A Treatise on

The Astrolabe;

addressed to his son John

by Geoffrey Chaucer.

A.D. 1391.

EDITED FROM THE EARLIEST MSS.

BY

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PREFACE.

DESCRIPTIONS OF THE MSS.

§ 1. The existing MSS. of the "Astrolabe" are still numerous. I have been successful in finding no less than eighteen, sixteen of which I here describe. It is remarkable that, although many printed editions of the treatise have appeared, no first-class MS. has ever hitherto come under the notice of any one of the various editors. This point will appear more clearly hereafter.

§ 2. A.—MS. Dd. 3. 53 (part 2) in the Cambridge University Library. The "Treatise on the Astrolabe" begins at fol. 212 of the MS. considered as a whole, but the folios are now properly renumbered throughout the treatise, as in the present volume. The MS. is of vellum, and the writing clear and good, with a great number of neatly drawn diagrams, which appear wherever the words "lo here thi figure" occur in the text. This MS. I have made the basis of the text, and it is followed with minute exactness except when notice to the contrary is given in the Critical Notes. Wherever any change of even slight importance is made, notice is drawn to the alteration by the use of square brackets.

This MS. is of considerable importance. The hand-writing

1 Two were kindly pointed out to me by Mr Bradshaw after this Preface was in type. Both are imperfect. They are (1) MS. Bodley 68, ending with Part ii. sect. 36, chiefly remarkable for containing the title "Bred and Mylk for children"; and (2) MS. E Museo 116, in the Bodleian Library, which contains a fragment of the latter part of the treatise on vellum, in the handwriting of the scribe of MS. Camb. Gg. 4. 27.
exactly resembles that in MS. B., and a comparison of the MSS. leads to the following results. It appears that MSS. A. and B. were written out by the same scribe, nearly at the same time. The peculiarities of spelling, particularly those which are faulty, are the same in both in a great many instances. It is also clear that the said scribe had but a very dim notion of what he was writing, and committed just such blunders as are described in Chaucer's Lines to Adam Scrivener, and are there attributed to "negligence and rape." ¹

It is still more interesting to observe that Chaucer tells us that he had to amend his MSS. by "rubbing and scraping" with his own hand; for MS. A. and B. differ precisely in this point, viz. that while the latter is left uncorrected, the former has been diligently "rubbed and scraped" by the hand of a corrector who well knew what he was doing, and the right letters have been inserted in the right places over the erasures. These inserted letters are in the hand of a second scribe who was a better writer than the first, and who was entrusted with the task of drawing the diagrams. The two hands are contemporaneous, as appears from the additions to the diagrams made by the writer of the text. Unfortunately, there are still a good many errors left. This is because the blunders were so numerous as to beguile the corrector into passing over some of them. When, for example, the scribe, having to write "lo here thi figure" at the end of nearly every section, took the trouble to write the last word "vigour" or "vigour" in nearly every instance, we are not surprised to find that, in a few places, the word has escaped correction. It further appears that some of the later sections, particularly sections 39 and 40, have not been properly revised; the corrector may very well have become a little tired of his task by the time he arrived at them. It must also be remembered, that such blunders as are made by a scribe who is not clear as to the meaning of his subject-matter are by no means the blunders which are most puzzling or most misleading; they are obvious at once as evident blotches, and the general impression left upon the mind by the perusal of this MS. is—that a careless scribe copied it from some almost perfect original, and that his errors were

¹ I. e. haste, rapidity. Cf. "Rydynge ful rapely;" Piers the Plowman, B. xvii. 49.
DESCRIPTIONS OF THE MSS. 

partially corrected by an intelligent corrector, who grew tired of his task just towards the end.

The order of the conclusions in Part ii. differs from that in all the editions hitherto printed, and the MS. terminates abruptly in the middle of a sentence, at the words "howre after howre" in Conclusion 40. A portion of the page of the MS. below these words is left blank, though the colophon "Explicit tractatus," &c., was added at the bottom of the page at a later period.

Certain allusions in the former part of the MS. render it probable that it was written in London, about the year 1400.

§ 3. B.—MS. E Museo 54, in the Bodleian Library, Oxford. This is an uncorrected duplicate of the preceding, as has been explained, and ends in the same way, at the words "howre after howre," followed by a blank space. The chief addition is the rubricated title—"Bred and mylk For childeren," boldly written at the beginning; in the margin are the following notes in a late hand—"Sir Jiffray Chaucer"—"Domínus Gaufredus Chaucerus"—"Galfredi Chauceri Tractatus de Ratione et vsu Astrolabij ad Ludouicum filium." At the end is the note—"Liber Francisci Beyley, 1637. Franc. Bayley, Nou Collegij Socius, Anno Dom., 1637. Ned. Tourner."

Before I undertook the present edition, a transcript of part of this MS. had been made for the Early English Text Society, which afterwards came into my hands. A portion of the text was "set up" from it, but the proof sheets were corrected by MS. A. I mention this to show how closely the two MSS. resemble each other in spelling. It is very seldom that such a course is practicable; but in this instance it occasioned no difficulty.


