qλ Mφ invenienda] inveniendo Fζ invenienda ... almuri] *om.* Eτ Mν Wβ(*add. Capitulum*) per almuri] *om.* Lγ Mδ almuri] al. Xδ; almuhantaruz Vψ; *add.* crespusculum Cη
- 2 Cum] Si Eκ; *add.* autem Bθ Bκ Cα Dη Eν Lζ Oσ Vπ Vυ Cum ... hore₁] *om.* Mτ Cum ... sit] Cum vis scire quota pars hore transierit Vγ transierit] pertransierit Cα Cδ Cε Cζ Oη Vψ; transierit Bβ; transiverit Pφ pars₁] ipse Sλ; partes Bβ; *add.* ipse Vα hore₁] *add.* inequalis Kδ Kε(*interlin.*) Pθ Qζ Qη scire] *om.* Wλ quota] que Dγ Mλ; *add. interlin.* vel que Oφ quota ... sit] *om.* Lλ Mι Nγ Qε Sθ; *marg.* Pζ; quanta sit Cγ; quantitatem Mα; quota restat Oχ(*interlin.*) hore₂] *om.* Eγ Gα; *corr. from* hora Sκ; *add.* inequales Kε(*interlin.*) Mτ Qζ pars₂] *om.* Eγ; *add.* ipsa Bζ Bκ Cα Cζ Dγ Eλ Eο Lζ Mμ Mγ Mλ Oη Oν Oσ Pφ Vβ Vν Vτ sit] *om.* Bθ Eα Eμ Vπ; transierit Kι; *add.* pertransita Kε Mτ Qζ scito] scias Dη; signa Wβ; sue Vτ; sume Bζ Eλ Eο Mγ Mλ Vν numerum] numero Kε Qγ

[CHAPTER 7.] ON FINDING THE PART OF AN HOUR WHICH HAS PASSED USING THE MURI

When a part of an hour has passed and you want to know what part of an hour it is, ascertain the number

graduum in limbo ab initio hore usque in almuri; et quomodo ille numerus se habebit ad numerum totius hore, sic pars hore transacta se habebit ad totam horam.

- 3 graduum] *add.* et altitudinis Ζα graduum in labro] *om.* Βδ in ... hore] *om.* Χα
in limbo] *om.* Δη Πξ; *marg.* Qδ limbo] *illeg.* Εα Εδ; astrolabio Ργ; [margo]labro
Ββ Βγ Cα Cδ Cε Cη Cι Eγ Gα Λλ Mα Mη Mι Mο Nγ Oν Oσ Oχ Pα Pδ Pζ Pο Pυ Pφ Qε Rα
Sβ Sλ Vα Vυ Vφ Vψ Wι; labro *corr.* to limbo Lζ; labro id est in limbi Cγ; lambro Mν; libro
Sθ; lymbo *some; corr.* from labro Sκ; *add. interlin.* vel in margolabro Oφ; *add. interlin.* al'
labro Vβ initio] *add.* istius Qη; *add. later hand 4-line marginal note* Qμ hore] *om.*
Mδ Rα; *interlin.* Oχ Vφ usque in] illius usque Cα; in Mδ; iste usque ad Wλ; usque
Eα; usque ad Ββ Βδ Cγ Dδ Eγ Eρ Gα Kε Kι Mν Mτ Oβ Oχ Pι Pφ Qε Qζ Qη Qι Sθ Vτ Vυ
Zα; *add. interlin.* finem eius per Βκ Lζ almuri] amuri Sθ; finem in almuri Eρ;
lineam(?) Vτ; lymbo(*expunged*) almuri Qδ; *add.* et quomodo in almuri Eν; finis eiusdem
tot prima pars graduum pertransita ab almuri vero numerum graduum [*illeg.*] partem
hore Gα almuri ... numerus] finem eiusdem hore sunt sicut prima pars graduum
pertransita ab almuri Pι et] *add. in marg.* vide Oι quomodo] *interlin.* Wμ; quod
Cζ; quoto Oη; vide quam Oβ; *add.* inveniens Cγ ille] iste Kε Kι Nα Qι Qη Vτ Xγ Xδ
numerus] *om.* Cγ Eλ Eο Sθ; *add.* ille S; *add.* iste Cδ habebit] habet Kδ Lκ
- 3-4 usque ... hore₁] *om.* Δη
- 4 numerum] *om.* Lδ; *add. interlin.* graduum Βγ totius] *om.* Πξ hore₁] *om.* Ργ;
interlin. Lζ; *add. interlin.* transacte Qμ sic] similiter Tδ sic pars hore] *om.* Eζ Pι
sic ... transacta] transacte ita Βη sic ... horam] *om.* Pζ pars] *om.* Cζ Eμ;
partes Kα; *add. interlin.* vel post equales Oφ pars hore] *om.* Oη hore₂] *om.* Ββ
Βγ Cζ Cη Eκ Eμ Eτ Eν Kθ Oγ Oζ Pβ Pγ Pξ Pρ Rγ Vξ Wβ Wι transacta] *om.* Qη;
pertransacta Kε Qζ; pertransita Kι Mι; transacte Kα Mη; transactum Cζ Eμ se] *om.*
Bδ Kθ; si Wλ; *add.* Xα se habebit] *om.* Lκ Qζ Qη habebit] habebunt Kα
totam] *om.* Bδ Eγ; noctam(!) Cγ; *add.* illam Πξ horam] *add.* 3-line gloss Ζα

of degrees on the rim from the beginning of this hour to the indicator-muri, and in the way that number has to the number [of degrees] of the whole hour, so the part of the hour which has passed will have to the whole hour.

[Comment:

Compare the current position of the indicator-muri along the edge of the astrolabe to the whole distance the indicator-muri would move in an hour, and that proportion will be equivalent to the portion of the hour which has elapsed.]

1 [CAPITULUM 8.] DE NUMERO HORARUM DIEI EQUALIUM PRETERITARUM

Si volueris scire quot hore equales transierunt de die, accipe gradum solis et

- 1 De ... preteritarum] *om.* Bδ Bε Bζ Bκ Cα Cδ Cγ Cε Dδ Eα Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Oβ Oν Oσ Oχ Pγ Pι Pξ Pφ Qε Qη Qi Rγ Sβ Sη Sθ Si Sl Vα Vν Vτ Vυ Wι Wλ Xα Xγ; *illeg.* Eγ Eζ Lλ; *faded* Eδ; *later hand* Mν; Ad inveniendum quot horae equales de die transierunt Lμ Qθ; Ad sciendum quot hore diei vel noctis sint transacte Mλ; Ad sciendum quot hore equales diei transacta sint Dγ; Ad sciendum quot hore equales diei transierunt Po Qβ(*add.* de die. Capitulum) Qμ(*die*); Ad sciendum quot horas equales habeat dies Bγ(*later hand*); Capitulum 9^m. De horis diei equalibus diei vel noctis equalibus preteritis Qδ; De horis diei equalibus transactis Oφ(*add.* in marg. De sciendo quot hore inaequales transierint de die); De horis equalibus diei vel noctis preteritis Rα; De horis equalibus in die Vγ; De(Die Pζ) horis equalibus in diebus preteritis Mι Nγ Pζ; Inveniundo horarum equalium diei sive noctis preteritarum Eτ; Inventio horarum diei sive noctis preteritarum Mν; Inventio quot hore diei inaequales (*corr.* to equales) sint iam transacte Bι(*add.* in marg. 9 c^m); Quot hore equales de die transierunt Lδ Oγ; Quot hore equales de die vel nocte Oη; Quot hore equales die(*om.* Pτ) sint transacte Kθ Pτ; Quot hore equales in die aliqua transierint Vξ; Quot hore equales transierint de die Eη Oτ; Quot hore equales transierint de die vel de nocte Bη(*add.* in marg. 9) Cζ Eμ(*marg.;* *add.* in marg. 9^{ms}); Quot hore transierunt Mπ; Quot hore equales de die ipse transierint Eo Eσ; Scientia in inventione horarum diei sive noctis preteritarum Wβ; Si vis numerum horarum equalium Bβ; Ut scias quot hore equales de die ipsa transierint Mγ; *add.* in marg. De horis equalibus in die preteritis Vβ; *add.* in marg. 10^m Qζ numero] inventione Vψ diei] *om.* Sκ; *marg.* Lβ equalium] *add.* inveniundo Cη preteritarum] *add.* Capitulum Cη; *add.* Rubrica Vπ
- 2 Si] Cum Bζ Bη Bι Bκ Cγ Cζ Dγ Eγ Eλ Eμ Eo Lλ Mα Mγ Mι Nγ Oη Oσ Oφ Oχ Pζ Pφ Qε Sβ Si Sl Vα Vβ Vγ Vξ Vρ Vτ Vυ; Cum autem Cα; *add.* vero Bθ Eν Vπ volueris] *add.* etiam Wλ scire] *om.* Eδ Qε quot] que Wλ; quo Pμ; quod Bδ Kα Kε Lβ Lκ Vξ hore equales] *om.* Vγ equales transierunt] *illeg.* Nα transierunt] fuerunt transacte(*interlin.* Lζ) Bκ Lζ; transeunt Mν Qμ(*add.* *interlin.* vel [tran]sierint); transeunt *corr.* to transierunt Sδ; transierint Mγ Sβ Vυ de] in Cγ Eγ Pρ de die] *om.* Vγ die] *add.* *interlin.* scilicet ab ortu solis Lβ accipe] accepta Cε; pone Cγ Eγ; *add.* altitudinem Pι gradum] gradus Qδ Pι Tδ; *add.* *interlin.* altitudinis Lβ solis] *add.* in signo Cα; *add.* *interlin.* in zodiacho Bγ

[CHAPTER 8.] ON THE NUMBER OF EQUAL HOURS OF A DAY WHICH HAVE PASSED

If you wish to know how many equal hours have passed in a day, take the degree of the sun and

pone super almucanthat altitudinis et signa locum almuri in gradibus. Postea volve

- 3 pone] *om.* Cγ Eγ Oχ; *illeg.* Nα; *add.* eum Mι Oι Oφ Qε Vβ(*interlin.*) Vγ super] *interlin.* Cδ; usue ad primum Vτ; *add.* eum Eν Lλ almucanthat] alm^{chv} Bζ; almicancaraz Ov; almicancrath Mτ; almicanth' Lμ; almicanthar^a Cα; almicantharath Lδ; almicantharaz Cδ Oη; almicantharath Eζ; almicantharatz Dη; almicanthararch Gα; almi^{ch} Pσ; almich Kθ; almichancarath Mγ; almichanth' Lκ; almith Bε; almi^{raz} Bκ; almit' Oβ; almith Qη; almi^{thrat} Wλ; almi^{trat} Kε; almi^{tt} Qζ; almuc' Mπ Sβ; almu^c Cε; almucan^{ach} Qμ; almucan^{at} Bη; almucancarach Sη; almucancarath VQ; almucanth' Dγ; almucan^{rath} Eτ; almucanth' Fα Qθ; almucanthar' Rγ; almucantharach Bθ; almucantharath Cζ Ek Oχ Pζ Qε Sθ Sλ Vγ; almucantharath Bδ Bι Eα Eη Eλ Eρ Kδ Lγ Lλ Mδ Oγ Pξ Pφ Qi Vα Vβ Vπ; almucantharaz Eμ Vν; almucantharaz *corr. to* almucantharath Oσ; almucantharath Nα Oφ; almucanth' Cι Eβ Lβ Mλ Oζ Pδ Pθ; almucantha Pγ; almucanthanth Cη; almucantharach Bβ Wβ; almucantharath Eδ Lη Mα Qλ Sκ Zα; almucantharath Bγ Eν Fβ Fζ Lε Mν Mφ Oι Oξ Oτ Oυ Pα Pμ Pν Pο Pρ Pυ Qβ Rα Sδ Vξ Wι Wμ Xα Xγ; almucanthath Tδ; almucanthrth Vι; almucanthrat Kα; almucantharath Vτ; almucantharath Pτ; almucanth' Eο; almucanth Xδ; almucantharath Mο; almucantharath Qδ Vψ; almucantharath Wα; almu^{raz} Lζ; almucantharath' h Si; almu^{rat} Eγ; almu^{rath} Pι Qγ Vν; almucantharach Pβ; almu^t Dδ Mη; almutantharath Mν; almutantharath Mι Nγ; almutantharath Cγ; *add.* sue Cα Eγ Vν altitudinis] *add.* solis Bε Eη; *add.* sue Bγ(*interlin.*) Cγ Vτ signa] nota Mι Nγ; pone Eα; signa Eμ locum] *om.* Kε Kι Mτ; *interlin.* Qζ; *add.* solis Bε almuri] per almurum Bε in] ex Qδ in gradibus] *twice* Pθ gradibus] gradu Pφ; *add.* marginis Cα; *add.* limbi Bβ Bε Dη Gα Kθ Mν Mφ Oι(*marg.*) Pι Si Vι Wλ volve] move Cγ Eγ; revolve Dη Sβ; volvis Fβ

set it on the almucantar of the altitude and mark the place of the indicator- muri on the degrees. Then turn

retro gradum solis usque ad primum gradum almucanthat in oriente;¹ et secundo

4 retro] *om.* Dη; *add.* id est contra motum diurnum Κι(*interlin.*) Qζ gradum₁] *twice* Vξ; gradus Mτ ad] *om.* Κε Κι ad ... gradum] *om.* Cε primum] *illeg.* Nα gradum₂] *om.* Βη Βθ Βκ Cζ Dγ Eδ Eζ Eλ Eμ Eρ Eυ Γα Κθ Κι Λζ Λλ Μα Μγ Μλ Μν Μο Μτ Οβ Οη Οφ Οχ Ρο Ρφ Qδ Qμ Ρα Ργ Σλ Vβ Vγ Vξ Vρ Vτ Wλ Wμ Xγ; *interlin.* Cδ; *del.* Λη Οι; sive gradum Κα almucanthat] almicantharaz Ov; almicantharath Mτ; almicanth' Lμ; almicantharath Lδ; almicantharaz Βκ Οη; almicanthth Pσ; almicantharath Eζ; almicantharath Dη; almicanthrat Κα; almicantharath Γα; almich Κθ; almichantrum Λκ; almi^{at} Κε Κι; almi^t Οβ; almith Βε Qη; almi^{thart} Wλ; almiutantharath Σι; almu^{ath} Qγ; almu^c Cε Cι Fα Mπ Σβ; almucanharach Ση; almucan Vν; almucanharath Vρ; almucan^{rath} Eτ Ρα; almucanrath Vτ; almucan^t Λη Pθ Qθ; almucan^{at} Eκ; almucan^t Ργ; almucanharach Ββ Βθ Qμ; almucanharath Cζ Μα Οχ Pζ Qε Σλ Vγ; almucanharath Βδ Βι Eα Eλ Κδ Λγ Λλ Μδ Ογ Οι Pφ Qδ Qι Tδ Vα Vβ Vπ Wμ; almucanharaz Cδ Eμ Oσ Vυ; almucantherath Nα Οφ; almucanth Xα; almucan^h Dγ Eβ Λβ Μλ Pδ; almucan^h a Pγ; almucanharach Wβ; almucanharath Fζ Oζ Σκ Ζα; almucanharath Βγ Cη Eρ Eυ Fβ Λε Μο Μν Μφ Oξ Oτ Oυ Pα Pμ Pν Pξ Pο Pρ Pτ Pυ Qβ Qλ Vξ Wι; almucanrath Eη; almucan^t Eο Mγ; almucan^h Xδ; almucanharath Vψ; almucan^h Vι; almucanharath Wα; almu^{rat} Eγ Eδ; almu^{rath} Pι; almu^{raz} Lζ; almuscanharach Pβ; almu^t Dδ Mη; almutantharath Mν; almutantherach Nγ; almu^h Bζ; almutanharath Cγ; almu^{trath} Qζ; almucan^{at} Βη in oriente] Ββ Βγ(*add. interlin.* vel orizonte) Βδ Cη Dη Eκ Eλ Eτ Fβ Κδ Κε Κθ Κι Λβ Λδ Λκ Λμ Μπ Μτ Οβ(*add. et in [illeg.] orizontem*) Ογ Oξ Pβ Pγ Qγ Vξ Wβ Wι Wλ; ex parte orientale id est orizontem Cα; id est ad orientem Eμ Οη; id est ad orizontem Cζ Pι; id est ad orizontem Oσ(*add. in marg. orientalem*); id est in oriente Cγ; id est orientem Cε; id est orizonte Xα; id est orizontem Βκ Cδ Cι Γα Eα Eδ Eζ Λζ Λλ Μα Μη Μν Μο Οχ Pδ Pζ(id est *interlin.*) Pθ Pο Pυ Qε Ρα Σβ Σθ Σλ Vα Vβ Vρ Vυ; id est orizontem orientalem Ov; id est orizontis Mι Nγ; id est usque ad orizontem Βη Vγ; in orientem Μλ Vτ; in orizonte/-em Βζ Βθ Βι Dγ Dδ Eβ Eγ Eη(*add. in marg. orientali*) Eο Eρ Eυ Fα Fζ Κα Λγ Λε Λη Μγ Μδ Μν Μφ Nα Oζ Oι Oτ Oυ Oφ(*add. in marg. al' id est orizontem*) Pα Pμ Pν Pξ Pρ Pσ Pτ Pφ Qβ Qδ Qθ Qι Qλ Qμ Sδ Ση Σι Σκ Tδ Wα Wμ Vι Vν Vπ Vφ Xγ Xδ; in orizonte orientali Βε Ζα; orizontem Vψ; sive ad orizontem Qη; supra orizontem orientalem in [*illeg.*] Qζ; *add. interlin* sive ad orizontem orientem Κε secundo] *om.* Qη Σλ; *illeg.* Βδ; et etiam Ση; etiam Nα Pξ; sb Mν; similiter Wλ; sunt pr[imo?] Vψ; sub Pυ; tunc Cα Κα Λμ Qζ; tunc etiam Βε Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Κδ Λβ Λγ Λδ Λε Λη Λκ Μδ Μη Μπ Μν Μφ Ογ Oζ Oξ Oτ Oυ Pα Pβ Pδ Pθ Pμ Pν Pρ Pσ Qβ Qγ Qδ Qθ Qι Qλ Sδ Σκ(*del. etiam; add. in marg. interim*) Tδ Vι Wα Wμ Xδ Ζα

4-5 secundo nota] subnota Po

¹ It is not possible to choose definitively between “in oriente” and “in orizonte/m” in this instance. The scripts for both words are very close to each other, and scribes obviously also had trouble choosing between them. In any case, it makes no real difference to the meaning of the instructions.

the degree of the sun back as far as the first degree almucantar [i.e., the horizon] in the east; and then

5 nota locum eiusdem almuri. Post hec divide gradus qui sunt inter duas notas per 15, et habebis horas equales.

Similiter facies in nocte; postquam enim inveneris horam equalem² per

- 5 locum eiusdem almuri] eius locum Pγ Wβ; eiusdem locum Bγ(*add. interlin.* almuri) Cη Dδ Eκ Eτ; locum almuri Bε Eλ Qη Vβ(*add. interlin.* eiusdem) Vτ; locum cuiuslibet almuri Mτ; locum eius almuri Cι Kδ Mη Pδ Sκ Vψ; locum eius de almuri Vπ; *add. interlin.* in limbo Oι Post hec] Postea *some*; Post hoc *some*; Post Bη divide] *om.* Mτ; divides *some* gradus] *om.* Wα; *add.* per 12 gradus Mγ; *add.* solis Mv qui sunt] *om.* Mv sunt] fuerint Cα inter] *add.* illas Bε duas] 2 / 2^{as} *some*; duas 2 Pξ; et Mτ; secundas Kα duas notas] et nota Pq; tanosß (?) Bβ per 15] *illeg.* Nα; *om.* Mγ Sλ Vα; xv Oχ Qε Sβ Sθ Si; et 15 Eδ Mv 15] quindecim Lκ; *add.* gradus Sη
- 6 equales] *add.* 1-line gloss Cα; *add.* per stellam super suam altitudinem positam retrahendo(detrahendo Vπ) gradum solis ad occidens(*add.* et Vπ) dividendo ut prius Vπ Xγ; *add.* Si vero fuerint gradus que non possent dividi per 15, pars quolibet gradum computa minuta 4 hore Kδ Pθ horas] *add.* pertransitas Mv Mφ Vι; *add.* transitas Vτ
- 7 Similiter] Sic Lζ Oη Ov Oσ Oφ(*add. interlin.* similiter) Pφ Vα Similiter ... nocte] *marg.* Pτ Similiter ... equalem] *om.* Dη facies] fac Mτ Pξ in] *interlin.* Pζ; de Bγ Bζ Cη Kε Mτ Qζ nocte] *add.* per stellam Bκ; *add.* per stellam super suam altitudinem(latitudinem Eν) positam(*om.* Dγ) retrahendo(detrahendo Bθ Dδ Eν; retrog^ado Gα; trahendo Dγ Mλ) gradum solis ad occidens dividendo(et divide Pι; et divide per 15 Vτ) ut prius Bζ Bθ Dγ Dδ Eλ Eο Eν Gα Mγ Mλ Pι Pτ Vν Wι Wλ; *add.* per stellam super suam altitudinem positam retrahendo gradum solis usque ad occidens vel orientem occidentalem quod [*illeg.*] et dividendo ut prius. Similiter facies in nocte Zα; *add. interlin.* scilicet per stellas Lζ postquam] post Oη Xδ enim] *om.* Bβ Bδ Bε Cγ Cι Dδ Eβ Eγ Eζ Eη Fα Fβ Fζ Kα Kδ Kε Kθ Ki Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mπ Mτ Mv Mφ Oβ Oγ Oζ Ov Oξ Oτ Ov Pα Pθ Pι Pμ Pν Pξ Po Pq Pσ Qβ Qγ Qζ Qη Qi Vi Vτ Vψ Wα; vero Cε Eα Eδ Gα Mv Mo Nα Pβ Pζ Pτ Pv Qδ Qθ Qλ Qμ Sβ Sδ Sη Sκ Tδ Wλ Xγ Xδ Zα inveneris] veneris Bβ; *add.* vel scieris Vξ horam ... per] *om.* Lδ equalem] *corr. from* inequalem Oι Sκ; *corr. to* inequalem Eη Wα; inequalem Bβ Bγ Bζ Bη Bθ Bi Bκ Cα Cγ Cδ Cε Cζ Cη Cι Dγ Dδ Eα Eγ Eδ Eζ Eκ Eλ Eμ Eο Eρ Eτ Kδ Kε Kθ Ki Lζ Lλ Lμ Mα Mγ Mη Mi Mλ Mv Mo Mτ Mv Mφ Nγ Oβ Oη Ov Oσ Oφ Pγ Pδ Pζ Pθ Pι Po Pτ Pv Qδ Qε Qζ Qη Qθ Qμ Rα Rγ Sβ Sθ Si Sλ Vα Vβ Vγ Vi Vξ Vν Vπ Vρ Vτ Vυ Vφ Wβ Wι Wλ Wμ Xα Xγ Zα; *add.* in nocte Cα per] *om.* Lδ; et Sλ

² As noted in the apparatus, the majority of the mss have “unequal hour” (“horam inequalem”) when it should be “equal hour.”

mark the place of the same muri. After this divide the degrees which are between the two marks by 15 and you will have the equal hours.

You will proceed similarly at night, for after you have found the equal hour using

gradum solis et altitudinem alicuius stelle, signato loco almuri, reduces gradum solis ad orientem occidentalem, et notabis iterum locum almuri. Et spacium inter hec duo loca

- 8 gradum₁] gradus Vτ; *add.* altitudinis Kε Kι Mτ Qζ; *add.* horam equalem Lδ solis] *om.* Bγ Cη Dγ Eκ Fβ Kα Pγ et] invenies Pρ; *vel* Oι; *add.* ad Bβ; *add.* per Cγ alicuius] *om.* Oχ; illius Sι stelle] *add.* cum Pρ; *add.* fixe Cα; *add.* quia Dη; *add.* (que Gα) inventam(*add.* et. Oβ) in dorso(*add.* astrolabii Kι) et positam in rethi ut oportet Bζ Dγ Eλ Eο Gα Kι Mγ Mλ Oβ Oφ(*marg.*) Pι Qζ(*add. illeg.*) Vν Vτ Wι Wλ Xγ; inventam in dorso astrolabii et positam in rethi ut oportet id est quantum hora excedit(excedat Kε) equalis(*om.* Kε) inequalem Kε Mτ loco] *add. in marg.* in quo tunc est Bγ almuri] *om.* Wμ; *add.* in qua motum diurnum Qζ; *add.* in limbo Oι; *add.* tunc Oσ reduces] *twice* Mφ Vι; induces Eο gradum₂] arcum Eλ solis] *om.* Pξ; *illeg.* Vγ; *add.* ad orientem id est Qζ
- 8-9 reduces ... occidentalem] 24 gradus solis ad orientem id est ad orientem orientalem interim Mτ reduces ... almuri] *om.* Bζ
- 9 orientem] cai[*illeg.*] Cι; orientem Cγ; orientem Fβ Lβ Pρ orientem occidentalem] orientem ad orientem orientem [*illeg.*] Kε Kι occidentalem] *add.* a quo incipit nox Dη; *add.* ibi incipit nox Lγ; *add.* quem ibi incipit Dδ Oξ; *add.* quem incipit nox Eη Lβ Lκ Pμ Pν; *add.* quem ibi incipit nox Bδ Bε Eβ Fα Fβ Fζ Kα Lδ Lε Lη Lμ Mδ Mπ Mν Mφ Oγ Oζ Pα Pβ Pρ Pσ Qβ Qζ Qθ Qι Qλ Rγ Sδ Tδ Vι Wα Zα; *add. illeg.* Qζ; *add. interlin. illeg.* Qζ notabis] nota Bε Eη interim] certum Mτ Qθ; totum Lγ interim locum] in locum interim Zα locum] *om.* Pρ; *interlin.* Eκ; in loco Qδ almuri] *om.* Rγ; *add. interlin.* in limbo Oι Et₂] per Pτ inter] in Bβ Pγ; ut Eν hec] *om.* Oη Vψ hec duo] *om.* Cδ hec ... loco] duas notas Xα duo] *interlin.* Qλ; 2 / 2^o some; II^o Qε; etiam Mν loca] *om.* Pι; *add.* signata Eλ

the degree of the sun and the altitude of some star, and the place of the indicator-muri has been noted, you will bring back the degree of the sun to the western horizon, and you will mark again the place of the muri. And you will divide the space [i.e., the degrees] between these two places

10 divides, sicut prius, per 15, et invenies. Eodem modo scies³ quot sint hore equales inter meridiem vel quemlibet punctum alium et quodlibet instans.

- 10 divides] *interlin* Cδ; divide *some* sicut prius] *om.* Bζ Bθ Dγ Eo Eu Vv Vτ; sicut primum Eα; ut prius Mτ; *add.* et scilicet Pγ; *add.* *interlin.* scilicet per 15 Vβ per 15] *om.* Bε Cγ Cδ Eγ Mι Oσ Oχ Pζ Sθ Sλ Vα Vβ Vγ Vv; *interlin.* Lζ; *illeg.* Eη; per quindecim Lκ et] *om.* Eγ Mι Nγ Qι; scilicet et] Bγ Bι Eδ Eρ Eτ Mv Pγ Pv Po Qδ Sη Wβ Vρ Xα Xγ; scilicet Bβ Cι; scilicet et Qμ invenies] *add.* horas noctis Nα; *add.* horas noctis preteritas Eρ Oβ Qη Pι Vφ Xα; *add.* horam Kδ; *add.* optatum Vα; *add.* quod queres Cγ Eγ; *add.* horas equales noctis preteritas Eλ Vτ; *add.* scilicet horas noctis preteritas Rα Sβ; *add.* *in marg.* (*later hand*) scilicet per altitudinem solis in diei vel stelle in nocte Qμ eodem] eo Bε Eη; Et habebis eodem Vβ; *add.* *in marg.* Hec littera “Et habebis eodem modo” et cetera est addita Vβ eodem ... sciens] et similiter Cγ modo] *om.* Lμ Qζ Qθ Xδ scies] *om.* Bδ Bε Dη Eβ Eη Fβ Gα Kα Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mτ Mv Mφ Oγ Oζ Oι Oξ Oτ Ou Oφ Oχ Pα Pβ Pμ Pv Pξ Pρ Pσ Pφ Qβ Qγ Qζ Qθ Qι QL Sδ Tδ Vβ Vι Wα Wλ Wμ Zα; scias Oβ; scieris Pγ; *corr. from* sciens Bγ quot] quod Bδ Eη Gα Lκ Wλ Pξ Sκ sint] sunt Cγ Dη Eβ Lβ Lγ Lη Mδ Mv Oζ Oι Oτ Pβ Pγ Pμ Pρ Pφ Qθ Sδ Sκ Vβ equales] equinoctiales Eu inter] *marg.* Oξ
- 10-11 et ... instans] *om.* Eζ; unum et invenies scilicet horas noctis preteritas Bζ; et videas quo eius sint in 15 inter 2 notas et tot sunt hore transacte Cα Eodem ... instans] *om.* Bη Bι Cδ Cε Cζ Dγ Eα Eγ Eδ Eμ Eo Eρ Lζ LL Mα Mγ Mη Mι Mλ Mv Nα Nγ Oη Oσ Oχ Pζ Pι Po Pτ Pv Qε Qη Rα Sβ Sη Sθ Sι Sλ Vα Vγ Vv Vρ Vv Xα Xγ; *marg.* Qμ Vφ Wι; horas equales noctis [*illeg.*] Bκ equales ... meridiem] *illeg.* Zα
- 11 meridiem] meridionale Qδ; *add.* *in marg.* scilicet cum eis in meridie vel in quoque alio instanti Qμ vel] et Bβ Bγ Cη Dη Eκ Eλ Gα Lδ Mδ Mπ Oβ Oγ Pξ Qγ Qμ; vel inter Kε Qζ Rγ vel ... instans] *om.* Mτ Zα; et qualibet Ø quod volueris Vφ quemlibet] quemcumque Qδ; quolibet Oβ; quodlibet Bβ Dη Eλ Rγ; *add.* horum Vψ alium] aliud Bβ Bθ Gα Pξ Pρ Pσ Vτ; almuri Bε Eη Rγ et] *om.* Pγ; in Dη; vel Bθ Dδ Eλ Eu Kα Vπ Vτ quodlibet] quolibet Dη; quolibet ad Dδ instans] *om.* Cγ Kα; *illeg.* Gα; in Ø Vτ; instanti Dη; Ø Qζ; *add.* et inter primam et [*illeg.*: repperis (?) Lδ, vapperis (?) Oγ] Lδ Oγ; *add.* *in marg.* Et hoc est verum si aliqua stella notabitur orietur in occasu solis Oι

³ The mss which omit the verb “scies” from this last sentence generally treat “invenies” as part of this sentence and therefore its verb.

as before, [that is], by 15, and you will find [the answer]. In the same way you will know how many equal hours are between midday or any other point and any moment you please.

[Comment:

Find the current position of the sun and (using the indicator-muri to find the degrees) divide the degrees from there back to the sunrise by 15 and this will give the number of equal hours which have passed since dawn. At night divide (by 15) the difference in degrees of the current position of a star back to the time of sunset and this will give the number of equal hours which have passed at night.

And you can do this for elapsed time from any (starting) point to the current point in time.]

[CAPITULUM 9.] DE CONVERSIONE HORARUM INEQUALIUM IN HORAS EQUALES

Si volueris reducere horas inaequales in horas aequales, scito gradus horarum

- 1 *before De]* *add.* 11 Lλ; *add.* Capitulum 10^m Qδ De ... aequales] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eκ Eλ Eν Gα Kε Kι Lζ Mα Mτ Nα Oβ Oν Oσ Oχ Pι Pξ Pσ Pφ Qε Qη Qι Rγ Sβ Sθ Sι Sλ Vα Vτ Vν Wλ Xγ Zα; *illeg.* Eγ Eζ; *faded* Eδ; 9^o horarum inaequalium in aequales et e converso Nγ; Ad reducendum horas inaequales ad horas(*om.* Qθ) aequales Lμ Qθ; Conversio horarum inaequalium in horas(*om.* Mι) aequales e converso Mι(*later hand*)Rα Vι Xα; Conversio horarum inaequalium in aequales Mο; Conversio horarum inaequalium in horas aequales [*illeg.*] Vι; De reductione horarum inaequalium Wι; De reductione horarum inaequalium in(ad Pο Qμ Sη Vγ) horas(*om.* Vγ) aequales Bη(*add.* et e converso; *add. in marg.* 10) Mλ Oη(*add.* et inaequales) Pο Qμ Vγ(*add.* et e converso) Sη; De reductione horarum inaequalium in horas aequales et inaequales(*add.* e converso Eμ) Cζ Eμ(*marg.*; *add. in marg.* 10^{us}); De reductione horas inaequales ad horas aequales Mτ; Modum reducendi horas inaequales ad aequales Bβ; Reductio horarum equalium in inaequales Mγ Eο; Reductio horarum inaequalium Eο; Reductio horarum inaequalium in(ad Bζ Mν Oφ Vξ) horas(*om.* Bζ Eτ Mν Pτ Vζ) aequales Bι(*add. in marg.* 10 c^m) Bζ Dγ Eτ Mν Mν(*later hand*) Oφ(*add. in marg.* Ad reducendum horas inaequales ad horas inaequales) Pτ Vβ(*add. in marg.* Conversio horarum inaequalium in aequales et e converso) Vζ Vρ Wβ(*add.* Capitulum); Reductione horas inaequales ad aequales Lκ; Scientia reductionis horarum inaequalium in horas aequales Qβ; *add. in marg.* 11^m Qζ in] *om.* Oξ Pθ Pμ inaequalium] equalium Qλ Wα horas] *om.* Oζ Pζ Pθ Pν Pψ in ... aequales] *om.* Kα aequales] *add.* et e converso Lλ; *add.* Rubrica Cη Vτ; *add.* ut pie(?) Fβ
- 2 Si] Cum Bζ Bη Bθ Bκ Cα Cγ Cζ Dγ Eγ Eλ Eμ Eο Eν Lζ Lλ Mα Mγ Mι Mλ Mν Mφ Nγ Oη Oφ Oχ Pζ Pφ Qε Sθ Sι Sλ Vα Vβ Vι Vν Vπ Vτ Wι; *add.* autem Zα Si ... aequales] *om.* Vγ volueris] vis many; *add.* scire Oβ reducere] ducere Kα Sλ; scire Eο inaequales] aequales Dη Kε Kι Mτ Qζ Vα inaequales in horas] *om.* Eζ in] *illeg.* Zα; ad some; et Qθ in horas] ad Rγ; *corr. in marg.* from et horas Wα in ... aequales] *om.* Cε Mα Mγ Oχ Pγ Qγ Qε Rα Sλ Vτ Vψ Wβ Wλ horas₂] *om.* Bε Bζ Cδ Eη Eκ Kα Mι Mν Mφ Nγ Pζ Pσ Qι Sθ Vι; *interlin.* Sβ aequales] inaequales Dη Kε Mτ Qζ; *add.* et e contra Dη Kι scito] *om.* Oβ; scias Cα Kα; vide per x^{mum} Qη; *add.* per 8^m canonem Bζ Eρ Gα Pι Rα Sβ(*interlin.*); *add.* tunc vide per 8^{tum} canonem Oβ scito gradus] scitis gradibus Bε Bζ Dγ Dδ Dη Fζ Eβ Eη Eλ Eο Fα Fβ Kε Lβ Lγ Lδ Lη Lκ Lμ Mγ Mλ Mπ Mτ Mν Mφ Oγ Oζ Oι Oξ Oσ Pα Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Tδ Vι Vν Vτ Wα Wι Xδ Zα; s [*lacuna*] gradibus Mδ gradus] gradum Bι Mν Sθ; graduum Oη; *add.* inaequalium Cε horarum] *interlin.* Sβ; *add.* diei vel noctis Zα

[CHAPTER 9.] ON THE CONVERSION OF UNEQUAL HOURS INTO EQUAL HOURS

If you wish to restore unequal hours into equal hours, ascertain the degrees of the unequal hours

inequalium, quot sint, et divide eos per 15 et habebis horas equales; similiter facies de horis equalibus.

- 3 inequalium] equalium Eα Eζ Po Qζ; *add.* scilicet(.6. Lδ) multi[plican]do numerum graduum in quantitatem horarum Lδ Oγ quot] que Qζ; qui Sη; quod Bδ Bζ Kε Vξ Qη Qθ Qi Sk Wλ quot sint] *om.* Dη; id est in quot gradibus hora equalis excedat inequalem vel e converso Pι sint] est Vγ; sunt Eμ Lλ Mν Oη Qμ Rα Sθ Vν Vρ Xγ; *add.* gradus Bζ; *add.* gradus quos Eγ divide] divides *some*; dividesque Bθ Ev Vπ; *add.* eum Vτ eos] *om.* Bζ Eγ Pι; eas Cα Pξ Qγ; eos gradus Oβ; gradus earum Bη Cζ Eλ Eμ Oφ Pφ Si Vv Vτ; gradus eorum Dγ Eo Mγ Mλ Oη Wι; quos Cγ; *add.* quota sit Qε 15] xv Oχ Qε Sβ Sθ; quindecim Lκ Tδ; 1 Pγ et habebis] *om.* Cε horas] *om.* Cγ Eγ Mν Qλ Wα Wι Wλ Zα equalibus] *marg.* Pζ; inequales Dγ Xγ; *add.* horas inequales dividendo per 12 Lε Tδ similiter] *twice* Mι; *add.* etiam(?) Kθ facies] *om.* Mα; fac Eγ
- 3-4 Similiter ... equalibus] *om.* Oη de ... equalibus] *om.* Bζ
- 4 horis] *om.* Bβ Bη Bθ Bκ Eα Eδ Eζ Eλ Eo Eρ Cδ Cζ Dγ Eμ Ev Gα Lλ Mα Mγ Mλ Mν Nα Nγ Oβ Oσ Oφ Oχ Pζ Qδ Qη Rα Sθ Si Vγ Vρ Vυ Wλ Xα Xγ; cuiuslibet Eγ equalibus] dequalibus(!) e converso Pι; inequales dividendo per 12 Eγ; inequalibus Rγ Zα; *add.* ad horas inequales Bκ; *add.* dividendo gradus per 12 Oβ; *add.* dividendo per 12 Qη; *add.* equales dividendo per 12 Oξ; *add.* et cetera Rγ; *add.* horas inequales Bε Eη; *add.* horas(*om.* Cγ Kα Pξ; in horas Pβ) inequales(equales Lμ Qθ Zα) dividendo per 12(1 [illeg.] 2 Qζ; duodecim Mτ Oφ Pφ Qθ) Bδ Cγ Eβ Dη Fα Fβ Fζ Kα Kδ Kε Kι Lβ Lγ Lη Lκ Lμ Mδ Mπ Mτ Mν Oζ Oi Oτ Ou Oφ Pα Pβ Pθ Pμ Pν Pξ Pρ Pφ Qβ Qγ Qζ Qi Qλ Sδ Vi Wα Xδ Zα; *add.* horas inequales dividendo per 12. Et habebis partes horarum inequalium Vβ(*add.* in *marg.* “horas inequales” et cetera est littera addita); *add.* horas inequales dividendo(*add.* and *expunged* horas equales) gradibus horarum equalium per 12 Wμ; *add.* in horas inequales dividendo per illa Pρ; *add.* in inequales dividendo numerum graduum equalium horarum per gradus [illeg.] hoc in equales Kθ; *add.* inequales Bθ Eλ Vπ; *add.* inequalibus Ev; *add.* 2.5-line gloss Cα; *add.* 3-line gloss Dδ; *add.* 4-line gloss Oγ; *add.* interlin. in inequales Qμ; *add.* in *marg.* scilicet dividendo gradus earum per numerum graduum equales tunc habunt gradus inequales Qμ; *add.* in *marg.* Scilicet numero graduum horarum equalium divide eos per numerum graduum hore inequalis qui tunc est et habebis Bγ; *add.* interlin. scilicet reducendo Kθ

how many there are, and divide them by 15, and you will have the equal hours. You will do the same with equal hours.

[Comment:

Take the length in degrees of a day or some part thereof in the unequal hour period and divide this by 15, and this will give the number of equal hours in that period. Note: it is the number of degrees in the period and not the number of unequal hours which are divided by 15.]

[CAPITULUM 10.] DE ALTITUDINE SOLIS IN MERIDIE HABENDA

Si volueris scire altitudinem solis in media die, quod est initium recessionis,

- 1 De ... habenda] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eκ Eλ Eμ Gα Kε Kι Lζ Mα Mτ Nα Oβ Ov Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qη Qi Rγ Sβ Sθ Si Sλ Vα Vν Vτ Vυ Wλ Xγ; *illeg.* Eγ Eζ Lγ; *faded* Eδ *cut off* Pζ; Ad habendum altitudinem solis in meridiei Vζ; Ad habendum altitudinem solis Eo Eο(*add. later hand* in meridiei) Mγ; Ad habendum solis altitudinem meridianam Pτ; Ad inveniendum altitudinem solis in meridie Lμ Qθ; Ad sciendum altitudinem solis in media(*om.* Wι) die Kθ Po Qμ Sη Wι; Capitulum undecimum. De altitudine solis meridiana vel stellis Qδ; De altitudine solis meridiana et stellarum Bη; De accipienda altitudine in media die Vγ; De altitudine solis invenienda. Cap. Qβ; De altitudine solis meridiana(meridina Cζ) et stellarum Cζ Eμ(*marg.*; *add. in marg.* 11^{us}) Oη; De altitudine solis in media die Lκ; De invenienda altitudine solis in meridie Bι(*add. in marg.* 11 c^m) Vβ(*add. in marg.* De altitudine solis in media die); De inuentione solis in meridie Wβ; Inuentio altitudinis solis in meridie Bγ(*later hand*) Dγ Eτ Mν Oφ(*add. in marg.* De sciendo altitudinem solis in meridie) Vο; Inuentio hore diei per allidadam Sκ¹; Si altitudinem solis vis scire in astr[olabi]ea Bβ; *add. in marg.* 12^m Qζ habenda] *om.* Dη Kα Mι Mλ Mπ Nγ Zα; invenienda Bθ Pυ Vπ; *add.* Capitulum Cη; *add.* Rubrica Vπ
- 2 Si] Cum Cα Cγ Cδ Cζ Dγ Eγ Eλ Eμ Eο Lζ Lλ Mα Mγ Mι Mλ Nγ Oη Ov Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Sλ Vα Vβ Vν Vτ Vγ Vυ Wι; Et si Bκ volueris] vis *many*; volu. vin volueris Bζ scire] *om.* Eδ Lδ Lλ Mα Qε Sθ Vα Vγ Vτ; *interlin.* Oσ; *marg.* Pζ; *add.* manifeste Fβ solis] *interlin.* Qi in] *om.* Sβ; *interlin.* Pζ Qξ in ... die] *interlin.* Vξ media die] medio die Vν; meridie Eλ Mι Mτ Nγ Pο; meridie hoc est media die Dη die] *interlin.* Oσ; nocte *corr. later hand* to die Eο quod] qui Dγ Mγ Vν; quot Oβ est] *om.* Bβ; *add. in* Sβ; *add.* spacium Eυ initium] *add.* cp̄ris(?) Qμ; recessionis] *add.* a chenith Bγ; *add.* [*illeg.*] a meridie Qζ; *add.* dicatur Bβ; *add.* eius a loca meridiana Cα; *add.* a meridie Mτ; *add.* scilicet ipsius diei W; *add. in marg.* etiam si non luceat sol super terram Oι
- 1-4 *different text (12 lines)* Pι

¹ This is actually the title of Cap. 11.

[CHAPTER 10.] ON HAVING KNOWLEDGE OF THE ALTITUDE OF THE SUN AT MIDDAY

If you wish to know the altitude of the sun at midday, which is the beginning of its decline [i.e., the beginning of its afternoon descent to the horizon],

pone gradum solis super lineam medii celi; et numerus graduum almucancharat a loco solis in orizontem est altitudo eiusdem medie diei. Similiter facies cum stellis fixis.

- 3 pone] *om.* Pγ gradum] gradus Vτ; *interlin.* Sθ solis] *om.* Pα; *illeg.* Vγ; illius Bε Eη lineam] *add.* mediam Bδ; *corr. in marg. from* medium Mλ medii] *add.* vel Mα medii celi] meridiē Vγ celi] diei Cγ Oχ Pζ Sβ Sθ Vβ(*add. interlin. al' celi*) et] in Cγ Eγ almucancharat] alenchabuth Qη; almi^{at} Kε; almicancharaz Ov; almicancharach Mγ; almicancrath Mτ; almicanrath Eζ; almicanthar' Lμ; almicantharath Lδ; almicantharaz Bκ Cδ Oη; almicanthar' Cα; almicanth Pσ; almicanthar' Dη; almicantharath Gα; almicanth Lκ; almi^{raz} Lζ; almit' Oβ; almiutantarach Sι; almu^c Cε Mπ; almucan Sβ; almucancharach Sη; almucancharath Vθ; almucancharath Vτ; almucan^{rath} Rα; almucan^t Qθ Rγ Sλ; almucan^{ath} Qμ; almucancharach Bθ; almucancharath Cζ Eκ Pζ Qε Sθ Vγ Zα; almucancharath Bδ Bι Eα Eη Eλ Kδ Lγ Lλ Mδ Oγ Oι Pξ Pυ Pφ Qγ Qδ Qι Tδ Vα Vβ Vπ; almucancharaz Vυ; almucan^t Qζ; almucancharath Nα Oφ; almucanth Xα; almucanth Cι Eβ Lβ Lη Mλ Pγ Pθ; almucancharach Pθ Wβ; almucancharath Fζ Mα Oζ Sκ; almucancharath Bβ Bγ Cη Eθ Eυ Fβ Lε Mο Mυ Mφ Oξ Oτ Oυ Pα Pμ Pν Pο Pτ Qβ Qλ Sδ Vν Vξ Wμ Xγ; almucancharath Vι; almucancharat Kα; almucan^t Kθ; almucan^t Bζ Eο Wι; almucan^t Xδ; almucancharath Vψ; almucancharaz Eμ Oσ; almucancharath Wα; almu^{rat} Eγ Eδ; almu^{rath} Eτ; almucancharach Pβ; almu^t Dδ Mη; almutantarath Mν; almutancharach Mι Nγ; almutancharat Cγ; almuth Bε Dγ; almu^{that} Wλ; *add. orizonte orientali ad locum solis Cα* a] *om.* Kα; et Oβ; in Sη loco] *add. interlin. orizonte Bι; add. in marg. in quo gradus solis tangebatur tunc orizont[cut off] scilicet sole oriente Bγ*
- 3-4 a loco solis] *om.* Dη
- 4 solis] *om.* Bδ Bε Cι Cε Dδ Eβ Eδ Eη Eθ Fβ Fζ Kδ Kε Kι Lγ Lδ Lε Lη Lκ Lμ Mδ Mν Mο Mπ Mυ Mφ Oζ Oξ Pα Pβ Pθ Pν Pο Pξ Pθ Qβ Qδ Rα Sη Vι Vψ Wα Xα Zα; *interlin.* Oι; *illa (interlin.)* Lβ in] *interlin.* Pθ; ab Dη Kα; usque ad Cα; usque in Cζ Oη; usque(*suprascr.*) in Eμ; *add. interlin. al' usque in Oφ orizontem] orizonte some;* orizonte orientale Dη; occidente Bι; oriente Bδ Eο Kα Mπ Qθ Tδ Vβ(*add. interlin. al' orizonte*) Vυ; orientem Oσ; orizonte Mδ Vα; *add. quod idem Cα; add. interlin. id est usque ad lineam medii celi Qζ est] cum Mγ; erit Cγ Lδ Lλ Mι Ov Pζ Qε Vγ; add. interlin. al' et Oφ eiusdem] om.* Cι Xδ; eius Bε Dη Qι; solis Sβ medie diei] meridiē Cγ Eγ Eδ Kδ Mι Nγ Pβ Similiter] *lacuna* Sη Similiter ... facies] *om.* Cε Mη Pγ; *illeg.* Cι; *fac some;* operandum est Cα cum] *om.* Eτ; de Pζ Pξ; in Sλ facies] *om.* Oη; scitis Fβ; *add. de nocte Qη; add. in nocte Oβ Oι(interlin.); add. scilicet ponendo cacumen(acumen Mτ) stelle supra lineam medii celi cum(ostendit tunc Mτ; tunc Kι) gradus qui sunt ab alimba(almicancrath Mτ; almik Qζ; almik^{at} Kι) primo in oriente(orizonte Mτ) usque ad locum solis in linea medii celi positum ostendit altitudinem stelle in medio diei(celi Mτ) Kι Mτ Qζ; add. si volueris habere altitudinem meridianam arcus stelle fixe Cα; add. ut s[imiliter(?)] Kδ; add. later hand in marg. si volueris earum altitudinem in linea medii celi scire Qμ*

set the degree of the sun on the line of the mid-sky, then the number of the almucantar degrees from the place of the sun on the horizon is the altitude of the same at midday. You will perform the same action with the fixed stars.