This is a beautifully written MS., on vellum, with 38 pages of text, and 4 blank pages. It has the conclusions in the same order as the preceding, six well-executed diagrams, and corrections on nearly every page. It is of early date, perhaps about A.D. 1420, and of considerable importance. It agrees closely with the text, and, like it, ends with "howre after howre." Some variations of spelling are
to be found in the Critical Notes. In this MS. the "Conclusions" are numbered in the margin, and the numbers agree with those adopted in this edition.

§ 5. D.—MS. Ashmole 391, in the Bodleian Library. This contains several tracts of very different dates—including tracts on astrology, calendars, tables, a printed tract, a tract on houses and horoscopes, a Latin tract with a very carefully painted picture resembling that given as fig. 19 in this volume, and finally, Chaucer's "Astrelabie." This is an old and well-written copy on vellum, with illuminated border on the first page, fair diagrams, blue and flourished capital letters, &c., and is much faded. It begins—"Lite lowys my sone, I aparceyue wel by certeyn euydences"—and contains the following, viz. all of Part i; Part ii, sections 1, 2, and part of 3, down to "18 degrees of heighte taken bi myn" in l. 30, after which several leaves are lost; then comes sect. 25, beginning at l. 17—"but for ensaumple; For wel I woot pe latitude of Oxenford," &c., followed by sections 26, 27, 28, 29, 30, and part of 31, down to l. 9—"The maner of diuysion of pe." The rest is torn away. I have made but little use of this MS., on account of its being so imperfect.

§ 6. E.—MS. Bodley 619. This MS., like B., has the title—"Brede and Milke for children." Like other good MSS., it ends sect. 40 with "houre after houre." But after this, there occurs an additional section, which is probably not genuine, but which I have printed here (for the sake of completeness) as section 46; which see.

There are some Latin notes in this MS. which are worth notice. The first is a note on Chaucer's words in Part i, sect. 10, l. 14, that "the sonne dwelleth ther-for neuere the more ne lesse in on signe than in another," which declares this to be a mistake, for the sun dwells longer in Cancer than in Capricorn; an observation which is perfectly correct.

Again, at the end of sect. 3 in Part ii, we have a Latin paragraph, beginning—"Nota, quod si quot miliaria sunt inter duas regiones"—and ending—"dando 100. miliaria. Idem facies de longitudinibus, si fuerint diverse, & latitudines eodem." This is a quotation from Messahala (see p. 97), and is very interesting, be-
cause it directly connects Chaucer's translation with the Latin text of Messahala.

At fol. 53, back, we find another Latin note, having reference to Part ii, sect. 39, as follows:—

"Nota; si vis seire per quot gradus currit Almicantatium, computa almicantarath, incipiendio ab orisonte vsque ad Cenith, et per numerum illorum diuide 90, et numerus quociens ostendet tibi per quot currat.

"Longitudines autem quarundam regionum, idem elongaciones circulorum earum meridianorum a meridiano vltime regionis habitalis in occidente. Et earum latitudines, idem distancias ab equinoxiali circulo, notabimus in quadam tabula."

This is of some interest, as shewing that the ancients took for their first meridian of longitude the meridian of the last habitable spot which could be reached in proceeding westward. The principle is clear, but the locality vague. Observe that the latter part of this note is also from Messahala; see p. 97.

At fol. 15, there is a note on Part i, sect. 21, l. 12, where Chaucer instances the stars Aldebaran and Algomeysa. To these are here added the stars "Menkar," "Algevez," and "cor leonis," that is to say, α Ceti, α Orionis, and α Leonis; with the remark—"nota: þat þese 5 sterres ben meridional fro þe ecliptic, and septentrional fro þe equinoctial, secundum astrolabium colleg. de Merton." Merton College, it thus appears, possessed an Astrolabe on which the five above-named stars were represented.

At fol. 21 is an additional section, not found elsewhere, which is printed in the Additional Notes; see p. 81. This conclusion has some claims to our notice, because, whether genuine or not, it is translated from Messahala.

§ 7. F.—MS. 424, in the library of Corpus Christi College, Cambridge. Very imperfect, especially at the beginning, where a large portion has been lost. Written in a close hand, late in the fifteenth century, though the thorn-letter (þ) appears in it. Begins—"vnderstood well þat þe zodiake is departyd in 2 halfe cercles as fro þe hede of capricorne"—which is sect. 16 of Part ii without the rubric. Then follow, with rubrics, the entire sections 17—36, the
last of which ends thus, with an additional remark—"& the begynnynge of ye 12 house is naydy to ye 6. ¶ To fynde ye howse by ye astrolaby ye pat is wratten fynde suche. Explicit tractatus astrolabii secundum chausers, factus filio suo lodowyeo."

Although the MS. is thus imperfect, we see that the conclusions follow the right order, as in the best MSS.

§ 8. G.—MS. R. 15. 18, in the library of Trinity College, Cambridge. This is a curious and interesting volume, as it contains several tracts in English on astrology and astronomy, with tables of stars, &c. It also contains the picture which I have but imperfectly represented in Fig. 19. ²

The copy of the "Astrolabe" in this MS. is not a very good one. It is not divided into paragraphs or sections, and occasionally portions of sentences are omitted. It ends with the words—"as well as by the fyxe sterre" in Part ii, sect. 34, l. 14. The conclusions are in the right order, and there are a few diagrams.