[Comment:

If you want to know the altitude of the sun at midday, place the point of the sun on the ecliptic (for that day) over the line through the middle of the sky (that is, the vertical diameter), and the number of the almucantar where it lies will be the altitude of the sun.]

[CAPITULUM 11.] INVENTIO HORE DIEI PER ALLIDADAM

Si per allidadam horariam vis scire horam diei naturalem, pone allidadam super

Cap. 11] *om.* Bζ Bη Bι Bκ Cα Cδ Cζ Dγ Eγ Eμ Lζ Lλ Mα Mγ Oσ Oχ Pζ Qε Rα Rγ Sβ Sθ St Sλ Vα Vγ Vq Vv; after Cap. 15 with insertion mark: Mλ; *in bottom marg. with interlin. glosses* Qμ(*later hand*)

- 1 Inventio ... allidadam] *om.* Bδ Bε Cγ Cε Dδ Eα Eζ Eκ Eλ Eν Gα Kι Lκ Mτ Nα Oβ Pγ Pι Pξ Po Pσ Pφ Qζ Qη Qi Sη Vτ Vφ Wλ Xα Xγ Zα; *faded* Eδ; *illeg.* Mv; Ad habend' horam diei naturalem per allidadam inchorariam Qβ; Ad inveniendum horam naturalem diei Lμ Oφ(*marg.*) Qθ; Ad horam diei naturalem per allidadem horariara(!) Eq; Ad sciendum horam naturalem diei Vξ; Ad sciendum horam per allidadam Pτ; Capitulum 12^m. De hora diei naturali per allidadam Qδ; De accepta horarum per allidadam Kθ; De hora diei naturalis habenda per allidadam horariam Mλ; De horis naturalibus Mπ; De inventione horarum inequalium per alliladam horariam Ov; De inventione hore diei(*add.* naturalis Vβ) per allidadem Dη Kδ Mι(aldidam) Vβ; Invenio eiusdem per lineas horarias in dorso Vι; Inventio horarum per allidadam que dicitur horaria Bγ(*later hand*); Inventio hore(horarum Vψ) diei per allidadam Cι Eβ Eτ Vψ; Inventio hore per allidadam horariam Mv; Si per allidadam vis scire horam diei Bβ; Verto 3 folia ca. Wι; [*illeg.*] gradus solis scilicet [*illeg.*] soli superiem pinnulam allidada Qμ hore] horarum Lδ Oγ; *add.* naturalis Bθ Pv Vπ diei] naturalis Wβ allidadam] aldidam Nγ; *add.* Rubrica Sδ Vπ *add. in marg.* 12^m Vφ; *add. in marg.* 13^{us} Qζ; *add. in marg.* c. 13 Sδ; *add. in marg.* Hoc capitulum "Si per allidadam" et capitulum subsequens "Item per alidadam" sunt ambo addita Vβ
- 2 Si] Et si Ev; Ut si Eλ Vπ Vτ; *add.* autem Eα per] quod Wλ allidadam,] aldidam Mι Nγ; alhidadem (*and elsewhere*) Pι Zα; alidadam Eα Eζ Rγ; alidandam Mτ(*and elsewhere*); alilada Ov(*and elsewhere*); alyadam Qη horariam] *om.* Cγ Eδ Fζ Lδ; *add.* iam Lκ scire] *om.* Cε Eα Eδ Eκ Eτ Kδ Mη Mλ Mν Nα Pγ Po Sη Wβ; *del.* Eζ Pθ; *interlin.* Sκ; habere Bδ Bε Dδ Eβ Eη Fα Fβ Kα Kε Kθ Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mo Mπ Mv Mφ Nγ Oγ Oζ Oi Oξ Oτ Ov Oφ Pα Pδ Pμ Pν Pq Pσ Pφ Qγ Qδ Qζ Qθ Qi Qλ Tδ Vβ Vι Wα Wμ Xα Xδ Zα; invenire Bγ(*interlin.*) Bθ Dη Eλ Eν Mτ Vπ Vτ Vψ Wι horam] hore Oγ diei] diey Xα; *add.* illius in dorso Xδ naturalem] talem Bβ; equalem Lδ Oγ; *add.* id est equalem Pι Zα; *add. interlin.* id est inequalem Kε; m^aent Fβ allidadam₂] *om.* Nγ Pθ; alididam Oγ Qθ; aliud Vψ; allid' Mη; alliladam Ov(*and elsewhere*) super] *om.* Mv; per Oγ
- 2-3 allidadam₂ ... altitudinem] altidadam(!) Mι super altitudinem] *om.* Mφ Vι
- 2-5 pone ... quesita] *om.* Xα

[CHAPTER 11.] FINDING THE HOUR OF THE DAY BY THE ALIDADE

If you wish to know the natural [i.e., unequal] hour of the day using the hour-alidade [or “time-telling” alidade], place the alidade on

5 altitudinem medie diei illius in dorso astrolabii suspensi; et verte dorsum ad solem tam diu donec umbra uniuscuiusque anguli superioris pinnule cadat in allidada, quelibet in directo sui lateris; et ubi ceciderit in divisionibus erit hora quesita.

- 3 altitudinem] allidadam Mo; hora Xγ; lineam sive arcum Pι; *add.* solis Wλ medie diei] medii diei *some*; meridiei Eδ Vτ; *add.* naturalis Rγ illius] istius Qη Vτ; *add.* allidadam Pθ suspensi] *om.* Eρ Gα Nα; *interlin.* Vφ; et fac punctum in qua ubi ipsam suspensat arcum hore 6^{te} Pι et verte dorsum] vertendo illius Bβ Eα Eδ Eζ Kθ (*add.* scilicet dorsum); vertendo illud Mv Po dorsum] *om.* Eλ; *add.* illud Mλ Ov; *add.* *and del.* astrolabii Pv; *add.* *interlin.* astrolabii Qμ Vβ ad solem] *rep.* Kι tam] *om.* Vξ
- 3-4 tam diu] *om.* Σκ
- 4 diu] *om.* Bδ uniuscuiusque] cuiuscumque Pθ; cuiuslibet Kε Kι Mτ Nα Qθ; cuiusque Kδ Lμ Pσ; uniuscuius Eρ; unius cuiuslibet Vφ; utriusque Pφ; *add.* pinnule Dδ; *add.* *interlin.* al' utriusque Vβ anguli] *om.* Kα Oφ; diei Mv Mφ Vι superioris] *om.* Sδ pinnule] *om.* Eρ Gα Pι Vφ; *lacuna* Kδ Pβ; perinule Fβ; pinnule Bθ; pinnulle Eα Mv; pinule Eμ Mπ Qδ Sη Σκ Wλ; premule Pφ allidada] alidida Mι Nγ; alididam Oγ Qθ Rγ; allidadam *some*; allilada Vψ; alyadam Qη; *add.* piah(?) in dorso Gα quelibet] *om.* Bδ Bε Cγ Cι Dδ Dη Eβ Eη Fα Fβ Fζ Gα Kα Kδ Kε Kι Lβ Lδ Lε Lκ Lμ Mδ Mη Mπ Mτ Mv Mφ Nγ Oγ Oζ Oι Oξ Oτ Ov Oφ Pα Pβ Pδ Pθ Pμ Pν Pρ Pξ Pσ Pφ Qβ Qζ Qη Qθ Qι Qλ Sδ Σκ Vι Vψ Wμ Zα; quolibet Vβ in₂] *om.* Pφ; *interlin.* Oφ
- 5 directo] puncto Vψ; recto Qλ; recto *corr.* to directo Wα lateris] *lacuna* Fβ ceciderit] cecideris(!) Mo; occiderit Cη; *add.* punctus Pι; *add.* talis umbra Bβ Eα(tallis) Eδ Eζ Kθ Mλ Mv Ov Po in] et Xγ in divisionibus] *rep.* Lβ divisionibus] diebus Pξ; *add.* horarum Bβ Bγ(*interlin.*) Bε Cγ Eα Kθ Lδ Mλ Mv Oγ Pι Po Qζ; *add.* ibi Bθ Eλ Lδ Mo Oγ Pv; *add.* regule Nα Pv Vβ; *add.* si(?) Xγ erit] est *corr.* to erit Oφ; in Nα; *add.* ibi Sη Vβ hora] ipsa Oζ quesita] *add.* Ad horam diei naturalis per allidadam horariam cognoscenda Gα

the back of the suspended astrolabe on the altitude [of the sun] at the middle of that day; and turn the back to the sun until the shadow of each edge of the upper vane falls on the alidade, anywhere in line with its side. And where it falls in the divisions will be the desired hour.

[Comment:

This chapter depends on the marking of the unequal hour-lines as outlined in the *Constructio*, Cap. 5. (Because, as noted there in the comment, few western astrolabes had these markings, Capitula 11 and 12 of the *Practica* are often omitted.)

Placing the time-telling alidade or rule (specifically the end along which the time-telling hours have been marked) on the maximum altitude of the sun for that day (noon, solar time) sets the two variables which determine the length of the natural day and of the 12 unequal hours for that day – the latitude of the observer and the day of the year (or the position of the sun along its annual orbit). Then, suspending the astrolabe, turn it so that the edges of the upper vane toward the sun will cast a shadow down the alidade, the edges of the shadow lining up along the rule. The unequal hour can then be read where the end of the shadow falls, according to the lines engraved across the alidade.

Note: since the alidade will be pointing more or less upwards toward the place in the sky where the noon-day sun would be, the early morning hour shadow or the late day hour shadow will cross the alidade close to the vane; and the nearer the hour is to noon, the more “vertical” will be the shadow and hence cross the alidade further from the vane. This is why the hour lines on the alidade are numbered from the vane outward toward the centre (1 to 6) and then back from near the centre to the vane (7 to 12).

Note: in modern practice, one must adjust the calculation by using the “solar noon” when the sun is indeed vertically overhead in the sky for the observer, rather than “civil noon” based on modern time zones. Solar noon can easily be calculated by dividing the length of time between sunrise and sunset by two, and adding this to the time of sunrise.

Thus if the sun rises at 6:34 a.m. and sets at 8:04 p.m. (or 20:04), the difference is 13:30 hours, half of which is 6:45 hours. Noon would then be at 6:34 plus 6:45 or 13:19 (i.e., 1:19 p.m.) Which would be the end of the 6th unequal hour and the beginning of the 7th. (It does not matter whether this is standard time or daylight saving/summer time as long as the calculations and the final reading all use the same time system.)]

[CAPITULUM 12.]¹ DE EODEM INVENIENDO PER LINEAS

Item per allidadam etiam in dorso et lineas horarum inter latera gnomonis, si

Cap. 12] *om.* Bζ Bη Bι Bκ Cα Cδ Cζ Dγ Eγ Eμ Eο Eρ Gα Lζ Lλ Mα Mγ Oβ Oη Oσ Oχ Pζ Pι Qε Qη Rα Sβ Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Xα; *add.* different version in bottom marg. Eρ(*later hand*); in bottom marg. Qμ(*later hand*) Vφ

- 1 De ... lineas] *om.* Bδ Bε Bι Cγ Cε Dδ Dη Eα Eδ Eζ Eκ Eλ Eυ Kε Lκ Mν Mτ Nα Oν Pγ Po Pξ Pσ Pτ Pφ Qζ Qi Qμ Rγ Vτ Vφ Wα Wλ Xγ; Ad sciendum horam naturalem in dorso astrolabii Vξ; Capitulum 13^m. De eodem in dorso Qδ; De eodem Kθ Mι Mπ Nγ Sη; De eodem habenda per allidadam et lineas horarias Mλ; De eodem inveniando etiam per allidadam Qβ; De eodem inveniando per lineas Oι Tδ; De eodem per lineas horarias in dorso Vβ; De eadem per lineas horarum Kδ Vπ(*add.* Rubica); De inventione horarum inequalium in dorso astrolabii Zα; Inventio de eodem per lineas Qγ; Inventio eiusdem per lineas horarias in dorso Eτ Wι; Item ad capitulum de eodem Lμ; Item alio modo fit supple Bγ(*later hand*); Item de eodem Oφ(*marg.*); Item de eodem ad ca^{lum}(calculum?) Qθ; Item per alia in horarias in dorso Wβ; Si horam vis scire per alidadam in dorso Bβ eodem] eadem Fζ Kα inveniando] *om.* Bθ Cι Mη Pδ Pθ Pυ Sδ Vψ lines] *add.* horarum Bθ Pδ; *add.* horias Mo; *add.* Rubrica Bθ *add.* in marg. 14^{us} Qζ; *add.* in marg. c. 14 Sδ
- 1-7 De ... quadrante] *marg.* Vφ
- 2 Item] Et est Lβ Lκ Wμ; Tunc Fβ per] *om.* Wλ; qui Bθ Vπ allidadam] alhidadam Zα(*and elsewhere*); alidadam Qδ Rγ; allididam Oγ(*and elsewhere*); allididera Mι; *add.* *interlin.* in astrolabio Zα etiam] *om.* *some* dorso] *add.* astrolabii Bδ Cγ Eβ Kα Lγ Lλ Mδ Mι Nα Oι Pξ Oν Sη Vβ Wβ et] ad Lκ; per Eτ Xγ; si Eκ(*deleted*); *add.* in Pβ; *add.* per Bθ Vφ inter] in Eυ latera] *add.* et cetera latera Eα gnomonis] *lacuna* Kδ; *g[illeg.]*monis Pβ; gno'is Cη Pγ Wι; gnomonibus Pφ; gomonis Eλ Mπ; *cut off* Eζ; *add.* descriptas vel super Eυ; *add.* vel super Bθ Eλ Mo Nα Pτ Pυ Qδ Sη Vβ Vτ; *add.* vel supra Bθ Eλ Mo Nα Pτ Pυ Qδ Qμ Sη Vβ Vτ si] *om.* Cε; sic Cγ Eβ Eη Fα Fβ Lβ Lε Lη Mδ Mι Nγ Oζ Oξ Oτ Oυ Pα Pβ Pμ Pρ Pσ Pφ Qβ Qγ Qθ Qi Qλ Tδ Xδ; vel supra Vπ Xγ(*ms skips to Cap. 28*)
- 2-3 inter ... sic] in dorso poteris illud idem invenire. Pone ergo Dη inter ... super] *marg.* Eζ(*later hand*) si sint] sicut Lκ; sit sicut Fζ Lγ Oι Wμ

¹ In many mss this capitulum continues on without title from Cap. 11.

[CHAPTER 12.] ON FINDING THE SAME THROUGH THE [HOUR-]LINES

Also by the alidade on the back and the hour lines between the sides of the gnomon² as if

² The use of *gnomon*, *-onis* here is not clear. Perhaps because gnomons cast shadows, it is an oblique reference to the shadow square on the back of the astrolabe, and hence to the unequal hour-lines which are usually drawn next to it – see variants “(*add. vel super*)”.

See also Cap. 42, 43 and 44.

5 sint posite ut in quadrante, sic. Super altitudinem solis meridianam in illa die pone allidadam; et nota ubi meridianus circulus, id est, linea finis 6^e hore, secuerit lineam fiducie ipsius allidade; et pone ibi signum de incausto; et illud signum valet situationem

- 3 sint] sit Cε Pδ Wμ; sunt Oφ posite] ponite Pβ; supponite Vφ; *add.* ibi Bβ Bδ Cι Dδ Eα Eβ Eη Fα Fζ Kδ Lγ Lδ Lε Lη Lκ Mη Mι Mφ Nγ Oγ Oζ Oι Oτ Oυ Oφ Pα Pβ Pδ Pθ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qλ Qι Sδ Sκ Vι Vψ Wα Wβ Wι Wμ Xδ; *add.* linee ibi Mδ ut] *om.* Bθ Sκ Vπ sic] *om.* Kθ Mλ Mν Oν Pο Vβ Wλ Zα; *del.* Sκ; sicut Mτ Mυ; sint(?) Qθ super] *om.* Pφ; per Vφ Wμ; similiter Pγ; sit Lβ Lκ solis] *om.* Kα in illa] gnilla(!) Bβ illa] *om.* Lβ Lκ; alia Fα Pφ; ista Kι Mτ illa diei] meridiēi Lη pone] *om.* Dη
- 4 allidadam] alidadam Rγ; *marg.* Fα; a^d Eβ Fβ Oι Oξ Oτ(*add. in marg.* allidadam) Oυ Oφ Pξ Qλ Sδ Wμ; a^{da} Lε; ali^d Fζ; aliud Cγ Kα Lκ Mδ Mι Nγ Pα Pμ Pν Pφ Qβ Qδ Qι Wα Xδ; allud' *corr. to* allid' Sκ; regulam Bδ ubi] ibi *corr. to* ubi Oτ meridianus] meridionalis Eδ circulus] *om.* Vφ id est] est Cγ; in Mδ; *add.* que est Oγ id est linea] *del. and add. interlin.* qui est Bγ linea] *om.* Kε Kι Mτ Rγ; lineas Pγ; *add.* qua est Lδ; *add. interlin.* quia Oφ finis] factas(?) Pγ 6°] 6 *many*; sexte *some*; 64 Cγ hore] horarum Mτ secuerit] *lacuna* Cγ; cecuerit Eζ; fecint *corr. in marg. to* secuerit Sκ; securrit Nα; secuit Pφ lineam] *rep.* Oν
- 5 fiducie] *add.* 6 hore Dδ; *add. in* Qδ ipsius] *marg.* Oι; illius Mν Oφ Pμ Pφ Qβ Sδ Wλ allidade] alidide Mι Nγ; alidade Qδ Rγ; allid' Mη Sκ ibi] ibidem Kδ de incausto] *om.* Dη; cum afcaūito(?) Tδ; de enclaustro Pφ; de incasto Mι; *add.* id est de atrameto Nγ; *add.* id est de atramento Mι de ... signum₂] *om.* Pγ et illud signum] et cetera Cγ Pφ signum₂] *om.* Bβ Bε Cε Cι Dδ Dη Eβ Eη Eυ Fα Fβ Fζ Kα Kδ Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mι Mπ Mυ Mφ Nα Nγ Oγ Oζ Oι Oξ Oτ Oφ Oυ Pα Pβ Pδ Pθ Pμ Pν Pξ Pτ Pυ Qβ Qγ Qδ Qζ Qθ Qι Qλ Qμ Sδ Sκ Tδ Vβ Vι Vπ Vφ Vψ Wα Wλ Wμ Xδ Zα valet] videlum Nγ; *add.* ad Bβ Bε Bθ Dδ Eη Eλ Eυ Kδ Kθ Lμ Mτ Oφ(*interlin.*) Pσ Qζ Qθ Qι Qμ Vπ Vφ Wλ situationem] *om.* Eα; situationi Nγ

they were placed on a quadrant, thus. Place the alidade on the midday altitude of the sun on that day and note where the midday [unequal hour] circle, that is, the line of the end of the 6th hour, cuts the trusted line³ of this alidade, and place there a red mark;⁴ and this mark takes the place of

³ *lineam fiducie*: the line down the “centre” edge of the alidade must be accurate and trustworthy since measurements depend on it. See *Comp. Cap.* 4 line 13.

⁴ The term *incausto* usually denotes the use of red wax. *Encausto* would be ink or dye. Here one needs to make a temporary mark on the alidade, and a dot of wax would be one (temporary) way of doing this. Note that *M₁* suggests “blacking” (*atramentum*).

margarite in quadrante. Deinde accipe altitudinem solis in quacumque hora vis, et illud signum inter horas dabit horam naturalem, ut in quadrante.

- 6 margarite] *lacuna* Cγ; margharite Mτ; *add.* ut Eδ in quadrante] *directe* Fζ
 quadrante] qua divide Pφ Deinde] *twice* Pγ accipe] *om.* Zα; *lacuna* Cγ
 quacumque] qua Dη Qι; qualibet Oζ hora] *illeg.* Qλ; *add.* tu Vφ
- 6-7 et ... horam] ad ^{et} signum inter horas dabit horam *corr. in marg. to* et huius signum dabit
 horas inter ceteras horas naturales Sκ
- 7 signum] *add. interlin.* ubi cadit Kι inter] *add.* has Kα horas] has lineas Eλ; *add.*
 quam [q3] Pγ dabit] *illeg.* Eλ; lineas oūdet Vτ; *add.* tibi Pδ horam] *add.* diei Bβ
 Eα Eζ Kθ Mν Ov Qζ(*marg.*) naturalem] *add.* inequalem Zα ut] *om.* Dδ; vel Nα
 ut ... quadrante] *om.* Eκ Kε Kι Mτ Vφ quadrante] *om.* Qθ; *add.* Et nota si quevis
 ante meridiem debet numerando incipere de prima hora versus sextam. Si quevis post
 debet incipere a sexta versus primam Dδ; *add.* margarita Oφ; *add.* sit Kδ

the bead⁵ in a quadrant. Then take the altitude of the sun at whatever hour you want and that mark between the hours will give the natural hour, as in a quadrant.

[Comment:

To find the unequal hour for any point of time in the day, first note the altitude of the sun at midday for the day in question by rotating the ecliptic circle on the rete so that the position of the sun in the ecliptic on that day is on the vertical midday line, and then by reading the altitude using the almucantars.

On the back of the astrolabe set the alidade to that midday altitude, and mark (temporarily) on the alidade (along its “centre line” edge) the point where it cuts the sixth unequal hour-line arc (found above or below the shadow square). Next rotate the alidade to the altitude of the present time; the temporary mark will now sit on or between other unequal hour-line arcs, and from this you can read (or estimate) the present time in unequal hours.

One would follow similar steps if one were ascertaining the present time using a quadrant.]

⁵ Although the actual meaning of *margarita* is an oyster’s “pearl”, it is also the name commonly given to the sliding bead on the plumbline of a *quadrans vetus*.

[CAPITULUM 13.] CAPITULUM PREAMBULUM AD QUEDAM SEQUENCIA

Amplius scito quod circulus signorum dividitur in duos semicirculos, quorum

Cap. 13] *in bottom marg.* Qμ(*later hand*)

- 1 Capitulum ... sequentia] *om.* Bδ Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eζ Eκ Eλ Eν Gα Kε Kι Lζ Lκ Lλ Mα Mτ Nα Oβ Oγ Oν Oσ Oχ Pγ Pζ Pι Pσ Pξ Pφ Qε Qζ Qη Qθ Qi Qμ Sβ Sθ Si Sλ Vα Vγ Vν Vτ Vυ Vφ Wι Wλ Xα Zα; *faded* Eδ Eο; *illeg.* Lμ; Ad cognoscendum sequentia Vξ; Capitulum 14^m. Preambulum ad capitula sequentia Qδ; Capitulum preambulum ad sequentia, et est de gradibus equedistantibus a solsticiis Vβ; Capitulum untile ad sequentia Rγ; Consideratio solsticiorum in ipso rethi Bγ(*later hand*); Cum gradus solis habeant altitudines meridianas et umbras equales Cζ; De divisione circuli signorum Mπ; Divisio circuli Bβ; Duos gradus sol habent altitudines meridianas et umbras equales Eμ(*marg.*; *add. in marg.* 12^{us}); Equatio solis per halhancabuth Oφ; Nota preambulum ad quedam sequentia vel de gradibus equidistantibus ab equinoctio Vι; Notabilia capitulorum sequentibus utilia Sη; Notabilia de gradibus equidistantibus a solsticii Eτ Mν Wβ; Notabilia per capitulis sequentibus utilis Kθ Pο; Nota preambulum ad quedam sequentia vel de gradibus equidistantibus Mυ; Notabilia precedentia ad sciendum gradum solis per alhantabut Dγ; Notabilia precedentia ad sciendum gradum solis per alhantabuth et quemdem alia Rα; Quedam distinctio partium zodiaci utilis ad sequentia Vq; Quedam divisio signorum utilis ad sequentia Bι(*add. in marg.* 12^{c^m}); Qui gradus solis habeant altitudines meridianas et umbras equales Bη(*add. in marg.* 12) Oη; Quid precognosci habet ad sequentia Mγ Pτ; Quod pre[*illeg.*] ad sequentia Eq Capitulum] *om.* Mδ Pβ Pμ Pq Vψ Xδ; Nota Oφ preambulum] preambulatorum Kδ; preamolum(!) Mι Nγ quedam] *om.* Bε Mλ; quod Pα sequentia] sequenciarum Vπ; *add.* a dicenda Pα; *add.* et de zodiaci divisione Qβ; *add.* necessarium Mδ *add. in marg.* 13^m Vφ; *add. in marg.* 15^{us} Qζ; *add. in marg.* Amplius capitulum Lζ; *add. in marg.* c. 15 Sδ
- 2 Amplius] *om.* Rγ; Et Bκ; Et tunc amplius Qη; Nota et amplius Zα; *add.* autem Mυ Mφ Vι Wα scito] nota Kε Mτ; scias Cα circulus] aliqua Cγ Eγ in ... semicirculos] solsticia Cγ Eγ duos] 2 / 2^{os} *some*; duo Mα Sθ Vα; *add.* rizcalis Vπ; *add.* equales Qμ semicirculos] circulos *corr. interlin. to* semicirculos Oγ; semicircula Sθ
- 2-4 Scito ... estivale] *om.* Dη

[CHAPTER 13.] PRELIMINARY CHAPTER TO CERTAIN THINGS WHICH FOLLOW

Further know that the circle of signs is divided into two semicircles, of which

5 unus est a capite Capricorni in caput Cancri, et alius a capite Cancri in caput Capricorni; et caput Capricorni est solsticium hyemale, caput Cancri estivale. Scito etiam quod omnes duo equidistantes gradus ab aliquo horum solsticiorum sunt unius declinationis

3 est] *om.* Xα capite,] *om.* Mo capite,] ... Capricorni₂] *marg.* Eζ(*later hand*) Capricorni,] Cancri Bζ Dγ Eo Mγ Mλ Vv Vτ in₁] usque ad Eλ in₁ ... Cancri,] *om.* Pφ; usque ad caput Cancri Wβ(*marg.*) in₁ ... alius] et Mι Nγ in₁ ... Capricorni₂] *om.* Eu Po; usque ad caput Cancri Eδ(*marg.*) caput,] *om.* Pδ Cancri,] *marg.* Cε; Capricorni Bζ Dγ Eo Mγ Mλ Vv Vτ; Capricorni *corr. to* Cancri Qζ et ... Capricorni₂] *om.* Eα Mv; *lacuna* Lβ alius] illius Qγ; *add.* est Pζ a₂] in Kδ; in *corr. interlin. to* a Sk Cancri₂] *om.* Qμ; Capricorni Bζ Dγ Eo Mγ Mλ Vv Vτ in₂] ad *some*; usque ad Eλ Qι caput₂] capite Cι Pδ Capricorni₂] Cancri Bζ Dγ Eo Mγ Mλ Vv Vτ

3-4 et ... Capricorni] *marg.* Qδ

4 et ... Capricorni] *om.* Gα Lγ Mo Pφ Pξ Pv Qδ; *marg.* Rα Sk Wα; quod Pβ caput,] *interlin.* Eα caput Capricorni] *om.* Bβ Eδ caput₁ ... estivale] caput Cancri est solsticium estivale(stivale St), caput(*add.* vero Eλ Rγ) Capricorni(*add.* est Cα Mλ Oφ Pφ Sι Vv) solsticium(*om.* Rγ) hyemale Bζ Cα Eλ Eo Mγ Mλ(caput Cancri *marg.*) Oφ Pφ Rγ Sι Vv; caput Cancri est solsticium hyemale Vτ; et solsticium estivale, et capud Capricorni est solsticium yemale Dγ Capricorni] Cancri Lλ est] in Lκ solsticium] *om.* Dδ Mπ hyemale] hiēle Sδ; hiemale Eκ Qγ Sθ Sλ Xδ; hiemamale Qε; yemale many; ymale Xα hyemale ... Cancri] *om.* Pζ caput,] *om.* Mα Mι Mτ Nγ Oχ Qε Sβ Sθ; *add.* vero Bθ Cγ Qμ Vπ Cancri] *add.* solsticium Eα Qμ Zα; *add.* est Qδ Vv; *add.* est solsticium Oγ Oη Qι estivale] hestivale Mλ; stivale Pβ Scito] Nota Dη; Scias Cα etiam] *om.* Bη Dη; *interlin.* Xδ; ea Sη; vero Pσ quod] *om.* Kα

4 - Cap. 21 line 4: solsticium ... meridiem] *from 15% to 30% of each line of ms Gα is cut off or too tightly bound to be read*

5 omnes] *om.* Nα Sη duo] *om.* Bη Cδ Eμ Ev Gα Kα Pθ Qμ; 2 / 2° many equidistantes] equales distantes Cα; eque distantes Dγ Kα Lκ Mv Oφ Qη Sλ Vφ Xα gradus] duorum graduum Ev; duorum graduum id est quodlibet in gradus equidistantes it est Qμ aliquo] aliquorum Pξ; altero Cγ; latero Eγ aliquo ... solsticiorum] anterior duorum solsticiorum versus meridiem vel alicuius Vτ horum] eorum Sθ; istorum Bζ Cα Dγ Eλ Eo Mγ Mλ Pφ Sι Vv Wι; *add.* duorum Dη Oβ Qη solsticiorum] *add.* scilicet Cancri et Capricorni Dη sunt] *om.* Pα; sint Sθ; sint sint Oχ unius] *add.* alius Bη declinationis] et equalis convitionis Mτ

one is from the beginning of Capricorn to the beginning of Cancer, and the other from the beginning of Cancer to the beginning of Capricorn; and the beginning of Capricorn is the winter solstice, the beginning of Cancer the summer [solstice]. Know as well that every two degrees equidistant from any of these solstices are of one declination [*or* have the same declination]

versus septentrionalem vel meridiem; et dies eorum vel noctes sunt equales, et umbre et altitudines sunt equales in media die semper.

- 6 versus] ad Sk(*interlin.*); ut Cγ versus ... meridiem] *om.* Vτ septentrionalem] aquilonem(!) Mτ vel₁] et *some*; per Pτ; *add.* versus Cα et₁] *add.* omnes Cα Oφ Pφ eorum] horum Cγ Eγ Pξ vel₂] *om.* VQ; et *some* noctes] *add.* eorum Ea sunt equales] *om.* Bθ Ev; *add.* si gressa comparacione(?) Oβ umbre] *add.* quoque eorum Eγ Lλ Mα Nγ Oχ Pζ Qε Sβ Sθ Vβ Vγ et₃] *om.* Rγ; *add.* similiter Bθ Eo Ev Mγ Qμ Vπ Vτ Wι
- 6-7 et₂ ... altitudines] *om.* Dη et₂ ... equales] *om.* Eβ Gα Qι Qλ Sλ Vα Wα; *illeg.* Cε
- 7 altitudines] altitudo Qε; latitudines Pv VQ sunt] *om.* Bβ Bη Bθ Cδ Cι Eα Eδ Eμ Eο Eρ Eυ Fζ Kδ Kθ Lζ Lλ Mα Mγ Mι Mλ Mo Mv Nα Nγ Oβ Oσ Oχ Pζ Pι Po Pv Qδ Qη Qμ Rα Sβ Sη Sθ Sι Sk Vγ Vν Vξ Vπ VQ Vτ Vυ Vφ Vψ Xα; similiter Wι sunt equales] *om.* Bζ Dη Lκ Mυ Mφ Ov Pδ Vι media] *rep.* Oχ media die] *illeg.* Kθ; meridie Eδ die] nocte Wλ; nocte die Wι semper] *om.* Bγ Cη Eλ Eκ Eο Eτ Lβ Rγ Wβ Wι; simpliciter Dγ; *add.* et illud est quia archus quos facit sol experiens in talibus gradibus sunt equales adminetur Lδ Oγ

toward the north or the south; and their days and nights are equal, and the shadows and altitudes at midday are always equal.

[COMMENT:

Astronomical information useful for the following chapters:

The ecliptic can be divided into two semicircles at the solstices, with the winter solstice at the beginning of Capricorn and the summer solstice at the beginning of Cancer.

And pairs of points on the ecliptic equidistant from the either solstice will have the same declination (north or south of the celestial equator), and equal days and nights; and at midday the sun will have the same altitude and cast equal shadows.]

[CAPITULUM 14.] DE GRADU SOLIS IGNOTO PER RETHE HABENDO

Cap. 14] *om.* Dη Qη

- 1 De ... habendo] *om.* Bδ Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eζ Eκ Eλ Eν Gα Kι Lκ Lζ Mα Mτ Nα Oβ Oν Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qi Rγ Sβ Sη Sθ Si Sl Vα Vν Vτ Vυ Vφ Wλ; *faded* Eδ Eο Lλ; Ad cognoscendum gradum ignotum Bη(*add. in marg.* 13); Ad cognoscendum gradum solis etc. Xα; Ad habendum gradum solis ignotum Vξ; Ad [*illeg.*] gradum solis ignotum Lμ; Ad inveniendum gradum solis ignotum Bγ(*later hand; add. qualibet die*) Kθ Mλ Po Qθ Qμ Wι; Capitulum 15^m. De gradu solis ignoto Qδ; Capitulum de gradu solis ignoto Bε; De arte cognitionis ignotum gradum solis Eο; De cognoscendo gradum solis(*om.* Oη Eμ) ignotum Cζ Eμ(*marg.; add. in marg.* 13^{us}) Oη Pτ; De inventione gradum solis ignotum Eζ; De investigatione gradus solis(*om.* Pζ) ignoti Nγ Pζ(*marg.*) Vβ Vγ; Ignotum gradum solis qua arte cognoscas Mγ; Inventio gradus solis ignoti Dγ Oφ Vο; Inventio gradus solis ignoti et cetera Bι(*add. in marg.* 13 c^m); Inventio gradus solis ignoti per alhatas[*i.e.*, alhantabuz] vel per rethe habendo Mυ; Inventio gradus solis ignoti per alhantaz Rα; Invencio solis gradus(*add. marg.* ignoti Wβ) per alhantabuth Mν Wβ; Si vis scire gradum solis ingnotum(!) Bβ ignoto] *om.* Kα ignoto ... habendo] *om.* Mπ per ... habendo] *om.* Zα rethe] re[*del.*] Pμ; recte Fβ; rete Mδ Oγ Vψ; rethi Sδ habendo] habendum Lβ; inveniendo Kα; *add.* Rubrica Pμ Vτ; *add.* Capitulum Qβ *add. in marg.* 14^m Vφ; *add. in marg.* 16^{us} Qζ; *add. in marg.* c. 16 Sδ

[CHAPTER 14.] ON FINDING THE UNKNOWN DEGREE OF THE SUN BY THE RETE
[i.e., finding the position of the sun along the ecliptic using the rete]

Si volueris cognoscere gradum solis ignotum, pone notam super altitudinem

- 2 Si] Cum Bη Bθ Bκ Cα Cδ Cζ Dγ Eλ Eμ Mα Mγ Mι Mλ Nγ Oη Oν Oσ Oφ Oχ Pζ Pφ Qγ Sβ Sθ Sι Sλ Vα Vγ Vν Vπ Vυ Wι volueris] vis *many* cognoscere] *om.* Sλ Vα; agnoscere Eλ; scire Bκ Cγ Cδ Cζ Eα Eγ Eζ Eκ Eμ Gα Lζ Lλ Mα Nγ Oν Oσ Oχ Pσ Pτ Qε Sβ Sθ Sι Vγ Wι Zα; scire vel cognoscere Kα; *add. interlin.* al' scire Vβ solis] *om.* Cγ Eγ ignotum] in notum Mι Nγ pone] ponam Mυ; *add.* gradum solis Xδ; *add.* regulam Pφ; *add. 7 lines* Cα; *add. interlin.* scilicet in almucantarath Qμ notam] nota Mι Nγ; regulam Mγ Vν; *add.* scilicem Kθ; *add.* super almucantarath Zα super] solis meridianam Pι; supra Lκ altitudinem] *illeg.* Pσ; lineam Bζ; solis Kθ; *add.* in linea Pι; *add.* in rethi et regula regionis Wλ; *add.* inventum per dorsum Cζ; *add.* scilicet solis Bβ
- 2-3 Si ... astrolabii] Cum volueris cognoscere gradum solis ignotum id est si nolueris in quo gradus signi in rete in quocumque die sit sol debes accipere per dorsum astrolabii maiorem altitudinem in meridie illius diei et scias quot gradus ascendit et numera tot gradus in almucantarath et in fine illorum graduum in linea meridiana pone notam. Et post modum volve rethe donec aliquis gradus cadat super notam et ille gradus vel eius nadyr est gradus solis illius diei. Et pone regulam vel notam super altitudinem medie diei in mediate scilicet quam sumpsisti prius per regulam in dorso astrolabii. Oφ; Cum volueris cognoscere gradum solis ignotum id est si [*illeg.*] in quo gradus signi in rete in quocumque diei sit sol debes accipere per dorsum astrolabii maiorem altitudinem in meridie illius diei et scias quot gradus ascendit [*illeg.*] numera tot gradus inter almucantarath et in fine illorum graduum in linea meridiana pone notam. Et post modum volve rethe donec alius gradus cadat super notam et ille gradus vel eius nadyr est gradus solis in signo per illo die. Et postea pone regulam et notam super altitudinem medie diei imediate quam sumpsisti prius in dorso astrolabii. Cα notam ... medie] [*illeg.*] g^{re} in soli super altitudinem in rethe et [*illeg.*] omnis Gα

If you wish to learn the unknown degree of the sun, place a mark on its midday altitude

5 medie diei, quam sumpsisti prius per regulam in dorso astrolabii. Deinde volve rethe, cadentque duo gradus super ipsam notam; quarum unum scies esse gradum solis per signum mensis cuius fuerit dies.

- 3 medie] *marg.* Lδ medie diei] diei in medie Cγ Eγ; diei in medietate Sλ; meridiēi Kε Kι Mτ diei] die Nγ; *add.* illius in dorso astrolabii suspensi Bδ Pξ; *add.* in medietate solis Pτ; *add.* scilicet Bκ Gα Mλ Vτ; *add.* scilicet in medietate Vα; *add.* sive medietate scilicet Eo; *add.* solis diei super almīcantarath Lδ; *add.* super almucantarath Oγ quam] in medietate scilicet a qua Bη Eμ Oη; in medietate a qua Cζ Eλ; in medietate(mediate Pφ Wι) scilicet quam Bθ Cδ Eν Mγ Eo Lζ Ov Pφ Vβ Vι Vπ Wι; quamquam Eδ Eζ; quia Lζ; si qua Dγ; *add. in marg.* “In medietate” etc. usque “Deinde voluens” est littera addita Vβ quam ... regulam] *om.* Pι quam ... astrolabii] *om.* Cγ Eγ Lλ Mα Mι Nγ Pζ Qε Sθ; *marg.* Sβ; sumpsisti] invenisti Bδ Dδ Eβ Eη Fβ Fζ Kα Kδ Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mπ Mτ Mν Mφ Oγ Oζ Oι Oξ Ov Pα Pβ Pδ Pθ Pμ Pν Pξ Qβ Qγ Qζ Qθ Qι Qλ Sδ Sκ Tδ Wα Xδ; scilicet Sλ prius] *om.* Bε; primum Eα; *add.* altitudinem Cζ Oη per regulam] *om.* Cα Pφ; per regulas Qγ; per tabulam Mν; *add.* signando diligenter punctum ultima quam non ascendit tunc notam illum Lδ Oγ per ... astrolabii] *add. interlin.* va...cat Lε astrolabii] abstrolabii Pα volve] move Kε Mτ Qζ Qθ; volvens Mι Nγ Qε Sθ Sλ Vβ; volves *some* rethe] recte Cγ Oχ Qε Vν; recte *corr. to* rete Wα; rete Bη Bκ Cδ Cζ Eγ Eμ Lλ Mα Nα Ov Ov Pζ Pφ Sθ Sλ Vα Vγ Vψ; rthe Oγ; rotam Mι Nγ; *add.* donec Eγ; *add.* donec aliqui gradus cadent super illam notam in predictam lineam [*illeg.*] Zα
- 4 cadentque] candendem Oη; cadent *some*; cadent quoque Pι; caderit Eγ; cadet Mα; eodem et Sθ; et cadent quot Kα; *add.* duo gradus qui erant equidistantes ab aliquo duorum solsticiorum Wλ cadentque duo] [*lacuna*].d. Sλ gradus] gradibus Vq; *add.* videlicet duo que equidistant ab aliquo solsticiorum non accipies signum pro notam sed pro duodecima parte zodiaci Oη duo] *om.* Pγ Qι; 2 *some*; duos Lκ Wβ; et Mτ ipsam] *om.* Kε Kι Mτ Qζ; illam Vτ notam] altitudinem Oβ; *add.* altitudinis Bζ Bθ Dγ Eλ Eμ Eo Mγ Mλ Pτ Qμ(*interlin.*) Vν Vπ Vτ Wλ; *add.* altitudinis solis Cα; *add.* ipsam altitudinis Wι; *add.* videlicet duo que equedistant ab aliquo solsticio Cζ quarum] quorum *many*; *add.* gradum Cζ Eμ(*interlin.*); *add. interlin.* altitudinem Oφ unum] unumque Vγ; utrumque Lλ(*add. interlin.* ali' unum) scies] scias Bκ Dδ Mτ Pζ Pι Pφ esse] *om.* Bβ Cγ Eλ Mν Oγ Vτ solis] *om.* Mδ
- 5 signum] *add.* non accipatur signum per nota vel 12^a parte zodiaci Cζ; *add.* solis Vq; *add. in marg.* per mensem non poteris scire utrum sol ascendat ad nos vel recedat a nobis Qμ cuius] cum Oχ fuerit] *add. illeg.* Qι dies] *om.* Vα

which you have previously taken with the rule on the back of the astrolabe. Then turn the rete and two degrees will fall on the said mark, one of which you will know to be the degree of the sun by the sign of the month of which it will have been the day.

[Comment:

To ascertain the position of the sun along the ecliptic, measure the altitude of the sun at midday. Then rotate the rete until the ecliptic is over the intersection of the almucantar of that altitude and the midday line, i.e., the vertical diameter.

There will be two possibilities depending on how far you turn the rete, for instance, a degree in Gemini and a degree in Leo. Common sense will tell you which to choose, i.e., Gemini if it is springtime or Leo if it is autumn.]

[CAPITULUM 15.] QUIS DIES CUI DIEI SIT EQUALIS

Si volueris scire que dies cui diei sit equalis, scies hoc per gradus

- 1 Quis ... equalis] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Dη Eα Eγ Eκ Eλ Eν Gα Kι Lζ Lκ Lλ Mα Mι Mτ Nα Nγ Oβ Oν Oσ Oχ Pγ Pζ Pι Pξ Pσ Pφ Qε Qζ Qη Qι Qλ Rγ Sβ Sθ Sι Sλ Vα Vγ Vν Vτ Vυ Vφ Wλ; *faded* Eδ; *illeg.* Eζ; Ad inveniendum g^osse(= grosse?) qui dies sint equales Bγ(*later hand*); Ad inveniendum que (qui Qθ) dies sint equales Lμ Qθ; Ad sciendum quis dies cui diei sit equalis Dγ Mλ Oφ; Capitulum 16^m. Que dies cui sit equales Qδ; Cognitio quis dies cui diei anni sit equalis Vβ Wβ; Quis] Que Bη Bι Cζ Fζ Mν Mφ Vξ Wμ; Cognosco qua dies cui dei sit equalis Mν Vι; De dictus que dies cuilibet diei sit equalis Kα; De equalitate dierum Mτ Zα; Invenio equalitatis dierum Kθ Pο Qμ Sη Wι; Que dies circuli sit equalis Pτ; Qui dies anni cui diei sit equalis Eμ(*marg.*; *add. in marg.* 14^{us}) Quis] Que Bη Bι Cζ Fζ Mν Mφ Vξ Wμ dies] *add.* anni Bι(*add. in marg.* 14 c^m) Cζ Oη Vρ equales] *add.* Capitulum Qβ; *add.* habendus Kδ; *add.* Rubrica Bθ Vπ; *add.* sequitur capitulum Mο *add. in marg.* 14 Bη; *add. in marg.* 15^m Vφ; *add. in marg.* 17^{us} Qζ; *add. in marg.* c. 17 Sδ
- 2 Si] Cum Cα Cγ Cδ Dγ Eλ Eο Mλ Oφ Oχ Pφ Sι Vβ Vν Wι; Cum enim Sβ; Cum etiam Bη Bκ Cζ Eμ Lζ Lλ Mι Nγ Oη Oν Oσ Pζ Qε Sθ Sλ Vα Vγ Vν; Cumque Eγ; *add.* etiam Bθ Eν Mα Vβ(*interlin.*); *add.* vero Dη volueris] *om.* Oχ; vis vel volueris Xα que] quis Bι Pξ Vν Vρ Vτ que dies] *om.* Kα dies] *add.* presenti Pι diei] *om.* Cγ Eγ Qγ cui] *om.* Oβ; cuius Qε; cuiuslebet Kα; que Bζ sit] *rep.* Pφ scies] *om.* Oχ Sι Vτ Wβ; scias Bδ Dγ Eα Eβ Fζ Kα Mτ Mυ Mφ Oζ Qβ Qγ Sκ Tδ hoc] *om.* Cε Dη Qι; hec Wβ; *add.* quod per Qη gradus] gradum Fζ Lλ Nγ; signa Eζ
- 2-3 gradus equidistantes] gradum equidistantem Bι Cη Eτ Mο Pγ Pτ Pυ Qδ Sι Sη Vξ Vρ Vτ Wβ; *corr. from* gradum equidistantem Bγ

[CHAPTER 15.] WHAT DAY IS EQUAL TO WHICH DAY

If you wish to know which day is equal to which day, you will know this by the degrees

equidistantes a solsticiis, quia eorum dies sunt equales, sicut dictum est superius.

- 3 equidistantes] distantes Pξ; eque distantes Bβ Bδ Kα Lκ Mν Qη Xα; eque distantem Vq
 a] *om.* Nα; per a Xα solsticiis] sostiō Cδ dies] *om.* Eλ; declinationes Vτ
 dies ... superius] *om.* Vq sunt] erunt Dη; *add.* declinationes Eλ equales]
Cap. 11 and 12 inserted here Mλ; add. relinquiturque quod nocte noctibus preter modicum
 sunt equale Ov; relinquiturque noctes noctibus et dies diebus equidistantes ab uno
 solsticio sunt equales preter modicum Ev; relinquiturque quod noctes noctibus et dies
 diebus equidistantium graduum ab uno solsticio noctibus graduum equidistantium ab
 altero preter modicum Bζ Vν; relinquiturque quod noctes noctibus et dies diebus [*lacuna*]
 noctibus graduum equidistantium ab altero preter modicum Bθ; relinquiturque quod
 noctes noctibus et dies diebus alicui ab uno solsticio noctibus graduum equidistantium
 ab alterorum preter modicum Eo; relinquiturque quod noctes noctibus et dies diebus
 noctibus graduum equidistantium ab altero preter modicum Vπ; relinquiturque quod
 noctes noctibus et dies diebus equidistantium graduum ab uno solsticio noctibus
 graduum est ab uno solsticio noctibus graduum equidistantium ab altero preter
 modicum Mγ; relinquiturque quod noctes noctibus graduum eque distantium ab uno
 solsticio noctibus graduum equidistantium ab alterutro preter modicum Wι; ut dictum
 est superius. Relinquiturque quod noctes noctibus et dies diebus equidistantium
 graduum ab uno solsticio ab noctibus graduum equidistantium ab altero preter modicum
 Oβ; delinquitur quod nocte noctibus preter modicum Dγ Mλ; relinquitur quod nocte
 noctibus preter modicum Vτ sicut] *om.* Zα; sic Lβ; ut Bζ Bθ Bκ Cγ Dγ Eα Eγ Eo Ev
 Mγ Mλ Ov Qη Rγ Vτ Wι; ut Vπ sicut ... superius] *om.* Eλ Eτ dictum]
 predictum Bκ Kι Lε Ov est] *om.* Kι Oχ superius] *om.* Bε Bκ Cγ Eγ Lδ Lζ Mι
 Mν Nγ Oγ Ov Pσ Si Sλ; iam Cδ; prius Bδ Cα Dη Eβ Eη Fβ Fζ Gα Kα Kε Kθ Lε Kι Lβ Lγ
 Lη Lκ Mπ Mτ Mφ Oζ Oi Oξ Ot Ou Pα Pμ Pν Pξ Pq Qβ Qγ Qθ Qλ Vι Wα Wμ Xδ Zα;
 supra Qη

equidistant from the solstices, since the days of those [degrees] are equal, as was said above.

[Comment:

If you want to know to know which day is equal to which other day, look at the degree of the sun in the ecliptic for the day, and days which are equidistant from the solstices by the same amount are equal, as was said above (Cap. 13).]