§ 9. H.—MS. Sloane 314, British Museum. A late MS. on paper, absurdly said in a note to be in Chaucer's handwriting, whereas it is clearly to be referred to the end of the fifteenth century. Size of page, about 8 inches by 54. The treatise begins on fol. 65, back, and ends on fol. 106, in the middle of a page, at the end of conclusion 36, like MS. F. It is written in a clear hand, but with pale ink. It has rubrics in red, and some not very well-drawn diagrams. The conclusions are (unless I have misread my notes) in the wrong order, i.e. in the order adopted in the old printed editions.

§ 10. I.—MS. Sloane 261. This is an "edited" MS., having been apparently prepared with a view to publication. Mr Brae has made considerable use of it, and gives, in his preface, a careful and interesting account of it. He concludes that this MS. was written by Walter Stevins in 1555, and dedicated by him to Edward Earl of Devonshire; and that MS. H. was one of those which Stevins especially consulted, because it contains marginal notes in Stevins' ¹

¹ Very indistinct. MS. Addit. 23002 has "ywrytten" here.
² I regret to say that my hasty copy of this picture gives merely the general idea of it. The truth is, I was not aware of the marvellous accuracy with which such a wood-engraver as Mr Rimbault can reproduce what is given him, or I would have taken care to copy it more exactly.
handwriting. The date 1555 was assigned to it by Mr Brae after most careful investigation; in any case, it is the latest MS. which I know of. A memorandum shews that this MS. was in Urry's hands in 1712; a fact which is (as Mr Brae points out) not much to Urry's credit, seeing that some of the glaring errors in Urry's edition might have been corrected by consulting Stevins. The contents of this MS. can be so well ascertained from Mr Brae's edition that it is unnecessary to say more about it here. The Conclusions are arranged in the same order as in other MSS. not of the first class.

§ 11. K.—MS. Rawlinson Misc. 3, in the Bodleian Library, Oxford. On vellum, 49 folios, with rich gold capitals, beautifully ornamented; in a large clear handwriting, with red rubrics. Title—"Astralabium." Begins—"Lityl lowys my sone," &c.—and ends—"For ye mone meuyth the contrarie from other planetys. as yn here epicircle. but in none other maner;" see end of Part ii, sect. 35. Order of Conclusions in Part ii as follows: 1—12, 19—21, 13—18, 22—35; as in other late MSS. There are no diagrams, and the MS., though well written, may perhaps be referred to the latter half of the fifteenth century.

§ 12. L.—MS. Additional 23002, British Museum. A fair MS., on vellum, without diagrams; size of page, about 7½ by 5 inches. Begins on fol. 3; ends on fol. 28b. Contents as follows:—Part i, wanting sections 15—23 inclusive; Part ii, sections 1—12, 19—21, 13—18, 22—35, as in K.; together with additional sections, viz. 41—43; also 44, 45; also 41a—42b; then 36 and 37, concluding with the words "of 3 howses that folowyn." The second part is thus seen to be nearly complete, although sections 38—40 are missing. See also the Additional Note on Part ii, sect. 3.

§ 13. M.—MS. E. 2 in the library of St John's College, Cambridge. Small MS. on vellum, without diagrams. Size of page, 6 in. by 4 in. Former owner, Wilielmus Graye. Contents: (a) Fol. 1. De septem climatibus expositio (Short treatise in Latin); (b) Fol. 2. De astrolabio. The leaves have been misplaced, and bound up in a wrong order, but nothing is lost. If they were properly rearranged, the order of contents of Part ii would be seen to be as follows, viz.
sections 1—12, 19—21, 13—18, 22—35, as in the last MS.; with
the additional sections 41—43; also 44, but not 45; also 41a—42b;
after which come sections 36—38, the last ending with the words
"styke an euen pyn or a were vpri^t, þe smallere þe bettre. sette þy
pyn be plum-rewle euen"; see l. 6. I have printed from this MS.
the last five words of sect. 40; also 41—43, and 41a—42b; besides
collating it for the improvement of the text in sect. 44. I have also
been indebted to it for the Latin rubrics to the conclusions, which I
have not found elsewhere. Several various readings from this MS.
appear in the Critical Notes.

§ 14. N.—MS. Digby 72, in the Bodleian Library. This is a
collection of various tracts, including tables of latitudes of planets, and
for finding the moon's place; table of roots of "mene motes" for the
"anni collecti," &c. (see Part ii, sect. 44); tables of the motions
of the sun and moon; astrological tables; description of planets; on
horoscopes; on aspects; after which, on fol. 78, a curious table of 15
fixed stars, in which each star is denoted by some odd-shaped strag-
gling character, and is connected with certain gems and herbs. On fol.
79 comes the "Astrolabye," beginning—"lytull lewis my zone, I
perseyve well," &c. The conclusions in Part ii are: 1—12, 19—21,
13—18, 22—35; 41—43; 44, 45; 41a—42b; 36 and 37, ending
with the words—"3 howsis that folowen;" cf. MS. L. From this
MS. I have printed the text of sections 44 and 45, but have made little
further use of it. The writing is not very good, and the ink pale.

§ 15. O.—MS. Ashmole 360, in the Bodleian Library. Late MS.,
on paper; former owner's name, Johan Pekeryng; without diagrams.
There are evidently some omissions in it. But it includes sections 44
and 45, and I have given various readings from it in those sections. It
ends at the end of sect. 43a, with the words—"one to twelfe. & sic finis."

§ 16. P.—MS. Dd. 12. 51 in the Cambridge University Library.
Small MS. on vellum, size of pages scarcely 6 inches by 4; containing
86 leaves, and written in the fifteenth century. The text is by no
means a bad one, though the spelling is somewhat peculiar. Unfortu-
nately, some of the pages are very much rubbed and defaced; other-
wise I should have made more use of it. As it is, I have taken from
it some various readings, recorded in the Critical Notes. The scribe
seems generally to have understood what he was writing, which is not
often the case in MSS. of the "Astrolabe;" so that this MS. is use-
ful in passages where other texts have absurd readings.

One point deserves particular attention. It not only contains
the conclusions of Part ii in the right order, but continues it without
a break to the end of conclusion 43; at the end of which is the
colophon—Explicit tractatus astrolabii.¹

§ 17. Q.—MS. Ashmole 393, in the Bodleian Library; on paper.
This is of little importance. The piece entitled "Chauuers: The
Tretysse off the Astrolabye" merely fills one closely-written leaf, and
contains a sort of epitome of Part i, with the beginning of Part ii.

§ 18. Of the above MSS., Mr Brae describes H., I., and L. only,
and does not seem to have made use of any others. Mr Todd, in his
Animadversions on Gower and Chaucer, p. 125, enumerates only four
MSS., which are plainly A., P., F., and G. The rest seem to have
escaped attention.

In addition to the MS. authorities, we have one more source of
text, viz. the Editio Princeps, which may be thus described.

R.—The edition of Chaucer’s Works by Wm. Thynne, printed
at London by Thomas Godfray in 1532. This is the first edition in
which the Treatise on the Astrolabe appeared; it begins at fol.
ccxcviii., back. The Conclusions in Part ii are in the order follow-
ing, viz. 1—12, 19—21, 13—18, 22—40; after which come 41—43,
and 41a—42b. This order does not agree precisely with that in any
MS. now extant, with the exception of I., which imitates it. It is
further remarkable for certain additions and errors, which are dis-
ussed in § 26 below. All later editions, down to Urry's in 1721,
contribute no new information. The few slight alterations which
appear in them are such as could have been made without reference
to MSS. at all.

REMARKS ON THE CLASSES OF THE MSS.

§ 19. On comparing the MSS., it at once appears that they do not
agree as to the order of the Conclusions in Part ii. The MSS. A., B.,

¹ This MS. is, in fact, of the first class, and should have been mentioned
much earlier; but the mistake was overlooked till it was too late to correct it.
C. (which are unquestionably the oldest) as well as E., F., G., and P., adopt the order which appears in this edition, but which has never appeared in any previous edition. In all other editions we find the three sections 19—21 made to precede sections 13—18. Now we might here appeal to authority only, and say that the order in the oldest MSS. ought to be preferred. But it so happens that we can appeal to internal evidence as well, and there are at least three considerations which shew that the oldest MSS. are certainly correct. These are as follows. In the first place, sect. 18 amounts to finding the degree of the zodiac which souths with any star, and begins with the words “Set the centre of the sterre vpon the lyne Meridional”; whilst sect. 19 amounts to finding the degree of the zodiac that rises with any star, and begins with the words “Set the sentre of the sterre vpon the est orisonte.” Clearly, these “conclusions” are closely linked together, and one ought to follow the other. But, in all the editions, this continuity is broken. In the second place, the rubric of sect. 21 is—“To knowe for what latitude in any regioun,” &c.; whilst that of sect. 22 is—“To knowe in special the latitude of owre countray,” &c. Clearly, these conclusions are closely linked, and in their right order. But, in all the editions, this continuity is again broken; and we have this absurd result, viz. that a proposition headed—“To knowe the degrees of the longitudes of fixe sterres” is followed by one headed—“To knowe in special the latitude of owre countray.” What in the world can the latitude of a place have to do with the longitude of a star? And how is it possible to assign, in this arrangement, the faintest idea of sense to the words “in special”? This argument is alone convincing. But thirdly, we may note the heading of sect. 16—“This chapitre is a Maner declaracioun to conclusiones pat folwen.” By the right arrangement, this section comes earlier than it does otherwise, and precedes sections 19, 20, and 21, which is a more natural arrangement than that in former editions. This is a minor point, and I lay no stress on it. But the two former reasons are cogent, and we see that common sense confirms that arrangement of sections which the authority of the oldest MSS. prescribes. The two things together are sufficient, and we can now trust to the oldest MSS. with the greater confidence. Hence we are enabled to draw a
line, and to divide the MSS. into two classes; those in which the order of sections is correct, and those in which it has suffered misplacement, the number in each class being much the same. This gives us the following result.

First Class. A. B. C. (probably D.) E. F. G. P.

Second Class. H. I. K. L. M. N. O.; to which add R.

But this division immediately leads to another very curious result, and that is, a certain lack of authority for sections after the fortieth.

A. ends with an incomplete sentence, in sect. 40, with the words—"howre after howre."

B. C. end exactly at the same place.

E. ends sect. 40 with the same words; and, after this, has only one additional section (46), which is, in my opinion, spurious; especially as it does not appear in Messahala, of which more anon.