[CAPITULUM 16.] DE INVENCIONE GRADUS STELLE CUM QUO CELUM MEDIAT

1 De ... mediat] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Eα Eγ Eκ Eλ Eν Gα Lκ Kε Kι Lζ Mα Mι Mτ Nα Oβ Ov Oσ Pγ Pι Pξ Pσ Pφ Qε Qη Qθ Qi Rγ Sβ Sη Sθ Si Sl Vα Vν Vτ Vυ Vφ Wλ Xα; *faded* Eδ Eo Lλ; *illeg.* Eζ; *partly in marg.* Pθ; Ad habendum gradum celi cum quo stella de linea mediat vel oritur Mλ; Ad sciendum cum quo gradu veniat stella ad lineam meridianam vel oriatur Vγ; Capitulum. Ad inveniendum que stella cum gradu zodiaci oriatur Lμ; Capitulum 17^m. De gradu stelle cum quo celum [*illeg.*] Qδ; Cum quo gradu quelibet stella celum mediat vel oritur Bι(*add. in marg.* 15 c^m) Vq; Cum quo gradu quelibet stella mediet(mediat Oη) celum vel cum quo oriatur Bη(*add. in marg.* 15) Cζ Eμ(*add. in marg.* 15^{us}) Oη; Cum quo gradu sit stelle in ortu vel in medio celi(*om.* Mγ) Eq Mγ Vξ; Cum quo gradu stella celum mediat Pτ; Cum quo gradu stella veniat ad mediam lineam Pζ(*marg.*); Cum quo gradu stella venit ad medium celi(celum Vι) Mυ Vι Wβ; Cum quo gradu stella venit ad meridiem Eτ Mτ; Cum quo gradu venit stella ad mod' celi Mν; De gradu stelle Zα; De invencione gradus cum quo stella aliqua celum mediat Vβ(*add. in marg.* cum quo gradu veniat stella ad meridianam lineam); Ex quo gradu veniat stella ad meridianam lineam Mι Nγ; Invencio gradum cum quo stellam meridialis oritur Kθ; Invencio gradum cum quo stella(stellam Dγ Oφ) celum mediat Bγ(*later hand*) Dγ Oφ Wι; Invencio gradum cum quo stella(stellam Qμ) celum mediat vel oritur Po Qμ Rα(*add. vel occidit*); Si vis scire cum quo gradu zodiaci aliqua stela venit ad meridiem Bβ De invencione] Inventio Mo stelle] *add. in nocte* Bθ Pδ Vπ; *add. note* Pv; *add. Rubrica* Vπ cum ... mediat] per filum Fβ; *om.* Pv; *add. Capitulum* Qβ quo] *om.* Pβ mediat] *om.* Xδ; *medicat* Tδ *add. in marg.* 16^m Vφ; *add. in marg.* 18^{us} Qζ; *add. in marg.* c. 18 Sδ

1-4 Ms Kα inserts the following, then Cap. 16, line 5, then Cap. 17, then the standard Cap 16, lines 1-4:

DE GRADU SOLIS INVENIENDO IN RETHE

Si vis invenire gradum solis in rethe considera altitudinem solis in meridiei et move rethe et videt duo gradus zodiaci super cenith altitudinem super almītrarat in linea meridionali vel meridiona quorum unum scias esse gradum per signum cuius fuerit dies.

[CHAPTER 16.] ON FINDING THE DEGREE OF A STAR WITH WHICH IT DIVIDES [I.E., COMES TO THE MIDDLE OF] THE SKY

Si volueris scire cum quo gradu aliqua stella venit ad medium diem, vel oritur, pone stellam super lineam medie diei, quia gradus qui ceciderit super eandem lineam

- 2 Si] Cum Bζ Bη Bκ Cα Cγ Cζ Dγ Eγ Eο Eυ Lλ Mα Mγ Mι Mλ Nγ Oη Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Sι Vα Vβ Vν Vπ Vυ Wι; *add.* autem Bκ Si ... medium] *om.* Xα Si ... oritur] *om.* Vγ scire] invenire Kα cum] *om.* Oχ Pμ Rγ; in Mι Qδ quo] *interlin.* Vτ gradu] *add.* accedit sive Cγ; *add.* zodiaci Bβ; *add.* *interlin.* signi Oι aliqua] *om.* Dη Pξ; ā Cδ stella] *om.* Oγ; *add.* celum mediat Fα; *add.* *interlin.* in reti non posita Qμ venit] inieint Bγ; venent Vπ; venerit Oφ ad] *om.* Mτ medium] mediam *some*; *add.* *in marg.* [*illeg.*] medium celi Qζ diem] *om.* Qε; celi Eμ Eυ Gα Mγ Mλ Oη Vν Vπ Vτ Wλ; celi diem Eη; celi vel ad medium diem Oν Qβ(*add. illeg.*); celum Bε Bζ Dη Eλ; celum vel diem Lδ; diei Pφ; *add.* *interlin.* vel celi Bγ; *add.* *interlin.* scilicet celi vel arcum Qμ vel] *om.* Cα; *aut some*; quando Cγ vel oritur] partem Sθ oritur] *cut off* Eκ; ad hortum Nα; ad ortum Bδ Bε Cα Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kδ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mπ Mτ Mυ Mφ Oι Oζ Oξ Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pρ Pσ Qγ Qθ Qλ Sδ Sη Sκ Tδ Vι Vψ Wα Wμ Xδ Zα; orizon Oχ; ortum Dγ Eλ Kε Kι Mγ Mλ Oγ Oφ Pφ Qβ Qζ Qι Sι Vν Vπ Vτ; *add.* eius orizontem occidentem Zα; *add.* vel occasum Cα Oφ Pφ; *add.* *interlin.* sive occidit Cδ
- 3 stellam] *om.* Kδ; *add.* meridie Sι super] *add.* eandem Bε lineam₁] *add.* eandem est gradus quesitus Pμ lineam₁ ... super] *om.* Oτ medie diei] *om.* Bε(*add. interlin. illeg.*); diei superius Sι; medii diei Nγ; medii dies Qε; meridiei Cγ Eγ Eδ Oβ Pν Vγ; meridiei vel medie diei Bη Cζ Eμ quia] et Bβ Bε Cα Cγ Cδ Eγ Eλ Gα Lβ Oβ Oγ Oσ Qη Sλ Wμ Zα; ui Bθ; ut Pι; *add.* inehipticia(?) Dδ quia ... qui] qui gradus qui gradus Vπ gradus] *add.* i° qui zo^{co} Cα; *add.* signi Lβ(*interlin.*); *add.* zodiaci Bε Zα; *add.* zodiaci scilicet Sι qui] *add.* semper Xδ; *add.* tunc Wμ ceciderit] cecidit Bκ Eα Mτ Pγ eandem] *om.* Bδ Cε; eam Dγ Mγ Mλ Oφ Pφ Wι lineam₂] *om.* Cα Eγ Lδ Oγ Oν
- 3-4 qui ... quesitus] *om.* Mη; *rep.* Lλ

If you wish to know with which degree any star comes to the meridian, or rises, set the star on the midday line, since the degree which falls on the same line

est gradus quesitus. Similiter fac ad lineam orientalem et occidentalem.

5 Gradum¹ vero longitudinis habebis per filum positum super polum zodiaci per totam declinationem inventum.

4 est] *om.* Eo; erit Cγ Cδ Eγ Λλ Mι Oχ Sθ Sλ Vγ est ... lineam] *om.* Bδ Eη gradus] *om.* Bκ Lε quesitus] *add.* medie diei Pμ Similiter ... occidentalem] Similiter facies in ortu alicuius stelle et occasum id est pone caput stelle in prima almicantera ex parte oriente et vide quis gradus zodiaco incadit super illam almicanteram primam capite illius stelle stante super illam almi^{raz} et ille est gradus cum quo venit illa stella ad ortum et peritur de occasu alicuius stelle operandi est. Cα fac] *om.* Cγ Pζ; faciens Vτ; facies Bη Bθ Bκ Cα Cδ Cζ Dγ Eλ Eμ Eν Lζ Mα Mι Nγ Oβ Oσ Oφ Qε Wβ Sθ Sι Sλ Vα Vβ Vπ lineam] *om.* Kθ; horam Rγ orientalem et] *om.* Eγ; horizontem Vν; *add.* de gradu ascendente et occidentalem Kα et] vel *some* et occidentalem] *om.* Bβ Bζ Bκ Cδ Dγ Eα Eμ Eo Eρ Kθ Lζ Λλ Mα Mγ Mι Mλ Mν Nγ Oσ Oχ Pζ Po Pτ Qε Rα Sβ Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Vφ Xα; *cut off* Gα; scilicet primum almicanteraz Oη; *add.* scilicet primum almucantaraz Cζ; *add.* [cut off] que stella orota cum gradu solis Gα; *add.* in marg. “et occidentalem” est litera addita Vβ

4-6 et ... inventum] *marg.* Eζ(*later hand*) Qμ(*later hand*)

5 before Gradum] *add.* DE GRADU LONGITUDINIS STELLE (STELLARUM Kδ Pθ) Cι Kδ Mη Pθ Sκ Vψ Zα; *add.* DE GRADU LONGITUDINIS(LONGITUDINIBUS Sδ) STELLE(*om.* Kα; STELLARUM Oυ Pβ) PER FILUM Eβ Eη Fα Fβ Fζ Kα Lβ Lγ(*twice*) Lδ Lε Lη Mδ Mι Mν Mφ Nγ Oγ(*add.* habendo) Oζ Oι Oτ Oυ Pα Pβ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα Wμ Xδ; *add.* DE GRADU LONGITUDINIS STELLE HABENDO Pδ; *add.* DE INVENTIONE GRADUS LONGITUDINIS EIUSDEM STELLE Vβ; *add.* in marg. 19^{us} Qζ; *add.* in marg. c. 19 Sδ Gradum] Gradus Pφ vero] *om.* Xδ; quoque Mι Nγ; *add.* stelle P longitudinis] *illeg.* Pξ; latitudinis Bθ Vπ; *add.* stelle Bε Eη Lδ Oγ Oι(*interlin.*) Qι Vψ; *add.* stellarum Kδ habebis] *om.* Pβ; *marg.* Lη; habebit Pφ super] supra Mτ; *add.* stellam et Vξ polum] filum in polo Wλ; polus Eμ zodiaci] *om.* Pβ; zodyaci Bγ Fβ Lκ Wι; *add.* qui est centrum zodiaci Zα per] *add.* *illeg.* Qζ

5-6 Gradum ... inventum] *om.* Bζ Bη Bι Bκ Cα Cγ Cζ Dγ Eγ Eα Eδ Eo Eρ Gα Lζ Λλ Mα Mγ Mλ Mν Oη Oσ Oχ Pζ Po Pτ Qε Rα Sβ Sθ Sι Sλ Vα Vυ Vφ Xα; *marg.* Eμ Oφ Wι; Quia gra Pι

6 inventum] *add.* et similiter a cume stelle Eλ Vτ; *add.* Iste modus non est omnino verus quia perietis proprie non est super polos zodiaci Lδ Oγ; *add.* per 23 gradus qui est proxima declinatio Zα

¹ Some mss treat this as a new capitulum, with or without an added title.

is the degree sought; do the same for the east line and the west [i.e., for the rising and setting of the star on the horizon].

Moreover you will have as a discovered fact the degree [or the discovery of the degree] of longitude through a string placed on the pole of the zodiac across the whole declination.

[Comment:

To find the degree of the ecliptic which crosses the meridian at the same time as a particular star (i.e., mediation), turn the rete so that the star is on the meridian line and then observe what degree of the ecliptic is also on the meridian line.

This can also be found by running a string from the pole of the zodiac to the star and on to the ecliptic.]

[CAPITULUM 17.] DE ALTITUDINE CENITH SOLIS HABENDO

Si volueris cenith altitudinis solis scire, accipe altitudinem eius qua hora volueris

- 1 De ... habendo] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eγ Eα Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Nα Oβ Ov Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Rγ Sβ Sθ Si Sλ Vα Vν Vυ Vφ Wλ; *faded* Eδ Eο Lλ; *illeg.* Eζ; Ad habendum cenith ortus(*del.*) solis Mλ; Ad habendum altitudine(*interlin.*) cenith solis(*add. in marg.* vel alicuius stelle) per azimuth Eο; Ad habendum cenith solis per azimuth Mγ Vξ; Ad inveniendum cenith altitudinis solis vel alicuius(*om.* Mυ Vι) stelle Eτ Mν Mυ Vι Wβ; Ad inveniendum cenith(cenit Lμ) in qualibet altitudinis solis Lμ Qθ; Ad sciendum zenith solis Vγ; Capitulum 18^m. De zenith altitudinis solis Qδ; De altitudine cenith ipsius sive solis capitulum Qβ; De altitudine cenit solis Kα; De cenith(cenit Zα; chenith Mπ) altitudinis solis Mπ Pτ Zα; De cenith(cenich Mι Nγ) solis Mι Nγ Pζ(*marg.*); De cenith(czenit(Bη) solis et stellarum in qua parte orizontis(orientis Cζ) oriuntur vel occidunt Bη(*add. in marg.* 16) Cζ Eμ(*marg.*; *add. in marg.* 16^{us}) Oη; De eodem Sη; De inventione altitudinis cenith solis vel stelle Vβ(*add. in marg.* Hoc capitulum “Gradum vero longitudinis” est additum); Doctrina ad inveniendum cenith vel centrum(?) solis in qualibet hora Bι(*add. in marg.* 16 c^m); Inventio cenith Oφ; Inventio cenith alti Wι; Inventio cenith altitudinis solis vel stelle Kθ Po Qμ; Inventio chenith ipsius solis Bγ; Invenio cenit solis Dγ; Inventio cenith vel centh vel sunt in omni altitudine Rα; Inventio cenith vel centri(?) solis in qualibet hora Vο; Si cenit solis scire desideras Bβ cenith] cenich Xα habendo] *om.* Cι Dη Eβ Eη Fα Fβ Fζ Kδ Lβ Lγ Lδ Lε Lη Mη Mφ Oγ Oζ Oτ Pα Pβ Pθ Pμ Pν Pρ Qλ Sδ Sκ Tδ Vτ Vψ Wα Wμ Xα Xδ; *illeg.* Oξ; habenda Mo; invenienda Bθ Pυ Vπ; inveniundo Pδ *add. in marg.* 20^{us} Qζ; *add. in marg.* c. 20 Sδ
- 2 Si] Cum Bδ Bζ Bη Cα Cγ Cδ Cζ Dγ Eγ Eλ Eμ Eο Lζ Lλ Mα Mγ Mι Mλ Mo Nγ Oη Ov Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Vα Vτ Vν Vυ Wι; Cum autem Bκ Vι; *add.* vero Bθ Vπ Si ... scire] *om.* Vγ cenith] *and elsewhere* cenit Sθ; cenit Bζ Eρ Fβ Kα Pμ Qε Wλ; cenich Eο Mι; cent Eγ; centrum Eμ(*add. interlin.* Id est cenith); chenith Vτ; tuch Cδ(*add. interlin.* vel ascenith) zenit Bη Cγ; zenith Kδ Kι Lκ Pρ Pσ Qδ Vα Vν Vφ cenith ... solis] solem Sλ altitudinis] *om.* Bβ Bγ Bζ Bη Bι Bκ Cζ Cη Eγ Eδ Eμ Eο Eρ Eυ Gα Kθ Lδ Lζ Lλ Mα Mγ Mι Mν Nγ Oγ Oη Oσ Oχ Pζ Pι Po Pτ Pυ Qε Qη Rα Rγ Sβ Sθ Si Vα Vν Vξ Vρ Vυ Wι Xα; *interlin.* Cδ Eζ Qμ; altitudinem Eη Kδ Vψ; corporis Dγ Mλ Vτ; gradus Bθ Eλ Vπ Vφ(*interlin.*); id est versus ortus ipsius Cγ(*interlin.*) solis] *om.* Pγ Rα Wλ Xα; *interlin.* Kε scire] *om.* Vρ; invenire Lδ Nα Oγ Rγ Sη Vβ; *add.* hoc est de quo azimuth solis sit Zα; *add.* idem in qua parte mundi sol oriatur Qμ accipe] *interlin.* Eζ; *illeg.* Oβ altitudinem] *om.* Eο; altitudinis altitudinem Fβ; in latitudine Oχ; *add.* scilicet Eρ; *add.* scilicet solis Rα Xα eius] hore Eρ; solis Gα Pι Qυ; *add.* in Bκ Dη qua hora] in hora qua Sλ; que hora Pβ

[CHAPTER 17.] ON FINDING THE CENITH [I.E. AZIMUTH]¹ OF THE SUN BY THE ALTITUDE

If you wish to know the cenith of the altitude of the sun [i.e., its azimuth], take its altitude for which hour you wish

¹ The word “zenith” here (for “azimuth”) is not used in the usual modern sense of the word, but is well attested in medieval Latin. Both “zenith” and “azimuth” are derived from the same Arabic word meaning “direction”. Our use of “zenith” as the point overhead is actually derived from the more restrictive medieval term *cenith capitis* which is found elsewhere in this text, especially in the *Compositio*. See J.D. North, *Chaucer’s Universe* (Oxford: Clarendon Press, 1988), p. 60 note 18.

hoc scire, et pone gradum solis super almucanharat altitudinis in parte qua fuerit sicut facis ad inventionem horarum. Post hoc, accipe quid congruit gradui solis de azimuth,

- 3 gradum] gradus Mτ gradum solis] *om.* Dδ et] est Wι solis] *om.* Bζ Bη Cζ Eo Oη Oφ Pγ Pφ Si; *add.* in signo Cα Vv almucanharat] alim̄rat Oβ; almi^{at} Kε Kι Qζ; almicacrath Mτ; almicanch' Mγ; almicanlerā Cα; almicantarach Kδ; almicantarath Eζ Gα Lδ Pσ Si; almicantaraz Cδ Oη; almicanteraz Ov; almicanharath Bβ Po; almicantrat Kα; almich Kθ; almichant' Lκ; almi^{chi} Wλ; almikanthrat Qη; almi^{rat} Eδ; almi^{rath} Eτ; almi^{raz} Bκ; almith Bζ; almu' Cε Mη Mπ Pθ; almuca^{ath} Qμ; almucan^{at} Bη; almucancarath Pξ; almucancharath Mo Pα; almucanrath Vτ; almucant' Lμ Qθ Sλ; almucantarach Bδ Sβ Sη; almucantarak Rγ; almucantarath Cζ Oχ Pζ Qε Sθ Vγ Zα; almucantarath Bθ Bι Eα Eλ Lγ Mδ Mν Nα Oγ Oι Pφ Qi Qλ Tδ Vα Vβ; almucantaratz Dη; almucantaraz Oσ; almucantatat Eκ; almicanterath Oφ; almucanth Dγ; almucanth' Cι Eβ Oζ; almucanthanth Cη; almucanharach Pτ; almucanharat Fζ Lβ Lη Mα Sκ; almucanharath Bγ Eρ Eν Fα Fβ Lγ Lε Mν Mφ Oξ Oτ Ov Pδ Pμ Pν Pρ Pυ Qβ Vν Vξ Vπ Wβ Wμ Rα Sδ Xα; almucanharath Vι; almu^{cat} (?) Eγ; almucatarach Eη; almucatharath Qδ; almuch' Eo; almuchan' Xδ; almuchancaraz Eμ; almuchantarath Vψ; almuchanharath Wα; almuch't Wι; almu^{raz} Lζ; almu^{rath} Pι Qγ; almustantarath Pβ; almut' Dδ; almutantaraz Vν; almutanterach Mι Nγ; almutarath Pγ; almutantar Cγ; almutantharath Vφ; almuth Bε; alucancarath Vρ; aliud cenith *corr. in marg. to* almucanrat Mλ; *add.* eadem Pι; *add.* sue Cα Vv; *add.* sui Dη altitudinis] [*illeg.*] latitudinis Pι; *add.* accepte Bθ Bκ Cδ Eλ Lζ Qμ Vπ Vτ; *add.* sic Oβ in parte] *om.* Pδ; in Pι; *add.* in Dδ Kδ Nγ Ov Pφ Sκ(*interlin.*) in ... fuerit] *om.* Cα qua fuerit] sua [*illeg.*] fuerit in oriente vel occidente Zα sicut] *marg.* Xα; sic Nγ Vυ Wα
- 4 facis] *interlin.* Eζ; facies Cε Pθ Oχ; fa[*lacuna*] Mν; fecisti Mι Nγ; *add.* ww Bκ ad] in Oβ; in ad Lζ horarum] *add.* mot(?) si de oriente pone super orientem [*illeg.*] Zα Post hoc] Post hoc hoc Oβ; Post quo Zα; Postea *some*; Postea hoc Pτ accipe] aspice Bζ Bη Bκ Cα Cδ Cζ Eγ Eν Eμ Eρ Gα Kε Kθ Lζ Lλ Mλ Mτ Oβ Oι Oσ Oφ(*add. interlin.* al' accipe) Oχ Pζ Pι Oη Pφ Qζ Rα Sβ Sθ Sι Sλ Vα Vβ(*add. interlin.* al' accipe) Vγ Vι Vυ Xα; accipe *corr. to* aspice Bθ Qε; *add.* aspice Vπ; *add.* vel aspice Dδ quid] qui Mη; quod Dδ Lκ Lλ Pξ Sβ quid congruit] [*cut off*] in parte orientali vel occidentali Gα congruit] contigit Si; convenit Lζ Ov Vγ gradui] altitudinem Cε; gradibus Mτ Pτ solis] *cut off* Pβ solis de azimuth] *add.* id est super quod gradum de azimuth cadet gradus solis in signo Cα de] *om.* Oφ; et Cε de azimuth] *interlin.* Eμ azimuth] alzemut Cγ; ascimith Eγ; asimut Bη Lλ Pζ; assumut Mι Nγ; azimuc Oη; azimut Vν; *add.* incipiendo a primo azimuth usque ad gradum solis Pδ

to know this, and set the degree of the sun on the almucantar of the altitude on the side [i.e., to the east or west, whether it is morning or afternoon] which it was just as you do for finding the hours. After this take what coincides with the degree of the sun in the azimuths

5 et super quem gradum sit cenith et de quarta que opponitur ei similiter; et necesse est

5 et₁] *add.* scies Tδ; *add. in marg.* scies Lε super ... cenith] super quem ceciderit Mτ; super quem gradum ceciderit sic zenith Rγ; super quem gradum vel ceciderit cenith solis Mo; super quod gradus Fα; super quot gradus sit Mι Nγ; super quot gradus ceciderit Bβ Bε Bζ Bθ Bι Bκ Cδ Cζ Dδ Eζ Eκ Eλ Eμ Eο Eρ Eτ Eυ Gα Kα Kθ Mγ Mλ Oβ Oη Oι Oσ Oφ Pι Kι Lζ Ov Pτ Pφ Qζ Qη Qμ Rα Sβ Sι Sλ Vα Vβ Vν Vπ Vρ Vτ Vυ Vφ Wι Wμ Xα Zα quot] quantus Xα; quem Eκ Eτ Kα Oι Pτ Qζ Qμ; quod Bε Bζ Bκ Eζ Eο Eρ Kθ Qη Vτ gradus] gradum Pτ; quare in eodem azimuth est gradus solis qui erit in parte opposita in eadem [altitud]ine et sic habebit solem idem cenith altitudinis in quartis oppositus Sδ ceciderit] posueris(*expunged*) ceciderit Wι; *add.* cenith Kθ

add. in marg. In aliis reperitur sic: “Et super quot gradus[*add. interlin.* quem gradum] sit cenith de quarta que opponitur. Et necesse est” etc. Vβ; *add. in marg.* quare in eodem azimuth est gradus solis qui erit in parte opposita in eadem altitudine et habebit sol idem zenit altitudinis in quartis oppositis Sκ super ... similiter] super quam sit zenit de 4^a que opponitur ei similiter (sit ... similiter *corr. in marg.* to ceciderit de quarta in qua ponitur ibi est cenit solis) Kε quem] *illeg.* Oζ; eadem(?) Oχ; illum Kδ Pθ; quam Cγ Pβ Sη; quemque Lε; quod Cε Mπ Oγ Qδ; quot Dγ Lλ Mα Pζ Vγ gradus] gradum Kδ Mν; *add.* quia in eodem azimuth est(erit Fβ) gradus solis que(quando Fβ) erit in parte opposita in eadem altitudine et sic habebit solis idem cenith altitudinis in quartis oppositis Fβ Qβ sit cenith] *corr. in marg.* to ceciderit Eη cenith] cent Sθ; zenith Lκ Qδ et₂] *om. many* de] *om.* Lγ de ... similiter] de gradus que(*add. interlin.* ei Pζ) opponitur Eα Pζ; de quarta in qua ponitur et illi erit cenit solis Oβ; de quarta in qua ponitur ibi est cenith solis sic cenith. De quarta que ei opponitur Bβ; de quarta in qua ponitur ibi est cenith solis similiter Mτ Qζ; de quarta in quarta ponitur et ibi est cenith solis Vτ; de quarta que opponitur erit cenit altitudinis solis Eκ; de quarta que opponitur ei, et ibi est cenrus sive cenith solis Kθ; de quarta que opponitur et ibi est cenith solis Bζ Bη Bθ Bι Bκ Cδ Cζ Dδ Eλ Eμ Eο Eρ Eυ Kι Lζ Mγ Mλ Mo Oη Ov Pτ Oσ Qη Qμ Rα Sβ(et ... solis *marg.*) Vα Vν Vπ Vρ Vφ Vυ Wι Wμ Xα Zα

que] in qua Kι Qη; qui Vπ; *add.* ei Cδ Lζ Mo; *add.* eius Ov opponitur] apponitur *corr.* to pponitur Oσ; opponit ei Vπ; ponitur Kι Qη; supponitur Bκ; supponitur eum Dδ; *corr.* to supponitur Lζ et] ei Wμ Xα; ei et Eυ; eius(?) Vφ; soli Oη et ibi] et in Bζ; sibi Zα est] erit Bκ; *add.* gradus Vυ cenith] cent Oσ; zenit Vυ; zenith Vφ solis] *om.* Pτ; *add.* sit cenith de quarta(gradu Xα) que opponitur Rα Xα

de quarta que supponitur sibi erit gradus cenith solis Pι; de quarta super quam(qui Oφ) ponitur et ibi(ubi Pφ) est cenith solis Pφ Oφ Sι Vβ; que opponitur et in 3[=est?] cenit solis Kα; que quarta que opponitur erit cenith altitudinis Eτ; quarta que op[*cut off*] cenith solis Gα; quarta que opponitur ibi cenit est sol Wλ de] *om.* Xδ quarta] iii^a Qε opponitur] *add. in marg.* 6-line gloss Bγ ei] *add.* est zenith Bε; *add.* quia in eodem azimuth erit sol qui erit in parte opposita eadem altitudine et sic habebis idem

[continued on the next page]

and on this degree is the cenith [i.e. azimuth of the sun at that hour] and likewise of the quarter which is opposite to it; and it is necessary

[*apparatus criticus for line 5 continued*]

cenith altitudinis in quartis oppositis Mπ ei similiter] *om.* Bγ Cγ Cη Dγ Eγ Λλ Eδ Eζ
 Mα Mι Mν Nγ Oχ Pγ Po Pv Qδ Qε Rγ Sη Sθ Sλ Vγ Vξ; *marg.* Wβ(*add. illeg.*); erit Vψ; vel
 ponitur Nα; *corr. in marg. to ibi est cenith solis Oι similiter] om.* Cε Mη; *interlin.* Eη;
add. et ibi erit cenith solis quia in eodem azimuth erit gradus solis qu erit in opposita
 parte in eadem altitudine et sic habebis sol idem cenith altitudinis in quartas oppositas
 Dη et₃] similiter et Bβ Kι

5-6 que ... quarta] *om.* Fβ

5-7 quem ... occidentalis] 7½ -lines Cα

ut hec quarta sit meridiana orientalis, vel septentrionalis orientalis; aut occidentalis meridiana, vel septentrionalis occidentalis. Et similiter facies de stellis fixis per earum altitudines.

6 ut] quod Bι Pξ Qη Rγ Sβ hec] *om.* Sη quarta] *iiii*^a Qε sit] *om.* Bθ Eζ; quo opposita sit quarta Sβ; scilicet per Pφ; *add.* aut / vel *many* vel] *om.* / aut *many* orientalis,] *om.* Bζ; occidentalis Kθ aut] *om.* / vel *many* occidentalis] *om.* Qζ

6-7 meridiana ... occidentalis] meridiana [*lacuna*] occidentalis meridiana(*del.*) aut occidentalis meridiana vel septentrionalis occidentalis Mν; meridiana occidentalis vel septentrionalis Eο Wι; meridiana occidentalis vel septentrionalis orientalis vel septentrionalis occidentalis Sλ; meridiana orientalis aut/vel meridiana occidentalis Mο Pτ Qδ Qη; meridiana orientalis, aut meridiana occidentalis, vel septentrionalis orientalis vel septentrionalis(*om.* Qμ Wλ) occidentalis Bι Cγ Cζ Eγ Eλ Eν Mι Nγ Oβ Ov Oσ Pζ Pι Qμ Rα Sθ Vα Vν Vφ Wλ Wμ Xα; meridiana orientalis(occidentalis Eδ) aut occidentalis meridiana aut septentrionalis occidentalis Eα Eδ Eζ Pγ Po Pv Vq; meridiana orientalis vel orientalis septentrionalis et cetera Vτ; meridiana orientalis vel septentrionalis Mγ Mλ Pφ Sι Vν; meridiana orientalis vel septentrionalis, meridiana vel septentrionalis occidentalis Lκ; meridiana orientalis aut/vel septentrionalis occidentalis Bη Eμ Mτ Oχ Qi Vγ; meridiana orientalis vel septentrionalis orientalis aut occidentalis Lγ; meridiana orientalis(*written over, illeg.*), vel septentrionalis orientalis vel septentrionalis occidentalis Eq; meridiana vel septentrionalis occidentalis Pξ; meridiana vel septentrionalis orientalis vel septentrionalis Bθ Vπ aut occidentalis meridiana] *om.* Lλ

7 meridiana] *add.* et est occidentalis Mη vel] *om.* / aut *many* vel septentrionalis] *rep.* Lδ occidentalis] *add.* et cetera Cε similiter] sempter Wλ de stellis fixis] *rep.* Eκ fixis] *om.* Cζ; *marg.* Eμ

7-8 per ... altitudines] *om.* Xδ

8 altitudines] altitudinem Eο Pτ; *add.* et cetera Mτ; *add.* 4 lines Zα; *add.* 12 lines Cα; *add.* Mτ Qζ(*add.* in *marg.* 21^{us}):

Cum volueris(*add.* etiam Qζ) habere maximam elevationem vel maximum appropinquationem solis ad cenith nr̄m(minimam?) pone principium Cancrī ad medii celi lineam et gradus almicanrath(almitz Qζ) ut prius(*add.* dictum est Mτ) ostendit tibi maximam elevationem solis.

Et si volueris scire quantum distat ad huc a cenith subtrahe elevationem maximam a 90 gradibus(*om.* Qζ) et residuum erit differentiam(*add.* inter cenith et maximam elevationem [*illeg.*] in quolibet elevatione poceris in [*illeg.*] distancia Qζ) inter cenith et elevationem solis.

Et si volueris scire iuxta(*om.* Qζ) minimam(maximam Qζ) altitudinem et maximam depressionem pone caput Capricorni ad lineam medii ifm(celi in eorum Qζ) almicanrath(almitz Qζ) exteriora id est extra istum punctum extencia numerando qui gradus sunt altitudo solis yma(ima Qζ).

that this quarter be the north-eastern, or the south-eastern, or the north-western, or the south-western. And similarly you will do this for the fixed stars through their altitudes.

[Comment:

To find the azimuth of the sun at any time, take its altitude at that time. Then rotate the rete so that the position of the sun on the ecliptic for that day sits on the appropriate almucantar of the altitude. This intersection will also indicate the azimuth on which the sun lies at that time. (It will be to the east if the hour is in the morning and to the west if it is in the afternoon.)]

[CAPITULUM 18.] DE CENITH ORTUS SOLIS HABENDO, ET ALIORUM PLANETARUM

Et si volueris scire cenith ortus solis, vel alicuius stelle fixe, pone gradum solis

Cap. 18] *om.* Eλ; Cap. 18 repeated M₁ and M₂, N_{γ₁} and N_{γ₂}

- 1 De ... planetarum] *om.* Bδ Bε Bζ Bη Bκ Cγ Cδ Cε Cζ Dδ Dη Eα Eγ Eκ Eμ Eν Gα Kε Kι Lζ Lκ Lλ Mα M₁ Mπ Mτ Nα N_{γ₁} Oβ Oη Ov Oξ Oσ Oχ Pγ Pζ Pι Pξ Pφ Qε Qζ Qη Qι Rγ Sβ Sδ Sθ Sι Vα Vγ Vν Vρ Vτ Vυ Vφ Wλ Xα; *faded* Eδ Eζ; Ad habendam cenith(cenich Eo) ortus solis Eo Eρ Mγ Mλ; Ad habendum cenith solis ortus vel stelle Vξ; Ad inveniendum cenith(cenit Lμ) in ortu solis Lμ Qθ; Ad inveniendum cenith ortus solis Eτ; Ad sciendum cenith(cenit Dγ) ortus solis Dγ Oφ; Capitulum 19^m. De zenith ortus solis vel occasus vel stellis Qδ; De cenit ortus solis vel alicuius stelle scire inveniendum Mν; De cenith ortus vel occasus solis Rα; De inventione cenith ortus solis vel alicuius stelle Vβ; Inventio cenith ortus Wι; Inventio cenith ortus solis Bι(*add. in marg.* 17 c^m); Inventio cenith ortus solis et stellarum Vρ; Inventio chenith ortus solus per azimuth Bγ(*later hand*); Inventio cenich ortus solis vel alicuius aliarum stellarum Vβ; Inventio cenich ortus solis vel alterius stelle Mν; Inventio cenith ortus vel occasus solis vel alterius stelle Pτ; Invenio cenith ortus solis vel stelle Kθ Po Qμ Sη; Si cenit ortus solis vel alicuius stelle scire desideras Bβ cenith] *and elsewhere* cenit Pμ solis] *om.* Pμ QλVι Wα habendo ... planetarum] *om.* Zα et aliorum planetarum] *om.* Sκ; et alicuius stelle fixe Bθ Vπ; et alterius stelle Pν; *add.* et alius stelle fixe Pδ; *add.* vel stelle invencion~ Vι *add. in marg.* 18^m Vφ; *add. in marg.* c. 21 Sδ
- 2 Et] Ut Eη si] cum Bζ Bη Bθ Bκ Cα Cδ Cγ Cζ Eγ Eμ Eo Eν Kι Lζ Lλ Mα M₁ Mλ N_{γ₁} Oσ Oφ Oχ Pζ Oη Ov Pφ Vβ(*added interlin.*) Vγ Vν Vπ Vτ Qε Sβ Sθ Sι Sλ Vα Vυ Wι scire] *om.* Eo Wμ cenith] cenit Bζ Qε Sβ Sδ Vα Wλ; cent Oσ Sθ; centrum Sλ; zenit Cγ; zenith Bε Kδ Lκ Nα Pσ Vα Vφ; *add. interlin.* id est azimuth Eμ; *add. interlin.* id est versus ortus qua non semper habere eundem locum ymo dieti transiantur Cγ ortus] *rep.* Rα; *add.* occasus Rγ ortus ... fixe] *inerlin.* Lδ vel] *om.* Xα; et Mγ alicuius] *om.* Eδ; alie Vα; altitudinis Lκ fixe] *om.* Qη; oriens Pξ; *add.* id est archum transitem per cenith caputem et archum solis in orizonte Lδ Oγ(*repeated in marg.*) gradum] gradus Oη; *add.* cuiuslibet Vι solis²] *om.* Lμ Pσ Qθ; *interlin.* Kε; *marg.* Wα
- 2-3 pone ... stellam] *om.* Eσ

[CHAPTER 18.] ON FINDING THE [POINT]¹ OF THE RISING OF THE SUN, AND OF THE OTHER
PLANETS

And if you wish to know the [point, i.e., direction] of the rising of the sun, or of any fixed star, take [i.e., observe or locate] the degree of the sun

¹ Again “cenith/zenith” is being used in the general sense of “direction” (i.e., point).

- 5 vel stellam super orizontem orientalem, et aspice quid sibi accidat de azimuth, super quam sit ortus; et hoc est cenith ortus. Et super simile eius erit occasus in simili eius quarta, sive septentrionalis sive meridionalis fuerit.
- 3 vel] sive *some* vel stellam] *om.* Bζ Cγ; vel alicuius stelle fixe Wι; vel/sive stelle Kα Rγ Sι; *add.* fixam Cα Eν Qμ(*interlin.*) Vπ super.] *om.* Xα orizontem] orientem Qγ; *add.* scilicet Oχ orientalem] *om.* Bδ Eδ Vγ VQ; *add.* *illeg.* Vξ aspice] a' Rγ; accipe Dγ Lη Nα Pυ Sη Vξ Pτ Wλ; respice Sλ; vide Qη; *add.* *interlin.* vel accipe Qμ quid] quem Dδ; quod Pφ sibi] *om.* Wλ; ea Oν; ei Bκ Lζ; scilicet Eα; si Sη; sit Oχ; tibi Dη accidat] abscondat Vυ; accedat Oξ; accideat Cγ; accideat *corr.* to accidat Kε; accidit Mι Mι₂; accipiat Nα; congruat Bδ; congruit Bζ Bθ Eο Eυ Mγ Mλ Vν Vπ Vτ Wι; *add.* vel congruat Cα; *add.* *interlin.* vel congruit Qμ de] *om.* Cδ; *add.* gradibus Pι de azimuth] decenit Qε Sθ; id est cent Mα azimuth] alzemut Cγ; ascemuth Eγ; azemut Bκ Pβ; azim¹ Lβ; azimuth Bζ; cenich Nγ¹; cenit Oχ; *add.* vel Cα super₂] similiter Cη
- 3-4 azimuth ... est] *om.* Lλ Vγ
- 4 quam] *om.* Pθ; quem Bβ Cγ Dη Kδ Lβ Mν Mπ Pδ Rγ Vν Vφ Xα; quo Pι; quod Bε Cα Lε Mι₂ Oγ Pν Qθ Sδ Xδ sit] est Bκ Oν; fit Lζ Oφ(*add.* *interlin.* al' sit) Pβ Pι ortus.] *om.* Mν Xδ et₁ ... ortus.] *om.* Bε Bη Eα Eη Eυ Lδ Mι₂ Oγ Oτ PQ hoc] hec/hic *some* est] *om.* Bζ; *interlin.* Sκ; erit Cα Cγ Mα Mι₁ Nγ₁ Pζ Qε; *add.* *interlin.* vel erit Oφ cenith] cenit Pφ Qε Sβ Sδ Vυ Wλ; cenith Qδ; cent Sθ; centrum Sλ; zenit Cγ Kε; zenith Vα Vφ ortus.] *om.* Pξ; *add.* solis Pγ Zα super] in Mν Mφ; si Bθ Pμ Vπ; secundum Bκ Cζ Eμ Lζ Pζ Oη Oι Oσ Sι Vα Vν; secundum ip Vτ; secundum hoc Mλ; similiter Kε(*add.* *interlin.* id est super similiter cum qua eius occasus) Kι(*add.* *interlin.* id est super 9sais 9 q^a eius occasus) Lκ Qθ; *add.* *interlin.* in hoc Oφ; *add.* secundum Rα super simile] secundum similiter Pφ; similiter similis Mτ simile] similem Vγ; similem gradum Oβ Qη; similiter simile Qμ; solem Kα simile eius.] sine si nulle/simille Mι₁ Nγ₁ eius.] *om.* Bζ Eο Oγ Oη; *interlin.* Wι; idem Sλ; illius Tδ; *add.* gradum Bκ Oι(*marg.*) Oν; *add.* quarta Mφ Vι erit] *om.* Wλ; est Bζ Cδ Cζ Eμ Eο Mγ Mλ Oη Oφ(*add.* *interlin.* al' erit) Pφ Sι Sλ Vβ Vν Vτ; gradum et Lζ erit ... eius.] *rep.* Wα occasus] occasum Lζ; *add.* eius Vυ in simili] si similis Mτ simili] simulrter(!) Oη eius.] *om.* Oβ Qη
- 4-5 Et₁ ... fuerit] 7 lines Cα in ... quarta] *om.* Mν Mφ Vι eius quarta] *interlin.* Eζ
- 5 quarta] *om.* Eδ; 4^a / 4^{ta} *some*; ē Po; *add.* *interlin.* scilicet opposita Oφ quarta ... meridionalis] orōlis(?) Kα sive.] *om.* Mπ; *add.* sit Kδ septentrionalis] orientalis Cη sive.] *om.* Eο; aut *some*; vel *few* meridionalis] meridiā Mα; meridiana Bη Dγ Cζ Eγ Lλ Mγ Oχ Pθ Vβ(*add.* *interlin.* meridionalis) Vγ Vν; *add.* occit Vτ fuerit] *om.* Bκ; *add.* et similiter facias de stellis fixis per earum altitudinem Mι₁ Nγ₁; *add.* 8 lines EK

or the star on the eastern horizon, and observe which azimuth falls near it, on which it rose; and this is the [point] of the rising. And on its corresponding [degree] will be the setting in its corresponding quarter – it will be either north or south.

[Comment:

Relate the day of the year with the position of the sun in the zodiac, as before.

To find the degree of the eastern horizon where the sun (or a star) rises, rotate the rete until that point on the zodiac is on the eastern horizon. The degree of sunrise will be shown by the azimuth of that point.

The degree of sunset will be the same azimuth but along the western horizon.]

[CAPITULUM 19.] DE QUATUOR PLAGIS MUNDI

Ad habendas quatuor mundi plagas veraciter, accipe altitudinem solis ut supra, et vide in qua quarta sit. Deinde vide in qua altitudine ipse gradus solis sit inter lineas

Cap. 19] *om.* Bη Cα Cδ Cζ Eγ Lζ Lλ Mα Oη Oσ Oχ Pζ Qε Sθ Sι Sλ Vα Vγ Vυ; *bottom marg.* Eμ Sβ

- 1 De ... mundi] *om.* Bδ Bε Bζ Bκ Cγ Cε Dδ Eα Eλ Eκ Eμ Eν Gα Kε Kι Lκ Mτ Oβ Ov Pγ Pι Pξ Pσ Pφ Qη Qi Rγ Sβ Vτ Vφ Wλ; Ad habendum mundi plagas in(*om.* Pτ) qualibet die Mγ Pτ; Ad habenda 4/4^{or} mundi plagas Dη Kδ; Ad habenda 4/4^{or} plagas mundi qualibet die Eo; Ad inveniendum 4^{or}/quatuor plagas mundi Lμ Mλ Qθ; Ad sciendas certe quatuor plagas mundi principales Bγ(*later hand*); Capitulum 20^m. De 4^{or} plagis mundi habendis Qδ; De inveniendis 4/quatuor mundi plagas Dγ Oφ Rα; De inventione 4^{or} plagarum mundi Vβ; De plagis mundi inveniendis Mδ; De quarta plaga mundi Xα; Inventio 4^{or} plagarum Eτ; Inventio 4/4^{or} plagarum mundi Eδ Kθ Mυ Po Qμ Sη Vi Vq Wβ; Inventio quatuor plagarum mundi per astrolabio Mν; Si 4^{or} mundi plagas cupis habere Bβ quatuor] *om.* Kα; 4/4^{or} many mundi] *om.* Lγ Zα; *add.* habendis Capitulum Mo; *add.* inveniendis Bθ Fβ Pυ Vπ Wμ; *add.* inveniendo Pδ; *add.* Rubrica Vπ *add.* in *marg.* 19^m Vφ; *add.* in *marg.* 22^{us} Qζ; *add.* in *marg.* c. 22 Sδ; *add.* in *marg.* hoc deficit capitulum de 4 plagis mundi Lζ
- 2 Ad habendas] Cum autem volueris habere Bκ; Regionis Zα; *add.* in *marg.* 25-line gloss Bγ quatuor] *om.* Cγ Vξ; 4 / 4^{or} some; iiii Eμ mundi] *om.* Oβ veraciter] *om.* Dη Eμ Kα; qualibet die Vξ accipe] recipe Oφ(*add.* *interlin.* al' accipe) Pφ ut supra] *om.* Eκ supra] gradus Eα Qθ; 8^a *corr.* in *marg.* to supra Sκ; *add.* et pone eam in almu^{rath} Pι
- 2-3 ut ... sit₁] *om.* Eμ
- 2-18 Ad ... predictas] *marg.* Eμ
- 3 vide₁] in die Mτ; m Eδ qua quarta] qua gradum Lμ Pμ; quo gradu Dη Pσ quarta ... qua₂] *om.* Cε sit₁] *om.* Bδ; *add.* altitudo Pγ Zα; *add.* Postea(Posita Cγ) pone gradum solis(*om.* Kε) in rethe(reta Mι; rete Vψ; rethi Fβ Fζ Kα Lε Lμ Mυ Mφ Oi Oτ Pq Pσ Qβ Qγ Qδ Qθ Qi Sδ Vβ Xδ; rethy Lκ; reti Kδ Mδ Ou Oφ Pφ Vi Wα; rhte Oγ; rota Nγ) in sua altitudine Bβ Bδ Bε Cγ Dδ Dη Eη Fα Fβ Fζ Kδ Kθ(*deleted*) Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mι Mυ Mφ Nγ Oγ Oζ Oi Oτ Oφ Pα Pβ Pδ Pθ Pμ Pν Oζ Ou Pq Pσ Pφ Qβ Qγ Qδ Qθ Qi Qλ(*faded*) Sκ(in *rethe marg.*) Tδ Vβ Vi Vψ Wα Wμ Xδ Zα; *add.* scilicet(?) altitudo si ante meridiem vel post Qδ Deinde] *add.* pone Lγ Deinde ... qua] *faded* Qλ Deinde ... altitudine] *marg.* Oφ vide₂] *om.* Pγ ipse] *om.* Oγ Vν ipse gradus] *om.* Rγ Wλ sit₂] *om.* Vξ; *interlin.* Kε inter] super Bδ lineas] *om.* Wλ; *rep.* Nγ

[CHAPTER 19.] ON THE FOUR DIRECTIONS [CARDINAL COMPASS POINTS]¹ OF THE WORLD

To find the four [cardinal] compass points of the world with exactitude, take the altitude of the sun as before and see in which quarter it is. Then see in which altitude is this degree of the sun among the azimuth lines

¹ Although *plaga* means an area as in an open expanse of land or sea, a territory or region, or a climatic region or zone, in this capitulum it must mean a direction or compass point.