D. fails earlier, viz. in sect. 31, which is incomplete.

F. has all down to the end of sect. 36, and then—"explicit."

G. breaks off in sect. 34, which is incomplete.

In none of the first-class MSS. (excepting P., which terminates with section 43) is there a word about umbra recta or umbra versa.

Even in the second class of MSS., we find H. breaking off at sect. 36, and K. at sect. 35; so that the sections on the umbrae rest only on MSS. I. (obviously an edition, not a transcript), L., M., N., O., and P. Putting aside the first of these, as being "edited," we have but five left; and in the first four of these we find that the additional Conclusions appear in a certain order, viz. they insert 44 and 45 (on the "mene mote") between three sections 41—43 on the "umbrae" and five other sections 41a—42b on the same.

§ 20. This at once suggests two results. The first is, that, as this gives two sets of sections on the "umbrae," we can hardly expect both to be genuine; and accordingly, we at once find that the last five of these are mere clumsy repetitions of the first three; for which reason, I unhesitatingly reject the said last five as spurious. This view is strikingly confirmed by MS. P.; for this, the only first-class MS. that is carried on beyond section 40, contains the first three sections on the "umbrae" only. The second result is, that if the first three sections on the "umbrae" are to be received, there is good reason

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why we should consider the possible genuineness of sections 44 and 45 on the "mene mote," which rest very nearly on the same authority.

Now the sections on the "mene mote" have in their favour one strong piece of internal evidence; for the date 1397 is mentioned in them more than once as being the "root" or epoch from which to reckon. In most cases, the mention of a date 1397 would lead us to attribute the writing in which it occurs to that year or to a later year, but a date fixed on for a "root" may very well be a prospective one, so that these sections may have been written before 1397; an idea which is supported by the line "behold wheper thy date be more or lasse pan be zere 1397;" sect. 44, 1. 5. But I suspect the date to be an error for 1387, since that [see Somer in Tyrwhitt's Glossary] was really the "rote" used by Nicholas Lenne. In either case, I think we may connect these sections with the previous sections written in 1391.1 Besides which, Chaucer so expressly intimates his acquaintance with the subjects of these sections in the Canterbury Tales,2 that we may the more readily admit them to be really his. There is still less difficulty about admitting the first three sections (41—43) on the "umbrae," because we find similar matter in the treatise of Messahala, from which, as will appear, he derived so much. And hence we may readily conclude that, in the second part, the first forty sections, found in the oldest MSS., are certainly genuine, whilst sections 41—43, as well as 44 and 45, have every claim to be considered genuine also. This need not, however, force us to accept the remaining sections, since they may easily have been added by another hand; a circumstance which is rendered the more probable by the

1 See Part ii, sect. 1, 1, 4; sect. 3, l. 11. "Obviously, nobody putting a hypothetical case in that way to a child would go out of his way to name with a past verb [see the second case] a date still in the future."—Morley's Eng. Writers, ii. 282. Similarly, the expression "I wolde knowe," in the former case, precludes a date in the past; and hence we are driven to conclude that the date refers to time present. Curiously enough, there is an exactly parallel case. Blundevill's Description of Blagrave's Astralabe, printed at London by William Stansby, is undated. Turning to his Proposition VI, p. 615, we find—"As for example, I would know the Meridian Altitude of the Sun y* first of July, 1592." The same date, 1592, is again mentioned at pp. 619, 620, 621, 636, and 639, which renders it probable that the book was printed in that year.

2 "Nother his collect, ne his expans yeres,
Nother his rotes, ne his other geres;" l. 11587,8.
REMARKS ON THE LATER SECTIONS.

fact that sections 41a—42b merely repeat 41—43 in a more clumsy form, and by the consideration that, if genuine, they should have occupied their proper place immediately after sect. 43, instead of being separated from the former set. As to sect. 46, I pronounce no decided opinion; there is but little to be said either for or against it, and it is of little consequence.

§ 21. But admitting the genuineness of sections 40—45, it at once becomes evident that there are two distinct gaps or breaks in the continuity of the treatise; the first between 40 and 41; and the second between 43 and 44. A little consideration will account for these. Looking at the Canterbury Tales, we observe the very same peculiarity; at certain points there are distinct breaks, and no mending can link the various groups together in a satisfactory manner. This can be accounted for in part by our knowledge of the fact that the poet died before he had completed the proper linking-together of the tales which he had more or less finished; but I think it also shews him to have been a fragmentary worker. It seems very probable that he did sometimes actually tire of a thing which he had nearly completed, and allowed himself to begin something else for which he had meanwhile conceived a newer enthusiasm. Such characters are not uncommon amongst men of great ability. To suppose that, upon reaching "conclusion" 40, he suddenly turned to the sections upon the "umbrae," which are at once more easy to explain, more suitable for a child, and illustrative of a different and more practical use of the Astrolabe, seems to me natural enough; and more probable than to suppose that anything is here lost. For, in fact, it is to the very MSS. that contain sections 41—43 that we are indebted for the last five words of sect. 40, so curiously omitted in the oldest and best MSS.; and this is a direct argument against the supposition of any matter having been here lost.