- 5 azimuth a principio quarte orientalis, que incipit a coluro septentrionali sive a medie noctis linea, a qua incipies computare. Et quotus fuerit numerus, tantum sume in dorso astrolabii ab ipso coluro versus armillam, procedendo per orientem, si est ante meridiem, vel per occidentem, si est post meridiem; et ubi numerus idem finitur, ibi
- 4 azimuth] alzemut Cγ; azimuth Bζ; azumuth Nα Xα; azymuth Eφ; *add.* si Oφ(*add. marg. al' sive*) azimuth a principio] ab inicio Pξ a₁] *in some*; si in Pφ principio] *illeg.* Zα quarte] 4^{te} *some*; iii^o Eμ a₂] in Eo Vι coluro] colluro Bκ Pξ; *add. interlin.* id est a linea an^h{anguli?} noctis Kε septentrionali] *om.* Bζ a] *om.* Rγ medie] meridie Cγ Pφ
- 4-5 que ... computare] *om.* Dη a₂ ... incipies] *om.* Kα sive ... linea] *om.* Pι a₃ ... linea] altitudo medie noctis Mτ
- 5 a] in Mι Nγ a qua] *om.* Bζ Eλ Qδ Wι; *interlin.* Eζ Vφ; *marg.* Kε; et ibi Bκ a ... incipies] incipiens Bι Bθ Cι Dγ Dδ Eo Eφ Ev Mγ Mλ Mν Mo Pι Po Pv Qη Qμ Rα Sβ Sη Vβ Vv Vπ Vρ Vτ Vψ Xα qua] quantus Mτ incipies] incipiens Nα Pθ Sκ computare] *om.* Mγ; *add.* per ii² Kα Et] in Oφ(*add. interlin. al' ut*) Et quotus] *rep.* Vπ fuerit] sint Vπ; sit Mτ numerus] *interlin.* Eζ tantum sume] cium sve (!) Vτ sume] sumpme Kθ in] de Vξ
- 6 astrolabii] abstrolabii Pα; *add. interlin.* id est Oφ; *add. in marg.* in eadem quarta Sκ ab ipso] vel ab ipso Qι; *corr. interlin. from* abu Eζ coluro] almero Pφ; colluro Bκ Cε Dη Mτ Nγ Pγ Pξ Vπ; *add.* a principio capricorni Zα; *add. interlin.* septentrionali Bγ armillam] *add.* computando Mτ procedendo] *illeg.* Eo; procedendum Cη; procedendum *corr. to* procedendo Bγ; procedentem Wι; procedentem Oξ per] ad Eo Qμ per orientem] *om.* Eδ Mv Po; per orientem Eζ(*interlin.*); pr orientem *corr. to* per orientem Bγ si est] sive Eα est] *om.* Mτ; fuerit Lδ Oγ ante] *add.* orientem Eφ
- 6-7 si ... occidentem] *om.* Nα
- 7 meridiem₁] medium diem Eκ Vξ vel] *om.* Pφ vel ... meridiem₂] *om.* Eλ Rα Xα vel ... idem] *om.* Pξ per] ab Pι; post Pθ Pφ per occidentem] postcedentem Eα est] fuerit Ev Vπ; sit Bκ Lδ Oγ meridiem₂] *om.* Mτ et] ut Bθ ubi] *om.* Qθ; *interlin.* Rα; ibi Vρ ubi ... finitur] *om.* Mv Mφ Vι Wα idem] *om.* Qι Wβ; ille Bβ Eμ Lδ; iste Qη finitur] confinitur Rγ; finis Mπ; fuerit Oφ(*add. in marg. al' finietur*) Pφ Qη ibi] *om.* Pι

from the beginning of the eastern quarter, which starts from the northern colure or the midnight line, from which you begin to count. And whichever the number is, take as much on the back of the astrolabe from the same colure towards the ring, proceeding to the east, if it is before midday or towards the west if it be after midday; and where the same number ends,

- pone regulam. Deinde astrolabium utraque manu tenens, sursum versa eius posteriori superficie, diligenter te oppone soli donec radius solis transeat per ambo foramina.
- 10 Tunc caute pone illud super terram, ut non moveatur ad aliquam partem; et habebis quatuor lineas in centro astrolabii concurrentes quatuor mundi plagas directe oppositas indicantes, scilicet orientalem, occidentalem, et cetera. Similiter operabis in nocte per stellam fixam.
- 8 pone] pones Bκ regulam] rigulam Nγ astrolabium] *om.* Kε Kι Mτ; *interlin.* Qζ; abstrolabium Pα; *add.* in Dη Oι(*interlin.*) tenens] *om.* Eλ Vτ; tociens/totiens Mτ Pρ sursum] *deletion and add. in marg.* sursum Eζ(*later hand*); *add.* non suspend~ per armillam sed orpas idem alens sursum Zα eius] est eum Bθ Vπ; *add.* foramina Eμ(*add. interlin. facie*) posteriori] posteriora Lκ; posteriore Vπ; superiorem Qζ; superiori Eα Fβ Kι Lμ Mι Mτ Nγ Pσ Qθ; superiori scilicet Vξ; *add. interlin.* id est dorso Bγ
- 9 superficie] facie Bθ Eν Rγ Vπ; *add.* regule [*illeg.*] in eat statu Eμ; *add. interlin.* scilicet facie Qμ diligenter] *om.* Wβ te] *om.* Dη Lλ; de Fβ(*add. interlin. bep(!)*) oppone] pone Oι Pξ solis] *om.* Oφ Qη; *interlin.* Kθ; solaris Bκ foramina] *add. illeg.* Zα; *add.* pinnularum Kε Kι Mτ Qζ
- 10 Tunc] Etiam Mτ caute] autem Vρ pone] ponas Qη Vρ Wλ; ponens Pγ; pones Bζ Bι Eτ Oν Pι Rα Vβ Vτ Vφ Xα; *add.* si Qλ illud] *om.* Bζ Dγ; illum Nα ut] donec Kθ non] *om.* Pι Eβ; *interlin.* Bγ Xα moveatur] *corr. from* moveantur Bγ; *add.* super Wλ ad] super terram seu Mτ aliquam] aliam Bκ; *add.* eius Mτ partem] *add.* et si Nα
- 11 quatuor₁] *om.* Pν; 4^{or} many; iii^e Eν; *add.* mundi Kε Qζ quatuor₁ ... concurrentes] tunc Oφ(*interlin.*) lineas] *add.* mundi Mτ lineas ... quatuor₂] *om.* Pσ Pφ in] a Kδ in ... plagas] *om.* Pξ centro] medio Qη; *add.* vel in medio Oβ concurrentes] contineus Mτ; continentes et concurrentes Rγ; *corr. in marg. from illeg.* Oξ quatuor₂] *om.* Xδ; 4^{or} many oppositas] *om.* Bε; opponas Pν
- 12 scilicet] *om.* Cγ Cε Dη Eβ Eη Fα Fζ Kα Kδ Lβ Lδ Lη Lκ Lμ Mδ Mη Mι Mπ Mτ Mν Nγ Oβ Oγ Oζ Oι Oτ Oφ Oυ Pα Pβ Pδ Pμ Pν Pρ Pξ Pσ Pφ Qγ Qθ Qi Qλ Sδ Sκ Tδ Vν Vψ Wα Xδ scilicet ... cetera] *om.* Eμ Qη Rγ Wμ orientalem] orientale Dη Lε Lκ Pμ occidentalem] *om.* Kθ Mν Oβ Oι Pδ; occidentale Dη Lε Lκ Pμ; oriente Eδ; orienti Mλ Vβ; *add.* meridionalem, septentrionalem Bθ Eν Kδ(*add. plagarum*) Qi Vν Vπ occidentalem ... similiter] *illeg.* Eρ et cetera] *om.* Bβ Bθ Eα Kα Mυ Oβ Pι Vι Vν Vπ Wλ; et aliqua Pρ; etiam Pξ; *ms. Xα ends* Similiter] sicut Wλ operabis] operaberis Vβ Dδ Mη in] de Fα Mι in nocte] *om.* Vι
- 12-13 per ... fixam] *om.* Vτ
- 12-18 Similiter ... predictas] *om.* Bκ
- 13 fixam] *om.* Bζ

place the rule there. Then holding the astrolabe in both hands, with its back surface turned upwards, carefully turn yourself toward the sun until a ray of the sun passes through both pin-holes. Then carefully place it on the ground [or place it horizontally] so that it [the rule or alidade] is not moved to either side; and you will have the four lines meeting in the centre of the astrolabe indicating the four [cardinal] compass points of the world directly opposite [each other], namely east, west, etc. Similarly you will work at night through a fixed star.

15 Vel² locata iam regula in dorso astrolabii, sursum versa eius facie, equidistanter
 orizonti ut in proximo dictum est, fac umbram amborum angulorum pinnule cadere
 super duo latera regule, scilicet dextram umbram super latus dextrum, et sinistram

- 14 *before Vel] add. CAPITULUM DE EODEM SED ALITER BΘ Vπ(add. Rubrica); add. DE EODEM Pv Xδ; add. (ITEM Vβ) DE EODEM SED(om. Vψ; secundum Sη) ALITER(aliquid Lβ) Cι Eβ Eη Fα Fβ Fζ Kα Lβ Lγ Lε Mδ Mη Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pδ Pθ Pμ Pv Qβ(add. Capitulum) Qγ Qλ Sδ Sη Sκ Tδ Vβ Vι Vψ Wα Wμ; add. DE EODEM DOCTRINA Oφ; add. DE EODEM SED ALIO MODO Pq; add. ITEM Mπ; add. ITEM ALITER DE EODEM UT SUPERIOR Kδ; add. in marg. c. 23 Sδ Vel] om. Kθ Xδ; Item Dη; Sel corr. in marg. to Vel Pα; add. aliter Eμ; add. sit Bβ locata] loca Wι; positam Mι Nγ; corr. from loca Bγ; add. regula Cγ iam] om. Lη Vφ; illam Bβ iam regula] om. Pξ regula] ista Wα; rigula Nγ; tabula Qγ astrolabii] abstrolabii Pα sursum] om. Eμ sursum ... facie] ut eius superficie Dη facie] faciem Eμ Nα; superficie Bδ Cγ Cι Dδ Eβ Eη Fα Fβ Kδ Kε Kι Lβ Lγ Lε Lη Lκ Lμ Mι Mπ Mτ Mυ Nγ Oγ Oζ Oξ Oι Oτ Oυ Oφ Pα Pβ Pδ Pθ Pv Pξ Pσ Pφ Qβ Qγ Qζ Qη Qθ Qι Qλ Sδ Sκ Tδ Vβ Vψ Wμ Xδ equidistanter] equidistans Pφ*
- 14-18 Vel ... predictas] *om. Bζ Bι Dγ Eα Eδ Eο Eρ Gα Mγ Mλ Mν Oβ Pι Pο Rα Sβ Vν Vρ Vτ Vφ; add. in marg. later hand Eζ Qμ*
- 15 *in] om. Bγ Cη Eκ Eτ Oν Pγ Vξ Wβ Wι; del. Lη proximo] primo Cι Pγ; add. illeg. Vφ dictum] predictum Eλ est] om. Kα Pξ amborum] om. Cγ angulorum] om. Pβ pinnule] lacuna Lβ Lκ; p[lacuna] Pα; pennule Pμ; pinnulle Mυ; pinule Mπ Qδ Sκ; plane Pφ; pnnile Bθ; prennile Mτ; presimilem/presimiliter Pv; p^hnile corr. in marg. to pinnule Oζ; add. eius Mη cadere] om. Qδ; cadet Kθ*
- 15-16 *amborum ... umbrum{1/2}] om. Pv*
- 15-17 *amborum ... latus] tus dextrum et sinistrum Xδ*
- 16 *duo] 2 many; om. Dη regule] regulis Pq; rigule Nγ umbram] om. Eζ; add. interlin. et sinistram Bε super₂ ... dextrum] om. Pβ Pδ Pθ Pμ*
- 16-17 *scilicet ... statim] et Dη dextrum₁ ... latus] faded Qλ; dextram umbram(add. in marg. super latus dextrum Qζ) et sinistram umbram(om. Kε Kι Mπ Pδ Pq; interlin. Qζ Qη Tδ) super(sint Pφ) latus dextrum et sinistrum Bδ Cγ Cε Cι Dδ Eβ Fα Fβ Fζ Kα Kδ Kε Lγ Lδ Lε Lη Lκ Lμ(add. umbram) Mδ Mη Mπ Mυ(add. regule) Mφ(add. regule) Nγ Oγ Oζ Oι Oξ Oτ Oυ Oφ Pα Pδ Pθ Pμ Pξ Pρ Pσ Pφ Qβ Qγ Qζ Qη Qθ Sδ Tδ Vι(add. regule) Vψ Wμ Zα; dextrum umbrum et sinistrum umbrum super latus dextrum et ita quod dextra super dextrum et sinistra super sinistrum Sκ; si(om. Wα) dextram umbram et sinistram Mτ Wα*

² Many mss treat this as a new capitulum, with or without a title.

Or having already set the rule on the back of the astrolabe with its face turned upward, parallel to [or level with] the the horizon as was said in the previous section, make the shadow of the two sides of the vane fall along the two sides of the rule, that is the right shadow along the right side and the left shadow

umbram super sinistrum latus; et statim habebis quatuor lineas et quatuor plagas mundi predictas.

- 17 umbram] *om.* Bθ Eζ Eλ Eμ Eν Mo Nα Pτ Pυ Qδ Qμ Sη Vβ Vφ Wλ umbram ... latus]
om. Lβ Pν Qι super ... latus] *om.* Bε sinistrum latus] latus depressum et
 sinistrum Pβ latus] *om.* Bθ Eλ Eμ Eν Mo Nα Pτ Pυ Qδ Qμ Sη Vβ Vπ Vφ Wλ; *add.* ita
 quod dextrum super dextrum et sinister super sinistrum Cε Cι Kε Mη Pδ Pθ Vψ
 statim] sinistrum Fβ quatuor lineas et] *om.* Bδ Eζ Lδ Mτ Oγ lineas] *add.*
 plagas Vπ lineas et] *om.* Wλ et quatuor₂] et ad quatuor Rγ; in Dδ; per Pφ Oφ;
 vel Bε Cγ Cε Cι Dη Eβ Eη Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Lκ Lμ Mη Mι Mπ Mν Mφ Nγ Oζ
 Oι Oξ Oτ Pα Pβ Pδ Pμ Pν Pρ Pσ Qβ Qγ Qδ Qθ Qι Qλ Sδ Sκ Tδ Vι Vψ Wα Zα; vel quatuor
 Pθ plagas] *om.* Vπ
- 17-18 lineas ... predictas] mundi plagas Pξ; partes mundi Eμ
- 18 predictas] *om.* Bδ Rγ; ostendentes(?) Vφ; supra dictas Kε Kι Mτ Qη Qζ; *add.* indicantes Qδ

along the left side; and automatically you will have the four lines and the four [cardinal] compass points of the world, as mentioned above.

[Comment:

To find the 4 cardinal points of the compass at one's current location, take the altitude of the sun (at any given time) using the alidade, and then place the degree of the sun (along the ecliptic for that day) on the almucantar of that altitude. This point will then intersect with an azimuth line. Note how far this azimuth is east or west of the meridian (i.e., the vertical diameter).

Returning to the back of the astrolabe, set the alidade on that degree along the rim. Now set the astrolabe on a horizontal surface with its back facing up and, not letting the alidade move, rotate the whole astrolabe so that the sun's rays pass through the holes in the vanes (or fall along the alidade's centre line), that is, the alidade is pointing directly at the sun. The vertical and horizontal diameters on the back of the astrolabe will then point east/west and north/south.

Instead of letting the rays of the sun pass through the hole(s) in the vane(s), you can also turn the astrolabe so that the edges of the shadow of the vane toward the sun fall along the sides of the alidade, in order to line up the alidade (and astrolabe) with the sun.]

[CAPITULUM 20.] DE DECLINATIONE CUIUSLIBET GRADUS HABENDA

Si scire volueris declinationem cuiuslibet gradus signorum, pone eum super

- 1 De ... habenda] *om.* Bγ Bδ Bε Bζ Bκ Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Lζ Lκ Mα Mδ Mτ Nα Oβ Ov Oσ Oχ Pι Pξ Pσ Pφ Qε Qη Qi Rγ Sβ Sη Sθ Si Sl Vα Vν Vτ Vυ Vφ Wλ; *illeg.* Eζ; *faded* Eδ; Ad habendam declinationem cuiusque gradus Eo Eρ Mγ Pτ(*add. solis*) Vξ; Ad inveniendum declinationem gradus cuiuslibet signi Lμ Qθ; Ad sciendum declinationem cuiusque gradus signorum Mλ; Capitulum 21^m. De declinatione gradus solis Qδ; De declinatione graduum Cα; De declinatione graduum ab equinoctiali et stellarum similiter(*om.* Bη) Bη(*add. in marg. 17*) Cζ Eμ(*add. in marg. 17^{us}*) Oη; De graduum declinatione Pζ(*marg.*) Vγ; De invenienda(inventione Vβ) declinatione cuiuslibet gradus signorum Bι(*add. in marg. c 19^m*) Mν Vβ; De latitudine regionis Mπ¹; Inventio declinationem cuiuslibet gradus signi Oφ; Invenio declinationis cuiusque gradus signorum(signi Qμ Wι; solis Rα) Dγ Kθ Po Rα Qμ Vρ Wι; Si vis scire declinationem cuiuslibet gradus signorum Bβ De] *om.* Mν declinatione] *invenione* Fα cuiuslibet] cuiuscumque Pρ; cuiusque Bθ Eτ Vπ Wβ Zα gradus] *om.* Kα; *add.* signorum Bθ Eτ Mν Pδ Pυ Qβ Vι Vπ; *add.* zodiaci Kδ habenda] *om.* Eτ; signi Wβ; *add.* Capitulum Qβ; *add.* et stellarum fixarum Pβ; *add.* Rubrica Vπ *add. in marg. 20^m* Vφ; *add. in marg. 24^{us}* Qζ; *add. in marg. c. 24* Sδ
- 2 Si] *add.* autem Bη Bκ Cζ Eν Lζ Lλ Mα Oη Ov Oσ Oχ Pζ Vβ(*interlin.*) declinationem] *om.* Sλ; *add.* solis Wβ cuiuslibet] *illeg.* Wα; cuius Eζ Sλ(?); cuiuscumque Bκ Cα Cγ Dη Eβ Eη Fα Fβ Fζ Kδ Lβ Lδ Lε Lκ Lμ Mδ Mo Mφ Oi Oτ Ov Oφ(*add. interlin. vel cuiusvis*) Pβ Pμ Pν Pσ Pφ Rγ Sδ Tδ Vψ Xδ; cuiusque Bγ Bζ Bι Cδ Cε Ci Eγ Eλ Eμ Eρ Eτ Gα Lη Mγ Mη Mλ Mν Mυ Oζ Oη Ov Oξ Oσ Pα Pδ Pι Po Pρ Qβ Qθ Qi Qλ Qμ Rα Si Sk Vα Vν Vξ Vρ Vφ Wβ Wι Zα; cuiusvis Bδ Bε Bη Cζ Cη Eα Eδ Eo Kθ Lζ(?) Pθ signorum] *om.* Pρ; *add. interlin. vel stellarum fixarum* Qζ eum] *om.* Cη Dδ Rγ; *eam some; interlin.* Bγ Pζ; *gra eum* Pι(*interlin.*); illud Vψ; ipsum gradum Eλ super] versus Pζ

¹ The titles for Cap. 20 and Cap. 21 have been switched in ms Mπ.

[CHAPTER 20.] ON FINDING THE DECLINATION OF ANY DEGREE [ALONG THE ECLIPTIC]

If you wish to know the declination of any degree of the ecliptic, set it on

- lineam medii celi vel diei, et scito eius altitudinem ab orizonte; postea scito altitudinem
 5 capitis Arietis et Libre in eadem linea. Deinde scito altitudinem utramque et differentia
 ipsarum altitudinum est declinatio eius gradus ab equinoctiali linea. Si autem gradus
- 3 lineam] *om.* Wλ; *marg.* Pv medii celi] meridionali Lβ; moridionalem Lκ; *add.* gradu
 solis Dδ medii ... vel] meridionali Kα celi vel] *om.* Bδ Bκ Cδ Eγ Lζ Lκ Mα Ov
 Oσ Oχ Pζ Pι Pφ Qε Sθ St Sλ Vα Vβ(*add. interlin.* al' medii celi) Vq Vv; *interlin.* Sβ; *add.*
interlin. medie Pα; *add. in marg.* medie Ov vel diei] *om.* Bη Dη Lλ Mι Nγ Oη Pξ Vγ
 Vξ Wμ; *interlin.* Eμ; *ut corr. to* vel Mη; vel medii diei Cα Oβ scito₁] scias Cα; scita
 Mτ altitudinem₁] altitudines Wλ; latitudinem Eα Vv; *interlin.* per almucanth'ath Bγ
 eius] *om.* Lλ Vγ Vv eius ... scito₂] *om.* Dη Mπ ab] in Dδ ab ...
 altitudinem₂] *om.* Mη; *marg.* Qι orizonte] oriente Cε Cη Lε Mτ Pγ Oσ Vξ; *corr. from*
 oiente Bγ; *add.* computando almutanterath Mι Nγ; *add.* oriente Qδ; *add.* per alumis
 numerus Zα; *add.* posite Vπ; *add.* vel orientale Fβ Oβ Pα(*interlin.*); *add.* scilicet Nα; *add.*
interlin. id est orizonte orientali Kε Kι; *add. in marg.* non tunc assumas gradus sed in rethe
 Lε(*later hand*); *add. in marg.* non tunc assimas tunc gradus altitudinis sed in rethe Tδ
 scito₂] *om.* Vγ Wλ; scias Cα; scies Eγ altitudinem₂] *om.* Mτ; *add.* est Fζ
- 4 capitis] *om.* Qβ; capite Mτ; capitum Sκ capitis ... altitudinem] *om.* Pv Pξ Xδ
 capitis ... utramque] scilicet equinoctialis utraque id est gradus et equinoctialis Bκ
 et₁] vel Bη Bι Cζ Dγ Eq Kε Kι Lλ Mγ Mλ Mo Nα Oβ Oη Oσ Oχ Pζ Pτ Pv Qδ Qζ Qη
 Rα Sη Sθ St Vα Vv Vφ Wλ; aut Pι; *et corr. to* vel Wβ Libre] *add.* id est equinoctialis
 Kδ; *add. interlin.* scilicet equinoctialis Pθ in] *om.* Wι linea] *add.* ab oriente Oβ;
add. medii celi Cα Eλ Mι Nγ Deinde] Postea Eδ scito] *marg.* Eζ; scias Cα; scita
 Mτ Qη; *add.* differentiam Eζ(*marg.*) Pζ scito ... differentia] *om.* Eλ altitudinem]
add. est Pγ altitudinem ... et₂] *om.* Eγ Sθ; *marg.* Sβ utramque] *corr. in marg. from*
 initiam Oξ; *add.* eum Mη; *add.* que est intra utrumque scilicet inter gradus signum quem
 vis et caput Arietis Mι Nγ et₂] tam altitudinem gradus in ista linea medii celi quam
 etiam altitudinem capitis Arietis seu Libre et istus scitas nuta duarum istarum
 altitudinum sive quia Cα; *add.* tunc Kα differentia] declinatio Mv; r^a Fβ
- 4-5 altitudinem ... ipsarum] differentiam utrarumque(utrumque Lλ) Lλ Mα Oχ Pζ Vβ Vγ;
 utramque altitudinem Sλ
- 5 ipsarum] *om.* Eκ Rγ Vφ; eorum Vv; ipsorum Mτ; istas Cα; utrarumque Sι; utriumque Eγ
 Sθ altitudinum] *om.* Mo; altitudines Cα; latitudinem Oχ est] que erit Eγ Lλ
 Mα Oχ Pζ Qε Sθ Sλ; que est Vβ est ... eius] *om.* Bθ declinatio eius] *om.* Vπ;
 differentia eius Mv eius] *om.* Eλ Pβ; eiusdem Rγ; huius Cζ Eμ Oη; illius Cα Wμ;
 eiusdem Cη Eκ Eτ Lλ Mα Mo Oβ Oι Pζ Pι Pτ Qε Sβ Vβ Vγ Wβ Wι gradus₁] *om.* Bζ
 ab ... linea] alia equinoctiali Dδ linea] *add.* que ducantur qū [*illeg.*] Zα
 autem] enim Cα gradus₂] *add.* ille Kα

the line of the middle of the sky or of the day, and know its altitude above the horizon [using the almucantars]; afterwards know the altitude of the beginning of Aries and Libra on the same line. Then consider each altitude and the difference of their altitudes is its declination of the degree from the celestial equator. If however the degree

signi fuerit septentrionalis, est declinatio septentrionalis; si meridionalis, meridionalis. Scito etiam quod gradus septentrionalium signorum sunt altiores equinoctio, quod est in capite Arietis et eius opposito; et meridionalium inferiores, secundum declinationes

- 6 signi] *om.* MΛ fuerit] *interlin.* Oγ; sit Pι; *add.* equalis Qη(*deleted?*) septentrionalis₁] *add.* tunc Lδ est] erit Cα Cδ Dη Λλ Mτ Oγ Pζ Sθ; et Pγ; quod Bδ est declinatio] *om.* Wβ est ... septentrionalis₂] *om.* Wλ est ... meridionalis₂] et si meridionalis Pι; et similiter de meridionali Nγ declinatio] *om.* Eη; illa declinatio Cα; *add.* eum Rγ septentrionalis₂] *om.* Bζ Oχ; *interlin.* Fβ si] et Pζ; et si *many*; *add.* autem Mo; *add.* vero Rγ si ... meridiana₂] et similiter de meridionali Mι; et simul meridiana Cε meridionalis₁] *om.* Bζ; meridiana *some*; meridiani Cδ Eμ Oχ Pζ Sλ; *add.* declinatio est Gα Oβ Qη; *add.* erit Dη Mτ; *add.* est Lκ Lμ Mν Mφ Ov Pσ Pφ Qβ Qθ Rγ Zα; *add.* ipsa est Pβ; *add.* iste declinatio est Cα; *add.* signi Kα meridionalis₂] *om.* Bδ Cγ Eo Kε Lβ Mτ Qζ Pγ; declinatio erit meridionalis Lδ Oγ; et cetera Kι; medii celi vel medii diei Lκ; meridiana *many*
- 6-7 si ... septentrionalium] signorum Vι
- 7 Scito] Scias Cα; *illeg.* Pξ quod₁] *om.* Mτ; quia Pφ; quot Cι Sλ septentrionalium ... equinoctio] signorum septentrionalis signi est altior Mι sunt] *om.* Mν; sicut Qγ; *add.* *interlin.* versus cuspidem Bγ equinoctio] *om.* Oχ; equinoxio Oι; equi quia magis appingentes ad cenith quam equinoctium noctio Fβ; *add.* quia(*add.* sunt Sκ) magis appingentes ad zenit/zentith quam equinoctionem Cγ Nα Ov(*marg.*) Sη Sκ(*marg.*); *add.* id est magis propinqua polo Mι Nγ quod₂] ut Lκ est] *om.* Mι Nγ
- 8 in] a Eγ Kδ Kι Mτ Pφ Qζ Arietis] *om.* Sι; *add.* et Libre Zα et₁] qui Bθ; *add.* in Cδ et₁ ... opposito] *om.* Cα; *corr.* to Libre Bγ; et(*om.* Oβ) ex opposito gradus signorum Oβ Qη eius] cum Libre Bβ; ex Kε Kι Mτ; *add.* et ex Kα opposito] oppositi Pζ; *add.* quod est in Libra Cζ Oζ; *add.* scilicet Libre Cδ Qμ Zα; *add.* usque ad Libram que opponitur Arieti Mι; *add.* *interlin.* sunt Oφ et₂] est Pθ; *add.* gradus Bθ Cα Eλ Ev Vπ Vτ; *add.* signorum Pι meridionalium] meridianorum *many*; *add.* gradus Oγ; *add.* gradus signorum Cζ Oι; *add.* graduum Bβ Kθ; *add.* signorum Qμ inferiores] *add.* sunt Bδ Bθ Cα Cγ Dδ Dη Eβ Eη Ev Fα Fβ Fζ Kα Kδ Kε(*interlin.*) Kι Lγ Lε Lμ Mδ Mη Mι Mπ Mτ Mν Mφ Nγ Oβ Oζ Oξ Oι Oτ Pα Pβ Pδ Pθ Pμ Pν Pξ Pσ Qβ Qγ Qδ Qη Qθ Qλ Sδ Sκ Tδ Vπ Vφ(*interlin.*) Wμ Xδ; *add.* sunt equinoctio Lδ Oγ; *add.* *interlin.* versus limbum Bγ secundum] sunt Bβ Lκ Qμ declinationes] declinationem Mτ Qβ Oφ(*corr.* *interlin.* -nes) Vβ; *add.* id est per declinationem Cζ Oη

of the sign were to the north, its declination is northern; if to the south, southern. And know that the degrees of the northern signs are higher than the [celestial equator] which is through through the beginning of Aries and its opposite [point]; and of the southern signs, lower, according to their declination

10 eorum ab eo. Maior autem declinatio est in capite Cancri et Capricorni. Eodem modo invenies declinationem stellarum fixarum.

9 eorum] *om.* Qθ; eorundem Rγ; horarum Pγ eorum ab eo] ipsarum ab equinocio Oβ; Libro scilicet equinoctiali Bκ eorum ... declinatio] *om.* Eo ab eo] *om.* Bε Eη eo] equinoctiali predicto Kα Kε Kι Mτ Qζ; equinoctio Bζ; *add.* non differentiam et latitudinis maioris Cι; *add.* scilicet equinoctiale Lζ Maior] a^{or} some; maxima Cδ; minor Oχ; q' Bη; *add. in marg.* Notabilia necessaria ad sequentia Lζ autem] *rep.* Vυ; alia Oη; enim Bθ Eλ Qμ est] *om.* Qι Nα; erit Oγ Sλ; *add.* declinatio Qη in] a Kε Kι Mπ Mτ Qζ et] ad Kι Mτ Qζ eodem] eo Pρ; eodemque Oχ Sθ Sι Sλ; *add.* autem Vα Vυ; *add.* quoque Bη Bκ Cδ Cζ Eγ Eμ Lζ Mα Oη Oφ Qε Vβ Vγ modo] *om.* Kθ

9-10 eodem ... fixarum] *om.* Dη

10 invenies] *om.* Oχ; *add.* invenire possis Cζ fixarum] *om.* Kδ Nγ Oξ; *add.* 3.5-line gloss Cζ

from it. Moreover the greatest declination is at the beginning of Cancer and of Capricorn. By the same method you find the declination of the fixed stars.

[Comment:

To know the declination of some degree or point on the ecliptic, place that point over the meridian line and read its altitude (using the almucantars). Then place the beginning of Aries (or Libra) on the same meridian and read its altitude. The difference in altitudes will be the declination of the point from the equator.

The northern signs (Aries to Virgo) have northern declinations, and are above the equator; the southern signs (Libra to Pisces) have southern declinations, and are below the equator. The greatest declinations are at the beginning of Cancer (northern) and the beginning of Capricorn (southern).

Declinations of the fixed stars can be similarly found.]

[CAPITULUM 21.] DE ALTITUDINE POLI VEL LATITUDINE REGIONIS

Scito quod latitudo regionis sit latitudo cenith capitum eius ab equinoctiali

- 1 De ... regionis] *om.* Bγ Bδ Bε Bζ Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Lζ Lκ Mα Mτ Nα Oβ Oν Oσ Oχ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Rγ Sβ Si Sλ Vα Vν Vτ Vυ Vφ Wλ; *faded* Eδ Eθ; *illeg.* Eζ; Ad habendum latitudinem cuiusvis(*om.* Dη Vξ) regionis Dη Eo Vξ; Ad inveniendum latitudinem alicuius regionis Lμ; Ad precognoscendum ea que secuntur Mγ; Ad sciendum latitudinis regionis Vγ; Capitulum 22^m. De latitudine cuiusque regionis Qδ; De altitudine poli Zα; De declinatione cuiuslibet gradus Mπ¹; De declinatione(*corr. in marg. to latitudine*) regionis invenienda Bη(*add. in marg.* 18); De invenienda latitudine regionis Dγ(*add. Rubrica*) Qθ(*marg.*) Rα(*add. et cetera*); De invenienda(*om.* Wι) latitudine cuiuslibet regionis Oφ Wι; De inventione latitudinis cuiusque regionis Vβ; De latitudine cuiusque regionis invenienda Kθ Mν Po Qμ Wβ; De latitudine regionis invenienda Cζ Eμ(*add. in marg.* 18^{us}) Eτ Mλ; De latitudine regionis per gradum solis habendam Pτ; De latitudine regionis scientia ca^{ior}/m^{ior} (?) Sη; De regionis latitudine Pζ(*marg.*); Habendam latitudinem regionis cuiuslibet sive elevationem poli Bι; Inventio latitudinis regionis vel elevationis poli Vθ; Si latitudinem regionis scire volueris Bβ De altitudine] *om.* Oξ; De latitudine Kδ poli] *om.* Bκ Lε Pβ Pγ Tδ vel] *om.* Mη; et Eη Pν; seu Cα latitudine] *om.* Kα; declinatione cuiuscumque Mν Vι; lat' Mη regionis] *add.* quod idem est habenda Mo; *add.* Rubrica Vπ; *ms.* Lδ *ends* *add. in marg.* 21^m Vφ; *add. in marg.* 25^{us} Qζ; *add. in marg.* c. 25 Sδ
- 2 Scito] Scias Cα latitudo₁] altitudo Fβ Wβ regionis] *om.* Qβ Sδ; *add.* distancialis Qη; *add.* et altitudo poli Zα regionis sit latitudo] vel longitudo Mτ sit] *om.* Vα; est Dη Pρ Qη Xδ latitudo₂] *om.* Kα Vα; altitudo Mν Mφ Oγ Vι Vτ Wα; distancia vel longitudo Cγ Dδ Kε Kι Qζ; longitudinis Sθ; longitudo Bθ Eρ Mα Mγ Oβ Oφ(*corr. interlin. al' latitudo*) Oχ Pι Pφ Qε Qη Rα Sβ Si Vβ Vγ Vν Vπ Vφ; longitudo vel latitudo Qμ; *corr. from longitudo* Eζ; *add. interlin.* scilicet distancia Bγ cenith] *om.* Bη Sθ; *illeg.* Bκ; cenit Oσ Qε Qη Sβ Vυ Wλ; cent Mα; zenit Cγ Vγ; zenith Bε Kδ Lκ Nα Qδ Vφ; *add.* seu distancia cenith Cα capitum] *om.* Eκ Qζ Qη Rγ; *illeg.* Eρ; capitis Pι; civium/cunum Cη Dγ Eτ Mγ Mη Mλ Oβ Pτ Rα Vν Vρ Vτ; *add.* civium Bγ Bθ Cζ(cunum) Eλ Eμ Eν Lζ Mα Oι(*marg.*) Oσ Oφ Oχ Pζ Pυ Pφ Qε Sβ Sθ Si(*and del.*) Sλ Vβ Vπ Vν; *add.* initium Lλ Vγ; *add. interlin.* id est zenit Bη eius] *om.* Bε Mτ Pι Rγ Wλ; *del.* Oι; cuiuscumque Eγ
- 2-4 Scito ... equalis] *marg.* Cδ

¹ The titles for Cap. 21 and Cap. 20 have been switched in *ms* Mπ.

[CHAPTER 21.] ON THE ALTITUDE OF THE POLE OR THE LATITUDE OF A REGION

Know that the latitude of a region is the latitude of its overhead zenith from the celestial equator

- circulo versus septentrionalem vel meridiem, que similis est altitudini poli septentrionalis et depressioni eius oppositi ab horizonte, que duo sunt semper equales.
- 5 Cum ergo latitudinem cuiusque regionis scire volueris, altitudinem solis in
- 3 circulo] *om.* Sβ; altitudo Pγ; linea vel circulo Bη Cζ Eμ Eν versus] *om.* Vα vel] et Oφ(*corr. interlin. to vel*) Pφ; *add.* versus Eδ vel meridiem] *om.* Eλ Sι que] qui Lζ; *add.* distancia Cα; *add.* scilicet declinatio cenith ab equinoctiali Qμ est] *om.* Fβ Mν Pξ Pφ Wλ altitudini] latitudini Mη
- 4 septentrionalis] *om.* Bθ Eν Vπ; unius Dη; *add.* ab oriente Pφ; *add.* ab horizonte Bη Bκ Cδ Cζ Eγ Eμ Lζ Lλ Mα Oι(*marg.*) Oν Oσ Oφ Oχ Pι Qε Sβ Sθ Sι Sλ Vα Vβ Vγ Vν; *add.* horizonte Pζ et] vel Lμ; *add.* cumque Vι depressioni] p'nsioni Nγ eius] *rep.* Eρ; poli Vβ; *add. interlin.* poli Oι eius oppositi] **om.** Wι; alterius Dη; eius per oppositi Lκ; poli meridionalis(meridiam Sθ; meridionali Sι) sub eo Sθ Sι Sλ Vα Vν Wμ; poli oppositi id est meridiani sub eo Vβ; *add.* poli australis Cα Oβ; *add.* predicto scilicet polo Mι eius ... horizonte] meridionali sub eo Lζ Pζ; meridionalis sub eo Bκ Oν; poli meridionalis sub eo Bη Cδ Cζ Eμ Mα Oσ Oφ(*add. interlin.* scilicet oppositi) Oχ Pφ Qε Sβ Vγ; poli meridiani Eγ oppositi] ex opposito Mτ ab] sub Pι horizonte] *add.* eiusdem regionis Eλ; *add.* illius regionis Vτ; *add. interlin.* scilicet meridionali Oι que] qui Wι; *add.* de Pγ; *add.* scilicet Oξ que duo] quo sic Qη que ... equales] que due partes similiter equales Lζ; que est similiter equales Mν duo] *om.* Bβ Qβ; due Bι Eα Eμ Mγ Mη Nα Oβ Pν Qμ Sβ Sι Sκ Vα Vβ Vπ Wλ; 3 Mφ Vι; tres Lγ Mα Oχ Pζ Qε Sθ(?); tria Eγ; altitudo poli septentrionalis et depressio poli australis Cα; *add.* altitudines Wλ; *add.* partes Bθ Eν Oν; *add.* scilicet elevatio et depressio Mι Nγ; *add. interlin.* distancie Bγ sunt semper] simpliciter Eδ semper] *om.* Bζ Eλ Mφ Vι; *interlin.* Kθ; in partes *corr. to simpliciter* Bγ; partes Bκ Cε; seui(?) Lβ; simpliciter Bβ; simpliciter Mν Vξ Rγ Wι equales] *om.* Cε; *ms* Oχ *ends*
- 5 Cum] *add. in marg.* Inventio altitudinis regionis Lζ; *add. in marg.* 1^a regula Dδ ergo] *om.* Cδ; autem Dη Gα; enim Mι Nγ; igitur Kι Mτ Oβ Qζ latitudinem] altitudinem Bζ Cα Dγ Eδ Eζ Mν Rα Sβ Vφ; longitudinem Mγ cuiusque] *om.* Dη Sι; alicuius Eα; cuius Eν Pγ Pζ Sβ; cuiuscumque Cα Lη Qι Qθ Sλ; cuiuslibet Cγ Eδ Eκ Gα Kα Kθ Kι Mν Mo Mτ Nα Oβ Oγ Pδ Po Pτ Pν Qδ Qζ Qη Rγ Sκ Vβ Vξ Vψ Wβ Wι Wλ; cuiusvis Bζ Bη Bι Bκ Cζ Dγ Eλ Eμ Eο Eν Lγ Lζ Mα Mγ Oν Oσ Oφ Pι Qε Rα Vα Vγ Vν Vφ cuiusque ... altitudinem] *om.* Sθ Xδ regionis] *om.* Eν volueris] desideras Eκ; *add.* in Mν; *add.* scilicet Eδ solis] *om.* Rα Wβ; poli *corr. in marg. to solis* Qδ; regionis Vτ in] *om.* Pβ

toward the north or the south, which is similar to the altitude of the northern pole (and its opposite depression) from the horizon, which two are always equal.

Therefore when you wish to know the latitude of any region, consider the altitude of the sun

media die considera, quam minues de 90, si fuerit sol in initio Arietis et Libre, et quod est residuum erit latitudo regionis; tunc enim motus solis erit in equinoctiali linea. Si vero in alio gradu fuerit sol, eiusdem gradus declinationem considera per tabulam

- 6 media] ipsa *corr. interlin. to media* Εκ; medio *some* medie die] meridiē Βη(*add. interlin media*) Βθ Βκ Ευ Λζ Vπ Vψ; medio diei Cζ considera] *om.* Ρα; primo considera Cα; *add. per 2 canonem Bζ; add. per 11(ii?) canonem Oβ; add. per 12/12^m canonem Eφ Gα Vφ; add. per 13 Mτ; add. per 13/13^{am} canonem Kα Kε Kι Qζ Qη; add. per h^mra novm suppo^m(?) Pι; add. quando sol est(fuerit Kδ) in primo Arietis vel Libre Kδ Pθ quam] *om.* Oβ; quid Pγ; *add. altitudinem solis Cα* minues] invenies Dγ Kδ Mu; invenies *corr. in marg.(interlin. Mη) to minues Cζ Mη* 90] 10 gradibus Cα; LX Sθ; LX *corr. to 90 Qε; nonaginta Lκ; add. gradibus Vα* 90 si] quo Mγ si fuerit] *om.* Pφ; si volueris Pξ si ... Libre] *om.* Kδ sol] *om.* Cζ Mv Mv Mφ Vι Wα in] *om.* Cζ Mv Pγ Pζ Pι initio] stacione Sι et,] vel *some**
- 6-7 quod est] *om.* Βγ Βη Βκ Cδ Cζ Eγ Eμ Kε Kι Λζ Λλ Mα Mι Mτ Nγ Oσ Pζ Qε Qζ Sβ Sθ Sλ Vα Vβ Vγ Vv; qrquod(?) Rγ
- 7 est] erit Eφ Wλ; fuerit Dη Eo Oβ Pι Qη est residuum] remanet Cα residuum] *add. initii Arietis* erit] est Βη Βκ Cδ Eμ Λζ Oγ Oσ Pφ Vβ Vτ Vv Wλ; *add. ibi Pσ; add. post talem subtractionem Cα* latitudo] *om.* Qι; habetur per latitudine Rγ; longitudino Dδ Λλ Mγ Vγ latitudo regionis] *marg. Pβ* latitudo ... enim] *om.* Sη enim] *om.* Kθ Pδ Pφ Wλ; lacuna Cγ motus] *corr. from magus(?) Pβ* motus solis] id est que sol est in primo gradu Arietis seu Libre esse Cα solis] *om.* Pι; celi Bζ solis erit] *om.* Kα erit,] est Cα Mv Ov Pγ erit in equinoctiali] *illeg.* Cε in] *om.* Wβ before Si] *add. DE ALTITUDE REGIONIS Cα* Si] *add. marg. 2^a* regula Dδ
- 8 vero] autem Dη; *add. fuerit Oγ* alio] aliquo Bβ Pγ Qη; aliquo *corr. to alio Pι;* aliquo aliquo Oβ; illo Pμ; septentrionale Rγ gradu] signo Bδ; *add. linea Oβ fuerit] illeg. Eα; erit Qθ; est Lμ Pι fuerit ... gradus] om. Pγ sol] solis quam primo gradu Arietis seu Libre Cα; add. scilicet(?) quod in principio Arietis vel Libre Pι eiusdem] cuiusdem Mτ; eius Βη Βκ Cδ Cζ Eγ Eλ Eo Ev Λζ Λλ Mα Mγ Oσ Oφ Pζ Pφ Qε Sβ Sθ Sι Sλ Vα Vγ Vv Vv; illius Dη gradus] lacuna Cγ declinationem] *om.* Nα; *add. a linea equinoctiale Cα* considera] *add. et illam declinationem potes Cα per] add. in marg. Hec littera "Per tabulas" usque ad litteram "Quam minues" est addita Vβ tabulam] liniam Eα; tabulas Bζ Pv Qδ Sη Vβ Vι; add. gradus Qβ Sδ; add. que ponitur post quadrantem Eφ Gα Ρα(add. in) Vφ(add. interlin. scilicet)**
- 8-9 considera ... vel] *om.* Mτ per ... vel] *om.* Kε Kι Pι Qζ Qη per ... datas] *om.* Βη Βκ Cδ Cζ Eγ Eμ Λζ Λλ Mα Oσ Pζ Pφ Qε Sθ Sι Sλ Vα Vγ Vv; *marg. Oφ Sβ*

at midday which you will subtract from 90 if the sun is in [the circle through] the beginning of Aries and Libra, and what is the remainder will be the latitude of the region, for then the motion of the sun will be on the celestial equator. If, however, the sun is in some other degree, settle on the declination of the same degree through a table

- 10 declinationis solis, vel per regulas ante datas; quam minues de altitudine solis in medio die, si fuerit septentrionalis; si vero meridionalis, adde illam. Et habebis altitudinem initii Arietis in regione illa, quam subtrahes, sicut predictum est, a 90, et quod
- 9 declinationis ... datas] id est per regulam proximam declinationem solis cum per regulas omnis declinationis $K\alpha$ solis₁] *om.* $B\beta$ $D\eta$ $E\lambda$ $M\iota$ $Q\beta$ $V\varrho$ vel] *om.* $M\pi$ $W\alpha$; et $B\zeta$ $E\iota$ $Q\beta$ $Q\gamma$ $V\xi$ vel ... solis₂] *om.* $C\epsilon$ $E\kappa$ per] *om.* $M\gamma$ $O\nu$ $Q\delta$ regulas] tabulas Eo ante] *om.* $G\alpha$ datas] dictas $E\alpha$ $M\gamma$ $M\iota$ $M\tau$ $N\gamma$ $O\gamma$; *add.* capitulo proximo $V\varphi$; *add.* cum ca^{so} proximo $G\alpha$; *add.* cum proximo $R\alpha$; *add.* per precedentem et in mediae $M\iota$ $N\gamma$; *add.* proxime $M\tau$ $K\iota$ $O\beta$ $P\iota$ $Q\zeta$; *add.* que ponitur post quadrante $B\zeta$; *add.* t^o proc^onno $E\varrho$ quam] ista declinatione inventa $C\alpha$; *add.* declinationem $G\alpha$ $M\iota$ $N\gamma$ $R\gamma$ minues] invenies $K\delta$ $Q\beta$; invenies *and corr. in marg.* to minues $C\zeta$ $S\delta$; minuta $M\tau$; *add.* eam $C\alpha$ de altitudine] *marg.* $S\kappa$; declinatione $X\delta$; de latitudine $C\zeta$; *add. interlin.* inventis per regulam in dorso astrolabii $B\gamma$ solis₂] *om.* $B\zeta$ in] *om.* $B\iota$; de $F\alpha$ $M\tau$ medio] media *some*
- 9-10 medio die] meridiana $B\epsilon$
- 10 si₁] *om.* $M\tau$; *add.* gradus $O\beta$ $P\iota$ $Q\eta$ si₁ ... septentrionalis] *marg.* $O\varphi$ (*add.* quod) fuerit] sit $B\theta$ $B\kappa$ $L\zeta$; *add.* declinatio $E\lambda$ si₂ ... illam] vel adde eam illi si fuerit meridionalis $B\theta$ $V\pi$; vel(et $P\varphi$) adde illam si fuerit meridiana $E\gamma$ $L\lambda$ $M\alpha$ $O\sigma$ $P\zeta$ $P\varphi$ $Q\epsilon$ $S\beta$ $S\theta$ $S\iota$ $S\lambda$ $V\beta$ $V\gamma$ $V\nu$; vel adde illam si fuerit meridionalis $O\nu$; vel adde illi si fuerit meridionalis $B\kappa$ $L\zeta$; vel adde si fuerit meridionalis $B\epsilon$ $D\eta$ $V\alpha$; vel adde si fuerit meridiana declinatio $C\delta$; vel addes eandem si fuerit meridiana $B\eta$ $E\mu$; vel addes idem si fuerit meridiana $C\zeta$ vero] *om.* $P\sigma$ $Q\theta$; *add.* fuerit $K\epsilon$ $K\iota$ $M\tau$ $O\beta$ $Q\zeta$ $Q\eta$ meridionalis] meridiana *many*; meridies $M\tau$; *add.* fuerit $R\gamma$; *add.* id est in signis meridionalibus $K\alpha$ adde illam] *marg.* $O\varphi$ illam] ad illam $Z\alpha$; ei illam declinationem $Q\eta$; illi $L\zeta$ $V\nu$; istam $K\iota$ $M\tau$; *add.* declinationem $O\beta$ $Q\mu$; *add.* declinationem(*add. and expunged* illius gradus) altitudini solis in media die $C\alpha$ et] *add.* tunc $O\varphi$ $P\varphi$ habebis] invenies $P\iota$ altitudinem] *om.* $B\epsilon$ $E\eta$; latitudinem $Q\eta$; *add. in marg.* equinoctialis $Q\zeta$
- 11 initii] *om.* $D\eta$ $L\mu$ $P\sigma$ $Q\theta$ $S\lambda$; *marg.* $S\delta$; in initio $W\lambda$ Arietis] *add. interlin.* et Libre $B\gamma$ illa] *om.* $L\gamma$ $P\iota$; eius $B\eta$; ista $K\epsilon$ $K\iota$ $M\tau$ quam] *add.* altitudinem Arietis et Libre $G\alpha$; *add.* altitudinem inicii Arietis $C\alpha$ subtrahes] minues $M\delta$; subtrahas $G\alpha$ $W\lambda$ sicut] ut $B\epsilon$ $V\alpha$ $V\xi$ predictum] dictum $B\eta$ $B\theta$ $D\eta$ $E\nu$ $K\epsilon$ $K\iota$ $M\iota$ $M\tau$ $N\gamma$ $Q\zeta$ $Q\eta$ $S\lambda$ $V\pi$ $W\lambda$ est] *om.* $Q\epsilon$ a] de *some* 90] 10 gradibus $C\alpha$; LX $S\theta$; LX *corr.* to 90 $Q\epsilon$; *add.* gradibus $C\delta$ $V\alpha$

of solar declinations, or through the instructions given above [in Cap. 20]; this you will deduct from the altitude of the sun at midday if it is northern; if, on the other hand, it is southern, add it. And you will [then] have the altitude of [the sun at] the beginning of Aries in this region, which you will subtract, as said before, from 90, and what

remanserit est distancia regionis ab equinoctiali linea.

- 12 remanserit] post talem subtractionem $C\alpha$ est] erit $B\iota$ $C\zeta$ $D\eta$ $E\gamma$ $L\lambda$ $N\alpha$ $P\beta$ $P\zeta$ $Q\varepsilon$ $S\eta$ $V\gamma$ $V\varrho$ $Z\alpha$; est vel erit $C\zeta$ distancia] *add. interlin.* cenith $O\varphi$ distancia ... linea] altitudo poli et per conversus latitudo illius regionis $D\eta$ regionis] *add.* illius $M\tau$; *add.* istius $K\varepsilon$ $K\iota$; *add. interlin.* id est cenith $Q\zeta$; *add. interlin.* latitudo $B\eta$ regionis ... linea] cenith ab equinoctialis vel latitudo regionis $O\gamma$ ab ... linea] *illeg.* $C\varepsilon$ equinoctiali] equinoxiali $O\iota$ linea] *om.* $M\tau$; *add.* vel latitudo regionis sive elevatio poli super orizontem qui idem sunt similitudo fac per stellas fixas $P\iota$; *add. 4-line gloss* $C\zeta$

remains is the distance of region from the celestial equator.