§ 22. The break between sections 43 and 44 may be explained in a totally different manner. I suppose that the break indicates a real, not an accidental, gap. I suppose section 43 to have been really the last section of Part ii, and I refer sections 44 and 45 to the Fourth Part of the Treatise, and not to the Second at all.¹ For if

¹ Not wishing to enforce this view upon every reader, and in order to save
we run through the contents of Parts Three and Four, we observe that they chiefly involve tables, with reference to one of which we find the words "vpon whych table the followith a canon," &c. Now sections 44 and 45 exactly answer the description; they are alternative canons, shewing how certain tables may be used. It happens that "Conclusion" 40 is particularly dependent upon tables. To supply these was partly the object of Part iv—"the whiche 4 Partie in special shal shewen a table of the verray Moeuyng of the Mone from howre to howre, every day and in every signe, after thin Almenak vpon wych table the followith a canon, suffisant to teche as wel the maner of the wyrkyng of that same conclusion / as to knowe in owre orizonte with wych degree of the zodiac that the Mone arisith in any latitude / & the arising of any planete after his latitude fro the Ecliptik lyne." The opening words of the same Conclusion are—"Knowe be thin almenak the degree of the Ecliptik of any signe in which that planete is rekned for to be," &c. This is easily said; but I suppose that it was not so easy in olden times to know off-hand the exact position of a planet. It must have been shewn by tables, and these tables chiefly considered the "mene mote," or average motion of the planets, and that only for periods of years. If you wanted the position of a planet at a given hour on a given day, you had to work it out by figures; the rule for which working was called a "canon." This very "canon" is precisely given at length in sect. 44; and sect. 45 is only another way of doing the same thing, or, in other words, is an alternative canon. When all this is fairly and sufficiently considered, we shall find good grounds for supposing that these sections on the "mene mote" are perfectly genuine, and that they belong to Part iv of the Treatise.

I will only add, that the fact of sections 41a—42b being thus placed after a portion of Part iv is one more indication that they are spurious.

§ 23. But it may be objected, as Mr Brae has very fairly objected, that Conclusion 40 itself ought to belong to Part iv. So it trouble in reference, I have numbered these sections 44 and 45. But if they belong, as I suppose, to Part iv, they should have been named "Part iv Canon 1," and "Part iv, Canon 2" respectively.
ought perhaps, if Chaucer had followed out his own plan. But we have clear indications that his was one of those minds which are not easily bound down to the exact completion even of designs which he had himself formed. The Prologue to the Canterbury Tales must have been written later than several of the tales themselves, and yet we find him deliberately proposing to furnish two tales for every speaker at a time when he had not even provided for them all once round. The well known difficulty about the number of the pilgrims is probably only one more instance of a similar uncertainty; for the simplest solution of the said difficulty is to suppose that the poet did not exactly know himself, but intended to make it come all right at some vague future period. So in the "Astrolabie," he seems to have laid down a plan, without any very distinct understanding that he was bound to abide by it. It is clear from its contents that the Prologue to the "Astrolabie" was written before commencement of the treatise itself, and not, as prefaces generally are, afterwards. He was pleased with his son's progress. Little Lewis had asked him if he might learn something about an astrolabe. The father at once sent him a small astrolabe by way of reward, constructed for the latitude of Oxford, and having 45 circles of latitude on the flat disc (see Fig. 5) instead of having 90 such circles, as the best instruments had. This, however, was a "sufficient" astrolabe for the purpose. But he believes the Latin treatises to be too hard for his son's use, and the conclusions in them to be too numerous. He therefore proposes to select some of the more important conclusions, and to turn them into English with such modifications as would render them easier for a child to understand. He then lays down a table of contents of his proposed five parts, throughout which he employs the future tense, as "the first partie shal rehearse," — "the second partie shal teweche," &c. This use of the future would not alone prove much, but taken in connection with the context, it becomes very suggestive. However, the most significant phrase is in the last line of the Prologue, which speaks of "other noteful

1 "A smal instrument portatif aboute;" Prol. l. 50.
2 "The almykanteras in thin Astrelabie ben compowet by two and two." Part ii, sect. 5, l. 1.
thingez, yif god wol vouche sauf & his modur the mayde, mo than I behete,” i. e. other useful things, more than I now promise, if God and the Virgin vouchsafe it. In accordance with his habits of seldom finishing and of deviating from his own plans at pleasure, we have but an imperfect result, not altogether answerable to the table of contents. I therefore agree with Mr Brae that the 40th conclusion would have done better for Part iv, though I do not agree with him in rejecting it as spurious. This he was led to do by the badness of the text of the MSS. which he consulted, but we can hardly reject this Conclusion without rejecting the whole Treatise, as it is found in all the oldest copies. By way of illustration, I would point out that this is not the only difficulty, for the Conclusions about astrology ought certainly to have been reserved for Part v. These are Conclusions 36 and 37, which concern the “equacions of howses;” and this is probably why, in two of the MSS. (viz. L. and N.), these two conclusions are made to come at the end of the Treatise. There is nothing for it but to accept what we have, and be thankful.

§ 24. If, then, the questions be asked, how much of the Treatise has come down to us, and what was to have been the contents of the missing portion, the account stands thus.

Of Part i, we have the whole.

Of Part ii, we have nearly all, and probably all that ever was written, including Conclusions 1—40 on astronomical matters, and Conclusions 41—43 on the taking of altitudes of terrestrial objects. Possibly Conclusion 46 is to be added to these; but Conclusions 41a—42b are certainly spurious.