[Comment:

The latitude of a location is the angle between the equatorial circle and the zenith of the location, and is also equal to the angle between the horizon and the north (or south) pole.

When the sun is at an equinox, that is, on the equatorial circle, the latitude of a location will be the complement of the midday altitude of the sun, or 90° minus the altitude of the sun at midday.

If the sun is at some other point along the ecliptic, determine the declination of the sun for that day (as outlined in Cap. 20, or from tables), and if the sun is north of the equator (between the spring and autumn equinoxes) subtract this declination from the midday altitude; if it is south of the equator (between the autumn and spring equinoxes), add this declination to the midday altitude. This addition or subtraction adjusts the current observed midday altitude of the sun to the midday altitude of the sun at the equinoxes, which then can be subtracted from 90° , as before, which will then be the latitude of the location.]

[CAPITULUM 22.]¹ DE EODEM, SED ALITER, CAPITULUM

Vel si volueris accipere altitudinem cuiusvis stelle altiore, et eius

Cap. 22] *om.* Oη

- 1 De ... capitulum] *om.* Bβ Bγ Bδ Bε Bζ Bη Bι Bκ Cγ Cδ Cε Cζ Cι Dδ Dη Dη Eα Eβ Eγ Eδ Eζ Eη Eκ Eλ Eμ Eν Fα Fβ Fζ Gα Kα Kδ Kε Kε Kθ Kι Lβ Lγ Lε Lζ Lη Lκ Lλ Lμ Mα Mδ Mι Mν Mo Mπ Mτ Mυ Mφ Nα Nγ Oβ Oγ Oζ Oι Oν Oξ Oσ Oτ Oυ Oφ Pα Pβ Pγ Pζ Pθ Pι Pμ Pν Pξ Po Pq Pσ Pτ Pυ Pφ Qβ Qγ Qδ Qε Qζ Qη Qθ Qι Qλ Qμ Rα Rγ Sβ Sδ Sη Sθ Sι Sκ Sλ Tδ Vα Vβ Vγ Vι Vν Vq Vτ Vυ Vφ Vψ Wα Wμ Wλ Sδ Zα; De altitudine poli Cα; De altitudine poli in qualibet regione Wι; De eodem per stellam et declinationem eius [*cut off*] Oφ(*marg.*); De eodem per stellas Vξ; De eodem per stellas fixas Eo Eq Mγ; De eodem sed aliter Bθ Mη(*marg.*); De latitudine poli in qualibet regione Eτ Wβ Capitulum] *om.* Bθ; Rubrica Vπ *add. in marg.* 26^{us} Qζ
- 2 Vel si] Et si Sλ; Si Kι Pξ Qη Vτ; Vel Oβ; *add. in marg.* 3^a regula Dδ Vel ... eius] Vel accipere alicuius stelle altiorum Si volueris eius Kι si volueris] suis lineis Sθ accipere] accipe Sθ Sι Vφ Wι; scire Mι Nγ altitudinem] *om.* Cζ Kα; latitudinem Oσ; latitudinem per Oβ Qη; *add. interlin.* in dorso astrolabii Bγ cuiusvis] alicuius Lμ Pσ Qθ Sλ; alicuiuslibet Kε; cuius Bη Cζ Oν Oφ Pγ Pφ; cuiuslibet Oβ Qη Sβ; cuiusque Eμ Mo Pυ; vel cuius Rα cuiusvis stelle] *rep.* Fβ; alicuius regionis accipe altitudinem cuiusvis stelle non occidentis in eadem regione Mι cuiusvis ... altiore] *corr. in marg. to* per cuiuslibet stelle fixe [*illeg.*] Qζ stelle] regionis *corr. in marg. to* stelle Oσ; stellarum Lμ Pσ Qθ; *add. que apparet* Qμ; *add. interlin.* fixe Bγ; *add. in marg.* non occidentis in illa regione Pζ altiore] *om.* Eν; declinationem Oβ Qη; *add. meridionala* Kα *add. qui est divc(?) celi* Zα; *add. interlin.* in meridie Bγ eius] *om.* Pq
- 2-3 si ... considera] *marg.* Sβ si ... est] si vero idem per stellas fixas scire placuerit Cδ; et fac ut prius Eλ accipere ... est] *om.* Cζ cuiusvis ... elongacionem] *om.* Bδ
- 2-4 Vel ... regione] Si altitudinem poli scire volueris accipe altitudinem altiore alicuius stelle que stelle [*illeg.*] accidet in illa regione etiam accipe Cα altiore ... stelle] *om.* Dη

¹ Most mss treat this as a continuation, without a break, of the previous chapter.

[CHAPTER 22.] CHAPTER ON THE SAME, BUT DIFFERENT

Or if you wish to take the higher altitude of any star,

elongacionem ab equinoctiali linea considera, cum qua fac ut supra dictum est.
 Quere quoque cuiusvis stelle non occidentis in eadem regione altitudinem altiorem et

- 3 elongacionem] longacionem Wβ; longitudinem Pv; longitudinem *corr. to* elongationem Tδ; *add.* altiorem Lμ; *add. interlin.* ponendo eam in linea meridiei Bγ ab equinoctiali] ab equinoctiali Oι; equinoctialem Mv; ab orientali Mτ linea] *interlin.* Kθ linea ... qua] *om.* Mv; et Pι considera] *om.* Bθ Eλ Eο Eυ Eμ Lζ Lμ Mγ Oβ Pτ Qμ Vπ Wλ Zα; *interlin.* Sκ; *rep.* Lγ considera ... qua] *om.* Bη Bι Bκ Dγ Eα Eδ Kε Kι Mα Mo Mτ Nα Oφ(*add. interlin.* cum qua) Pσ Pv Pφ Qζ Qη Sη Sθ Sι Sλ Vα Vβ Vγ Vρ Vυ Vφ; *add. in marg.* Eζ(*later hand*) considera ... est] fac vel predictum est *corr. in marg. to* fac sicut predictum est supra Oσ cum qua] *interlin.* Qμ; et Eρ Pζ Qε Rα Sβ; *add.* et Qδ; *add. in marg. 10-line gloss* Bγ cum ... est] fac sicut predictam est Lζ Ov fac] facit Bβ; fiat Pβ; *add. interlin.* cum illa Vφ ut] *rep.* Kθ; quod Lκ; sicut Bκ Kε Kι Mι Nγ Qζ Qη supra] *om.* Eμ Kι Lμ Mτ Pσ Pφ Qζ Qθ; prius Bβ Bδ Bε Cγ Cε Eβ Eη Fα Fβ Fζ Kα Lβ Lγ Lε Lη Lκ Mδ Mη Mι Mτ Mυ Mφ Nγ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pρ Qβ Qγ Qi Qλ Sδ Sκ Tδ Vι Dδ Wα Wμ Xδ Zα; superius Kδ; *add.* ut Eδ dictum] predictum Bη Bκ Kε Kι Mτ Qζ dictum est] *om.* Lλ Mα Pζ Qε Sβ Sθ Vγ; *add.* prius Kθ; *add. in marg.* que est declinatio ipsius stelle Sκ; *ms* Qi *ends*
- 4 Quere] Si autem [*illeg.*] vise scire, quere Zα Quere quoque] Item quere Eγ Lλ Mα Pζ Qε Sβ Sθ Vγ; Que Mτ; Quereris Cη; *add. interlin.* Vel Eμ; Vel quere Bγ Bζ Bθ Bκ Cη Eκ Eλ Eτ Eυ Lζ Mγ Oβ Ov Pγ Qη Qμ(*add.* quoque) Rγ Vν Vξ Vπ Vτ Wβ Wι; *corr. to* ^{vel} quere Eζ; *add. in marg.* 4^a regula Dδ Quere ... cuiusvis] Quere cuiusvis *corr. in marg. to* Quere quoque cuiusvis Oσ quoque] *om.* Bη Cδ Cζ Eμ Kα Kε Kι Pι Qζ Sι Sλ Vα Zα; *marg.* Oφ cuiusvis] alicuius Mo; cuius Cζ Cη; cuiuslibet Kε Kι Lλ Mα Mτ Pζ Qε Qζ Sβ Sθ Vγ Vν; cuiuscumque Oφ Sι Sλ; cuiusque Bζ Bκ Eο Lζ Mγ Pv Pφ Vα Vβ(*add. interlin.* al' cuiuslibet) stelle] *add.* gradus polum Mτ Qζ non] in Dγ; numquam Kα occidentis] orientalis *corr. to* occidentalis Sλ; *add.* scilicet super apparentis Kε Kι; *add.* sed semper apparentis Mτ Qζ in ... regione] *om.* Dη eadem] illa Sλ regione] *om.* Pι; *add.* in puncto opposito(?) Qζ altitudinem] *add.* in linea meridiei Oγ; *add.* scilicet Dη et] ut altitudinem maioris arte super polum et eius depressioni super polo quere altitudinem eius Qμ
- 4-5 altiorem et inferiorem] maiorem et minorem Eλ

examine its elongation from the celestial equator, and do with it as was said above. And seek out the higher and lower altitude of any star which does not set in the same region [i.e., never dips below the horizon]

5 inferiorem, et utriusque collecte simul tolle medietatem, que est altitudo poli in eadem regione.

- 5 inferiorem] *om.* Ζα(*add.* 2.5 lines); *add.* sui circuli quem facit die et nocte Μτ Qζ; *add.* altitudinem conversa aliorum et inferiorem eius altitudinem altiorem scilicet altitudinem versas a^{orum} et inferiorem eius altitudinem Οβ et] *add.* quere Βκ Λζ utriusque] *add.* altitudinis Cδ Ογ Qμ collecte] *om.* St; colere Να; collecto collecto Μι Νγ simul] in simul / insimul Ββ Βγ Cδ Cη Cι Dγ Eδ Eκ Eμ Eρ Eτ Γα Κθ Λλ Μη Μν Οσ Pγ Pδ Pζ Pι Pυ Sη Qδ Qε Qμ Rα Sβ Sθ Sι Sκ Sλ Vα Vβ Vγ Vφ Vψ Wβ Wι; insibilis Να Pτ; in simili Vυ; in similis Wλ; similis Cγ tolle] *om.* Βκ Λζ Μτ; accipe Eγ; collecte Wβ(*and deleted*) tolle medietatem] *interlin.* Kε que ... poli] *om.* Eδ est] *om.* Qλ; erit Eμ Lγ Pζ Qε Sθ; *add.* ibi Ογ; *add.* vel erit Βη altitudo] elevatio Κα; latitudo Μτ Οβ Qζ; *add. and del.* regioni Lγ poli] *om.* Βι Βθ Dγ Eζ Eρ Eυ Kε Κι Μτ Pι Vπ; *interlin.* Vφ
- 5-6 in ... regione] *om.* Ογ
- 6 regione] *add.* et est eadem cum(in Eυ) latitudine(longitudine Vπ) regionis Βκ Βθ Eλ Eυ Lζ(*marg.*) Ον Vπ Vτ Vφ; *add.* que est eius latitudo regionis Cδ

and take the mean of both collected at the same time, and this is the altitude of the pole in the same region.

[Comment:

Or you can take the highest altitude of a star, calculating its distance from the equatorial circle as noted before. Measure its highest and lowest declinations on the same day twelve hours apart, and the average of the two will be the altitude of the pole above the horizon at that location (and therefore the latitude of the region, as indicated in Cap. 21).]

[CAPITULUM 23.] DE NOTICIA TABULE ALMUCANTHARAT

Cap. 23] *om.* Bη Bι Bκ Cγ Cδ Cζ Dγ Eα Eγ Eζ Eκ Eμ Λλ Mα Oη Oσ Pζ Pτ Qε Rα Sβ Sθ Si Sλ Vα Vγ Vq Vv; *bottom marg.* Lζ Po Qμ

- 1 De ... almucanthat] *om.* Bγ Bδ Bε Bζ Cε Dδ Eλ Eν Gα Kε Kθ Kι Lκ Mτ Nα Oβ Ov Pγ Pι Pξ Po Pσ Pφ Qζ Qη Qμ Vν Vτ Vφ Wλ; *faded/illeg.* Eδ Eρ; Ad cognoscendam cuius regionis sit tabula Sη; Ad quam latitudinem facta sit alm~ Vξ; Ad quam latitudinem facta sit tabula almu~ Vι Wβ; Ad quam latitudinem facta sit tabula alm~ augeti'/iugeti' Mν; Ad quam latitudinem facta sit tabula alm~ facta Mν; Ad quam latitudinem facta sit tabula astrolabii Lζ; Ad quam latitudinem tabula sit facta Eo Eτ Wι; Ad quam regionem facta sit tabula Mπ; Ad quam regionem facta sit tabula alm~ Qθ; Ad sciendum cuius latitudinis sit tabula Mλ; Cognitio cuius regionis sit tabula latitudinis Oφ; Cap.^m 23^m Cuius regionis sit tabula Qδ; De inventione cenith latitudinis per alm~ Vψ; De noticia ad quam latitudinem facta sit tabula alm~ Vβ; De rotulis matris ipsorum alm~ Zα; Dicitur ad quam regionem vel latitudinem facta sit tabula alm~ Lμ; Si vis scire ad quam altitudinem sit facta tabula alm~ Bβ; Si volueris scire ad quam latitudinem tabule sit facta Mγ; *add. in marg.* 25 Wα; *add. in marg.* c. 26 Sδ; *add. in marg.* 22^m Vφ tabule] *om.* Cα almucanthat] *cut off* Fβ; almicanterath Cα; almicantharatz Dη; almicantralis Bβ; almicantrat Kα; almu Wα; almucant' Fζ Lη; almucantarath Oξ Qβ; almucantarath Eη Kδ Lβ Lγ Mδ Oγ Oι Vβ; almucantat Cη; almucanth' Fα Mη Oζ Pδ Pθ; almucanthat Cι; almucanthatrach Pρ; almucanthat Bθ Dη Fβ Mν Ov Pμ Sδ Sκ Vι Vπ; almucanthatrach Eβ Mo Oτ Pα Pν Pυ Qγ Qλ Tδ Vξ Wβ Wμ; almucanthdrath Mφ; almu^{at} Lμ; almuchacarath Xδ; almuchantarath Vψ; almuchant'at Lε; almu^{rat} Qθ; almuscantarach Pβ; almutanterach Mι Nγ; almutantherat Mν; *add.* Rubrica Bθ Pθ Vπ

[CHAPTER 23.] ON THE LABELING OF A PLATE WITH ALMUCANTARS

Si vis scire ad quam regionem vel latitudinem facta sit tabula almucanthatat,

- 2 Si vis] Ni vis EQ; Si velis Mo Pv Qη Sη Vβ; Sive Eδ ad quam] *rep.* Ov
 regionem] altitudinem Wλ regionem vel] *om.* Bβ Bγ Bζ Bθ Dη Eδ Eλ Eο Eτ Ev
 Gα Kθ Lζ Mγ Mλ Mv Mo Nα Oβ Ov Pγ Pι Pμ Po Pv Qδ Qμ Rγ Sη Vβ(*add. interlin. al'*
 regionem) Vv Vξ Vπ Vτ Vφ Wβ Wι regionem vel latitudinem] *om.* Qη vel] *om.*
 Kε Kι Qζ vel latitudinem] *om.* Mτ Wλ latitudinem] altitudine Pβ; regionis Mτ
 sit] est Bθ Ev Pφ Rγ Sη Vv; *add. in Cι tabula] om. Bζ Cα; tabulam Qη; add.*
 astrolabii Zα almucantarath] *om.* Kε Kι Mτ Qη; *illeg. Pι; corr. from* almucantarathilis
 Vβ; almcanth Cι; almi^{at} Qζ; almic' Cε; almicantarath Zα; almicantarath Pσ; almicantarathil'
 Po; almicanterath Cα; almicanth Bζ; almicanthar' Dη; almicanthatat Eδ; almicanthat Kα;
 almicantrialis Wλ; almicatharalis Bβ; almicanthatat Mγ; almicanthar' Lκ; almicanthatat
 Kδ; almi^{rach} Gα; almuc' Eβ Mπ; almucanthatat Qθ; almucanthar' Fα Fζ Lβ Lγ Lε Lη Lμ Oξ Ov
 Pθ; almucanthar' a Qλ Wα; almucanthatat Bδ Eη; almucanthatat Rγ; almucanthatat Bθ Eλ Mδ
 Oγ Oι Pξ Pφ Qμ Sδ; almucanthatatilis Sη Vv; almucanthatth Tδ; almicanthatat Nα Oφ;
 almicanthatatilis Qδ; almicanthar' Oζ Pγ Pδ Wι; almicanthar'al' Bγ; almicanthatat' Cη;
 almicanthatat Pφ; almicanthatatilis Mλ; almicanthatat Eτ Oτ Sκ; almicanthatatiles
 Ov; almicanthatatilis Kθ Mo; almicanthatat Eφ Ev Fβ Mv Pα Pμ Pv Qβ Vξ Vπ Wβ
 Wμ; almicanthatatilis Pv; almicanthatat Mφ; almicanthar' th Vι; almicanthatat Vτ;
 almucanthar' Lζ; almucanthar' Xδ; almucanthar' Eο; almucantharath Vψ; almu^{ra} Pι; almuscanthatat
 Pβ; almu' Dδ Mη Oβ; almu^{tac} Qγ; almutanthatat' Mv; almutanthatat Mι Nγ; almuth Bε;
 almutanthatat Vφ; almutanthatat Cγ; *add. ālis Mγ*

If you wish to know for which region or latitude a plate with almucantars has been made,

vide in linea meridiana quot almucanthatat sint a circulo equinoctiali usque ad cenith,

- 3 vide ... almucanthatat] *margin.* Fζ; *reper.* Cε in linea] aliam lineam Xδ; aliam lineam lineam Pv in ... meridiana] *om.* Bζ Bθ Eδ Eλ Eο Eρ Eυ Gα Kε Kι Lζ Mγ Mλ Mν Mo Mτ Ov Pι Pο Pυ Qδ Qζ Qη Qμ Vν Vπ Vτ; *margin.* Vφ meridiana] meridionali Bβ Oφ Pφ; *add. interlin.* id est medii celi Wβ quot] quod Bδ Eδ Kε Lκ Qη Sκ Vπ Vτ almucanthatat] almi^{at} Kι; almicancrath Mτ; almi^{at} Qζ; almi^{ath} Kε; almi^{rat} Eδ; almi^{that} Wλ; almicantarach Kδ; almicantarath Z; almicantarath Pο Pσ; almicanterath Cα; almicanthá Bε; almicanthar' Dη; almicanthat Kα; almichanch't Mγ; almichant' Lκ; alm^{rat} Gα; almuc' Cε Mπ; almucant' Fα Fζ Lβ Lμ Oζ Qθ; almucantarach Bδ Qγ Sη; almucantarach Rγ; almucantarath Eλ Lγ Mδ Oγ Oι Pξ Pφ Qδ Qμ Vβ Vν; almucanterath Nα Oφ; almucanth' Cι Eβ Lη Pγ Wι Wμ; almucanthā Mλ; almucanthatrach Bβ Eρ Pρ Wβ; almucanthatrach Bγ Eτ Mυ Ov Oξ Oτ Pα Pδ Pθ Pμ Pν Pυ Qβ Qλ Sδ Tδ Vξ Vπ; almucanthāth Cη; almucanthdrath Mφ; almucanth'th Vι; almucantrach Eη; almucant'ath Ov; almucantrath Vτ; almuchancarach Xδ; almuchantarach Bθ; almuchantarath Fβ Vψ; almuchanth'a Eο; almuchanthatrach Lε Mo Sκ; almuc^{rat} Lζ; almu^{rat} Pι; almuscantarach Pβ; almut' Dδ Oβ; almutantarach Mν; almutanterach Mι Nγ; almutanthatrach Vφ; almuth Bε; almuth Kθ; almuthanthatrach Mη; almutharath Wα; almutrantac Cγ; alentabuth Qη sint] *om.* Kα; sit Bβ Mτ; *add.* a linea seu Cα; *add.* supra Qζ sint a circulo] super angulo Vφ a] *om.* Cα Kθ Lβ; ab Mδ; in Eδ Pρ; in *corr.* to a Bζ; sumpta a Kι Qη; super Kε Mτ circulo] linea Bδ Lκ Pξ circulo equinoctiali] linea circuli equinoctialis equinoctiali] equinoxiali Bε Lμ Oι Vξ; septentrionalis *expunged* Mλ usque ad] ad Lζ Mτ; usque a Wι cenith] ceneth Gα; cenit Bζ Kα Lμ Wλ; ζenith Qδ; zenit Eγ; zenith Bε Kε Lκ Pσ Vφ; *add.* in linea meridiei Lζ

see how many almucantars there are from the celestial equator to the zenith along the meridian line,

5 vel ab axe ad orientem in septentrione; et super tantam latitudinem facta est tabula.
Altitudo vero Arietis est tot graduum quot fuerint ab eodem circulo ad orientem, vel a

- 4 ab] *om* Dδ Oβ; ad Lκ Ov axe] asse Mι Nγ; axi Oβ; *add.* in centro astolabii Zα; *add.* versus circulum Cancrī Qη Wλ ad] in Ov; usque ad *many* {Bδ Bε Cα Cε Cι Dδ Dη Eβ Eλ Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Lκ Lμ Mδ Mι Mο Mν Mφ Oγ Oζ Oξ Oυ Pβ Pμ Pν Pξ Pρ Pσ Pφ Qθ Qλ Sβ Sκ Tδ Vβ Mη Nγ Oι Oτ Oφ Pα Qβ Qγ Vι Vψ Wα Wμ Xδ Zα}; *add.* *interlin.* usque Bγ ad ... septentrionale] versus circulum Cancrī ad Capricornum Eο; versus circulum Cancrī ad septentrionale Bζ Bθ Eρ Eυ Gα Kε Kι Mγ Mλ Mτ Oβ(*om.* ad) Pι Qζ Qμ Vπ Vτ(*add.* usque ad orientem ab liqe(?)) Vφ orientem] orientem Bβ; orientem Cε Lβ Nα in septentrione] *om.* Mι Nγ Qη septentrione] linea medie noctis Lζ; orientem Lμ; septentrionem Bβ Mγ; *ouc(?) corr. in marg.* to septentrione Sκ; *add.* in [*illeg.*] parte Kα; *add.* quidam est Pι et] *add.* habebis Kε Kι Mτ Qζ Qη et ... tantam] *om.* Eλ et ... tabula] *om.* Bδ tantam] *om.* Lγ; datam Vτ; illam Cζ Mη Pα; quam Mτ Pι Qη; quantam Eρ Gα Kε Kι Qζ Vφ; totam Cα; *add.* illam Pξ latitudinem] altitudinem Bζ Bθ Oγ Pρ Vπ est] *add.* hec Dη; *add.* ille Oυ; *add.* illa Bε Cε Dδ Eη Fα Fζ Kα Kδ Lβ Lη Mδ Mη Mι Mν Mφ Nγ Oγ Oξ Oτ Oυ Pα Pβ Pδ Pθ Pμ Pν Pξ Pφ Qγ Qθ Sδ Vι Vψ Zα; *add.* in Cι tabula] almucantherath Vξ; regula Nα; *add.* id est quod grad~ sint in alantabuth tot est latitudo ad quam facta est Qη; *add.* id est quot graduum super almucantherach(almi^{ch} Kε; almi^{at} Kι) tot est latitudo ad quam facta latitudo Eρ Gα Kε Kι; *add.* id est quot sint gradus almi^{at} tot est latitudo ad quam facta Qζ; *add.* id est quot ga almutantherat tot est latitudo ad quam facta est Vφ; *add.* *illeg.* Pι
- 5 vero] autem Bε Arietis] *add.* et Libre Pι est] *add.* *interlin.* tantum Bγ est tot] ostentur(?) Nα tot] *om.* Lμ Qθ; quot Rγ quot] *om.* Qη; quod Bδ Gα Mν fuerint] *om.* Eβ; sunt Bε Cε Eη Lβ Lκ Pφ Wα; *add.* *interlin.* sunt Vβ eodem] *add.* *interlin.* scilicet Arietis Bγ; *add.* *marg.* scilicet equali Kδ circulo] circulusque Pυ; *add.* almucantherath Oν; *add.* equinoctiali Lκ; *add.* equinoctialis que Qδ; *add.* scilicet equinoctiali Vτ; *add.* *interlin.* scilicet equinoctiali Qμ ad] usque ad Bβ Eδ Eλ Eυ Gα Kθ Mν Mο Nα Oν Qδ Qη Sη Vβ Vπ Vτ Vφ Wλ; *add.* *interlin.* usque Bγ orientem] orientem Bβ Bδ Lβ; orientem almucantherath Eλ Vτ(almucantherath) Vφ(almucantherath); orientem Cε Fζ Lη Mπ Pα Pμ Pρ Pφ Wμ; orientem Oφ(*add.* *interlin.* al' orientem) Sδ(*add.* *in marg.* orientem); *add.* *interlin.* al' orientem Vβ a] *om.* Bε Eη Qθ; ad Fβ Lβ Mη Nα Oβ Pα Sη
- 5-6 est ... axem] computata per almutantherach(*add.* sint a linea circuli Nγ) ab oriente usque ad circulum equinoctial' cum tot graduum quot sint ab eodem circulo ab oriente vel a cenich ad assem. Unde nota quod omnis regio habet latitudinem preterin regione qui est directe sub equinoctiali Mι Nγ ad ... axem] equinoctiali usque ad primum almu^{rat} orientale Pι; id est equinoctiali Eο; scilicet equinoctiali Bζ; usque ad orientale almichanch' Mγ / almucantherach Eρ / almucantherath Vν; vel almr^{rat} Gα; equinoctiali usque ad orientem almith Kε/almi^{ath} Kι/almucantherath Mτ vel ... axem] alantabuth etc. Qη

or from the axis to the horizon in the north; and the plate is made for such a latitude. Indeed the altitude [of the beginning] of Aries is as many degrees as are from the same circle to the horizon, or from

cenith ad axem.

- 6 cenith] cenit Kα Lμ Pφ Wι Wλ; ζenith Bδ Qδ; cenic Fζ; cen^t Lη; chenith Mπ; zenit Cγ;
 zenith Bε Lκ Pσ; zinnith Qβ; *add.* capitum Mo Nα Sη Vβ; *add.* que est esiduum factus(?)
 Cε; *add.* regionis Kα ad] usque ad Mη Vφ Wλ; vel Sη; *add.* *interlin.* usque Bγ
 ad axem] *om.* Qθ axem] *add.* id Bβ; *add.* Nota: axis est polus vel equus in
 media astrolabio Kα

the zenith to the axis.

[Comment:

To find which latitude a plate has been engraved, examine the number of almucantars counting along the meridian line from the zenith southwards (i.e., towards the top of the astrolabe) to the equatorial circle. (“Counting” means the number of engraved almucantars multiplied by the number of degrees between them.)

Similarly, the latitude would be the distance of the axis of the astrolabe north to the horizon; in other words, the almucantar on which the axis is set.

The “altitude of the beginning of Aries” is the altitude (to an observer at the latitude of the plate) of the intersection of the ecliptic and the equatorial circle which on an astrolabe is the complement of the latitude, and therefore the distance of the horizon to the equatorial circle or the zenith to the axis.]

[CAPITULUM 24.] DE HORA HABENDA PER TABULAS LATITUDINIS

Cap. 24] *om.* Cα

- 1 De ... latitudinis] *om.* Bγ Bδ Bε Bζ Bκ Cγ Cδ Cε Dδ Dη Eα Eγ Eκ Eλ Eν Gα Kε Kι Mα Mτ Nα Nγ Oβ Ov Oσ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Rγ Sη Sθ Sι Sλ Vα Vν Vτ Vυ Wλ; *faded/illeg.* Eδ Eρ Lλ Mι; Ad inveniendum altitudinem regionis non scripte in astrolabio Qθ; Ad inveniendum horas altitudinis alicuius(?) regionis cuius latitudo ipsis tabulis astrolabii est descripta Lμ; Ad inveniendum horas in ima regione per tabulas alterius regionis Mλ; Ad quam latitudinem facta sit tabula almucantha't Vι; Cum in aliqua inventio hore in regione aliqua Wι; De apparī scias per unam tabulam hore alicuius Eο Vξ; Cap.^m 29^m De horis regionis carentis tabula Qδ; De inventionē horarum per astrolabii [*illeg.*] non habere tabula Zα; De inventionē hore et aliorum in regione per tabula(!) proximorum regionum Mν; De [inven]tione tabula almucantharath Mφ; De opere astrolabium in descriptam Pζ(*marg.*); De opere astrolabii non ibi descripta regione Vγ; De opere astrolabii, non ibi descripta regione. De inventionē hore, per non tabulam regionis Vβ(*add. interlin. vel latitudinis; add. in marg.* Hic subponit quod sciamus omnes latitudines non tamen horas quod bene est possibile. Et ita nota sunt tria, per que 4 invenientur.); Hoc latitudinis regionis Mπ; Inveniēdo horarum in regione carente tabula latitudinis in astrolabio Bι(*add. in marg. c 21^m*); Inveniēdo hore in aliqua regione per non suam tabulam Dγ Oφ; Inventio horarum in regione cuius latitudo [*illeg.*] astrolabii minime est descripta Vρ; Inventio horarum per astrolabii [*cut off*] Eτ; Inventio horarum per astrolabii tabulas regionis alterius Lζ(*marg.*); Inventio hore et aliorum in regione per tabulam proximorum regionum Mν Wβ; Inventio hore in aliqua regione per non suam tabulam Rα; Cap. 22. Inventio hore in maiore regione per non sua tabulam Sβ(*marg.*); Inventio hore in regione aliqua in non sua tabula Kθ Po Qμ; Inventio hore in regione aliqua per 2 tabulis regionum Pτ; Quando in regione cuius latitudinis tabula non habetur per alias tabulas poteris invenire Cζ; Quando in regione cuius latitudinis tabula non habetur quod alias tabulas astrolabii hore ipsius inveniendum Bη(*add. in marg. 19*); Qui in regione latitudinem tabula non habetur et per alias tabulas astrolabium horis ipsius inveniantur Oη; Quo modo in regione cuius latitudinis tabula non habetur per alias tabulas astrolabii hore ipsius inveniantur Eμ(*add. in marg. 19^{us}*); Si per aliquem(?) astro[lab]ium vis scire horas Bβ; Ut operari scias per unam tabulam loco alterius Mγ; *add. Rubrica/Rx Cη Mo Pμ; add. in marg. 23^m Vφ; add. in marg. 26 Wα; add. in marg. 27^{us} Qζ add. in marg. C. 27 Sδ*
 hora habenda] horis inveniendis Cη habenda] habendis Mo tabulas]
 tabulam Mη Pδ Pυ Vψ; ·t· Sκ latitudinis] *add.* que non est in astrolabio Lκ

[CHAPTER 24.] ON FINDING THE TIME BY THE LATITUDE PLATES

Cum in aliqua regione, cuius latitudo in tabulis astrolabii non fuerit descripta, volueris invenire per illud astrolabium horas, illius regionis latitudinis et latitudinis

- 2 Cum] Quando Qθ; *add.* autem Bκ Dη; Sciendo Lμ in ... astrolabii] *om.* Eλ aliqua] aliquo *some*; qualibet Bζ Bθ Eλ Eο Eυ Mλ Vν Vπ Vτ cuius] *om.* Pν Xδ latitudo] longitudo Pϑ; *add.* cum horis Kι Mτ Oβ Qζ Qη; *add. in marg.* et cum horis Kε in ... astrolabii] tractabunt astrologi Sθ tabulis] tabellis Eγ Mα astrolabii] *om.* Bη Cζ Mγ Mλ Vτ; abstrolabii Pα; astrologia *corr. to* astrolabii Wα non] *om.* Eζ Eβ fuerit] est Cγ Eβ Fα Fβ Fζ Lβ Lγ Lε Lκ Lη Lμ Mδ Mη Mι Mπ Mν Mφ Nγ Oγ(*interlin.*) Oζ Oι Oξ Oτ Oυ Pα Pθ Pμ Qβ Qγ Vι Vψ Wα Wμ; sit Dη Sι descripta] *om.* Eυ; depicta Eκ; despecta Vτ; inscripta Mτ; non scripta Tδ; scripta Bθ Dη Mν Mφ Qη Vι Vπ
- 2-3 non ... astrolabium] *om.* Cε
- 3 volueris] vis *some*; voluimus Eδ invenire] *add. interlin.* scire scilicet Bγ illud] idem Lλ Mα Pζ Pι; istud Lκ Vα Vξ; *add. interlin.* al' idem Vβ astrolabium] abstrolabium Pα; *add.* illius regionis Eγ; *add.* supra quod non habes tabulam Nα horas] hora Mτ illius] *om.* Mπ; altitudinis illius Lμ; eius Oβ; illius cām Bζ; istius Qη illius ... latitudinis,] *om.* Fβ; illius regionis latitudinis illius regionis Kθ *marg.* Oυ regionis] *om.* Vν; *add.* et regionis Oν; *add. interlin.* id est latitudinis Kι regionis latitudinis] *illeg.* Lμ; regionis Kι(*add. interlin.* id est latitudinis) latitudinis,] *om.* Bζ Eα Eδ Kε Kι Lγ Mο Mτ Oη Pγ Sι Vα; altitudinis Bβ Oζ Pϑ Pφ Qζ(*interlin.*; *add. in marg.* latitudinis) Qθ; altitudinis latitudinis Pσ; longitudinis Bη Bθ Bι Dγ Eγ Eκ Eτ Eυ Gα Pζ Pι Pτ Pυ Qδ Vπ Vϑ Vτ Wλ; longitudinis *corr. in marg. to* latitudinis Sκ; longitudinis latitudinis Bβ; *corr. to* longitudinis Eμ; *add.* ad quod non habes latitudinem in tabula astrolabii Oβ; *add.* regionis Kθ; *add.* regionis scilicet Cε; *add. interlin.* scire scilicet Bγ latitudinis,] altitudinis Bβ Oι Pα Pβ Pξ Pϑ Qγ Qθ Sκ Vι Wα; longitudinis Bη Cγ; *add. interlin.* maioris Bγ

When you wish to find the time by an astrolabe in any region whose latitude was not inscribed on the plates of the astrolabe, take note of the difference between the latitude of this region and

- 5 sibi propinquioris minoris ibi descripte nota differentiam. Deinde proportionem illius differentie ad differentiam que est inter minorem latitudinem ibi descriptam et
- 4 sibi] *om.* Cε Kα Kε Kι Mτ Oη Pβ Qζ Qη; scilicet Eδ sibi ... minoris] differentiam altitudinis [*illeg.*] propinquioris maioris astrolabii et minoris Gα; et maioris et minoris Cγ; maioris propinquioris sibi et minoris Cη; maioris sibi propinquioris nota differentia et latitudinis maioris et minoris Kθ Tδ; propinquioris sibi(*add.* minoris Oγ) nota differentiam et latitudinis etiam(*om.* Lμ) maioris et minoris Bδ Bε Eβ Fβ Eη Dη Fα Fζ Kδ Lβ Lγ Lε Lη Lκ Lμ Mδ Mπ Mν Mφ Oγ Oζ Oξ Oτ Oυ Pδ Pθ Pμ Pν Pσ Qβ Qλ Sδ Vι Vψ Wμ Xδ; sibi propinquioris nota differentia regionis minoris *corr. to* latitudinis sibi propinquioris minoris Cδ; sibi propinquiores nota differentiam et latitudinis etiam maioris et minoris Bβ(latitudinem et) Oι Pα Pξ Pρ Qγ Qθ Sκ Wα propinquioris] propioris Pφ Oφ(*add. interlin.* al' propinquioris); *add.* et latitudo in(etiam Nγ) maioris et Mι Nγ; *add.* maioris et Mo Pβ Pι Pτ Vτ Wλ; *add.* regionis Qμ; *add.* super regionis et Nα; *add.* tam maioris quam Zα; *add. interlin.* al' propioris Vβ minoris] *om.* Bζ Mτ; imo Bη; *interlin.* SA ibi] *om.* Dδ; *interlin.* Oξ; id est Pβ; illi Eτ; illius Vτ; sibi Dη Qδ Qε ibi descripte] *om.* Dδ Mι Nα Zα; inde scripte Sθ descripte] descriptam Qθ; despecte Vτ; scripte Mτ; *add.* latitudine Eδ nota] notam Cδ differentiam] *add.* vel latitudinis maiorum et minorum ibi descripta Kα; *add.* et latitudinis maioris et minoris si erit notam differentiam Rγ Deinde] *add.* nota Mν; *add.* vide Gα Pι illius] istius Lλ Mα Oβ Qβ Vβ(*add. interlin.* illius) Vγ; *add.* scilicet latitudinis quesite ad latitudinem minorem Oγ
- 4-5 Deinde ... differentiam] *om.* Cγ Pζ; *marg.* Oφ
- 5 differentie] *add.* 1 line expansion Wλ ad differentiam] *om.* Mo Nα Sη; *interlin.* Vβ; illius Vξ; *add.* scilicet prima ad secundam Dδ que est] *om.* Oυ Qγ est] *om.* Bδ inter] intra Nγ minorem] maiorem Gα; uxorem minorem Cη²; uxorem(*expunged*) minorem Bγ latitudinem] *om.* Kθ; *add.* scilicet propinquiorem Dδ ibi] *om.* Bη Bζ Bι Bκ Cδ Cζ Dγ Eγ Eρ Eυ Gα Kε Kι Eμ Lλ Mα Mγ Mλ Mτ Oη Oσ Pι Pξ Pρ Pφ Qε Qζ Rα Sθ St Sλ Vα Vγ Vπ Vρ Vτ Vυ Vφ; *interlin.* Vβ; et Bθ Cε; in tabula Eλ Vv ibi descriptam] *om.* Lζ descriptam] *del.* Vφ; *add. interlin.* in tabula Oφ
- 5-6 descriptam et maiorem] maiorem discriptam in tabula Bζ Bθ Eo Mγ Mλ Vπ

² Skeat (*Treatise on the Astrolabe* [1872], p. 105 – note to line 247): “The scribe seems to have been thinking of something else besides his work”!

of the lesser latitude [of a plate which is] engraved there closer to it. Then commit to memory the proportion of that difference to the difference which is between the lesser latitude [of the plate] engraved there and

maiolem, inter quas videlicet est latitudo regionis illius, memorie commenda. Postea vero accepta solis altitudine in eadem regione, quere horas per latitudinem minorem, et

- 6 maiolem] ibidem scriptam et notam Kα; minorem Gα; *add.* deinde Eκ; *add.* in tabulam Eν Vτ; *add.* propinquiolem Dδ; *add.* vel Bη; *add. interlin.* descriptam Vφ quas] *add.* latitudines Dδ; *ms.* Vτ *ends* videlicet] *om.* Eλ; *lacuna* Cγ; scilicet Pξ Qμ; videt Sι videlicet ... illius] considera si videlicet est latitudo regionis Fβ est] *interlin.* Oτ est ... illius] altitudo Wλ latitudo] altitudo Dη; longitudo Eλ; *corr. from* altitudo Sι illius] *om.* Bβ Bδ Bε Bι Cγ Cε Cι Dγ Dδ Dη Eβ Eζ Eη Fα Fζ Kα Kδ Kθ Lε Lη Lμ Mδ Mζ Mη Mι Mν Mπ Mυ Mφ Oγ Nγ Oυ Oζ Oξ Oτ Pα Pβ Pν Pξ Pρ Pσ Qβ Qγ Vι Qλ Rα Sδ Sθ Sκ Tδ Vϑ Vφ Vψ Wα; *interlin.* Qμ; et Lκ; in qua fueris Kε(*add. interlin.* illius) Mσ Mτ Nα Pυ Qδ Sη; tunc queris(?) Pι; *add.* cuius horas queris Bθ Bκ Eυ Lζ Oν Vπ Vφ(*marg.*); *add.* in qua fueris Kι Qζ Vβ(*interlin.*); *add. interlin.* cuius vis horas querere Cδ illius ... comenda] illius cuius horas queris Oι(*interlin.*); tue Gα commenda] commendanda Mφ Pρ Pφ Qη commendatur Nγ
- 7 vero] *om.* Eγ Vγ accepta] accipe Mτ; *add. interlin.* secundum ascensionem Sβ solis] *add. and del.* declinatione Vφ altitudine] altitudinem Mτ Oτ; latitudine Mυ Vι regione] *om.* Oβ; *add.* in que es(!) Qμ quere] que Mα Vβ; queras Bκ Kε Mτ Qζ horas] *add. interlin.* per 4 canone³ Sβ latitudinem] altitudinem Lμ Pβ Vα; latitudines Sι; *corr. from* altitudinem Oγ minorem] maiolem Gα; minoris Sι; *add.* que scilicet sit inter tabulas Mι
- 7-8 minorem ... latitudinem₂] *om.* Wα et ... maiolem] *om.* Lλ Pφ Vγ; *marg.* Oφ

³ If this is a reference to the *Practica*, it should more likely be to Cap. 3 rather than Cap. 4. The capitula in ms Sβ are not numbered and this reference seems to have been added by a later hand.

and the greater, between which is clearly the latitude of this region. Afterwards having taken the altitude of the sun in that region, ascertain the hours [i.e., the time] by the lesser latitude, and

10 similiter per latitudinem maiorem, et harum horarum diversarum differentie tolle partem secundum proportionem differentie superius sumptam; quam partem addes horis minoris latitudinis, si fuerint pauciores horis maioris latitudinis, vel subtrahes ab

- 8 similiter] *om.* Bζ Eo Mγ Zα similiter per] *om.* Mλ latitudinem₂] altitudinem Pβ Sβ maiorem] *add.* minorem Pι et harum] *om.* Cγ Lκ Pβ Sκ Vα; *illeg.* Gα harum] *om.* Mη Vξ; illarum Oσ Vυ; istarum Bγ Cζ Eϑ Lλ Mα Oβ Oη Pζ Pι Qε Qη Rα Sθ Vγ Vφ; istarum relinquarum Eo Qμ; reli(n)quarum Bθ Bι Bκ Cδ Dγ(?) Eυ Lζ Mγ Oφ Pφ Sι Sλ Vν Vπ Vϑ; utrarum Sβ; *add. interlin.* istarum Vβ; *add. in marg.* reliquarum Vφ harum horarum] relinquarum Bζ diversarum] *om.* Gα Eϑ Pι Rγ; *marg.* Sβ; et quantum(quantitate Pι; quantitatum(!) Vφ) earum quas invenies per canonem 7⁴ vel per almuri diversarum horarum Eϑ Pι Vφ; *add.* et quantum earum quas invenies per canonem sept^{em} vel per almuri diversarum horarum Kα diversarum differentie] quantitatem earum(*om.* Mτ) quas invenies per canonem 7^m per almuri diversarum horarum de que differentia Kι Mτ Qζ Qη; *del. and add. in marg.* quantitatem earum quas invenies per canonem 7^m vel per almuri diversarum horarum differentie Kε differentie₁] *om.* Cε; *interlin.* Qλ; *lacuna* Cγ; de Mν; differentiarum Cγ Dη Fα Lβ Lγ Lμ Mφ tolle] quantitatem quos inveniens per 7^{um} canonem per almuri de que differentie Oβ
- 9 partem] *om.* Vυ; *marg.* Oσ; *add.* proportionalem Bβ Bγ Cη Eκ Eτ Kε Kι Mτ Oβ Ov Pγ Qζ Rγ Vξ Wβ Wι secundum] *interlin.* Qγ; *add.* quod Nα secundum proportionem] *om.* Cι Ov differentie₂] *illeg.* Nα; differentiarum Cγ Dη Pβ Xδ superius] *corr. from* superioris Rα; prius Bε Kα Vξ superius sumptam] tunc [*illeg.*] et minorem ad differentiam maiorem et minorum Oβ sumptam] *interlin.* Qζ; differentiarum Xδ; positarum vel sumptarum Dη; scriptam Kα; scripte Mτ; sumptarum Cγ Fα Lβ Lγ Mδ Mφ Nγ Oζ Oι Oτ Pβ Pδ Pν; sumpte Oη quam] quot Lκ partem] partes Bζ addes] addas Bη Mυ; adde Mτ; addis Cε; reddas Nα
- 10 horis₁] *om.* Bθ Lκ Vπ; *interlin.* Eκ; hore Bκ Sλ horis minoris] horum minorem Kα minoris] *corr. from* maioris Lζ latitudinis₁] *illeg.* Nα; altitudinis Eδ; *add.* vel subtrahes ab eisdem Qθ si ... latitudinis₂] *om.* Eα Eλ Mγ Mλ Nα Pζ Pι Pφ Sι Vυ; *interlin.* Eκ(si] scilicet) pauciores] minores Kε Kι Mτ; *corr. from* plures Qθ horis₂] *om.* Gα Wλ; hore Kδ maioris] aoris Kα latitudinis₂] *om.* Bη Cζ Eμ subtrahes] *om.* Bη; subtrahas Oη; subtrahe Mτ ab] *om.* Sη; ad Vπ; *add.* ipsis Pν
- 10-11 si ... eisdem] *om.* Mν pauciores ... fuerit] *om.* Eυ

⁴ These references in various mss to the “7th canon” do match up with the contents of Cap. 7 of the *Practica*.

similarly at the latitude of the greater, and of the difference between these diverse hours [or times] take a [proportional] part according to the proportion of the difference [in latitude]; taken above which part you will add to the hours of the lesser latitude, if they are fewer than the hours of the greater latitude, or you will subtract from

eisdem, si fuerint plures; et que tunc remanserint erunt hore illius regionis. Similiter facies in horis noctis et in aliis operibus.

- 11 eisdem] eadem Mη Pφ; eis Bε Vψ; eiusdem Lκ; istam Kα que tunc] *illeg.* Nα
 tunc] *om.* Xδ remanserint] *add.* hore Bδ Cγ Cε Cι Dδ Dη Eβ Eη Fα Kα Kδ Lγ Lε
 Lκ Lη Mδ Mη Mι Mπ Mυ Mφ Nγ Oγ Oζ Oι Oτ Oυ Pα Pβ Pδ Pθ Pμ Pν Qβ Qγ Qλ Sδ Tδ
 Vι Vψ Wα Wμ Xδ Zα erunt] *om.* Pφ illius] *om.* Oι; eius Zα regionis] *add.*
 in quo est Bβ
- 12 facies in] *illeg.* Nα in₁] de Kε Kι Mτ Qζ in horis] minoris Mν horis] *om.*
 Bζ noctis] *add.* per stellas Cδ et ... operibus] *om.* Kε Kι; *marg.* Qζ; a mays a
 peribus Kα(?); et cetera RΥ et in₂] vel Pφ in₂] *om.* Eκ operibus] *om.* Bκ;
illeg. Wα; operationibus Dη Lγ Lη Mδ Mη Nγ Oβ Oγ Oι Pβ Pδ Pθ Pξ Pρ Qβ Qγ Qη Qθ Sδ
 Sκ Tδ Vι Vψ Wμ Zα; operficionibus Mφ; operonibus Lβ Oτ Pα; *add.* ascendente et in arcu
 diei Qμ; *add.* et in ascendente et in arcu diei Oφ(*add. in marg.* et in ascensionibus) Pη; *add.*
 in ascendente arcus diei Eν Pτ(arcu); *add.* in ascendente et in arcu diei Bζ Eο Vν; *add.* in
 ascendente et in ortu diei Mγ; *add.* in ascendente in arcu die Bθ Eλ Vπ Wλ; *add.* ut in
 ascendente et arcu diei Eμ; *add.* ut in ascendente et in arcu diei Bη Oη Sι; *add.* ut in
 ascensionibus et in arcu diei et cetera Mλ; *add.* ut in ascendente in arcu diei Cζ; *add.* vero
 in scientia arcus diei vel noctis acci^{do} proportion' et in scientia altitudinis medii diei
 suñdo proportionalr~ secundum quod dictum est Cδ(?); *add. 8-line gloss* Cζ

the same, if they are more; and what then remains will be the hours of this region. Similarly you will do this for the hours of the night and in other calculations.

[Comment:

If you do not have a plate for your astrolabe which matches your latitude and you still wish to know the time, take the plate for the next greater latitude and the plate for the next lesser latitude. Note the proportional differences between the latitudes of these two plates and your own latitude.

Next measure the altitude of the sun and calculate the time using both (the greater and lesser latitudes) plates. Then divide the difference between these times according to the proportions calculated for the latitudes, and this will be the time at your latitude.]

[CAPITULUM 25.] AD HABENDUM GRADUM SOLIS IGNOTUM

Cap. 25] *om.* Bε

- 1 Ad ... ignotum] *om.* Bγ Bδ Bε Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Kι Lκ Mα Mτ Nα Oβ Oν Oσ Pγ Pζ Pι Pξ Pσ Pφ Qε Qζ Qη Qθ Rγ Sθ Si Sλ Vα Vν Vυ Vφ Wλ; *faded/illeg.* Eδ Eζ Eϑ; Ad habendum gradum solis quolibet die per alh~ Lμ; Ad inveniendum gradum solis per alh~ Dη Mτ; De cognoscione gradus solis ignoti per altitudinem solis in meridiei Bη(*add. in marg.* 20) Cζ Eμ(*marg. and add.* 20^{us}) Oη; De gradu solis ignoto habendo Cη; De gradu solis ignoto per alh~ habendo Mo; De gradu solis per alh~ inveniendo Eτ Mλ Mυ Vι Wβ; De gradu solis inveniendo per alh~ Sη; De inventione gradus solis Vβ; De inventione gradus solis per alh~ rethe Zα; 19. Item de inveniendo gradum solis Lλ; Item de inveniendo gradum solis Vγ; Inventio gradus solis alia arte Mγ; Inventio gradus solis alia arte qua prius dicta Vξ; Inventio gradus solis ignoti alio modo Lζ(*marg.*); Inventio gradus solis per alh~ comucor Po; Inventio gradus solis per alh~ Pτ Qμ Rα Sβ(*marg.*; *add.* C. 23) Vϑ Wι; Inventio gradus solis per alh~ quolibet die anni Dγ Oφ; Inventio gradus solis per alh~ Bι(*add. in marg.* c. 2[*cut off*]; *add. in marg.* Idem docetur in 13 capitulo unum superficie); Inventio graduum solis per alh~ Kθ; Si gradum solis per alh~ vis invenire Bβ; *add.* Capitulum Qβ; *add. in marg.* 24^m Vφ; *add. in marg.* 27 Wα; *add. in marg.* 28^{us} Qζ; *add. in marg.* C. 28 Sδ
- alh~ = alhantabuz] Lμ Mτ Mo Vι; alantabuth Vϑ; alchantabuch Sη; alenkabut Dγ; alhā Bι; alhancabutz Oφ; alhancabuz Pτ; alhantabat Dη; alhantabut Bβ; alhantabuth Po Qμ Sβ; alhanthabuth Mλ Wβ Wι; alhanthabuz Eτ Mυ; alhentabuth Zα; almuthanthath Kθ
- Ad habendum] *rep.* Mη;

[CHAPTER 25.] TO ASCERTAIN THE UNKNOWN DEGREE OF THE SUN [ALONG THE ECLIPTIC]

Cum qualibet die gradum solis per alhantabuz volueris invenire, altitudinem eius in media die considera, quam notabis in almucanthat in meridiana linea; tunc

- 2 Cum] Si Bθ; *add.* autem Bκ; *add.* in Bζ Bι Kδ Vq Cum ... invenire] Si volueris scire gradum solis per alntabuch seu per rete quod idem est Ca qualibet] quamque Kα; quolibet Nγ die] *om.* Fζ Vγ; de Pγ; hore Eδ gradum] *corr. from* graduum Bγ solis] *om.* Mη Pγ; *add.* gradum Vv per] *om.* Nα alhantabuz] *illeg.* Oξ; alanbur Vα; alacanbuth Vq; alancabuch Sη Vv; alancabut Mα Vγ; alancabuth Mλ Oφ Pv Vβ; alancabuz Bκ Cδ Lζ Mγ Oσ Sλ; alanchabuth Eμ; alantabut Bζ Eo Vv; alantabuth Bθ Bι Cζ Ev Pφ Si Vπ; alantabuz Bδ; alanthabuz Xδ; alatabuth Nα; alatabuz Cγ; alcanbuth Eγ; alencabuch Gα; alencabuth Qη Sβ; alentabuth Rα; alenthabuth Vφ; alhancabuch Dδ; alhancabuz Qθ; alhanchabuth Mτ Pτ; alhantab~ Kα; alhantab3 Ou; alhantabor Pq; alhantabū Vψ; alhantabuch Qμ; alhantabur Pv Tδ; alhantabus Pσ; alhantabut Bη Oη Pι; alhantabuth Dη Eα Eδ Eζ Eτ Mv Mo Ov Po Qδ Rγ Vξ; alhantabutz Mφ Vι; alhantabuz Cι Eβ Eη Fα Fβ Kδ Lβ Lγ Lε Fζ Lμ Mδ Mι Mπ Mv Nγ Oγ Oζ Oτ Pα Pβ Pθ Pμ Pξ Qγ Qλ Sδ; alhantab^r Lη; alhanthabuch Kθ Wβ; alhanthabuth Bβ Bγ Cη Wι; alhanthabuz Lκ Pδ; alhentabuth Zα; allancabut Lλ; allancabuz Pζ; allantabud Eκ; allantabuz Qβ Wα; allatabuth Qζ; allencabuch Eq; allenchabuch Dγ; allentabuth Kε; allenthabuth Kι; almucantarath Eλ; almuth' Mη; antabus Wλ; antabuth Pγ; anthabuz Sκ; elentabuth Oβ; hanc tabulam Cε; *add.* id est per retem(recte Cγ) Cγ Mι; *add. interlin.* id est rethe Fβ; *add.* tunc Lη volueris] *add.* scire vel Cι invenire] *om.* Lκ
- 3 ius] *om.* Eλ Lη; solis Cα Eα Mα Pι media die] meridiē Kε Mτ Qζ Qθ die] *om.* Lμ Oη; nocte die Eq; *add.* in quarta altitudinis per altitudinem et solem Bζ considera] considerabis Pq notabis] *rep.* Mτ; notes Pq in₂] *om.* Mη almucanthat] *illeg.* Eη; alenthabuth Qη; almi^{at} Kε Kι Qζ; almicanch' Mγ; almicancrath Mτ; almicantarach Gα Kδ; almicantarath Bβ Pσ; almicantaraz Cδ(*add. interlin.* sue altitudinis) Oη; almicanterath Cα; almicanthat' Dη; almicantrat Kα; almichanth' Lκ; almi^{rat} Eδ; almirath Eα; almi^{that} Wλ; almu^{ach} Qμ; almu^c Mτ; almu^{at} Bη; almu^{can} cantharach Wβ; almu^{cancarath} Vq; almu^{canch'} Dγ; almu^{cant'} Fα Lμ Oζ Qθ; almu^{cantar} Oσ; almu^{cantarach} Bδ Sη; almu^{cantarak} Rγ; almu^{cantarath} Eγ Eκ Pζ Qε Sθ Sλ; almu^{cantarath} Bθ Bι Eλ Fζ Lλ Mδ Nα Oγ Oι Pξ Pv Pφ Qδ Qλ Sβ Vα Vβ Vγ Vv; almu^{canta}th Tδ; almu^{cante}th Oφ; almu^{cant}' Cι Eβ Lγ Lη Mλ Wι Wμ; almu^{cantha'} Pγ; almu^{cantharac} Qγ; almu^{cantharach} Eβ Pq; almu^{cantharat} Cζ Mα; almu^{cantharath} Bγ Cη Eτ Ev Fβ Lβ Lε Mo Mv Mφ Ov Oξ Oτ Pα Pμ Pv Pτ Qβ Rα Sδ Vι Vξ Vπ; almu^{cant}^{raz} Lζ; almu^{cath'} Bζ; almu^{catharath} Pθ; almu^{ch} Kθ; almu^{chan'} Xδ; almu^{chantarath} Vψ Wα; almu^{chant'} at Ov; almu^{chanth'} Eo; almu^{chanthabuz} Cε; almu^{chantharath} Pδ; almu^{chantratz} Eμ; almu^{rath} Eζ Pι Po; almu^{scantarath} Pβ; almu^{t'} Oβ; almu^{tantarach} Mv Si; almu^{tantaraz} Vv; almu^{tanterach} Mι Nγ; almuth Dδ; almu^{thanthat} Vφ; almu^{thanthat} Mη; almu^{trātac} Cγ; *add.* mmne ine Eζ(?) in₃] *om.* Kι Qζ; et Nγ in₃ ... linea] *om.* Si meridiana] media Pq linea] *om.* Pτ Qδ tunc] *om.* Eδ
- 3-4 tunc ... signorum] *illeg.* Oξ tunc ... gira] *om.* Pι

When you wish to find the degree of the sun on whatever day by the hantabuz [i.e., rete], consider its altitude in the middle of the day, which you will mark on the almucantar at the midday line; then

5 quartam circuli signorum in qua fuerit sol gira; et gradus qui continget notam altitudinis in meridiana linea est gradus solis.

- 4 quartam] 4^{am} *some*; 4^{am} *corr. to illeg.* Εκ; iv Lβ quartam ... et] *om.* Dη circuli] singuli Vα circuli signorum] *om.* Mι Nγ Vξ signorum] *om.* Bδ Cα Cγ Cι Eβ Eη Fα Fζ Kδ Lβ Lη Lκ Lμ Mδ Mπ Mυ Oτ Oυ Pα Pβ Pδ Pμ Pν Pξ Pρ Pσ Qλ Sκ Vι Vψ Wμ Xδ Zα; *margin.* Oι fuerit] est Gα sol gira] longyza(!) Wι gira] *om.* Oη Sλ; gyra Bβ Bγ Bζ Cα Eζ Eρ Eτ Kε Lκ Mλ Mτ Pγ Pο Qη Rγ Sη Vφ; gyram *corr. to gira* Εκ; g[lacuna] Mδ continget] continet Eα Mλ Pο; contingit Bθ Cγ Dη Pφ Sη Vν Vξ Vπ Vρ notam] *om.* Mτ; *add.* almicantrat Kα
- 4-5 circuli ... est] *om.* Eδ et ... linea] cognoasam a's(?) continget illam latitudinem meridiana linea et ille gradus in zodiaco quam tanget gradum altitudinis Cα
- 5 altitudinis] *om.* Cε; *add.* facta in almutanterach Nγ; *add.* in almutanterach Mι in] *om.* Eο Pι; *interlin.* Pζ; et Sι meridiana] media Bγ Cη Pγ Vξ Wβ; *add.* sua Eη linea] *om.* Bζ Pφ; *add.* super [lacuna] Sκ est] *om.* Kα; ad Pγ; erit (*rep.*) Vψ; factam erit Mα Pζ Qε Sβ Sθ Vβ; *add.* 4 Pο; *add.* *interlin.* factam erit Oφ solis] *add.* et cetera Oβ; *add.* quesitas etc. Qη; *add.* 7.5-line gloss Cζ

turn the quarter of the circle of signs in which the sun was; and the degree which will touch the mark of the altitude in the middle line is the degree of the sun.

[Comment:

To ascertain where along the ecliptic the sun is on a particular day, measure the height of the sun at noon. Note that position on the meridian line (from the zenith to the south, that is, towards the top of the astrolabe) using the almucantars. Then rotate the rete so that the circle of the ecliptic intersects with the meridian and the noted almucantar and this will give the degree of the sun along the ecliptic, or in the zodiac.

Note that for any noon-day altitude there are two possible positions along the ecliptic, equidistant from the solstices, so one chooses the obvious sign given the season of the year, e.g. Pisces in the late winter or Libra in the autumn.]

[CAPITULUM 26.] DE LONGITUDINE INTER DUAS REGIONES HABENDA PER ECLIPSIM

Longitudo regionis ab alia est distancia meridiani circuli unius a meridiano circulo alterius. Cumque volueris scire longitudinem inter duas regiones, considera

- 1 De ... eclipsim] *om.* Bγ Bδ Bε Bζ Bκ Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Kε Kι Lκ Mα Mτ Nα Oβ Oν Oσ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Rγ Sη Sθ Sι Sλ Vα Vν Vυ Vφ Wλ; *faded/illeg.* Eδ Eζ EQ; Ad cognoscendum longitudinem regionis Eo; Ad inveniendum latitudinis inter duas regiones Lμ Qθ; Ad sciendum longitudinem et latitudinem civitatis Dη; 2° De distancia longitudinis regionis ab alia Lλ; De distancia longitudinis unius regionis ab alia Vγ; De latitudinibus regionum inveniendas per eclipsim lune Mν; De longitudine inter duas regiones per eclipsim lune Mυ Pδ(lunarem); De longitudine inter regiones Mι Nγ; De longitudine invenienda Eτ; De longitudine regionis Bη(*add. in marg.* 23) Cζ Eμ(*marg., add.* 21^{us}) Mπ Oη Pζ Zα; Cap.^m 26^m De longitudine regionis habenda Qδ Mλ Oψ; De longitudine regionis invenienda Dγ Pτ Sβ(*marg.; add.* 24); De longitudine regionum invenienda Rα; De longitudinibus regionum inveniendas per eclipsim lune Wβ; Inventio distantie 2 regionum Bι(*add. in marg.* c. 2[*cut off*]); Inventio distantie regionis VQ; Inventio distantie regionum inter se Kθ Qμ Wι; Inventio longitudinis inter 2 loca Lζ(*marg.*); Nota de longitudine regionis Cα; Que per scientia oportet ad sequentia (?) Gα; Que pre sci[ri] oportet ad sequentia h' Mγ; Que presciri oportet ad sequentia ad sciendum longitudinem regionis Vξ; Si scire vis longitudinem inter te et aliam regionem Bβ; *add. in marg.* 28 Wα; *add. in marg.* 29^{us} Qζ; *add. in marg.* C. 29 Sδ duas] 2 / 2^{as} some habenda] *om.* Bθ Cι Eη Lε Pθ Pυ Tδ Vι habenda ... eclipsim] *om.* Kα Kδ Mη per eclipsim] *cut off* Fβ eclipsim] ech̄ Pθ; eclipticum Mδ; eclipsum Mφ; eclipticam Vψ; lineam eclipticam. Capitulum Mo; *add.* lune Vβ; *add.* lunarem Bθ Mη; *add.* Rubrica Vπ
- 2 Longitudo] Scire quod longitudo unius Cδ; *add.* autem Cε; *add.* unius Bκ Dη Lζ Sκ(*marg.*) Wμ ab] *om.* EQ; *rep.* Qλ Wα ab alia] ad allia Mγ alia] altera Mτ; ea Sλ; illa Fζ Nα; *add.* linea Oη meridiani] *rep.* Pμ; meridiana in Mα meridiani ... unius] illius Pφ circuli] *rep.* Oη unius] *om.* Eγ; illius Bζ Bη Cδ Eλ Eμ Eo Lλ Mα Mγ Oη Oι Oφ(*add. in marg.* al' unius) Qε Sθ Sι Sλ Vα Vγ Vν; *add. interlin.* illius Vβ a meridiano] anni Lκ
- 2-3 Longitudo ... alterius] *marg.* Cδ(*later hand*) Lζ
- 3 circulo] *om.* Eγ Lζ Zα alterius] *add.* in equinoctiali Mυ Mφ Vι Cumque] Cum Cδ Dγ Eζ Lζ Mυ Mφ Pν Qζ; Cum igitur Bκ Mτ; *add.* ergo Oβ; *add.* igitur Qη scire] *add.* altitudinem Kα longitudinem] *corr. from* altitudinem Wι; *add.* regionis Bζ inter ... regiones] regionis Qη duas] *om.* Mι Mτ Nγ Sι; 2 / 2^{as} some; *add. and del.* longitudes Pθ regiones] *om.* Bζ; *interlin.* Eo considera] *om.* Sι; *add.* eclipsim Oβ
- 3-10 cumque ... tabula] *om.* Cα

[CHAPTER 26.] ON FINDING THE DISTANCE [IN LONGITUDE] BETWEEN TWO REGIONS BY AN
ECLIPSE

The longitude of a region from any other is the distance of the meridian circle of one from the meridian circle of the other. And when you wish to know the distance between two regions, consider

5 initium eclipsis lunaris, per quot horas equales distet a medio precedentis diei in utrisque regionibus. Deinde minue horas unius regionis de horis alterius, et que remanserint erunt hore longitudinis inter utrasque. Multiplica itaque eas in 15, et habebis quot gradus sit earum longitudo ab invicem.

- 4 eclipsis] circulis Bδ; elipsim mensis(?) Mπ; eclipsis Qδ; eclipsis Mφ Qζ lunaris] lacuna Sθ; lune Pφ Oφ; lune and add. interlin. lunaris Vβ; add. quia hanc habes frequentius Bζ; add. illeg. Pι quot] quod Bδ Bζ Kκ Lβ Sκ equales] om. Bδ Bε Cγ Cε Cι Dδ Eβ Fα Fβ Kδ Lγ Lη Fζ Lμ Mη Mπ Mυ Mφ Oδ Nα Nγ Pα Pδ Pθ Pμ Pξ Qβ Qγ Qθ Qλ Sκ Vι Vψ Wα Xδ Zα; marg. Oυ; interlin. Oτ; add. hoc distet quare arabes incipiant dies suam a media Vπ; add. luna Eγ distet] differt Qε; dispatet Mδ; distat Mγ Mτ Mυ Oβ Pζ a medio] lacuna Cγ; a meridiano Eα Wλ; a meridie Mτ; add. diei Bθ Bκ; add. meridie Nγ diei] om. Pα
- 5 utrisque] uterisque Oη; utriusque Bβ Bθ Deinde] om. Mτ; Inerum Lλ(add. interlin. al' deinde); Iterum Vγ; Post Dη Deinde ... regionis] om. Eη Kδ Lβ Lκ Oυ Pθ Pμ Pν Qγ Qλ Wα Xδ; marg. Lε Oξ Oι(add. inventas) Oτ Pα; Ita Fζ minue] minuas Gα Kε Kι Mo Mτ Mυ; minuas Mφ; minuas corr. to minue Rα; in horas Mν; move Vα regionis] om. Dη Oζ Pφ; add. ad horis Mτ; add. inventas Lλ Oφ(interlin.) Sβ Sθ Vβ(interlin.) Vγ; add. inventis Mα Pζ(add. in marg. de horis alterius); add. si minoris Zα de] ab Rγ de horis] rep. Pξ horis] add. regionis Oφ Pφ alterius] add. regionis Kε Qζ Rγ Vξ que] quod Sλ; quot Vξ
- 6 remanserint] add. hore Mδ erunt] om. Mη longitudinis] om. Kα; latitudinis Sκ inter] in Pφ inter utrasque] om. Pα; add. regiones Oφ(marg.) Vφ(interlin.) multiplica] coliplica Wα; multiplicata Eγ itaque] interlin. Oσ itaque eas] om. Eγ Qη; 13 eas Vψ; atque eas Kδ; eas Bζ Mλ Nα Oφ Vν Wλ; ergo ea Dη; gⁱ eis Cδ; istas eas Cε; ita ea Cη; ita eas Kα Mη; itaque Eκ Eτ Xδ Vβ; ita^{que} ea Bγ; itaque ea Bη Bι Bκ Dγ Eδ Eζ Eμ Fα Lζ Pο Pυ Oφ Sη Sλ Vα Vξ Vφ; itaque eos Bβ Dδ Eβ Eη; itaque etiam Pγ; -que eas Kε Kι; utique eas Sι in] per Bβ Mτ Qζ Qη Qθ; add. interlin. al' per Oφ in 15] illeg. Nα 15] rep. Vπ; quindecim Mτ; xv Sθ; 5 15 Bθ; 12 Bκ; 75 corr. in marg. to 15 Mη
- 7 habebis] add. per Kε Kι Pι Qζ quot] quem Vψ; quod Bδ Bζ Cδ; tot Wλ quot gradus] illeg. Eζ gradus] graduum Bδ Dη Eβ Eγ Fα Fζ Lβ Lη Lλ Lμ Mα Mδ Mλ Mυ Mφ Oη Oυ Pζ Pμ Pν Qβ Qε Qλ Sκ Sλ Vβ Vγ Vν Vψ Wμ Xδ Zα; corr. to gradibus Bγ sit] sint Mδ Vφ longitudo] latitudo Kα; latitudo corr. to longitudo Sλ ab] om. Sβ; interlin. Pν; marg. Pο; ad Pγ ab invicem] om. Bη Eγ Kδ Lλ Mα Pζ Qε Sθ Sλ invicem] initio Bκ Mλ Vν

the beginning of a lunar eclipse, by how many equal hours it is distant from noon of the previous day in both regions. Then subtract the hours of one region from the hours of the other, and what remains are the hours of longitude between both. Therefore multiply them by 15, you will ascertain the number of degrees of their distance from each other.

10 Longitudines autem quarundam regionum, id est, elongationes circulorum eorum meridianorum a meridiano circulo ultime regionis habitabilis in occidente, et earum latitudines id est distancias ab equinoctiali circulo notabimus in quadam tabula.

- 8 Longitudines] Initio longitudinis Bζ; Verumtamen(Verumptamen Mα Qε) longitudines Eγ Lλ Mα Qε Vβ autem] *om.* Bγ Bζ Bη Bθ Bι Bκ Cγ Cζ Cη Dγ Eα Eγ Eδ Eζ Eκ Eλ Eμ Eο Eρ Eτ Gα Kε Kι Lζ Lλ Lμ Mα Mλ Mν Mo Mτ Mυ Mφ Nα Oβ Oη Ov Pγ Pζ Po Pτ Pv Pφ Qδ Qε Qζ Qη Qμ Rα Sβ Sη Sθ Sι Sλ Vα Vβ Vγ Vι Vν Vξ Vπ Vρ Vφ Wα Wβ Wι Wλ; vero Oσ Vυ; *add. in marg. illeg.* Rγ quarundam] earumdem Cγ id] *illeg.* Bι; *om.* Bη Gα; hoc Bγ Cη Eκ Eτ Nα Pτ Rγ Sη Vβ(*add. interlin.* al' id est) Vξ Wι Wλ id est] *om.* Bδ; et Bζ Dγ Eγ Cζ Eδ Eζ Eμ Eο Eρ Kε Kι Kθ Mγ Mλ Mν Mo Mτ Oβ Oη Oφ(*add. interlin.* al' id est) Po Pv Pφ Qδ Qζ Qη Rα Sι Vν Vρ Vφ Wβ Zα; eum Pγ elongationes] elongationem Mo; longitudines Eα Pρ Qη circulorum] *om.* Cζ Eμ Oη
- 8-10 Longitudines ... tabula] Potes etiam habere longitudines civitatum per tabulas de longitudinibus et latitudinibus regionum Dη
- 9 eorum] *om.* Kα Vν; earum *many*; *add. illeg.* Zα meridianorum] *rep.* Pρ a] de Kδ a ... circulo] *om.* Bθ Vπ circulo] *om.* Bδ Be Cγ Ce Ci Dδ Eβ Eη Fa Fβ Fζ Kδ Lβ Lγ Le Lη Lκ Lμ Mδ Mη Mπ Mυ Mφ Nγ Oγ Oξ Pa Pβ Pδ Pμ Pv Pρ Pσ Qβ Qγ Qθ Qλ Sδ Sk Tδ Vψ Wα Xδ Zα; *interlin.* Oι ultima] *lacuna* Vρ habitabilis] *marg.* Eδ; hebit Lκ; intabulis Qδ in] *add. parte* Gα in occidente] *om.* Eζ occidente] *add.* posite Eγ Eλ Mα Oι(*interlin.*) Oφ(*interlin.*) Pζ Qε Sβ Sθ Sλ Vβ(*interlin.*) Vγ
- 10 latitudines] altitudines Eα Eδ Mτ Po; longitudines Cη Dγ Eκ Eτ Mι Nγ Pγ Qγ; longitudines *corr. to* latitudines Bγ id est] *om.* Cγ Wλ; et Bγ Cη Eκ Eτ Mτ Pγ Pτ Rγ Sλ Vν Vξ Vρ Wι; et cetera Oβ Qη; in Bβ; *add.* earum Eλ Fa distancias] *add.* earum Lη equinoctiali] *add.* usque ad comuni(?) ab axe usque circulum Cancrī Qζ circulo] *om.* Wβ Zα notabimus] notabis Mγ Sι; notavimus Fa Pρ Sθ; vocabimus Lκ quadam] reliqua Oγ tabula] figura tabula Cε Mη; tabulla Mγ; *add.* astronomie Bθ Eλ Ev Gγ Ov Vπ; *add.* astronomie et longitudine poli Wλ; *add.* astronomine vel per altitudi Mλ; *add.* astronomie vel per altitudinem poli Pτ; *add.* astronomine vel(*om.* Eo; scilicet Vφ) per altitudinem poli Bζ Eo Vν Vφ(*marg.*); *add.* etc. Qη; *add.* Nota quod longitudo consideratur secundum unam(diem Nγ) que est ab oriente in occidentem quomodo etiam est via solis Mι Nγ; *add.* Nota quod longitudo directe(?) transversio(?) que est super equinoctiale latitudo vero directe(?) ab uno polo versus alium Cγ; *add.* sufficienter Bγ Cη Eκ Eτ Mγ Pγ Rγ Vξ Wι; *add.* 2 lines Cα

The longitudes, however, of specific regions, that is, the distances of their meridian circles from the meridian circle of the farthest region habitable region in the west, and their latitudes, that is, distances from the celestial equator we will note in a certain table.

[Comment:

Finding the difference in longitude between two regions involves working from some same event visible in each place; here a lunar eclipse is suggested.

Knowing the time (in equal hours) that has elapsed in each location between the beginning of the eclipse and the previous local noon allows the user to calculate the time it has taken for the sun to move from one region to the other. Multiplying these (equal) hours by 15 gives the difference in longitude in degrees.

The text notes that there is a table which gives the comparative longitudes of various places including the most westerly known habitable region (usually taken to be the Canary Islands), but such a table is found in very few mss.⁵]

⁵ As noted above, such a table is found in mss Kδ and Lζ, although the table might also be found in other mss unrelated to the *Practica* text.

ADDENDUM 26

inserted in Kδ:

	g ^s	m ^a
Latitudo Hiolen	40	8
Latitudo Montis Pesidani	44	4
Latitudo Parisii	48	8
Longitudo Hiolen a vero occidenti	28	30
Differentia ab occidente habitabili	11	0

inserted in Lζ:

Nomina regionum	longitudo		latitudo	
	g ^{us}	m ^a	g ^{us}	m ^a
Alexandria	51	20	31	0
Irholm	56	0	32	0
Cremona	48	30	44	22
Perisi'us	40	47	49	6
Tholetum	28	30	40 ³⁹	0 ⁵¹
Marsilia				
Floriara				
Tholosa	40	47	42	45

ADDENDUM 26

inserted in Kδ:

	degrees	minutes
Latitude of Hiolen ⁶	40	8
Latitude of Montis Pesidani ⁷	44	4
Latitude of Paris	48	8
Longitude Hiolen from the very west	28	30
Difference from the habitable west	11	0

inserted in Lζ:

Name of the region	longitude		latitude	
	degrees	minutes	degrees	minutes
Alexandria	51	20	31	0
Jerusalem	56	0	32	0
Cremona	48	30	44	22
Paris	40	47	49	6
Toledo	28	30	40 ³⁹	0 ⁵¹
Marseille				
Florence				
Tolosa	40	47	42	45

⁶ Hiolen: not identified. (The ms could read "Hiden", but unlikely.)

⁷ Mons Pesidanus/Mons Pesidani: not identified.

[CAPITULUM 27.] DE EODEM IN MILIARIBUS

Si quot miliaria sint inter duas regiones a se invicem distantes noscere queris, longitudinem et latitudinem inter utrasque considera. Deinde longitudinem in se

Cap. 27] *om.* Cα

- 1 De ... miliaribus] *om.* Bγ Bδ Bε Bζ Bκ Cγ Cδ Dδ Dη Eα Eγ Eκ Eλ Eν Kε Kι Lκ Mα Mτ Nα Oβ Ov Oσ Pξ Pγ Pδ Pι Pσ Pφ Qε Qζ Qη Qθ Rγ Sθ Sι Sλ Vα Vν Vυ Vφ Wλ; *faded/illeg.* Eδ Eζ Eο; Ad inveniendum distantiam inter 2 loca Eο; Ad sciendum quot miliaribus due regiones a se distant Bι(*distent; add. in marg. c. 23*) Vο; Ad sciendum quot miliaria sunt inter duas regiones Mν Vβ(*add. in marg. Quot miliariorum sit duarum regionum intervallum*); Capitulum 27^m De distantia regionum Qδ; De distancia regionum invenienda Dγ Oφ Rα Sβ(*marg.; add. 25*); De distantii civitatum Zα; De eodem Mι Nγ; Quot miliaria Mπ; Quot miliaria sint inter loca regiones Bη(*add. in marg. 22*); Quot miliaria sint inter duas/2 regiones Cζ Eδ(*marg.*) Eμ(*add. in marg. 22^{us}*) Eτ Kθ Mλ(*add. qualibet*) Oη Pζ(*marg.*) Oο Qμ Vι Wβ Wι; Quot miliaria sint inter regiones Vξ; 21. Quot miliariorum sint inter [*illeg.*] duarum regionum Lλ; Quot miliaria sint inter Mν(*add. in marg. duas regiones*); Quot miliaria sint inter regiones distantes Pτ; Quot sint miliaria inter loca Lζ; Quot sint miliaria inter duas regiones Sη; Quot sint miliaria inter duas regiones a se distantes Lμ; Quot miliariorum sit intervallum duarum regionum Vγ; Si scire volueris quot sint miliaria inter regiones Mγ; Si vis numerum miliarium scire inter regiones Bβ; *add. capitulum Cη Mo; add. Rubrica Bθ Vο; add. in marg. 25^m Vφ; add. in marg. C. 30 Sδ*
- 2 Si] *om.* Mν Vι; Ci Dγ; Vis scire Sκ; *add. autem Bη Bκ Cδ Cζ Dγ Dη Eγ Eμ Gα Kε Kι Lζ Lλ Mα Mτ Oβ Oη Ov Oσ Oφ Pζ Pι Pφ Qε Qζ Qη Rα Sβ Sθ Sι Sλ Vα Vβ Vο Vυ Vφ quot] quod Bδ Sκ; tot Vυ sint] om. Bη Cζ Eμ Kθ Vυ duas] 2 / 2^{as} many; illeg. Dη; et Sη; II Oβ a] ad Eα; scilicet a Eκ a ... distantes] *om.* Cδ Oσ Rγ Vυ se] te Sι invicem] *om.* Bβ Bζ Eγ Eλ Eο Eν Mo Pζ Pι Qδ Qη Rα Sβ Sη Vβ Vγ Vφ invicem distantes] *om.* Bη Bι Bκ Cζ Dγ Eο Lζ Mα Mγ Oη Pφ Sθ Sι Sλ Vα Vν Vο; *marg.* Oφ distantes] *interlin.* Eμ; *add. si Mν Vι noscere] cognoscere Bθ Eν Vπ; nosse Vο noscere queris] scire volueris Kθ Zα queris] om. Dδ**
- 2-9 noscere ... queris] *om.* Pξ(*entire capitulum added in bottom margin, later hand*)
- 3 longitudinem₁ et latitudinem] *om.* Pμ; *add. illeg. Sλ et latitudinem] om. Cδ Gα; rep. Eλ; et altitudinem Eα; et similiter latitudinem Pι inter] om. Mν Mo Po Sη; in Gα utrasque] utramque Bδ Bζ Eβ Dη Lγ Lε Mν Mφ Oγ Ov Po Pο Qβ Sη Vι Wα; utramque regionem Eν Vπ considera] *add. et latitudinem Gα; add. 7.5-line insert Fβ* Deinde] *om.* Pγ longitudinem₂] latitudinem Kε Mτ in] a Dγ in se] nocte Lκ*

[CHAPTER 27.] ON THE SAME IN *MILIARIA* [ROMAN MILES]⁸

If you seek to know how many *miliaria* are between two regions distant one from the other consider the longitude and the latitude between the two. Then add the longitude

⁸ *Miliarium*: “1000 [of something]”. In terms of distance, it is 1000 paces, each consisting of 5 Roman feet, hence a distance of 5000 Roman feet. The Roman foot is generally taken to be about 296 millimetres, and a Roman mile would be 1,480 metres, i.e., 1.48 km.

5 ductam latitudini in se multiplicata aggrega. Et collecte exinde sume tolle radicem, et unicuique gradui ipsius radiceis et dimidio da centum miliaria; et per tot miliaria distat una regionum ab alia.

- 4 ductam] ducta Gα; inducta Kδ; *add.* multiplicatam Zα ductam ... se] *marg.* Oξ latitudini] longitudini Mτ in] *om.* Pγ se] *add.* similiter Wβ multiplicata] aggregate Bδ; ducte Eγ; multiplicare Sι; multiplicatur Nγ; *add.* considera et O; *add.* et illa similiter Wβ aggrega] adde Pρ; adgrega Mι Nγ; congrega Nα; coniuncta(?) et adde Zα et₁] in Mη collecte] collige Cη Ek Mγ; ab collecta Pρ; colerice Cε; collecte sumes Kι; collectione Mη Pν; tollecte Mν; tollēm Kε; tollere Bβ; *add.* ducte Lκ collige ... radicem] collecte sume cī in quem radicem Eγ exinde] *om.* Mo; *illeg.* Pτ Qλ; in Lμ Mι Mπ Pν Vξ Vψ; inde Bβ Bγ Bδ Bε Bθ Bκ Cγ Cε Cη Cι Dδ Dη Eα Eβ Eδ Eζ Eη Ek Et Ev Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lζ Lη Lκ Mδ Mη Mν Nα Oβ Oζ Oι Oξ Ou Ot Pα Pβ Pγ Pδ Pθ Pμ Pν Po Pξ Pρ Pσ Pτ Pυ Qβ Qγ Qθ Qμ Sδ Sη Sκ Tδ Vγ Vι Vπ Wα Wι Xδ Zα; in se Nγ Rγ Wβ; vide Oγ exinde ... tolle] *illeg.* Ov sume] *om.* Gα Pι; sumpte Kθ; *add.* per additione Mν Vι tolle] *om.* Kδ Mλ; quere Bζ Bι Bκ Cδ Cζ Dγ Eγ Eλ Eμ Eo Ev Gα Kε Kι Lζ Lλ Mα Mγ Mτ Oη Oσ Oφ Qε Qζ Qη Rα Pζ Pι Pσ Pφ Qμ Sβ Sι Sλ Vα Vβ Vγ Vν Vπ Vρ Vυ Vφ; in quere Bη; *add.* extrahe Zα; *add. interlin.* quere Oι radicem] *add.* quadratam Bβ Bε Eλ(?) Kε Kι Mλ(*interlin.*) Mτ Pι Qδ Qη(*interlin.*) Sκ(*marg.*); *add.* scilicet quadratam Zα; *add. interlin.* id est quadratam Vβ
- 5 unicuique] *add.* radicem Bζ; *add.* scilicet Zα ipsius radiceis] *om.* Bη Cζ Eμ et₁] *om.* Mν; cum Kε Qζ demidio] *om.* Gα; adimid' Mν; *add.* gradui Zα da] *om.* Vα; das Cγ; diei Mγ centum] 100 *some*; c *some*; *add. interlin.* 100 Vβ; *add. interlin.* al' 90 Kε miliaria₁] milliararia Oη; *add.* [*illeg.*] vel 16 teutonica Zα et₂] *add.* que collecta fuerint Cζ Eμ Ev Kε Mλ Vν; *add.* que collecta fuerint miliararia Nα Pτ Sη Vπ; *add.* quod collecta fuerint Oβ Oη Pι Qζ; *add.* quot(*add.* miliararia Cδ; *add. interlin.* al' que Oφ) collecta fuerint Bζ Cδ Dγ Eo Eρ Kι Lζ Lλ Mα Mγ Mτ Oι(*marg.*) Ov Oσ Oφ Pζ Pυ Pφ Qδ(*add.* milliararia) Qε Qη Qμ Rα Sβ Sθ Sι Sλ Vα Vβ(*add. interlin.* miliararia) Vγ Vρ Vυ Vφ Wλ(*add.* milliararia); *add.* quot(que Bθ Eγ Eλ) collecta fuerit suma Bη Bθ Bι Bκ Bγ Eλ et₂ ... miliaria₂] *om.* Oζ Pρ Rγ; *faded/illeg.* Gα per] *om.* Mτ tot] *add.* enim Mo miliaria₂] *om.* Bγ Bζ Bι Bκ Cδ Eγ Ek Ev Eα Eζ Eμ Eo Eρ Et Kε Kθ Lζ Lλ Mα Mγ Mλ Mν Mτ Oβ Oη Oσ Pγ Pζ Pξ Pτ Pφ Qζ Qη Rα Sη Sθ Sι Sλ Vα Vβ Vγ Vν Vξ Vπ Vρ Vυ Wβ Wι Wλ; regionum Mν Pι distat] *rep.* Eβ; distabit Vγ
- 6 una] *marg.* Sκ; *add.* quoque Sλ regionum] *om.* Pι; earum Eγ Mo Nα Pτ Pυ Qδ Sη Wλ; illarum regionum Bθ Ev Mλ Vπ; ipsarum regionum Bη Cδ Cζ Eλ Eμ Eo Lλ Mα Mγ Oη Oφ(*add. interlin.* al' illarum) Pζ Pφ Qε Qμ Sβ Sθ Sι Vγ Vν; ipsorum Vβ(*add. interlin.* regionum); istarum regionum Bκ Lζ Pφ; pars ipsarum regionum Vν; regio Bε Cη Dδ Dη Eα Eδ Eη Fζ Kα Kδ Kε Kι Mν Mτ Oβ Oγ Pγ Pξ Po Pρ Vξ; regio *corr. to* regionum Qγ; regio *corr. from* regionum Bγ ab] *illeg.* Ov; altera Pρ; et Bθ Vπ

taken [i.e., multiplied] by itself to the latitude multiplied by itself. And take the square root from the combined sum, and for each degree and a half of this root give 100 *miliaria*; and by so many *miliaria* is one region distant from the other.

Si autem earum latitudo fuerit eadem, fac cum gradu longitudinis tantum sicut debet fieri cum gradu radicis. Si vero longitudo fuerit una, fac cum latitudine tantum, et inuenies quod queris.

- 7 autem] vero Eϵ earum] *om.* Cε Kα Pτ; ipsarum Bζ Eο latitudo] longitudo Dγ fuerit] sit Vξ eadem] *om.* Mγ Vγ; ea | eadem Eκ; in eadem Eζ Lκ fac] *om.* Qη; *marg.* Kε cum] in Vα gradu] gradibus Bη Bκ Cγ Cδ Cζ Eγ Eμ Lζ Lλ Mα Mτ Oβ Oη Oι Oσ Pζ Sλ Vα Vβ(*add. interlin al' gradu*) Vυ Vφ; *add. latitudinis* Sη gradu longitudinis] longitudine Dη longitudinis] latitudinis Wλ tantum] *om.* Bζ Eλ Sθ; tunc Qη sicut] *om.* Qη; *interlin.* Eζ; *add. interlin.* dictum est Oι
- 7-8 tantum ... radicis] *om.* Eδ sicut ... fieri] *rep.* Oυ
- 7-9 Si ... queris] *om.* Xδ
- 8 debet] deb[er]es Sι; deberet Bβ Bθ Eα Mo Mτ Po Pτ Pυ Qδ Qμ Sη Vπ; deb'nt Mν; dēret Kθ; dictum est debere Bζ Bη Bι Bκ Cδ Cζ Dγ Eγ Eμ Eο Eρ Lζ Lλ Mα Mγ Mλ Oη Oν Oσ Oφ Pζ Pι Pφ Rα Sβ Sθ Sλ Vα Vβ Vγ Vρ Vυ Vφ; dictum est deberet Eζ Gα Kι Qζ; dictum est per debet Kε; dictum est quod debet Mτ; ductum est deb'es Sι; est debere Vν; oportet Pα fieri] *add. sicut dictum est* Qη cum₁] in Pφ Sι cum gradu] cum gradibus Eγ Mτ Oι Oν Pι Qζ Vβ(*add. interlin al' gradu*) Vφ Zα; de gradibus Qη; in gradibus Bη Bκ Cγ Cζ Dγ Eμ Eρ Gα Lζ Lλ Mα Oη Oφ Pζ Qε Rα Sβ Sθ Sλ Vα Vγ Vρ Vυ; ut dictum est de gradibus Oβ vero] *om.* Mτ; eadem Vξ longitudo] longitudo latitudo Sι; *add. interlin al' latitudo* Oφ fuerit] fuit Nγ una] *om.* Cγ; eadem Eγ Eυ Nα fac] facies *many*; facies *rep.* Vρ cum₂] *add. etiam* Eδ latitudine] longitudine Dγ Qζ Wλ; longitudine *corr. in marg. to latitudine* Zα tantum] *om.* Eγ Vφ; tunc Qη
- 9 inuenies ... queris] habis quesitum Vξ quod] idem quod Rγ; quot Cγ; *add. tu* Mo Nα Pυ Sη queris] scideras Sι; scire desideras Bζ Bη Bκ Cδ Cζ Dγ Eγ Eλ Eμ Eο Eρ Gα Kε Kι Lλ Mα Mγ Mλ Mτ Oη Oν Oσ Oφ Pζ Pφ Qε Qζ Qη Rα Sβ Sθ Sλ Vα Vβ Vγ Vυ Vρ Vυ Vφ; scire desideras et scito Pι; *add. De ascensionibus signorum in circulo obliquo* Mo; *add. chapter by Iohannes de Calamonte*⁹ (1.5 folia, ff. 64^r-64^v; f. 65^v blank): "Canon docens utilitatem tabule regionum subscripta" Vβ(*add. in marg.* Hanc litteram ego Iohannis de Calomonte cum sua tabula inmediate subscripta addidi)

⁹ For Iohannes de Calamonte, see note to *Comp.*, Cap. 7 line 9.

If, however their latitude is the same, treat a degree of longitude just as a degree of the root ought to be treated. If, however, the longitude is the same, treat it as with the latitude and you will find what you seek.

[Comment:

To calculate the distance in Roman miles between two points, ascertain the latitude and longitude of each, and the difference in degrees between them. Then, (following Pythagoras's theorem), multiply the difference in longitude by itself and add to it the difference in latitude multiplied by itself; take the square root of the sum. Then multiply each degree and a half by 100 and this will be the distance in Roman miles.

If the two places have the same latitude, simply multiply each degree and a half of longitude by 100; if they have the same longitude, multiply each degree and half of latitude by 100.

Note: This is not really accurate since a degree of longitude varies when measured at the equator (maximum, where it equals a degree of latitude, ignoring the slightly non-spherical shape of the earth) and when measured at the poles (minimum, i.e., 0). And even when the length of the degree is standard (along the equator, along a meridian, or along a great circle), this calculation gives an earth circumference of about 35,500 km when in reality it is just over 40,000 km.]

[CAPITULUM 28.] DE ASCENSIONIBUS SIGNORUM IN CIRCULO DIRECTO

Si autem ascensiones signorum in circulo directo scire desideras, initium cuiusvis signi super lineam meridianam pone, et locum almuri in margine nota. Postea

Cap. 28] *two versions* Cζ₁ Cζ₂

- 1 De ... directo] *om.* Bγ Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Ov Pγ Pδ Pι Pσ Pφ Rγ Sη Sθ Sι Sλ Vα Vν Vυ Vφ Wλ; *faded/illeg.* Eδ Eζ Eθ; *marg.* Eδ Eμ(*add.* 27^{us}) Pζ; Ad habendum ascensiones signorum in circulo directo Bι(*add.* *in marg.* c^m. 24); Ad inveniendum ascensiones signorum Mγ; Ad inveniendum ascensiones signorum in circulo directo Eο Lμ Pτ Vξ; Ascensiones signorum in circulo directo Mπ Vθ; De ascensione signorum in circulo directo Cζ₁ Cζ₂; De ascensionibus signorum in circulo directo Lβ Qμ; De scientia ascensionum signorum in circulo recto Dη; Inventio ascensionis signorum in circulo directo Dγ Oφ Rα Sβ(*marg.*; *add.* C. 29); Scientia ascensionis signorum in circulo directo Cη; Si vis invenire ascensiones signorum(!) Bβ; *add.* Rubrica Vπ; *add.* *in marg.* Cap.^m Lζ; *add.* *in marg.* 27 Bη; *add.* *in marg.* 30 Wα; *add.* *in marg.* 31^{us} Qζ; *add.* *in marg.* C. 31 Sδ De] Cap.^m 28 De Qδ; 25 De Lλ signorum] *om.* Mλ directo] recto Eτ Pβ Qθ; *add.* sciendis Bθ Mη ascensionibus] ascensu Zα
- 2 Si autem] Cum Kι Si ... desideras] *om.* Pξ Vγ autem] *om.* Bζ Cα Eλ Mγ Oφ Pφ Sι Vν; volueris Mτ ascensiones] *add.* circulorum Eλ signorum] *om.* Bκ Kα Mτ Rα directo] *om.* Mτ; recto Pβ; recto *corr.* to dyrecto Dγ; *add.* equinoctiali Zα; *add.* id est meridiano Dδ scire] *om.* Lμ Pφ desideras] *om.* Bζ; consideras Kα; volueris Bη Cζ₁ Cζ₂ Eμ Mτ Oη Qη Wι Zα
- 3 cuiusvis] cuius Cε Eγ Oη Sθ; cuiuscumque Cα; cuiusque Pφ; eius Bβ signi] *add.* 29 Bζ lineam] latitudinem Eζ; *add.* *in marg.* locum almuri in margine pone Oξ; *ms* Xγ *restarts* meridianum] *add.* ascensus igitur ipsorum in linea medii celi similis ascensioni est ipsorum in circulo equinoctiali Bζ pone] *add.* ascensus igitur ipsorum in circulo equinoctiali pone Vφ; *add.* ascensus igitur ipsorum in linea medii diei, similis est ascensioni ipsorum in circulo equinoctiale Pι locum] *add.* in Lλ Pζ Sβ Sθ Sλ locum ... margine] *om.* Kδ Oξ almuri] *add.* *interlin.* al' almucantarath Oφ margine] *add.* astrolabii Dδ nota] *om.* Pφ; pone et nota Cα Cγ Dδ Eβ Fα Fβ Kα Lβ Lε Lη Lκ Fζ Mπ Oγ Oζ Oι Oτ Oυ Pα Pβ Pμ Pν Pξ Pθ Qγ Qλ Sδ Tδ Wα Xδ; *corr.* from pone et nota Lγ; vero Mτ; *add.* cum incausto Dδ; *add.* quod Mπ Postea] et Bη Cζ₁ Cζ₂ Eμ Oη
- 3-6 lineam ... signorum] *ms* Xγ *damaged and unreadable*

[CHAPTER 28.] ON THE RISINGS OF THE SIGNS IN THE DIRECT CIRCLE [I.E. VIS-A-VIS THE
EQUATORIAL CIRCLE]

However, if you wish to know the risings of the signs in the direct circle, place the beginning of any sign on the meridian line, and note the place of the indicator- muri on the rim. Afterwards

- 5 move rethe donec finis signi cadat super lineam meridiei, et gradus quibus movebitur almuri erunt ascensiones eiusdem signi; et similiter facies ad quamlibet portionem circuli signorum.
- 4 move] *om.* Vγ; pone Dδ rethe] recte Lκ Vγ VQ; retam Mι Nγ; rete *some* finis] ainis Eo finis signi] *om.* Mτ cadat] sit Bζ Bκ Cδ Cζ₁ Cζ₂ Eγ Eμ Eo Lζ Mγ Mλ Oη Oσ Oφ(*add. interlin. al' cadat in linea*) Pζ Pφ Qε Sβ Sθ Sι Sλ Vα Vβ(*add. interlin. cadat*) Vγ Vν; sunt Mα super] per Bβ Kθ(*add. interlin. id est super*); supra Lκ; *ms* Lκ *ends* super lineam] in linea Lμ lineam] *om.* Eκ meridiei] meridiana *corr. to* meridie Lμ; meridianam Cα Nα Pν Zα; *add. nam(expunged)* Oυ; *add. interlin.* [meridi]anam Vβ gradus] *om.* Lμ; gradibus Bβ; gradum Pγ quibus] cuius Eν; quilibet Pφ quibus movebitur] *rep.* Cη movebitur] movetur Eα Kδ Nα Qθ
- 4-5 gradus ... signi] interum locum almuri nota. Tunc gradus que sint inter illas duas notas erunt ascensiones Wμ
- 5 almuri] *om.* Pι; *add. in limbo* Qμ; *add. in margine* Dδ Oφ(*interlin.*); *add. :: gradus inter fuerint almuri* Oβ(?) erunt] *rep.* Mλ; sunt Bδ ascensiones] ascendentes Cα eiusdem signi] *om.* Bδ Bε Cα Cγ Cε Cι Dη Eβ Eη Eμ Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lε Lζ Lη Lμ Mα Mδ Mη Mι Mπ Oγ Oζ Oξ Oτ Pα Pβ Pδ Pθ Pμ Pξ Pρ Pσ Qγ Qθ Qλ Sδ Sκ Tδ Vψ Wα Xδ; *marg.* Oι; signorum in circulo meridiano Dδ(*add. in marg. illeg.*); super rethis circulum Mν Mφ Vι signi] *om.* Bζ Bη Eλ Eo similiter] *rep.* Oβ facies] *om.* Qγ portionem] *om.* Kα; proportionem Bζ
- 5-6 ascensiones ... signorum] *om.* Sι
- 6 circuli] *om.* Qθ signorum] *om.* Bγ Bζ Bη Bθ Bι Bκ Cδ Cζ₁ Cζ₂ Cη Dγ Eγ Eδ Eζ Eκ Eλ Eo Eρ Eτ Eν Fβ Gα Kι Lγ Lλ Mγ Mν Oσ Mo Oη Ov Pζ Pι Po Pτ Pν Qε Qμ Rα Rγ Sβ Sη Sθ Sλ Vα Vγ Vν Vπ Vυ Vφ Wβ Wι Wλ; etc. Qη; *add.* Vel pones novellam super utrumque arcus(*add. dati* Pυ). Et gradus limbi intercepti sunt eius ascensiones. Pυ Vβ(*add. in marg.* Hic littera "Vel pones" et cetera est addita); *add.* Vel pone novellam super utrumque terminum (fraicium? Sη) arcus dati et gradus limbi intercepti sunt eius ascensiones Nα Qδ Sη;*add. 8 lines* Cα

turn the rete until the end of the sign falls on the meridian line, and the degrees by which the indicator-muri will be moved will be the rising of the same sign; and you will do this similarly for any portion of the circle of signs.