Part iii probably consisted entirely of tables, and some at least of these may very well have been transmitted to little Lewis. Indeed, they may have been prepared by or copied from Nicholas of Lynn and John Somer before Chaucer took the rest in hand. The tables were to have been (and perhaps were) as follows.

1. Tables of latitude and longitudes of the stars which were represented on the “Rete” of the Astrolabe. Specimens of such tables are printed in § 30 of this Preface.

2. Tables of declinations of the sun, according to the day of the year.
3. Tables of longitudes of cities and towns.

4. Tables for setting clocks and finding the meridian altitudes (of the sun, probably).

Such tables as these are by no means lost. There are MSS. which contain little else, as e. g. MS. Hh. 6. 8 in the Cambridge University Library. The longitudes of towns are given in MS. Camb. II. 3. 3, at fol. 214b. Again, in MS. F. 25, in St John's College Library, Cambridge, we find tables of fixed stars, tables of latitudes and longitudes of towns, tables of altitudes of the sun at different hours, and many others.

Part iv was to explain the motions of the heavenly bodies, with their causes. This was probably never written. It was also to contain a table to shew the position of the moon, according to an almanac; and such a table is given in the St John's MS. above mentioned, and in MS. Camb. II. 3. 3, at fol. 143. This was to have been followed by a canon, and an explanation of the working of the Conclusion—"to knowe with wych degree of the zodiac that the Mone arisith," and "the arising of any planete," &c. The canon is partly accounted for, as regards the planets at least, by sections 44 and 45, and the "conclusion" by section 40.

Part v was to contain the general rules of astrology, with tables of equations of houses, dignities of planets, and other useful things which God and the Virgin might vouchsafe that the author should accomplish. Sections 36 and 37 tell us something about the equations of houses, but, in all probability, none (or, at least, no more) of this fifth Part was ever written. Tables of equations of houses, for the latitude of Toledo, are given in MS. Camb. II. 3. 3, at fol. 177, and elsewhere. Of the general rules of astrology we find in old MSS. somewhat too much, but they are generally in Latin; however, the Trinity MS. R. 15. 18 has some of them in English.

On the whole, we have quite as much of Chaucer's Treatise as we need care for; and he may easily have changed his mind about the necessity of writing Part v; for we actually find him declaring (and it is pleasant to hear him) that "natheles, theise ben observauncez of iudicial matiere & rytes of paiens, in which my spirit ne hath no feith;" ii. 4. 34.
§ 25. I next have to point out the sources whence Chaucer’s treatise was derived. Mr Halliwell, in a note at the end of his edition of Mandeville’s Travels, speaks of the original treatise on the Astrolabe, written in Sanskrit, on which he supposes Chaucer’s treatise to have been founded. Whether the Latin version used by Chaucer was ultimately derived from a Sanskrit copy or not, need not be considered here. The use of the Astrolabe was no doubt well known at an early period in India and among the Persians and Arabs; see the “Description of a Planispheric Astrolabe constructed for Shah Sultan Husain Safawi, king of Persia,” by W. H. Morley, in which elaborate and beautifully-illustrated volume the reader may find sufficient information. Marco Polo says (bk. ii. c. 33) that there were 5000 astrologers and soothsayers in the city of Cambaluc, adding—“they have a kind of Astrolabe, on which are inscribed the planetary signs, the hours, and critical points of the whole year;” Marco Polo, ed. Yule, i. 399. Compare also the mention of the instrument in the 161st night of the Arabian Nights’ Entertainments, where a translation which I have now before me has the words—“instead of putting water into the basin, he [the barber] took a very handsome astrolabe out of his case, and went very gravely out of my room to the middle of the yard, to take the height of the sun;” on which passage Mr Lane has a note (chap. v, note 57) which Mr Brae quotes at length in his edition. There is also at least one version of a treatise in Greek, entitled περὶ τῆς τοῦ ἀστρολάβου χρήσεως, by Johannes Philoponus, of which the Cambridge University Library possesses two copies, viz. MSS. Dd. 15. 27 and Gg. 2. 33. But it is clear, from his own words, that Chaucer followed the Latin, and I can point out one of the Latin treatises to which he was very considerably indebted. This is the “Compositio et Operatio Astrolabie,” by Messahala,1 of which copies are, I have no doubt, sufficiently numerous. The Cambridge library has four, viz. Hh. 6. 8, Ll. 1. 13, Li. 3. 3,2 and Kk. 1. 1, and there

1 Macha-allah or Messahala, an Arabian astronomer, by religion a Jew, flourished towards the end of the eighth century. Latin translations of four of his works (not including the Treatise on the Astrolabe) have been printed, and were published at Nuremberg in 1549. A list of his works is given in Casiri (Bibl. Arab. hisp. tom. 1er. pag. 434), and in the Biographie Universelle.