[Comment:

Essentially this is about measuring the projection of a section of the ecliptic against the equatorial circle, or, for instance, how far has the sun moved vis-à-vis the equator when it has moved through a full sign along the ecliptic. In modern terms it would be the difference in right ascension between the beginning and end of that section/sign.

One places the beginning of the section/sign on the meridian circle, and notes the position along the rim where the indicator-muri at the beginning of Capricorn rests; then one rotates the rete until the end of the section/sign is over the meridian line. The amount that the indicator-muri moves along the rim will be the amount of ascension.]

[CAPITULUM 29.] DE ASCENSIONIBUS SIGNORUM IN CIRCULO OBLIQUO

Ascensiones autem signorum in qualibet regione sic poteris invenire: move

Cap. 29] *illeg. Xγ; two versions Cζ₁ Cζ₂*

- 1 De ... obliquo] *om. Bγ Bδ Bε Bζ Bκ Cγ Cδ Cε Eα Eγ Eδ Eη Eλ Eκ Eν Gα Kε Kι Lζ Mα Mo Mτ Nα Oσ Ov Pγ Pι Pξ Pσ Pφ Qε Qη Sη Sθ Sι Sλ Vα Vν Vυ Vφ Wλ; faded/illeg. Eζ Eϑ; Ad idem in circulo obliquo Eo; Ad inveniendum ascensiones signorum in circulo obliquo Vξ; Ad inveniendum ascensiones signorum(singnorum Bβ) in qualibet regione Bβ Lμ Qθ; Ad inveniendum elevationes signorum in circulo obliquo Pδ; Ad sciendum ascensiones signorum in circulo obliquo Dη; Ad sciendum elevationes(elevationem Vπ) signorum in circulo obliquo Bθ Pv Vπ; Ascensiones signorum in qualibet regione Mπ Oη Vϑ; De ascensionibus regionum Pζ(marg.); 26 De ascensionibus signorum in qualibet regione Lλ; De ascensione signorum in qualibet regione Vγ; De ascensione signorum in qualibet regione in horizonte obliquo Cζ₁ Cζ₂; De ascensione signorum in circulo obliquo Eμ(marg; add. 28^{us}); De eisdem in circulo obliquo Rγ; De eisdem in circulo obliquo inveniendis Mv Vi; De eodem circulo obliquo Pτ; De eodem in circulo obliquo Eτ Wβ Wi; De eodem in circulo obliquo in qualibet regione Mγ; De ortu et occasu signorum in qualibet regione Mλ; Inventio ascensionum eorumdem in qualibet regione Bι(add. in marg. c. 25); C. 30. Inventio ascensionum in circulo obliquo Sβ(marg.); Inventio ascensionum signorum in circulo obliquo Dγ; Inventio earundem in(de Kθ) circulo obliquo Kθ Po Qμ Rα; add. in marg. 28 Pα; add. in marg. Cap.^m Lζ; add. in marg. 31 Wα; add. in marg. 32^{us} Qζ; add. in marg. C. 32 Sδ De] *add. regionum Vβ signorum] om. Oβ obliquo] signorum Cα; add. et cetera Oβ**
- 2 Ascensiones ... regione] *om. Vγ autem] om. Bζ Cα Eγ Eo Kε Kι Mγ Mλ Mτ Pφ Qζ Rγ Sι Vν Wβ Wλ; add. et occasus Bθ Ev Pδ Pι Vπ signorum] om. Bε Bκ Dη Eη Kδ Kθ; add. a quantum movetur quodlibet signum in qua totum ascendat super orizon Dδ; add. et occasus eorumdem Bζ Eλ Eo Gα Mγ Mλ Oφ(marg.) Pτ Qη Vν Wλ; add. in circulo obliquo et Mη Zα; add. interlin. et occasus Vφ regione] add. et occasu Kα; add. et occasu eorumdem Kε Kι Mτ Oβ Qζ sic] om. Kε Kι Mλ Qζ; si Pφ; signorum Mτ; add. eis Vγ invenire] investigare Eϑ; add. pone initium signi super oriçonem, deinde Dγ; add. pone initium signi super primum almi^{ath} oriçonem, deinde in oriente Kι; add. pone initium signi super primum almicanrath(almi^{at} Lμ Qζ Qθ; almuth Qη)in oriente et Lμ Mτ Qζ Qη Qθ; add. in marg. al' littera sic hic: pone initium signi super primum almucantar at in oriente Oφ move] exne/eperne Ov*
- 2-3 move ... signi] initio alicuius signi in horizonte in partem orientale et noto almuri move rethe Pι

[CHAPTER 29.] ON THE RISINGS OF THE SIGNS IN THE OBLIQUE CIRCLE [I.E., VIS-A-VIS THE HORIZON]

However, you will be able to find the rising of the signs for any region thus:
move

rethe ab initio signi usque ad finem eiusdem, et gradus quibus movetur almuri in margine erunt ascensiones signi in eadem regione; movebis enim signum in orizontis

- 3 rethe] rete *some*; regulam recte Cδ(*add. interlin. vel rethe*); retam Mι signi] cuiusvis de duodecem signis Mι Nγ; signius Bθ; *add. eius Vπ; add. istius in orizontis linea Kε Kι Qζ; add. scilicet lineam orizontis Dδ; add. super lineam orizontis orientalis et primi almitatr' Oβ; add. super lineam orizontis vel primi alencabuth Qη; add. in marg. in orizonte Σκ usque ad] illeg. Oσ; ad Bκ Cδ Cζ₁ Cζ₂ Dγ Eμ Eρ Kε Kι Lζ Pι Sι Sλ Vα; in Mα Oι Oφ Pζ Qζ Sθ Vγ; illius in orizontis linea ad Mτ; usque Eκ; usque in Bε Bθ Cε Cι Dδ Eη Eλ Fβ Kδ Lβ Lγ Lμ Mδ Mη Mι Mλ Mν Nγ Oτ Oυ Pα Pβ Pδ Pθ Pμ Pξ Pο Pρ Pσ Pτ Pυ Qβ Qγ Qδ Qθ Sδ Sη Vι Vν Vξ Vπ Vφ Wα Wλ Xδ; ut in Bζ Mγ usque ... eiusdem] in fine illius Lλ Qε Sβ finem] lineam Bι(*add. in marg. orizontis ex parte orientalis*) Dγ; lineam orizontis ex parte orientalis Vρ eiusdem] eius Sθ; illius Mα Pζ Vγ; ipsius Eα Eγ; *add. et finem motus almuri in limbo Dδ; add. signi Eδ Pι; add. supra orizontem Nα; add. interlin al' illius Vβ quibus] quilibet Lβ; quilibet expunged Fζ quibus movetur] quos dist~ Pι movetur] mo^t Pφ; motus Bκ Lζ; move Bθ; movebitur Bε Cα Cγ Cε Cι Dδ Eβ Eγ Eη Eρ Fα Fβ Fζ Kα Lε Lη Lλ Mδ Mη Mι Mτ Mυ Nγ Oγ Oζ Oν Oτ Oυ Pβ Pδ Pζ Pρ Qγ Qε Qλ Sθ Vψ Wα Zα; movebis *corr. to* movebitur Vβ; movebuntur Mν; movētur Kδ almuri] scilicet almuri Fα(*marg.*); *add. interlin. al' almucanta^{mat} Oφ in] om. Bθ Vπ***
- 3-4 usque ... signi] *marg. Oι*
- 4 margine] marginem Mτ erunt] erit Pζ; *add. asig Bθ erunt ... regione] marg. Oφ signi] om. Mγ; ipsius signi Eλ; muri Nα; signorum Bγ Cη Eκ Eτ Pγ Pτ Rγ Wι Wλ eadem] om. Bη movebis] movebitur Cε Dγ Pα enim] om. Eα; autem Bβ Bδ Bε Bη Cα Cγ Cε Cζ₁ Cζ₂ Cι Dδ Dη Eβ Eη Eλ Eμ Fβ Kα Kδ Lγ Lε Lμ Mδ Mη Mι Mπ Mφ Oγ Oζ Oη Oξ Oτ Oυ Pα Pγ Pδ Pθ Pμ Pν Pξ Pρ Pσ QβQθ Qλ Σκ Tδ Vι Vν Wα Wμ Zα; cuiusvis Bθ Eυ; etiam Eρ; *add. his Eλ in₂] om. Eα Eγ; add. orizonte sive Fβ in orizontis] om. Mυ orizontis] orientis Mo(**add. in marg. al' orizontis*); orisontis Bβ; orizontis scilicet Eγ; orizonte scilicet in Cα; orizontem in Vν*
- 4-5 movebis ... orientali] *om. Gα Vφ movebis ... ascensionem] om. Kε Kι Mτ Oβ Pι Qζ Qη*

the rete from the beginning of the sign to the end of the same and the degrees by which the indicator-muri is moved along the rim will be the risings of the sign in the same region; for you will move the sign in

- 5 parte orientali, ut scias eius ascensionem. Ut autem scias eius moram in occasu, movebis illud in orizontis parte occidentali; ita etiam fiet in qualibet circuli portione.
Gradibus etiam ascensionum divisus per 15, et residuo pro horis fractionibus
- 5 parte orientali] partem orientalem Bζ Pξ Pφ Vv orientali] *om.* Vψ ut₁] ac Mι Nγ; et Eη Eκ; hic Sη; ubi Pθ ut scias₁] *rep.* Lλ; ut scies Cε ascensionem] ascensiones Eμ Lλ Pγ; *add.* per motum almuri Qμ Ut₂] *interlin.* Sκ; Si Gα; Uñ Cε autem] *om.* Wβ eius] *add. and del.* ascensionem Wι moram] motus Cγ; *rep.* Wβ in occasu] *om.* Cα occasu] occidente Bδ Bε Cγ Dδ Dη Eη Fζ Kα Kδ Lβ Lγ Lε Lη Lμ Mι Mv Nγ Oζ Ov Pα Pv Pφ Pσ Qγ Vψ Wμ Zα movebis] movebitur Cε Dη Mo Ov Pα; ponito Pι
- 5-6 orientali ... parte] *om.* Eγ ut₁ ... occidentali] *om.* Cι Dγ
- 6 illud] *om.* Bδ Bε Cγ Cε Eα Eβ Eη Fα Fζ Kα Lβ Lγ Mδ Mι Mv Nγ Oζ Ot Ov Pα Pβ Pθ Pμ Pv Pξ Pφ Pσ Qβ Qγ Qθ Qλ Sδ Sκ Tδ Vψ Wα Wμ Xδ Zα; *interlin.* Oι; illum Mα; initio signi Pι; signum Cα Dη; *add.* signum Sθ Vφ(*interlin.*) illud in] *om.* Mη; illius Lμ in ... occidentali] in occidente in parte orizontis oal' Cα; parte orientis occidentalia Kδ orizontis] *om.* Ov; orizontis Bβ; orizonte versus Mτ; *add.* per Bζ; *add.* versus Kε Kι Qζ Qη parte] *om.* Lε; *add.* in Qμ parte occidentali] partem occidentalem Bβ Bζ Oφ Vv; *add.* et nōto almuri ut prius move rethe ad finem eiusdem signi Pι etiam] *om.* Mo; autem Cι Vβ; ut Lβ fiet] *om.* Nα; fac Mτ; facies Bθ Ev(?) Vπ; fiat Mι Nγ Qη quilibet] gradibus Bζ; *add.* parte et Bκ; *add.* signi vel Oβ circuli] orientali Cγ; signi Kε Kι Mτ Qζ Qη portione] *om.* Vψ; per portione Kα; proportione Bζ Cι Dγ Qμ Rα Sλ
- 7 Gradibus] In gradibus Kδ; Si grad[ibus] Kε Mτ Qζ; *corr. to gradum* Sκ; *add. in marg.* Hec littera "Gradibus" cum duobus capitulis imediate subsequentibus videlicet "Ut habeas noticiam stillarum" et cetera et "Scire volens gradum stelle" sunt addita Vβ etiam] *om.* Eμ Kε Kθ Mτ Qζ Qη Rα; autem Lζ; et Vπ ascensionum] *om.* Cα; *interlin.* Eμ; ascensionis Mτ; divisionum Eα divisus] diviseris Mτ; divisio Pγ; divisionis Pδ residuo] residuum Mτ; *add.* hore Lε; *add.* quod videmus(?) Zα pro] *om.* Lε; per Mη; quod Wλ pro horis] post hore Dγ; pro unius hore Oβ Qη horis] hore Bζ Bθ Kδ Mτ Ot Qδ Rγ; *add. interlin.* id est ascensionis Oγ fractionibus] *illeg.* Kθ; fractionem Mo; *add.* ob' Cε
- 7-10 Gradibus ... regione] *om.* Bη Bκ Cδ Cζ₁ Cζ₂ Eγ Lλ Mα Oη Oσ Qε Sθ Sι Sλ Vα Vv; *marg.* Lζ; *top marg.* Sβ per ... regione] *marg.* Eμ

the eastern part of the horizon, so that you know its rising. However, in order for you to know its delay in {time of} setting, you will move it to the western part of the horizon; also it will be done thus in whatever part of the circle.

As well if the degrees of the risings are divided by 15, and the residue reckoned as fractions of an hour,

- 10 computato, habebis horas equales; vel eis divisus per numerum graduum hore inequalis, patebit per quot horas naturales vel inequales cum fractionibus, quodlibet signum vel planeta vel quelibet portio ascendat vel occidat in qualibet regione.
- 8 computato] *illeg.* Nα; *rep.* Mv; computatis Mλ habebis ... equales] *om.* Eo Mγ Vv equales] *add.* et minuta hore Mλ Oφ(*interlin.*); *add.* per quod ascendit Zα vel ... inequales] *rep.* Eη eis] eas Mτ; eius Mγ Qη per ... gradum] *illeg.* Nα(*add.* id est hore] *add.* *interlin.* scilicet per 12 Wα hore inequalis] *om.* Ev; meridionales Bβ inequalis] equalis Pγ; naturales Qη
- 8-9 computato ... fractionibus] *om.* Pq
- 9 patebit] habebit Bζ; *corr. from illeg.* Oδ patebit ... inequales] *om.* Qη quot] *om.* Kα; quas Pγ; quod Bδ Bζ Lβ Mπ horas ... inequales] *illeg.* Nα naturales] equales Bβ Kι vel,] *om.* Oφ; et Bζ Mv Oβ vel inequales] *om.* Rγ Sη; *interlin.* Vβ inequales] equales Cγ Kε Pδ; innaturales Dη cum fractionibus] *om.* Mo; *add.* signorum Vq quodlibet] quod Ev; quodlibet Eη Mv signum] *om.* Vq
- 9-10 vel ... regione] *cut off in marg., illeg.* Eμ
- 10 planeta] plura Mγ Pv; *add.* quelibet Kα; *add.* *interlin.* scilicet signa Vβ vel,] aut Kε Kι Qη; et Kδ vel quelibet] *om.* Fβ quelibet] que hoc *corr. in marg. to* quelibet Sκ; *add.* proportio~ Mv vel occidat] *om.* Vq occidat] descendat Rγ regione] *add.* Si autem scire volueris divide [*illeg.*] die per 12 Zα; *add. in marg.* hic deficiuntur 2 capitula Lζ¹⁰; *add. 8 lines* Cα

¹⁰ Actually the two missing capitula (30 and 31) as well as capitula 34 are found in the bottom margin of the previous folio.

you will have the equal hours; or if they [the degrees of the rising] are divided by the number of degrees of an unequal hour, it will show by how many natural or unequal hours with fractions, a given sign or planet or whatever portion [of the sky] rises or sets in whatever region.

[Comment:

To measure the rising (or setting) of a sign (or planet or any part of the sky) vis-à-vis the “oblique circle” (i.e., the horizon), set the beginning of the sign on the horizon (in the east) and note its position along the outer rim using the indicator-muri on the rete (at the beginning of Capricorn). Then move the rete so that the end of the sign, etc., crosses the horizon and then see how far the indicator-muri has moved along the rim. Do the same along the western horizon for the descent or setting of a sign.

To find the length of time for the rising or setting, divide the degrees of the point of rising by 15 to give the number of equal hours (and fraction thereof). Or divide the degree of the point of rising by the number of degrees in an unequal hour (for that day) to give the number of unequal hours (and fraction thereof).]

[CAPITULUM 30.] DE NOTICIA STELLARUM INCOGNITARUM POSITARUM IN ASTROLABIO

Ut habeatis noticiam stellarum incognitarum que posite sunt in astrolabio, sume

Cap. 30] *om.* Bη Cδ Cζ Eγ Eκ Λλ Mα Oη Oσ Pζ Qε Sθ Si Sλ Vα Vγ Vυ; *marg.* Eμ Lζ Sβ;

- 1 De ... astrolabio] *om.* Bγ Bδ Bε Bζ Bκ Cγ Cε Dδ Eα Eλ Eμ Eο Eυ Gα Kε Kι Lζ Mο Mτ Nα Oβ Oι Oν Pγ Pι Pξ Pσ Pφ Qη Qθ Rγ Sη Vν Vφ Wλ Xγ; *faded/illeg.* Eδ Eζ Eο Sβ; Ad cognoscendum stellas descriptas in astrolabio Vξ; Ad cognoscendum stellas descriptas in instrumento Mγ; Ad cognoscendum stellas positas in astrolabio Pτ; Ad habendum noticiam stellarum incognitarum Lμ; Ad habendum noticiam stellarum incognitarum in astrolabio Mλ; Ad habendum noticiam stelle ignote in astrolabio posite Bι (*add. in marg. c. 26*); Cognitio stellarum ignotarum in astrolabio positarum Kθ Po Qμ; De cognitione stellarum incognitarum Qδ Zα; De cognitione stellarum incognitarum que sunt in astrolabio Kδ; De cognitione stellarum ignotarum Pυ Vπ (*add. Rubrica*); De cognitione stellarum positarum in astrolabio id est in celo Oγ; De noticia habenda stellarum incognitarum Dη; De noticia stellarum Mπ; Inventio stellarum incognitarum in astrolabio Dγ Oφ Rα (*add. positarum*); Noticia stellarum incognitarum in astrolabio Wι; Noticia stellarum incognitarum in astrolabiis positarum Mυ; Noticia stellarum incognitarum per stellas notas in astrolabio Vο; Si vis agnoscere stellas ignotas positas in rethi Bβ; *add. in marg. 32* Wα; *add. in marg. 33^{us}* Qζ; *add. in marg. c. 33* Sδ De] *om.* Eτ Vι Wβ Mν noticia] cognitione Bθ Cι Mη Pδ Pθ Vψ positarum in astrolabio] *om.* Kα; Rubrica Bθ astrolabio] abstrolabio Pα; stralabio Pβ
- 2 Ut] Et Bθ Lβ Pξ; *add. autem* Mυ Mφ Vι habeatis] habeas Bι Dγ Eο Lε Mλ Mτ Nα Nγ Oτ Oζ Pφ Rγ Zα noticiam] *om.* Mτ; *rep. in marg.* Fβ; cognitionem Rγ stellarum] *add. and del. fixarum* Eα incognitarum] inconitarum Dγ; ignotarum Nα; *add. in quilibet regione* Dδ incognitarum que] *illeg.* Gα que posite sunt] positarum Bε Bκ Lζ Wβ astrolabio] abstrolabio Pα; asstrolapsu Mπ; stralabio Pβ
- 2-3 sume primo] post Pο

[CHAPTER 30.] ON KNOWLEDGE OF UNKNOWN STARS POSITIONED IN AN ASTROLABE

In order that you have knowledge of unknown stars which are positioned on an astrolabe, first take

primo altitudinem alicuius stelle note, et pone eam in almucanthat super similem altitudinem. Postea vide stellam quam volueris scire, super quantam altitudinem iaceat

- 3 primo] prius Mτ Qθ Pξ primo ... alicuius] *illeg.* Gα altitudinem] latitudinem Rα alicuius] *om.* Kδ Pξ Wλ; *add.* postea Qζ stelle] *om.* Pτ; *add.* tibi Dδ Gα Vφ(*interlin.*) note] nocte Cγ; in nocte Pγ; *add.* scilicet altitudinem qua est notissima(?) Stellarum qui est in fine thanus(?) Zα; *add. interlin.* per altitudinem Oτ note et pone] notate Pυ et] sed Eα eam] illam stellam notam Cα in] *om.* Cα; super Eμ almucanthat] *illeg.* Xγ; altitudine Eο; alencabuth Qη; aalmucantrach Sη; almi^{at} Qζ; almicantrath Mτ; almicantrach Kδ; almicantratz Bκ; almicanteras Cα; almicanth Pσ; almicanthat Eδ Zα; almicanthat Bβ Pο; almicanthatz Dη; almicantrat Kα; almicanat Oβ; almichanch' Mγ; almith Bε Kε; almi^{ath} Ki; almi^{that} Wλ; almu' Lμ; almu' Mπ; almucanc' Eμ; almucant' Dδ Eβ Fα Lη Lμ Qθ; almucantar' Rγ; almucantrach Bδ Mν; almucantarat Lζ Vν; almucantrath Bθ Eα Eλ Lγ Mδ Oγ Oι Oν Oφ Pφ Qμ Tδ Vβ Vφ; almucantath Eζ; almucant'ath Oυ; almucantherath Nα; almucanth' Bι Mλ Pγ Pδ Pθ Rα Sβ Vι Wμ; almucantha^{at} Pξ; almucanth^{al} Bζ; almucanthatrach Cι Eρ Pρ; almucanthatrat Lβ Oζ Sκ; almucanthatrach Eυ Fβ Fζ Lε Mο Mυ Oξ Pα Pμ Pν Pτ Qβ Qγ Qλ Vξ Vπ Wβ; almucanth'ath Bγ Cη; almucanthdrath Mφ; almucantherat Pυ; almucantherath Qδ; almucantl'ath' Wι; almucanthatrach Sδ; almucan Kθ; almu^{ch} Dγ; almucha Xδ; almucanthatrach Vψ; almucanth Cε; almucanthatrach Wα; almu^{rath} Eτ Pι; aluscantarath Pβ; almutantarat Vφ; almutantrach Mι Nγ; almutant' Mη; almutrantac Cγ similem] *om.* Eδ; consimilem Cα
- 3-7 in ... quam] *illeg.* Gα
- 4 altitudinem₁] *add. and del.* stelle note et pone Kδ Postea] *om.* Mο Postea ... altitudinem₂] *om.* Wβ vide] sume Eα; videas Mτ quam ... scire] de qua quere considera Cα quam] quamcumque Pι; *add.* margine Pφ scire] *om.* Cγ Dδ Oβ; *illeg.* Pι; *add.* in astrolabio Kε(*interlin.*) Kι Mτ Qζ Qη super] *om.* Wα; per Eρ Kα Kε Kι Mτ Qζ Qη Sβ altitudinem₂] latitudinem Fζ Rα

the altitude of any known star, and place it among the almucantars on [one of] a similar altitude. After this examine the star which you wish to know, on which altitude

5 inter almucanthat, et in qua parte sit, scilicet, in oriente vel occidente; quo viso, pone regulam in dorso astrolabii super eandem altitudinem, et verte illud astrolabium

5 inter] *om.* Eo Eτ; in Eδ Mτ Qδ; super Bδ Cγ Cε Cι Eα Eβ Eη Fα Fβ Kα Kδ Lβ Lε Lη Mδ Mη Mπ Nα Oι Oφ (*add. in marg. al' inter*) Qγ Qθ Qλ Sδ Sκ Oγ Oζ Pδ Oυ Pθ Pμ Pν Pφ Qβ Vι Wα Wμ Xδ Zα; *add. interlin. super* Vβ inter ... sit] *illeg.* Xγ almucanthat] *illeg.* Oν; alencabuth Qη; alm Eμ; almi^{at} Kε Qζ; almi^{ath} Kι; almicancrath Mτ; almicantarach Kδ; almicantarath Zα; almicantaraz Bκ; almicanteras Cα; almicanth Pσ; almicanthat Eδ; almicanthat Bβ; almicanthatz Dη; almicantrat Kα; almicat' Oβ; almichanch' Mγ; almith Bε; almithat Wλ; almu^{ac} Eo; almu^c Cε Mπ Oζ; almu^c Dδ; almu^candrath Mφ; almu^canrath Bθ; almu^cant' Eβ Lη Lμ Qθ; almu^cantaharath *corr. to* almu^canthat Eζ; almu^cantaht Lβ; almu^cantarach Bδ Mν; almu^cantarak Rγ; almu^cantarath Lζ Vν; almu^cantarath Eα Eη Eλ Fζ Lγ Mδ Nα Oγ Oι Pξ Qγ Qδ Qλ Vβ; almu^cant'ath Oυ; almu^canth' Bι Cι Mλ Pγ Pδ Pτ Rα Sβ Vq Wμ; almu^canthatrach Eq Pq; almu^canthat Bζ Pυ; almu^canthatrach Eυ Fβ Lε Mo Mυ Oξ Oτ Pα Pθ Pμ Pν Po Qβ Sδ Vπ Wβ; almu^cantha^t Tδ; almu^cantha^h Cη; almu^canth'ath Bγ; almu^canthatrach Oφ; almu^canth't Vι Wι; almu^cātac Cγ; almu^ch Kθ; almu^ch^{ch} Dγ; almu^ch^a Xδ; almu^ch^{nt}arath Vψ Wα; almu^ch^{ath} Eτ Pι Qμ Vξ; almu^ch^{nt}arath Pβ; almu^t Mη; almu^tantarath Vφ; almu^tanterach Mι Nγ et] etiam Bκ Lζ et ... scilicet] *add. 2 extraneous lines* Cα sit] *om.* Bε; sunt Qδ; mundi(?) Eλ; *add. sui* Bθ scilicet] *om.* Bδ Mτ Qζ; sive Dδ Kε Kι Mτ Pq; sive sit Eo; vel Cγ; *add. si* Bβ Eδ Eζ Mν; *add. sit* Bθ; *add. sive* Bζ Bι Dγ Eυ Nα Pι Pτ Pυ Rα Sβ Vβ Vq scilicet ... occidente] *om.* Eμ; sive scilicet sit in oriente Vπ in₂] *om.* Bε Pq vel] sive Bι Kε Kι Lβ (*interlin.*); sive in Bζ Dδ Mτ Nα Pι Pτ Qζ Qη Sη Vν Vq Vφ Xγ; *add. in* Bγ Cγ Eα Eo Eτ Eυ Lμ Mπ Mυ Mφ Nγ Oβ Oζ Pγ Pξ Po Pυ Qβ Sδ Vβ vel occidente] *om.* Bθ Lζ quo viso] qua visa Eη; quo facto Mτ

5-6 quo ... occidente] *om.* Eζ Eo

6 regulam] eam Cη Eτ Pγ Wι; eam *del. and add. interlin.* regulam Bγ; rigulam Nγ in] *om.* Kθ; *add. eo* Cγ astrolabii] *om.* Dη; abstrolabii Pα; astralabii Pβ astrolabii ... altitudinem] *illeg.* Xγ super] *add. latitudinem vel* Oβ super ... altitudinem] *om.* Bκ Dγ Eδ Eq Lζ Mν Po Qμ Rα Sβ; *marg.* Bι Vφ; super suam altitudinem Mλ (*marg.*) super ... verte] *om.* Eζ eandem₁] *om.* Pδ; iiiitam Bβ; illam Bδ Bε Cα Cγ Cε Dγ Eα Eβ Eη Eμ Fα Fβ Fζ Kα Kδ Lβ (*add. interlin. eodem*) Lγ Lε Lη Lμ Mδ Mη Mι Mπ Mυ Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pq Pφ Qβ Qγ Qθ Sδ Sκ Tδ Vι Vψ Wα Wμ Xδ Zα; similem Pι; suam Mλ; *add. interlin. illam* Vβ et] *add. suspenso astrolabio* Bζ Bθ Eλ Eo Eυ Mγ Pτ Vν Vπ Wλ Xγ; *add. [illeg.] fixa* Pι et verte] et non verte Pν Xδ; et sivō Mι Nγ; verteque Bκ Lζ verte] *marg.* Pι verte illud] verte regulam et verte regulam Kε illud] *om.* Bε Cα Wμ Zα; id Rγ; idem Pγ; regulam Kι Oβ Qζ Qη astrolabium] *om.* Bγ Bζ Bθ Bι Bκ Cη Dγ Dδ Eδ Eζ Eλ Eμ Eo Eq Eτ Eυ Gα Kε Kθ Kι Lζ Mλ Mν Mo Nα Oβ Oν Pγ Pι Po Pτ Pυ Qδ Qζ Qη Rα Rγ Sβ Sη Vν Vξ Vπ Vq Wβ Wλ; *interlin.* Vβ; abstrolabium Pα; astrolabium Pβ

among the almucantars it lies and in what part it is, that is, in the east or in the west;
having seen this place the rule/alidade on the back of the astrolabe on the same altitude,
and turn this astrolabe

ad eadem plagam celi in qua accepisti stellam; et maior stella quam vides per foramina regule ipsa est quam queris.

- 7 ad] per Mτ; super Qη eandem₂] *add.* partem Mυ plagam] per longam Mτ
 celi] *om.* Eμ Mι qua] quo Pφ; *add.* parte Vπ accepisti ... stella] *illeg.* Xγ
 stellam] altitudinem stelle Pθ; *add.* et almucantarath Eλ; *add.* ignotam Kε Kι Mτ Oβ
 Qζ Qη; *add.* quam queris Pι; *add.* in qu~ [*illeg.*] est astrolabio Zα et] *add.* etiam Fβ
 maior stella] *illeg.* Cα; maiorem stellam Kι Mτ Qζ Qη vides] videbis Rγ
- 8 regule] *om.* Bζ Cγ; rigule Nγ; tabule in regula Rγ; *interlin.* Kε (*add.* and *del.* vides)
 ipsa] *om.* Pδ; illa Cγ Dη Eα Fα Fβ Fζ Kα Lε Lβ Lη Mδ Mπ Mυ Mφ Oζ Oι Oξ Oτ Oφ
 Pα Pβ Pμ Pν Pξ Pθ Pσ Qγ Qθ Qλ Sδ Tδ Wα Wμ Xδ Zα; illa stella Pφ Qβ; ille Bδ Dδ Eβ Eη
 Oυ Vβ; stelle Mη ipsa est] *interlin.* Qμ; est illa est illa Lγ; *add.* stella Bζ ipsa ...
 queris] est illa quesita Oγ queris] *add.* [*illeg.*] fit per solem ad eius ortum et occasum
 Cα

to the same area of the sky in which you have observed the star; and the larger star which you see through the pin-holes of the rule is the very one you seek.

[Comment:

If you find a star engraved on the rete of an astrolabe which you do not recognize, observe in the sky the altitude a star you do know. Plot this star on the rete (it may already be there) along the almucantar of the appropriate altitude. Then compare the unknown star with this, as to its altitude and whether it is east or west of the known star.

Setting the alidade on the back of the astrolabe to the altitude of the unknown star, look through the pin-holes at the part of the sky that it should be in (i.e., east or west of your known star), and the largest star you then see through the pin-holes (at that altitude and in that region) will be the unidentified star in the rete. (By examining the constellation in the sky in which the unidentified star is found, you should be able to figure out which star it is.)]

[CAPITULUM 31.] DE COGNITIONE STELLARUM INCOGNITARUM NON POSITARUM IN
ASTROLABIO

Scire volens gradum stelle ignote in astrolabio non posite vel planete, expecta

Cap. 31] *om.* Bη Cδ Cζ Eγ Λλ Mα Oη Oσ Pζ Qε Sθ Sλ Vα Vγ Vv; *marg.* Eμ Lζ Sβ Si

- 1 cognitione] noticia Cη Eη Mδ Mo Qβ positarum] *om.* Pι
- 1-2 De ... astrolabio] *om.*: Bγ Bδ Bε Bζ Bκ Cγ Cε Dδ Dη Eα Eκ Eλ Eμ Eο Eυ Gα Kε Kι Lζ Mι Mτ Nα Nγ Oβ Ov Pγ Pι Pξ Pσ Pφ Qη Rγ Sη Vv Vφ Wλ Xγ; *faded/illeg.* Eδ Eζ Eο; Ad cognoscendum stellas non descriptis in astrolabii Vξ; Ad habendum gradum stelle ignote in astrolabio non posite Mλ; Ad inveniendum gradum stelle ignote Qθ; Ad noscendum stellas non descriptis in instrumento Mγ; De cognitione stellarum fixarum in quo gradu non positarum in astrolabio Cα ; De cognitione stellarum incognitarum non(*interlin.* Lε) positarum in astrolabio Fβ Fζ Lβ Lγ Lε Lη Mφ Oγ Oζ Oξ Pβ(astralabio); De cognoscendum gradum stelle non descripte in astrolabio Pτ; De gradu stelle ignote Mπ; De gradu stelle in astrolabio non posite Eτ Mv(*add. illeg./faded*) Wβ; De gradu stelle in astrolabiis non posite vel de cognitione stellarum incognitarum non positarum in astrolabio Mv Vi; De gradu stelle posite in astrolabio Wi; De inveniendum gradum stelle ignote in astrolabio non positione Lμ; De stellis ingnotis cognoscendis Bθ Pv Vπ(*add. Rubrica*); De vero motu stellarum Zα; Inventio gradus stelle in astrolabio non posite Dγ Oφ Rα Sβ(*marg.; add. C° 31*); Inventio stelle ignote in astrolabio non posite Bι(*add. in marg. c 28*); Noticia gradus stelle vel planete ignoti Vο; Scientia stellarum ignotarum in astrolabio non positarum Kθ Q; Si vis scire gradum stelle in astrolabio non posito Bβ; *add. in marg. 33 Wα; add. in marg. 34^{us} Qδ; add. in marg. c. 34 Sδ*
- 2 astrolabio] abstrolabio Pα
- 3 Scire volens] Et si scire velles Bι; Scire volueris Qδ; Si desiderare volens Cα; Si forci(?) scire volueris Pο; Si scire velis Lε; Si scire vis Kε Kι Mτ Qζ; Si scire volens Eδ Eζ Pο; Si scire volueris Mι Nγ Qη Tδ Wβ; Si vero vis scire Dη; Si vis scire Eκ Scire ... gradum] *om.* Bι gradum] *om.* Bζ; grande Bθ ignote] insignite Pφ; *add. interlin.* vel incognite Vβ in] per Cε astrolabio] abstrolabio Pα; astralabio Pβ non] *om.* Eο; ut. Pφ posite] imposita Oγ expecta] *interlin.* Oφ; especta Bζ; expectabis Pο; exspecta *many*

[CHAPTER 31.] ON KNOWLEDGE OF UNKNOWN STARS NOT POSITIONED IN AN ASTROLABE

When wishing to know the degree of an unknown star or planet not positioned in an astrolabe, wait

5 donec ille planeta vel stella sit in meridie. Deinde visa aliqua stella cuius locum pro certo scias et astrolabio insignita, secundum eius altitudinem rethe dispone, ponendo stellam inter almucanthat super similem altitudinem; et in directo gradus signorum

- 4 donec ... vel] *illeg.* Xγ ille] *om.* Dη Ev; illa¹¹ *many*; ista Kε Kι; iste Bδ Gα Nα Pτ planeta vel] *om.* Bζ Eo Mγ vel] *om.* Dγ Mλ; in Pγ vel stella] *om.* Pα; *interlin.* Pσ sit] fuerit Lμ Oφ Qθ sit ... stella] *interlin.* Oφ in meridie] *om.* Pμ meridie] oriente vel meridie Eα; *add.* in altitudine maiori Dδ Deinde] de illis Bβ; *add. interlin.* videndo per foramina Vξ aliqua] *om.* Eo Qδ; *corr. from* aliquam Sκ; alia Bκ stellae₂] *marg.* Rα; *add.* quam vides Cι cuius] eius Bβ
- 5 scias ... insignite] *illeg.* Xγ et] in Bδ Bε Bκ Cα Cγ Eβ Eη Eλ Eμ Fα Lβ LεMδ Mτ Mυ Mφ Nα Oζ Pβ Pμ Pρ Pσ Qβ Qλ Sκ Vι Vξ Vρ Vψ Wα Wβ Xδ Zα; que in Lζ; *add.* in Oτ astrolabio] abstrolabio Pα; stralabio Pβ insignite] *om.* Wμ; *infigura expunged* Oξ; *inscripta* Kε Mτ Qζ Qη; *insignita* Bδ Bε Dδ Fβ Fζ Kα Lζ Mδ Mπ Mυ Mφ Nγ Oγ Oτ Ou Oφ Pα Pβ Pδ Pθ Pμ Pν Pξ Pρ Pφ Qβ Qγ Qζ Qθ Sδ Sκ Tδ Vι Vψ Wα Wλ Xδ Zα; *insignito* Mo Pι; *signata* Nα Vπ; *signate* Bβ Dη Eλ; *del. and add.* signata Bγ altitudinem] *corr. to* latitudinem Vβ; latitudinem fac Wλ eius] *om.* Dγ Eλ Lγ Mπ Mτ Nα Oζ Oξ Pδ Pι rethe] recte Bζ; rete *some* dispone] *disposita corr. to* dispone Oτ; *add.* rethe Bζ; *add.* scilicet Pι ponendo] movendo Wμ; pone Kα Lγ
- 6 stellam inter] *om.* Mτ inter] *om.* Pν Xδ; et super Mη; in des inter super Cε; super Bδ Cγ Cι Dδ Dη Eη Fα Kδ Lβ Lγ Lη Mι Mυ Nα Oζ Oτ Oφ(*add. interlin* al' inter) Pβ Pδ Pθ Pμ Pξ Pρ Pσ Pφ Qβ Qγ Qδ Qθ Sδ Sη Vι Vψ Wα Wβ Wμ Tδ Zα; super id est inter Kα; *add. interlin.* super Vβ; *ms* Rγ *ends inter ... similem] illeg.* Xγ almucanthat] *illeg.* Gα; alencabuth Qη; alcantharath Eζ Po; almi^{at} Kε Kι Qζ; almicanth' Mγ; almicantharath Kδ; almicantharat Zα; almicantharaz Bκ; almicanteras Cα; almicanth Pσ; almicantharatz Dη; almicantha'th Bβ; almicantrath Mτ; almi^{rat} Eα; almit' Oβ; almi^{that} Wλ; almu^{ath} Qμ; almu^c Cε Dδ Mπ; almucancarath Sη; almucanthe' Ev; almucant' Eβ Lβ Lη Lμ Oζ Pθ Qθ; almucantarath Bδ Mν; almucantarath Ek Lζ Vν; almucantarath Bι Bθ Eα Eη Eλ Fζ Mδ Nα Oγ Oι Pφ Vβ Vρ Vψ; almucanthe' Cι Fα Mλ Pγ Pδ Pτ Rα Sβ Wμ; almucanthatrach Eρ Pρ; almucanthatrat Bζ Pυ Sκ; almucanthatrath Bγ Ev Fβ Lε Mo Mυ Oξ Oτ Ou Pα Pμ Pν Qβ Qλ Sδ Vπ Wβ; almucanthath Tδ; almucanthat Eτ; almucanthatrath Mφ; almucanthatrath Oφ; almucanthatrath Ov; almucanthe't Vι Wι; almucanthat Kα; almucanthe Kθ; almu^{chv} Dγ; almucanthe Xδ; almucanthatrath Qδ; almucanthatrath Wα; almucanthatrath Cη; almu^{rath} Pι Qγ Vξ; almucanthatrath Pβ; almutantarath Vφ; almutantherath Mι Nγ; almutanthe' Mη; almuth Bε; almuth Eo; almu^{tra} Pξ; almu^{trath} Cγ in] *om.* Cη Ek Wι; *interlin.* Bγ Sκ in directo] edirecto Eτ; sã directo illius Cα gradus] gradu Bθ signorum] *om.* Kε(*add. in marg.* signorum et gradus); *add.* et gradus Kι Mτ Oβ Qζ Qη similem] *add.* suam Pι

¹¹ *Planeta, -ae* is masculine in classical Latin but medieval scribes sometimes treated it as feminine because it is a first declension substantive.

until this planet or star is on the meridian. Then observe some star whose position you know for certain and has been marked on the astrolabe, set in the rete according to its altitude, placing the star among the almucantars on a similar altitude; and in line with the degree of the signs

qui erit in linea medii celi erit stella de qua dubitas, et est longitudo eius nota; latitudo patet, computatis almucanthat a nota illius altitudinis usque ad equinoctialem. Potes

- 7 qui] et Pξ qui erit] *del. and add. interlin.* extitis Bγ erit₁] est Dη Kα Wβ
 linea] *om.* Bζ; libra Bβ linea medii] medio Eμ medii celi] *om.* Wμ
 celi] *om.* Eκ stella] gradus stelle Kθ Mv Mφ Vι de ... eius] *illeg.* Xγ
 qua] *om.* Cε dubitas] dubitabas Bβ Cγ est] *om.* Mτ Oβ Vβ; erit Pι Oφ sic
 erit Dη longitudo] *add.* celi Bζ eius] *om.* Bε Dδ Eη Kα Lμ Mv Mφ Oγ Oτ Pα
 Qθ Qμ Vι eius nota] *om.* Bβ; *add.* 2 lines Eρ eius ... latitudo] *om.* Eζ nota]
add. qui tunc est in linea medii celi Wλ latitudo] *om.* Kα; illa latitudo Vξ; *add.* autem
 Bε Zα; *add.* eius Eλ Eμ Oβ Zα; *add.* nota Mδ; *add.* vero Mo
- 7-8 et ... equinoctialem] *om.* Cα latitudo ... equinoctialem] 4.5 semi-legible lines Gα; 5.5
 lines Pι; 6 lines Oβ; 7 lines Qη; 8 lines Qζ; 8.5 lines Kε Vφ; 7 lines Kι; 9 lines Mτ
- 8 computatis] computando Lβ Mγ Nγ Oγ Ou Pδ Pρ Qβ Qγ Wβ; computaris Mγ
 almucanthat] *illeg.* Eβ Xγ; almicantarach Kδ; almicantarath Zα; almicanth Pσ;
 almicanthar' Dη; almicantharath Bβ; almichanch' Mγ; almi^{rat} Eδ; almi^t Bκ; almith Bε;
 almi^{that} Wλ; almuc' Cε Dδ Lμ Mη Mπ; almucan^{ath} Pξ; almucancarach Sη; almucant' Eκ Eμ
 Fα Lη Oζ Pθ; almucan^{tam} Dγ; almucantarath Vv; almucantarath Bθ Bι Eλ Fζ Fγ Mδ Nα Oγ
 Oι Oξ Oτ Pφ Qδ Vβ Vρ Vψ; almucantarh^a Eη; almucant'at Qθ; almucanth' Cι Lβ Mλ Pγ
 Pδ Pτ Rα Sβ Wμ; almucanthatrach Eρ Pρ; almucanthatrat Bζ Pυ Qγ Sκ; almucanthatrath Eζ
 Eτ Eυ Fβ Lε Mo Mv Ov Pα Qλ Sδ Pμ Pν Qβ TδVξ Vπ Wβ; almucanth'ath Bγ Cη;
 almucanthdrath Mφ; almucanth't Wι; almucanth'th Vι; almuch Bδ Kθ; almucha Xδ;
 almuchantarath Ou; almuchanthatrath Wα; almu^{rat} Qμ; almurath Mv Po; almuscantrach
 Pβ; almut' Lζ Oβ; almutanterach Mι Nγ; almuth Oφ; almuth Eα; almuth^{ar} Eo; almutrātac
 Cγ nota] *add. interlin* al' numero Vβ illius] alius Wβ; similitudinis Eo Mγ Vv;
add. est almucnthatrach a nota illius Pρ altitudinis] latitudinis Lμ Mv Rα Xδ; *add.*
 scilicet(?) stelle incognite Zα usque ad] ad Mι equinoctialem] *add.* 4 lines Eρ
 Potes] Nota et Potes Vφ; Postea Fβ; Poteris Kε Mτ; Similiter potes Mv Mφ Vι
- 8-9 computatis ... eius] *om.* Kα ad ... occasum] *illeg.* Xγ

which will be in the line of the middle of the sky will be the star about which you have doubts, and its longitude is marked; its latitude is obvious, the almucantars having been counted from the mark of this altitude unto the celestial equator. As well you can

10 etiam per occasum solis rethe disponere, si nullam stellam cognoveris. Et sic cognosces omnes stellas.

- 9 etiam] *om.* Kε Lβ Oβ Qζ per] *om.* Pq occasum] locum Eα; occasionem Dγ
 solis] *add.* per Lβ rethe] *om.* Nα; recte Bζ; recthe VQ; rete *some*; *add.* tuum Bβ
 Bγ Bδ Bζ Bη Cδ Cε Cζ Cη Eβ Eγ Eδ Eκ Eλ Eο Eτ Fβ Lε Lκ Oυ Vξ Wι Wλ disponere]
 deponere Eυ; disponeas Oγ si nullam] per simillam VQ nullam] *om.* Dδ
 stellam] *om.* Bζ Eλ cognoveris] noveris Gα; *add.* tu Sη et sic] et^c Eυ Kε
 Zα; 2° Oβ sic] si Vψ; *add.* quoque Bζ cognosces] *add.* tu Vβ
- 10 omnes] *om.* Mπ; inemēē Nα stellas] *om.* Bε; *add.* fixas et alias item Bκ; *add.* in rethe
 positas Bβ; *add.* 2.5 lines Zα

set on the rete by the setting of the sun, if you know no star. And so you will know all the stars.

[Comment:

If you find a star which you do not recognize and is not engraved on the rete of an astrolabe, observe its altitude in the sky when it is on the meridian line. Then having observed at that same time some star which you do know (and is engraved on the astrolabe) set the rete so that this known star is on its appropriate almucantar. Then the unknown star will be on the centre-line of the astrolabe, and you can read its "longitude"¹² along the ecliptic where the ecliptic crosses the centre line. Its latitude is found by counting the almucantars from the equatorial circle up to the altitude observed.

If there is no star visible that you know, you can set the rete according using the the point where the sun sets that day.]

¹² This actually mediation, the point on the ecliptic which crosses the meridian at the same time as the star.

[CAPITULUM 32.] AD SCIENDUM IN QUO GRADU SIGNI LUNA SIT

Cum in quo gradu signi luna sit scire volueris, altitudinem lune considera; et

Cap. 32] *two versions* Cζ₁ Cζ₂

- 1 Ad ... sit] *om.* Bγ Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eο Eυ Gα Kε Kι Mα Mτ Nα Oν Oσ Oυ Pγ Pδ Pι Pξ Pσ Pφ Qε Qζ Qη Sη Sθ Sι Sλ Vα Vν Vυ Vφ Wλ Xγ; *faded/illeg.* Eδ Eζ EQ; Ad habendam lunam in quo signi Vξ; Ad inveniendum gradum signi in quo est luna Qθ; Ad inveniendum in quo gradu sit luna Vι Wι; Ad sciendum locum lune Dη; De gradu lune et planitarum Bη(*add. in marg.* 29) Cζ₁ Cζ₂ Eμ(*add. in marg.* 30^{us}) Oη Pζ(*marg.*); De(27. De Lγ) gradu lune et planitarum in signis Lλ Vγ; De loco lune inveniundo, Rx Qδ; De loco lune vel cuiusvis planete Zα; In quo gradu lune sit luna Mν; In quo gradu signi sit luna vel planeta Mγ Pτ; In quo signo sit luna Mπ; Inveniundo in quo gradu signi sit luna Eτ; Inventio gradus lune VQ; Inventio gradus signi lune vel alicuius planete Dγ Oφ Rα Sβ(*marg.*; *add.* c. 33); Qualiter inveniatur in quo gradu signi luna sit PQ; Regula ad sciendum in quo gradu signi sit luna Bι; Si scire volueris in quo gradu signi(!) sit luna Bβ; *add. in marg.* 34 Wα; *add. in marg.* 35^{us} Qζ; *add. in marg.* C° 35 Sδ; *add. in marg.* Hec regula subponit quod nulla sit latitudo lune quod raro est. Vel in directo eius erit gradus eius per circulum denotatus transiens per polos orbis signorum Vβ Ad] *om.* Mλ sciendum] inveniendum Lμ Wβ signi] *om.* Bθ luna] *om.* Fζ sit] *om.* Po; *add.* Rubrica Vβ Vπ; *add.* Rx Cη Mo Pμ
- 2 Cum] Si Cα; *add.* autem Bκ; *add.* igitur Oφ signi] *om.* Oβ Pσ Qε; *interlin.* Lζ signi ... sit] fuerit sic luna Wβ luna] alius planeta luna Vβ; stella Cη sit] *add.* vel planeta Zα volueris] desiderans Qθ; desideras Bκ Dδ Eκ Eτ Lζ Lμ altitudinem] altitudines Bζ lune] *om.* Dδ Eγ; *corr. interlin from linee* Sκ considera] *om.* Lβ; accipe Cα et] *add.* pone Mα Qη
- 2-3 et ... in,] in parte PQ et ... parte] et eam in almucath in parte in qua fuerit nota. Utramque altitudinem accipe, scilicet lune, alicuius stelle in nocte eodem hora Sκ(*marg.*; *later hand*)

[CHAPTER 32.] TO KNOW IN WHICH DEGREE OF A SIGN THE MOON IS

When you wish to know in which degree of a sign the moon is, determine the altitude of the moon; and

eam in almucantherat in parte in qua fuerit nota; deinde stellam aliquam in rethi constitutam super altitudinem suam in eadem hora cum altitudine lune acceptam, in

- 3 almucantherat] *illeg.* Eγ Xγ; alencabuth Qη; almi^{at} Kε Kι Qζ; almicancrath Mτ; almican^{rat} Bκ; almicantrach Kδ; almicantarar Zα; almicantarath Bβ; almicantaraz Cδ Oη; almicanteris Cα; almicanth Pσ; almicanther' Dη; almichanch' Mγ; almi^{rat} Eδ; almi^{rath} Gα; almit' Oβ; almith Bε; almi^{that} Wλ; almuc' Cε Mπ Pθ; almucan^{at} Bη; almucan^{ath} Pξ; almucancarach Sη; almucant' Fα Lμ Oζ; almucantarar Cζ₂ Pζ; almucantarath Bθ Bι Fζ Lγ Lλ Mδ Nα Oγ OιOν Oτ Qγ SβVβ Pφ Vα Vν Vρ Vψ; almucantaraz Cζ₁ Oσ; almucanterath Qδ; almucanth Dγ Oφ; almucanther' Eβ Eη Lβ Lη Mλ Pγ Pδ Pτ Rα Wβ Wμ; almucantherach Eρ Pρ; almucantherat Wι; almucanther'arat Bζ; almucantherath Eτ Eυ Fβ Lε Mο Mυ Oξ Oυ Pα Pμ Pν Pο Pυ Qβ Qλ Sδ Tδ Vπ; almucantheraz Eμ Mα; almucantherath Cι; almucanther'ath Bγ Cη; almucantherdrath Mφ; almucanther'th Vι; almucantherat Kα; almucantherat Qε; almucanther'at Eκ; almucanther Kθ; almu^{ch} Bδ; almucantherath Xδ; almucantherat Wα; almucanther^{at} Eο; almu^{raz} Lζ; almu^{rath} Pι Vξ; almu^{scantarach} Pβ; almu^t Dδ Mη; almutantherach Sι; almutantherat Vφ; almutantherath Mν; almutantheraz Vυ; almutantherach Mι Nγ; almuth Eα; almu^{rath} Cγ in parte] *om.* Eη Oγ OτPρ; *marg.* Pι in₃] *om.* Oη Pζ Sβ Sλ Vα Vγ Vξ Xδ; de Mπ fuerit] *sint / fuit* Oυ Pμ; *sit* Bε Pρ; *add.* luna Cα; *add.* Si fuerit in parte occidentali vel orientali Sι nota] *om.* Bζ deinde] *rep.* Vυ; *add.* capias altitudinem Cα stellam] *om.* Bβ; *add.* fixam Cα aliquam] *illeg.* Oξ; *aliam* Vα; *alteram* Vυ in₄] *om.* Bη Bκ Cγ Cζ₂ Eγ Eμ rethi] *recte* Vα; *rete some*; *rethe* Bκ Cα Nγ Oφ Pν Pτ Sι; *rethe in rethi* Oν
- 3-5 nota ... fuerit] *om.* Pγ
- 4 constitutam] *statuatur* Cε; *statuta* Nγ; *statutam* Bδ Cι Dη Eα Eβ Eη Fα Fζ Kα Kδ Lβ Lγ Lε Lη Lμ Mδ Mη Mι Mπ Mυ Mφ Oγ Oζ Oι Oσ Oτ Pβ Pδ Pθ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qθ Qλ Sδ Sκ Tδ Vι Vψ Wα Xδ Zα; *centrum illius stelle in almicanthers Cα super] add. similem Pι altitudinem] altitudines Bζ; ms Wα inserts a list (fol. 90v) of latitudes and longitudes of various cities suum ... altitudine] rep.* Eλ in ... hora] *ei* Bθ hora] *om.* Mν Vπ cum] *interlin.* Vπ cum ... lune] *om.* Cα suum] *add. interlin.* id est stelle Vβ lune] *linee* Oβ acceptam] *accepta* Bζ Cζ₁ Cζ₂ Dη Eλ Eμ Eο Kι Lλ Mτ Nγ Oη Vγ; *acceptum* Rα; *add.* in qua accipiebatur altitudo sume Cα

mark it in the almucantars in the part in which it is [i.e., east or west]; then place some star in the rete located on its altitude measured in the same hour as the altitude of the moon [was measured], in

5 parte qua fuerit, pone; et gradus circuli zodiaci qui ceciderit inter almucanthat super notam altitudinis lune, erit gradus lune. Si autem apparuerit in die, idem facies cum

- 5 parte] *add.* in Bβ Bζ Cα Dδ Fζ Gα Kα Mo Nα Oφ(*interlin.*) Pδ Pι Qη Sη Vq Vψ Zα
 qua] *om.* Lγ fuerit] *add.* illa stella Pφ Oφ; *add.* parte Vψ pone] nota Dη
 et] duos Nα; tunc Cα; *corr. from* in Sκ et ... almucanthat] *om.* Bβ
 gradus] signum gradum Qζ circuli] *om.* Cα Cγ Dη Qη zodiaci] *om.* Eγ;
 zodiaci Nγ; zodiaci Bδ; zodiaci Fβ Wι qui] et Pξ; que qui Pθ ceciderit] fuerit et
 ceciderit Mδ; occidit Mτ inter] in Bδ Bε Bκ Cδ Cε Cζ₁ Cι Eβ Fζ Lβ Lε Lλ Mδ Mι Mπ
 Mτ Oγ Oφ Pδ Pμ Pν Pq Pσ Pφ Qε Qθ Sη Sκ Vv; in altitudine Fβ; super Dη
 almucanthat] *illeg.* Xγ; alencabuth Qη; almi^{at} Kε Kι Qζ; almicancrath Mτ;
 almicantarach Kδ; almicantarath Zα; almicantaraz Cδ Oη; almicanteras Cα; almichanch'
 Mγ; almi^{rat} Eδ Gα; almi^{raz} Bκ; almith Bε Pσ; almi^{that} W; almu^{ath} Qμ; almuc' Cι Mπ Mη;
 almucancarach Sη; almucant' Fα Lμ Oζ Pθ Qθ; almucantararat Pζ; almucantarath Qε Sθ
 Sλ; almucantarath Bθ Eλ Eν Fζ Lγ Lλ Mδ Nα Oγ Oι Oν Pα Pφ Qγ Qδ Sβ Vα Vβ Vν Vψ;
 almucantaraz Cζ₁ Cζ₂ Oσ; almucant'at Eκ; almucanth' Bι Dγ Eβ Lη Mλ Pγ Pδ Pτ Rα Vι
 Vq Wμ; almucanthat' Dη; almucanthatrach Eq Pq; almucanthat Bζ Mα Sκ;
 almucanthatrach Bγ Cη Eη Fβ Lε Mo Mν Oξ Oτ Oυ Pμ Pν Qβ Qλ Sδ Tδ Vπ Wβ;
 almucanthatrach Eμ; almucanthatrath Mφ; almucanthat Pυ; almucanthatrath Oφ;
 almucanthat' t Wι; almucanthat Kα; almuc^{at} Bη; almu^{cat} Eγ; almuc Kθ; almuc^h Bδ; almucha
 Xδ; almucrū Cε; almutantarach Sι; almuka^{ath} Pξ; almu^{rath} Eζ Eτ Mν Pι Po Vξ;
 almuscantarach Pβ; almu^t Dδ Oβ; almutantarath Vφ; almutanterach Mι Nγ; almutanteraz
 Vυ; almuth Eα; almuth^{ac} Eo; almutrātac Cγ; altmchanthat Wα super] *rep.* Qδ
- 6 notam] *om.* Bγ Cη Eκ Eτ Pγ Wι altitudinis] altitudinem Cη Eκ Kι; altitudinem *corr.*
in marg. to notam altitudinis Bγ; latitudinis Oη Rα lune₁] *om.* Xγ; linee Mτ; *corr. from*
 nota Kε; *add.* note Oβ; *add.* sol Cζ erit] eritque Cι; est Mτ; et Kα Pγ erit ...
 lune₂] *om.* Qβ Wλ; *marg.* Pθ; sol Cζ₁ Cζ₂ lune₂] *om.* Bζ Bι Dγ Eδ Eζ Eo Eq Gα Mγ Mν
 Mo Nα Qμ Rα Vν Vq; *interlin.* Qδ; eius Bη Bθ Cγ Cδ Eγ Eλ Eμ Eν Lζ(*add. interlin.* lune)
 Lλ Mα Oν Oσ(*add. interlin.* scilicet lune) Oφ Pζ Pι Pφ Qε Sθ Sι Sλ Vα Vβ Vγ Vπ Vυ; eius
 scilicet lune Bκ; solis Oη; *add. in marg.* Si luna non habeat latitudinem Bγ autem] *om.*
 Sι; *add.* luna Cα; *add. interlin.* scilicet luna Vβ apparuerit] apparuit Cη; *add.* luna Sι
 in die idem] idem in die Sι; in dictionem Nα idem] *om.* Eo; illud Dη
 facies] fac Mτ Qζ; facias Lμ

6-7 cum altitudine] *om.* Pσ Qθ

the part which it is; and the degree of the circle of the zodiac which falls between the almucantars on the mark of the altitude of the moon will be the degree of the moon. If however it appears in the daytime, you will do the same with

altitudine illius et altitudine solis. Considera igitur cuius signi sit gradus. Idem¹³ poteris quoque eodem modo planetarum loca investigare, si eorum altitudinem in nocte poteris notare.

- 7 illius] *illeg.* Gα; eius Pι Sθ Zα; eius in die Dη; ipsius Oβ Wλ; istius Kε Qη; *add.* lune Pδ; *add. interlin.* scilicet lune Vβ illius et altitudine] *om.* Kα Mτ illius ... idem] *marg.* Qδ et] *add.* cum Eλ et altitudine₂] *rep.* Pι altitudine₂] altitudinem Mτ; *corr. from* latitudine Sθ solis] *om.* Wλ Considera ... gradus] *om.* Cα Pι igitur] *om.* Bη Cγ Eγ cuius signi] *interlin.* Vφ signi] *om.* Mι Nγ; *add.* idem Dδ sit] *add.* ille Bε sit ... idem] sic idem gradus. Vυ; s it idem gradus. Bθ Bκ Eτ Eυ Lζ gradus] *add.* eius et habebis quod queris per Oβ; *add.* iste et habebis quod queris per Kε Kι Qζ; *add.* sit iste et habebis quod queris per Mτ Idem] *om.* Bε Cα Cδ Cζ₁ Cζ₂ Dδ Dη Kδ Lη Oη Pβ Pι Vα Vγ Vξ; *erased* Bγ; iste et habebis quod queris per illud Qη poteris] *add.* idem VϞ
- 8 quoque] *om.* Kδ Kε Kι Oγ Pφ Qζ Qη; et Wβ; -que Dδ Pβ; etiam Cα; *add.* in Lλ Qγ Vγ quoque ... modo] *om.* Mτ eodem modo] eodem mē modo Mη; modo Bε; per idem Bι VϞ; *add. interlin.* aliarum Bγ Cα planetarum] pl'a Dγ loca] *om.* Eλ; locum Mα investigare] *marg.* Sβ si] sic Mo si eorum] et Bζ; eorum Eο; si earum *some*; si hororum Wβ altitudinem] altitudines Lλ Mα Sθ Sλ; *add.* eorum Eλ in] etiam. Bζ in nocte] *om.* Eυ Sι Vπ poteris] *add.* invenire vel Kε Kι Mτ Qζ
- 9 notare] invenire Cα Pσ; *add.* sequitur Bβ; *add.* [*illeg.*] hec regula non est omnis vera quando scilicet luna habet latitudinem ad eclipta Dδ

¹³ Scribes are undecided as to whether *idem* begins the next sentence or finishes the proceeding one; sense can be made for either reading. But *idem* beginning a sentence is more normal than ending one.

its altitude and the altitude of the sun. Therefore consider of which sign is the degree. Likewise you will also be able to discover in the same way the location of the planets, if you will be able to measure their altitude at night.

[Comment:

In order to determine in which degree in which sign the moon (or a planet) is, measure the altitude of the moon and at the same time the altitude of a nearby star (a star which is engraved or marked on the rete of the astrolabe). Then set the rete by positioning the star on the appropriate almucantar (either to the east or the west according to the observation), and then read on the ecliptic the sign and degree where the ecliptic crosses the almucantar of the moon. Again choose the sign according to whether the moon is to the east or to the west. This will be the position of the moon vis-à-vis the ecliptic.]

[CAPITULUM 33.] DE LOCO LUNE INVENIENDO

Cum in quo gradu signi sit luna scire desideras, quot dies habeat mensis lunaris

Cap. 33] *om.* K₁ L₁ O_v P₁ S₁ W₁; *in bottom marg. with insertion mark* K_ε; *two versions* C₁ C₂ O_{φ₁} V_{φ₂}(*bottom marg.*)

- 1 De ... inveniend] *om.* B_γ B_δ B_ε B_ζ B_κ C_α C_γ C_δ C_ε D_δ D_η E_α E_γ E_κ E_λ E_ο E_υ G_α K_ε L_ζ L_η M_α M_τ P_γ N_α O_β O_σ P_v P_ξ P_σ P_τ P_φ Q_ε Q_η S_η S_θ S_ι V_α V_v V_υ V_{φ₁} W_λ X_γ; *faded* E_δ E_ο; Ad inveniendum in quo signo sit(*add.* sol E_ζ) luna E_ζ K_θ P_ο Q_μ V_ξ; Ad sciendum in quo gradus signi sit luna L_ε T_δ; Ad sciendum in quo signo sit luna V_γ; Alia regula in quo signo sit luna B_ι(*add. in marg.* C. 34); Cum vis scire in quo sing(= signo) sit luna B_β; 31. Cum volueris scire in quo signo sit luna L_λ; De gradu signi lune Z_α; De eodem loco lune inveniend] V_π; De eodem scilicet loco lune inveniend] P_v; De(Cap. 40 De S_β) inventione loci lune per etatem eius D_γ R_α S_β(*marg., later hand*); De loco lune per regulam compt~M_λ; De notitia in quo gradu sit luna O_{φ₁}; De signis lune P_ζ(*marg., later hand*); Eodem loco inveniend] lune B_θ; In quo signo sit luna M_γ; In quo signo sit luna per computationem B_η(*add. in marg.* 34) C₁ C₂ E_μ(*marg.; add.* 34^{us}); Inventio loci lune per eius etatem O_{φ₂}; Item aliter de eadem de loco lune inveniend] M_v V_ι(de de); Item aliter in quo gradu signi sit luna M_v V_β; Item aliter potes invenire in quo W_ι; Item de eadem alio modo V_β; Item de eodem L_μ Q_θ; Item de loco lune habendo. Rubrica M_ο; Modus sciendi in quo signo est luna V_ο; Qualiter inveniatur locus lune P_ο; Ut aliter in quo gradu signi sit luna E_τ; *add. in marg.* 36^{us} Q_ζ; *add. in marg.* C^o 36 S_δ; *add. in marg.* Istud capitulum est super additum “Cum in quo signo sit luna” et cetera cum duobus capitulis immediate sequentibus videlicet “Loca planetarum” et cetera et “Scire volens” et cetera V_β De] *add.* eodem scilicet P_δ inveniend] *add.* capitulum C_η
- 2 Cum] Item cum D_η Cum ... desideras] Cum(*add.* vero B_κ) volueris scire in quo signo sit(*fuit* S_ι *marg.*) luna B_ζ B_κ L_ζ M_α M_γ O_σ O_{φ₂} P_ζ P_φ Q_ε S_ι V_v V_υ V_{φ₂}; Et vis scire in signo sit luna V_π; Scito V_γ; Si ergo(*om.* B_θ) vis scire in quo signo sit luna B_θ E_υ; Vel sicut C_α in] *om.* M_τ quo] *om.* P_μ; quod P_ξ; quot V_α gradu signi] gradu C_ε C_η D_η E_τ; gradu B_γ(*add. interlin.* signo vel) B_η C_γ; sic G_α; signi B_ε B_η C_γ; signo B_β B_ι C₁ C₂ E_γ E_δ E_ζ E_λ E_μ E_ο L_λ M_v M_ο O_β P_ο P_τ P_v Q_η R_α S_β S_θ V_α V_β(*add. interlin al'* gradu signi) V_{φ₁} W_λ X_γ luna] *add.* aliter B_ε scire] *add.* cum G_α desideras] optam P_ο; volueris B_η C_γ C_δ C₁ C₂ E_γ E_λ E_μ E_ο E_τ K_α K_θ L_ε L_λ M_λ O_η P_τ S_β S_θ T_δ V_α W_λ X_γ X_δ quot] quod B_δ E_δ E_ο G_α K_α L_β M_v Q_η habeat] habet M_τ; *add. in marg.* id est quot sit dies ano | vila^o B_η mensis] *om.* S_θ lunaris] *om.* B_γ(*add. interlin.* luna); inter didane inter quos et pontem diem sumarum K_α
- 1-6 Cum ... gradus] *om.* P_v

[CHAPTER 33.] ON FINDING THE LOCATION OF THE MOON

When you wish to find in which degree of a sign the moon is, consider how many days of the lunar month it has [i.e., has passed]

in eadem die considera; quibus duplicatis, quod collectum fuerit distribue dando cuilibet signo 5. Et incipias a signo in quo fuerit sol, et ubi finierit numerus in eodem

- 3 in] *om.* Vv; et Mτ; *add. interlin.* luna Bγ in ... die] *om.* Bθ Ev Vπ eadem] ea Mλ Oσ Pφ Sθ Vα Vv eadem die] illa Mγ considera] *om.* Cγ Vγ; *marg.* Sβ; scias Pβ; scito Bζ Bκ Cδ Cζ₁ Cζ₂ Eγ Eλ Eμ Lζ Lλ Mα Mγ Mλ Oσ Pζ Pφ Qε Sθ St Vα Vv Vv; vide Pq; *add.* et duplica Vβ; *add.* et mūāndo a sig^{ti} post 9irtom Zα quibus] diebus Kε; quicque Sθ; *add.* diebus Gα St quibus duplicatis] duplicatis diebus adde 5 et Qζ Qη; multiplicatis diebus adde 5 et Mτ duplicatis] considera Eδ; duplicatum Nγ; multiplicatis Vv; *add.* adde Oη Qδ; *add.* adde(addito Oβ) 5/quinqve/v et Bζ Bη Bθ Bι Cα Cγ Cδ Cζ₁ Cζ₂ Dγ Eγ Eλ Eμ Eo Eρ Ev Gα Kε Lλ Mα Mγ Oβ Oι(*marg.*) Oσ Oφ₁ Oφ₂ Pτ Pζ Pφ Qε Rα Sβ Sθ St Vα Vβ(*interlin.*) Vγ Vv(quintam) Vπ Vv Vφ₂ Wι Wλ Xγ; *add.* adde 20 Vφ₁; *add.* ei Bκ; *add. interlin.* al' duplatis Vβ quod] *om.* Mι Nγ; quot Ev distribue] adde signis Vφ₂; divide Zα; *add.* et divide per quinque Oβ; *add.* id est divide per 5 Dη; *add.* per 5/quinqve Bβ Bγ Cη Eδ Eζ Et Kθ Mv Nα Oγ Pγ Po Qμ(*interlin.*) Vξ Wβ; *add.* per [*erasure*] 5 Eκ; *add.* per 5 scilicet dando et cetera divide per 5 dando cuicumque signo unum quintam Fβ; *add.* signis Bη Bθ Bι Bκ Cα Cγ Cδ Cζ₂ Dγ Eγ Eλ Eμ Eρ Ev Gα Kε Lζ Mα Mγ Mλ Mτ Oη Oι Oσ Oφ₁(*interlin.*) Oφ₂ Pζ Pφ Qε Qζ Qη Qμ Rα(*marg.*) Sβ Sθ St Vα Vγ Vv Vπ Vρ Vv Vφ₁; *add.* singulis Eo distribue dando] distribuendo Pτ dando] *om.* Cδ Mv; singularis Bζ; *add.* uni Gα
- 3-4 quod ... signo₁] adde Kα quod ... 5] *marg.* Cζ₂ dando ... incipias] *illeg.* Xγ
- 4 cuilibet] cuique Bζ Bη Dγ Eκ Eλ Eμ Eo Eρ Gα Lλ Lμ Mα Mγ Mλ Mo Nα Oη Oσ Oφ₂ Pζ Po Pσ Pv Pφ Qδ Qθ Rα Sη Sθ St Vα Vγ Vι Vv Vv Vφ₁ Wι Wλ; unicuique Bε Cα Cδ Cε Dδ Eα Eβ Eη Fα Fβ Fζ Kδ Kε Lβ Lγ Lε Lη Mδ Mη Mφ Nγ Oβ Oζ Oξ Oτ Ov Oφ₁ Pα Pβ Pδ Pθ Pμ Pξ Pρ Qβ Qζ Qη Qλ Sβ Sδ Sκ Tδ Vβ Vφ₂ Wα Wμ Xδ Zα; unum Bδ signo₁] *om.* Bζ Bη Bθ Bι Cγ Cδ Cζ₁ Cζ₂ Dγ Eγ Eλ Eμ Eo Eρ Ev Gα Kε Lζ Lλ Mα Mγ Mλ Mτ Oη Oσ Oφ₂ Qη Pζ Pτ Pφ Qζ Rα Sβ Sθ St Vγ Vv Vπ Vρ Vv Vφ₁ Vφ₂; signorum Nα Sη 5] *om.* Dγ Mv Pτ Sθ Wλ; 5^{am} Dη; quinque *some*; v Qε Qθ; *add.* dies Kδ Pθ; *add.* gradus Vξ Zα; *add.* scilicet quintam Oβ 5 ... signo₂] *om.* Xδ incipias] incipiendo Cγ Eγ Qμ; incipies Bι Cα Cζ₁ Cζ₂ Mλ Oη; invenies Mτ signo₂] gradu signi Kδ; signis Bι; *add.* et gradu Vγ in₁] illius Lμ in quo] et quo Qζ; ubi Vξ sol] *om.* Lζ; coniuncta solis Cγ; in tempere coniunctionis Dη; scilicet qūīctia vide tñ prius Bκ; solis Qδ(*add. in marg.* coniuncta); *add.* ipse commentione Zα; *add.* ipse commentive et a gradu illius signi Kα et₂] in quo Sη ubi] *add.* sit sol cumquo gradu Bκ finierit] finieritur Bκ; finietur Bζ Mλ St numerus] *add.* graduum Kδ eodem] iitar(?) Oβ
- 4-5 in₂ ... signo] ibi Vφ₂

[up to] the day in question; after doubling this, divide up what has been calculated by giving 5 [units] to each sign. And you should begin from the sign in which the sun was [at the beginning of the lunar month], and where the number finishes in the same

5 signo est luna. Et si remanserit unum infra 5, iam perambulavit luna 6 gradus; et si 2 12; et ita usque in 5. Semper pro quolibet uno residuo pone 6 gradus.

- 5 signo] *om.* Dδ; loco Gα Kε Qζ Qη; *add. interlin* id est in signo sequenti Pα; *add. sequenti* Oβ est] erit Qε Sβ Sθ luna₁] sol luna Eμ; *add. in eodem gradu* Kδ unum]¹⁴ *om.* Bθ Ev Vπ VQ; 1 *some*; id est Bγ Cη Eγ Eδ Eζ Eλ Eτ Pγ; unus dies Kδ; *add. dies* Pθ infra] super Bβ Vβ(*add. interlin* infra); ult^a Mι Nγ 5] *om.* Bη; *quinq* *some*; v Qε Qθ Sθ; ·i· Cε; 51 Pξ; *add. si unum* Bθ Vπ; *add. interlin.* id est, ipsi(?) quintas post signum Pα iam] cum Mτ; illam Kα perambulavit] perambulat Bβ; *corr. from* perambulat Sκ luna₂] *om.* Vγ; *add. per* Mv Xδ 6] *sex some*; VI Qε Sβ; 5 Mδ gradus] *add. illius signi* PQ; *add. illius signi in quo est* Cα; *add. de signo quod non complete pertransunt* luna Kε Mτ Qζ; *add. sequitur* Bβ si₂] *om.* Bζ Nα Qη; *add. perambulavit* Eλ 2] 2^o / duo *many*; remanserit Qη; vero Sθ; *add. est* Sι; *add. infra* quinq perambulavis Oη; *add. remanserint perambulavit* Kε Mτ Qζ
- 5-6 et₁ ... gradus] 3.5-line replacement Oβ et₂ ... gradus] *om.* Cη; *margin.* Bγ
- 6 12] *om.* Fβ; XII Pζ Qε Sβ Sθ; 10 Mι Nγ; 23 VQ; 52 Qδ; *add. et si* 3, 18 Zα; *add. gradus* Cα Mτ Oη Vφ₂ Vυ et ... gradus] et si 3 18, si 4 24, si 5 totum signum vel domum unum Vγ; gradus et cetera de aliis. Etatem lune duplica post addito quinq. Quinq dabis signo quo lune cepit origo. De reliquis finis numer~ dabit hic t^c suarum Kε; gradus et cetera de aliis. Etatem lune duplica post addito 5. Quinq dabis signo que lune cepit origo. Ac reliquis finis unum dabit hac c suarum Qζ; gradus et cetera. unius(*expunged*) etatem lune duplica post addito quinq. Quinq dabis signa quo lune cepit origo. Ac reliquis finis numer~ dabit h' tibi lunam etc. Mτ; *add. in marg.* tatem lune duplica post addito quinq. [Quinq dabis signo quo lune cepit origo Qδ ita] *om.* Lζ; sic Bκ Kδ Oφ₂ Pφ Sη; sicut Mφ usque in 5] in aliis Qη in] *om.* Tδ; ad Cα Cγ Eγ Gα Kα Lλ Oη Pφ Vα Vφ₁ 5] quinq *some*; 5^m Cα; v Qε Qθ Sβ; *add. interlin.* .a. in 12 Lζ Semper] Propter Bκ Lμ; scilicet Bι VQ Semper pro] *illeg.* Vι Semper ... gradus] *om.* Cγ Cδ Eγ Lλ Pζ Pτ Sθ; *illeg.* Mα pro] *om.* Wβ; in Mv; quo Cε pro quolibet] *om.* Nα quolibet] *om.* Bε Bκ Eκ Qη Vυ Vφ₂; quodlibet Mλ; reliquo Qδ; *add. signo* Oγ uno] *om.* Bδ Eα Lμ Mλ; id est Mo; limbo Wι; unoquoque Bε Eλ; *add. remanserunt perambulavit* Kε residuo] *om.* Mo; residuo Kα; *add. puncta(?)* Qμ pone] *om.* Qη Vξ; ponendo Mι Nγ; *add. unius* Eη 6] *sex some gradus]* *add. [illeg.] gradus.* Etatem lune duplicata post addito quinq. Quinq dab' signo quo lune cepit origo. Et sic invenies signum quo [*illeg.*] insratum Vφ₂; *add. 3.5 lines* Zα; *add. 5 lines* Cα; *ms Cα ends;* *add. extraneous chapter* [DE RE PERDITA INVENIENDA. Ut rem predictam invenies (*add. in marg.* Nota experimentum) Mγ (fol. 21^{ra-7b}); *add. similar extraneous chapter* (DE INVENTIONE REI PERDITE) Bι(fol. 73^{va}) Bζ(fol. 39^{va}) Eo(fol. 190^{rb}) Lζ(fol. 41^r marg.) Vv(fol. 182^{vb}-183^m) VQ(fol. 29^{ra})¹⁵

¹⁴ Many manuscripts appear to have “·i·” here, that is “id est”, but this is most likely a mistake for, or a sloppily written, “.1.” for “unum”.

¹⁵ This material is also sometimes found at the end of Cap. 41.

sign is the moon. And if one from the 5 [units] remains, the moon has already travelled 6 degrees [in the sign]; and if 2 [units remain then] 12 [degrees]; and so on up to 5. Always take 6 degrees for every single [unit] remaining.

[Comment:

The moon moves 360 degrees along the ecliptic in a lunar month, or 30 degrees (one sign) in 2.5 days, or 12 degrees in one day. Since dividing 30 (days) by 12 (signs) is complicated, the suggestion is to double the days that have passed and divide this by 5 to produce 5 “units” for each sign.

To find the position of the moon on any day, take the number days that have passed since the beginning of the lunar month (the “new” moon), double this and divide by 5. Starting with the position of the sun (along the ecliptic) at the time of the new moon (when the sun and the moon are at the same point along the ecliptic), count off these groups of 5 units along the ecliptic, each one being a sign.

When all the units have been distributed along the ecliptic, the last unit will be the position of the moon in whatever sign you have ended in. There will probably be some remainder of units (between 1 and 4), and in each one of these the moon will have travelled 6 degrees, so you can then calculate how far the moon has moved in the last sign.

As an example, if it is 16 July and the lunar month began on 25 June, the lunar month is 21 days old; you double the 21 and divide by 5 to produce 8 with a remainder of 2. If on 25 June the sun was in 4° of Cancer, then counting from this point you will arrive at 4° of Pisces. Since there is a remainder of 2, the moon will have moved another 12 degrees and its position will therefore be 16° of Pisces.

Note: the fact that you begin the calculation from position of the sun at the beginning of that lunar month means that issues of co-ordinating the solar and lunar calendars do not arise; the starting point is always a new “observation” of the two together. Again the fact that the lunar month is only (approximately) 29.25 days long also becomes irrelevant (or at least undetectable).]

[CAPITULUM 34.] DE LOCIS PLANETARUM INVENIENDIS

Loca planetarum poteris alio modo investigare, verius. Sume altitudinem planete quando est iuxta lineam medii celi, et serva eam. Item, sume ad eandem horam

Cap. 34] *om.* Bη Cδ Cζ Eγ Λλ Mα Oη Oσ Pζ Qε Sθ St Sλ Vα Vγ Vυ; *bottom marg.* Eμ Lζ Sβ; *upper marg.* Qμ; *add. extra capitulum in bottom marg.* Vβ: Istud capitulum “si vis scire” est additum: ARGUMENTUM IN QUO SIGNO LUNA COTIDIE PER SUAM ESTATEM SECUNDUM QUOD ASSEQUITUR SOLEM. Si vis scire in quo signo sit luna

- 1 De ... inveniendis] *om.* Bγ Bδ Bε Bζ Bκ Cγ Cε Dδ Eα Eκ Eλ Eμ Eο Gα Kε Kι Lζ Mτ Nα Oβ Oν Pγ Pι Pν Pξ Pσ Pφ Qη Sη VνVφ Wλ Xγ; *faded/illeg.* Eδ Eζ Eο; Ad inveniendum loca planetarum Qθ Vξ; Ad inveniendum vera loca omnium planetarum Dη; Ad investigandum loca planetarum Eτ Lμ; Aliter ad habendum loca planetarum Bι(*add. in marg.* c. 29); Aliter modus equandi planetis Kθ Pο; De investigatione locarum(loca Mυ) planetarum Mν Mυ Vι Wβ; De locis planetarum aliter Rα; Cap. 34 De locus planetarum aliter Sβ; De locis planetarum aliter et verius Mλ; Inventio locarum planetarum aliter Mγ Pτ Vο; Investigatio aliorum planetarum Wι; Si loca planetarum vis scire Bβ; *add. in marg.* 37^{us} Qζ; *add. in marg.* C° 37 Sδ planetarum] *add. unie Ov inveniendis] om.* Kα Mι Mπ Nγ Oφ₁ Zα; aliter Dγ; *add. Rubrica Vπ; add. sequitur. Capitulum Mo*
- 2 Loca] Nota Bδ Eδ Kι; *add. illeg.* Zα planetarum] *add. pois Pμ poteris] poterit Cδ; add. in poteris ... modo] volens Cγ alio modo] om.* Eμ Xδ; *illeg.* Gα; aliter Eκ; aliter et alio modo Vξ investigare] *om.* Bζ; invenire Eμ Gα Mτ; *add. et [illeg.] et Eκ verius] om.* Bκ Cγ Cε Lζ Oβ; *illeg.* Bε; *lacuna* Xδ; et melius Nα Sη; et verius *many*; melior et verius Pτ; melius et verius Oγ; si vis Wμ; sic melius Eμ; *add. endis Qδ; add. eud pon^os Eη(?)*; scilicet verius Kα Sume] Sumpive(?) Kθ
- 3 planete] *om.* Pφ quando] qui Mυ est] *om.* Eζ Wβ iuxta] ante Qδ Sη; in Pυ; *corr. in marg. from in Oζ lineam] altitudinem Pι serva] marg.* Oξ Wα Item] Et Eμ sume] *om.* Eο; sumpive Kθ ad] *om.* Bβ Bε Cι Eη Vβ; *interlin* Kι; in Bδ horam] *illeg.* Nα
- 3-4 ad ... ascendens] ascendens(*add. in Eα*) eadem hora Cγ Cε Cι Dδ Dη Eα Eβ Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Lμ Mδ Mη Mι Mπ Mυ Mφ Nγ Oγ Oζ Oι Oτ Oφ₁ Pα Pβ Pδ Pθ Pμ Pν Pξ Pρ Pσ Pφ Qβ Qγ Qθ Qλ Sδ Sκ Tδ Vι Wα Xδ Zα
- 3-5 serva ... et] *om.* Lζ

[CHAPTER 34.] ON FINDING THE LOCATIONS OF THE PLANETS

You will be able to discover the locations of the planets in another, more accurate way. Take the altitude of the planet when it is near the line of the middle of the sky, and keep [*or* make note of] it. Likewise at the same hour take

5 ascendens per aliquam stellarum fixarum, et hoc serva etiam cum hora. Posthec vide quando ille planeta incipiat descendere a linea medii celi, et sume eius altitudinem quando sit equalis altitudini prius sumpte ante lineam medii celi; et iterum in eadem hora sume ascendens et horam per aliquam stellam fixam. Deinde sume medium inter

- 4 ascendens] *om.* Mv per] *om.* Cε; ad Vπ per ... hora] *om.* Kδ stellarum] stellam Bζ stellarum fixarum] stellam fixam Mι Nγ; *add.* scilicet computando gradus eius in almithat scilicet in quo gradu est Wλ; *add.* si non fieret de luna potest fieri de die per solem Eμ hoc] *om.* Kα Mτ serva] *om.* Wλ; *add.* id est signi(?) motus in limbi Zα serva ... hora] *illeg.* Nα etiam] *om.* Eλ Mγ Zα; ī Cε hora] *om.* Bζ; horis Bδ Eα Posthec] Postea *many*; Post hoc *some*; Et Mτ
- 5 quando] an Pφ; cum Bδ Bε Bζ Bθ Cγ Cε Cι Dη Eα Eβ Eη Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Mδ Mη Mι Mπ Mυ Mφ Nγ Oγ Oζ Oι Oξ Oτ Oυ Oφ₁ Pα Pβ Pθ Pμ Pν Pρ Pσ Qγ Qθ Qλ Sk Tδ Vβ(*add. interlin.* quando) Vι Vπ Vψ Wα Wμ Xδ Zα ille] *om.* Lβ; illa *some*; idem Pι; ipse Dη; iste Kε Nα Pτ Qη incipiat] incipiant Bθ Vπ; incipiet Cγ Eκ Nγ incipiat ... et] *illeg.* Nα descendere] ascendere Bβ Kα linea medii] medio Bε medii celi] meridiana Eμ celi] *om.* Mτ; *add. illeg.* Ov et] *add. in marg.* iterum in eadem horum Sk sume] supive Kθ eius] *om.* Eκ Mv Qη; illius Kα
- 5-6 et ... celi] *om.* Kδ Pφ; *marg.* Oφ₁
- 6 quando ... altitudini] *om.* Vρ sit] est Bβ Eκ; fuerit Eλ; sit vel fit Oφ₁ sit ... celi] est in altitudinem similem prius Eμ equalis] similis Dη altitudini] *add.* sue Pι; *add.* ut Mδ sumpte] suscepte Eυ celi] *om.* Bζ interim] totum Fβ in] *interlin.* Mo in eadem] *om.* Cγ
- 6-7 interim ... stellam] sume eius altitudinem quando sit equalis altitudini prius sumpte ante lineam Nγ
- 7 hora] *om.* Kα sume] accipies Bδ Eα ascendens] ascendentem Pρ et] in Pρ et horam] *om.* Qη per ... fixam] *om.* Eμ aliquam] quam Pγ stellam fixam] stellarum fixarum Kε Kι Mτ; *add.* signi transitam(?) almuri in limbi Zα; *add.* ut prius Pι; *add. illeg.* Gα medium] *interlin.* Kε; *add.* gradum Eμ

the rising by any one of the fixed stars, and keep [*or* make note of] this also with the time. After this observe when this planet begins to descend from the mid-sky line, and take observe its altitude when it is equal to the altitude when observed earlier before [it reached] the mid-sky line, and again at the same hour observe the rising and the hour by some fixed star. Next assume the mean between

ascendens primum et secundum per almuri in limbo; et gradus qui ceciderit tunc super lineam medii celi, in illo est planeta.

- 8 ascendens] *om.* Bζ et,] *add.* ascendens Mι Nγ secundum] 2^m Kδ Mτ Vβ
 almuri] almucantrat Kα; *add.* et pone almuri super medie graduum ab ipso per
 [*illeg.*] suorum Ga limbo] labro Mι Nγ; lymbo Mφ Qζ; *add.* et pone illud medium in
 oriente super horizontem Vψ qui] et Pξ; *add.* ascendent Zα ceciderit] caderit Eo
 tunc] *om.* Eλ Mυ Pφ Sβ super] in Bθ Bκ Eυ Lζ Qμ Vπ; inter Bζ Eo
- 9 lineam medii] medio Bκ Lζ medii celi] meridiana Eμ in illo] illa Kα; ille est in
 quo Vν; in illa Eη Lβ Oυ Pβ Pν Qγ Qθ Sδ; in isto Mυ Vι Wα; in quo Eλ in ...
 planeta] est gradus planete Pι; est ille in quo est planeta Mτ; locum planete quod queris
 Oγ illo est] aliquo Qη planeta] *add.* etc. Mπ Vπ; *add.* quesitus Pφ; *add. illeg.* Zα

the first rising and the second using the indicator-muri on the rim; and the degree which then falls on the mid-sky line, there is the planet.

[Comment:

This “more accurate” way of finding the positions of planets involves observing the planet in question at some altitude just before it reaches the mid-sky meridian, and again at the same altitude after it has passed the meridian and begun its descent. At the same time as these observations are made one also observes the rising of a star. One next takes the mean position between these two risings, and sets that degree of the ecliptic on the horizon; the point on the ecliptic which is then on the meridian will be the “longitude” of the planet.

Note: this is not completely accurate since the point of rising does not change its degree uniformly over time, and therefore the point sought is not necessarily the mean between the two. The error is minimal if the two observations are made when the planet is near the meridian, but this is not an ideal time to make the observations of altitude, since the closer the planet is to the meridian, the less its altitude changes over time and therefore the more difficult it is to know when the planet is at exactly the same altitude for the two observations.¹⁶]

¹⁶ See J.D. North, *Chaucer's Universe* (Oxford: Clarendon Press 1988), pp. 68-69 and note 26.

[CAPITULUM 35.] DE LATITUDINE PLANETARUM A VIA SOLIS

Scire volens utrum planeta sit australis vel septentrionalis a via solis, considera utrum altitudo quam sumpsisti quando erat prope lineam medii celi sit equalis altitudini gradus in quo est planeta, vel maior, vel minor. Si enim est equalis, tunc

Cap. 35] *om.* Bη Bκ Cδ Cζ Eγ Eμ Λλ Lμ Mα Oη Oσ Pζ Qε Sθ Sι Sλ Vα Vγ Vυ; *bottom marg.* Lζ Sβ

- 1 De ... solis] *om.* Bγ Bδ Bε Bζ Cγ Cε Dδ Dη Eα Eκ Eλ Eο Eυ Gα Kε Kι Lζ Mτ Nα Oβ Oν Pγ Pι Pξ Pσ Pφ Qη Sη Vν Vφ Wλ Xγ; *faded/illeg.* Eδ Eζ Eο Pτ; Ad inveniendum latitudinem planetarum Kθ Pο; Ad inveniendum utrum planeta sit septentrionalis vel australis Qθ; De altitudinibus et parte latitudinis habenda Wι; De inveniendo latitudinem planetarum Qμ; De locis planetarum inveniendis Pν¹⁷; De latitudine planetarum Cι Sκ; De latitudine planetarum a via etiam solis. Rx Mo; De latitudine planetarum ab ecliptica Dγ Oφ Rα Sβ(C° 35 De ...); De latitudinibus planetarum et parte latitudinis invenienda Eτ Mν Wβ; De latitudinibus planetarum et parte latitudinis habenda vel de latitudine planetarum a via solis Mν Vι; De retrogradatione planetarum *corr. to* De planetarum latitudine Zα; De sciendum latitudinem planetarum a via solis Mλ; Inventio latitudinis planete a via solis Bι(*add. in marg. c. 30*); Planeta sit australis Mτ; Sciencia latitudinis planetarum et in qua parte Vο; Si vis scire utrum planeta sit australis vel meridialis Bβ; Ut scias latitudinem et partem latitudinis Mγ; Ut scias per latitudinem totum partem latitudinis Vξ; *add. in marg. 38 Qζ; add. in marg. C° 38 Sδ* solis] *add. invenienda*] Cη Fζ Oξ Vβ; *add. Rubrica/Rx* Bθ Pμ Qβ Vπ
- 2 Scire volens] Scire volueris Mι Qδ; Si autem vis scire Dη; Si scire volens Eδ; Si scire volueris Kε Kι Qζ Wβ Wι Wλ; Si scire volueris scire Mτ; Si vis scire Bε Eη Oγ Oτ planeta sit] plasit Sκ sit] *om.* Cε vel] *om.* Bδ; sive Kα a] *om.* Bε; ab Eβ; et Bδ; in Cη a ... solis] *om.* Oζ Pο solis] *add. primo* Nα considera] *rep.* Eκ
- 3 altitudo] altitudinem Qβ; *add. planete* Cε; *add. interlin. solis* Oι altitudo quam] *illeg.* Xγ quam sumpsisti] sumpta Cγ sumpsisti] assumpsisti Wλ quando] *add.* illud planeta Oγ; *add. in marg. planeta* Sκ erat] *add. in linea* Zα prope] iuxta Eκ prope ... celi] in linea meridiana Nα Sη medii] *om.* Pξ medii celi] meridianam Pν Vβ(*add. interlin al' medii celi*) celi] *lacuna* Mo sit] et Lη Oζ
- 4 gradus in] *om.* Bδ; graduum in Eδ est₁] *interlin.* Oι; *add. positus* Eο est₁ ... minor] *illeg.* Xγ planeta] sol Cε vel₁] *om.* Qβ; *interlin.* Oξ; et Pν; *add. est* Gα si ... est₂] *lacuna* Bδ si ... equalis] *om.* Lγ enim] *om.* Cγ Eτ Mτ Pξ; vero Bε Eη est₂] *om.* Bζ Bι Cγ Eτ Lζ Pι Pφ Rα Sβ Vο tunc] *marg.* Oξ; *add. enim* Bζ Vν

¹⁷ This is the rubric for Cap. 34. Since Cap. 34 is missing from ms Pv, the rubrics seem to have shifted to the following capitula.

[CHAPTER 35.] ON FINDING THE LATITUDE OF PLANETS FROM THE PATH OF THE SUN

If you wish to know whether a planet is south or north of the path of the sun, consider whether the altitude which you observed when it [i.e., the sun] was near the line of the middle of the sky is equal to the altitude of the degree in which the planet is, or greater or less. For if it is equal, then

- 5 directe est in via solis, et nullam habet latitudinem. Si autem altitudo planete sit maior quam gradus in quo est [sol], tunc planeta est septentrionalis a via solis; si minor, tunc est australis; et tantum declinat a via solis quantum est maior vel minor illa altitudo.

- 5 directe] directus Bδ in] *om.* Mπ Wλ; *marg.* Oι et ... latitudinem] *om.* Oγ latitudinem] altitudinem Mv; *add.* solis Bζ latitudinem ... autem] *illeg.* Xγ autem] *om.* Bδ Cγ Cι Eα Eβ Ev Fα Fβ Kε Kι Lγ Lε Lη Mη Mo Mπ Mv Nγ Oγ Oζ Oξ Oφ Pβ Pθ Pσ Qγ Qη Qλ Sδ Tδ Vβ Vπ Vψ Wμ; vero Pρ Zα autem ... sit] vero Pξ altitudo] latitudo Kδ Qθ Pι; *marg.* Rα; *add. interlin.* al' latitudo Oφ sit] est Bδ Bζ Bθ Cγ Cε Dη Eα Eβ Eo Ev Fβ Fζ Gα Kα Kι Lβ Lγ Lε Lζ Mπ Mτ Mv Mφ Nγ Oζ Oξ Oι Oτ Oφ (*add. interlin.* sit) Pβ Pδ Pμ Pν Pρ Pσ Pτ Qγ Qδ Qη Qλ Sκ Vβ Vν Vφ Xδ maior] *add.* vel Pδ
- 5-6 et ... solis] *om.* Bε Eη Nα autem ... [sol]] maioris Eτ
- 5-7 maior ... australis] minor tunc est australis. Si maior tunc est septentrionalis Vξ
- 6 quam] *add.* planeta Bζ quam ... [sol]] *om.* Pξ in quo] *marg.* Qδ sol] Cε; *om.* Dη; planeta Bβ Bγ Bδ Bζ Bθ Bi Cγ Cζ Cη Cι Dγ Dδ Eα Eβ Eδ Eζ Eκ Eλ Eo Eρ Ev Fα Fβ Fζ Gα Kα Kδ Kε Kθ Kι Lβ Lγ Lε Lζ Lη Lκ Mγ Mδ Mi Mλ Mν Mo Mπ Mτ Mv Mφ Nγ Oβ Oγ Oζ Oι Ov Oξ Oτ Ov Oφ Pα Pβ Pγ Pδ Pθ Pi Pμ Pν Po Pρ Pσ Pτ Pv Pφ Qβ Qγ Qδ Qζ Qη Qθ Qλ Qμ Rα Sβ Sδ Sη Sκ Tδ Vβ Vi Vν Vπ Vρ Vφ Vψ Wα Wβ Wι Wλ Wμ Xγ Xδ Zα tunc₁] *om.* Lε tunc₁ ... solis] *om.* Eζ tunc planeta] *om.* Eo Oγ septentrionalis] declinis versus septentrionem Pρ a via solis] *om.* Ev Xγ Wι; a ecliptica Eλ; a motu solis Pφ; in viam Oβ si] sed Pγ; *add.* autem Dη Pρ; *add.* est Kα tunc₂] est tunc planeta Pρ
- 7 australis] *add.* quare Oβ; *add. in marg.* si maior septentrionalis Bε et ... declinat] *illeg.* Xγ declinat] *om.* Lε; deviat Nγ; *add.* altitudo illa Bβ quantum] *corr. to quanto* Bγ illa altitudo] *om.* Bβ Bγ Bζ Bθ Bi Cη Dγ Dδ Eδ Eζ Eκ Eλ Eo Eρ Eτ Ev Gα Kθ Kι Lζ Mγ Mλ Mν Oβ Ov Pγ Pi Po Qμ Rα Sβ Vν Vξ Vπ Vρ Vφ Wι Wλ Xγ; altitudo Mv; Mφ Nα Nγ Vι; est altitudo Lγ; illa latitudo Kα Vβ

it is directly in the path of the sun and has no latitude [vis-a-vis the sun]. However, if the altitude of the planet is greater than the degree in which the [sun]¹⁸ is, then the planet is north of the path of the sun; if less then it is southern; and it is so much distant from the path of the sun as much as that altitude is greater or lesser.

[Comment:

This is fairly straightforward. Measure the altitude of the planet vis-à-vis the ecliptic and of the sun when each passes the middle of the sky, and compare the two. If the two altitudes are equal, the planet is on the ecliptic. If the altitude of the planet is greater, it is to the north; if it is less, it is to the south. And the difference in altitudes will be the distance of the planet from the ecliptic.]

¹⁸ Nearly all the manuscripts read “planeta”, but to make sense of the sentence, the altitude of the planet (the subject of the sentence) must be compared with that of the sun; hence my amendment.