2 This splendid MS., of the thirteenth century, is dated 1276, and illustrated
is another copy in St John's College Library, Cambridge, marked F. 25. The title should be particularly observed; for the treatise is distinctly divisible into two separate parts, viz. the "Compositio Astrolabii" and the "Operatio Astrolabii." The former begins with the words—"Scito quod astrolabium sit nomen Græcum," and explains how to make an astrolabe, and how to inscribe on it the various necessary lines and circles with sufficient exactness. It is much the longer portion of the treatise, and (in MS. II. 3. 3) is illustrated by numerous diagrams, whilst the second part has no such illustrations. But it does not appear that Chaucer made any use of this former part, as his astrolabe had been procured ready-made. The second part of the treatise, or "Operatio Astrolabii," begins with the words "Nomina instrumentorum sunt hec." This is evidently one of the sources from which Chaucer drew largely, and I have therefore printed it at length in this volume, from MS. II. 3. 3, with a few corrections from the other copies. Chaucer's Part i is almost wholly taken from this, but he has expanded it in several places, with the evident intention of making it more easy to understand. In Part ii, he has taken from it, with more or less exactness, sections 1—3, 5—8, 10, 11, 13—18, 20, 21, 24, 25, 27—31, 33—37, 41, and 42; whilst sections 4, 9, 12, 19, 22, 23, 26, 32, 38—40, and 43 do not appear in it. In other words, Messahala's treatise accounts for thirty-one conclusions out of forty-three, or about two-thirds of the whole. In some places, Chaucer has translated almost word for word, so as to leave no doubt as to his authority. Besides which, I have already remarked that Chaucer's version is directly connected with Messahala by the quotations from the latter which appear in MS. E.; see description of this MS. above. If it be inquired, whence did Chaucer derive the remaining third of his Second Part, I think it very likely that some of it may be found amongst the varied and voluminous contents of such a MS. as II. 3. 3, which is a sort of general compendium of astronomical and astrological knowledge. The complete solution of this question I leave to some one with more leisure than myself, being satisfied that with beautifully-executed coloured diagrams. It is a storehouse of information about the Astrolabe, and I frequently quote from it.

1 See the Description of the Plates in this volume.
to have discovered the original of Part i and two-thirds of Part ii is to have made a good start.\footnote{The first suggestion as to Chaucer's use of Messahala came to me, as many other excellent suggestions have come to me, from Mr Bradshaw.} It must not be omitted that the MSS. of Messahala are not all alike, that some copies have propositions which are not in others; and that the order of the conclusions is not invariable. The chief noteworthy difference between Chaucer's version and the Latin original is in the order of the conclusions; it is clear that Chaucer not only took what he liked, but rearranged his materials after his own fashion.

§ 26. About the early printed editions of the Astrolabe, I have not much to say. The Editio Princeps of 1532 was clearly derived from some MS. of the second-class, and, what between the errors of the scribes and printers, absurdities abound. After a careful examination of the old editions, I came to the conclusion that the less I consulted them the better, and have therefore rather avoided them than sought their assistance.

The following is a brief but accurate list of the editions of Chaucer's Works:

1. Ed. by Wm. Thynne, London, 1532. Folio. (The "Astrolabe" begins on leaf ccxeviii, back.)

2. Reprinted, with additional matter, London, 1542. Folio. (Leaf cxxi.)

3. Reprinted, with the matter re-arranged, London, no date, about 1551. Folio.


5. Reprinted, with additions and alterations by Thomas Speght, London, 1598. Folio. (Leaf 261.)

6. Reprinted, with further additions and alterations by Thomas Speght, London, 1602. Folio. (Leaf 249.)


Urry's edition is at least as bad as any before it; but there are a
few useful explanations in the Glossary, which was added by Mr Timothy Thomas. All these editions not only give the conclusions in a wrong order, but (like the MSS. of the second class) absurdly repeat Conclusion I of Part ii, and reckon the repetition of it as Conclusion III. MSS. of the first class are free from this defect, and may thus be easily known. The only edition worth consulting is that by Mr A. E. Brae, published quite recently, in 1870. Mr Brae made much use of MS. I., besides which he consulted the Printed Editions, and MSS. H. and L. See the descriptions of these MSS. above. From this edition I have taken many hints, and I wish to express, very thankfully, my obligations to it. Mr Brae has brought to bear upon his work much skil and knowledge, and has investigated many points with much patience, minuteness, and critical ability. But I cannot but perceive that he has often expended his labour upon very inferior materials, and has been sometimes misled by the badness of those MSS. to which alone he had access; whereas I have made a point of consulting MSS. at least half a century older, and far more correct. It is solely for this reason that I believe this edition will be found more generally useful than his, as containing a sounder text; for I have been so fortunate as to have met with fewer corrupt readings, and in many cases the older MSS. explain passages at once, at the meaning of which he could but guess. 1 It is from no wish to depreciate his labour (which has been considerable), but only for the reader’s information, that I point out a few passages where the older MSS. at once correct the text of the Editio Princeps (R) and the printed texts generally.

Conclusion III in R. (which must either be rejected or altered from the form in which it there appears) does not appear at all in the best copies.

Mr Brae observes that the description of the “Moder” (i. 3) is repeated in “all the copies.” In the best MSS. it is not so repeated.

The Pin, in R., is said to hold the “tables of the clymathes in the

1 For all the information derived from Mr Brae’s works, he has my sincere acknowledgments and thanks; and for any expressions of mine which insufficiently represent his claims as an interpreter of Chaucer, my regret. To all fellow-workers I cordially wish success, and would rather forego all credit than claim too much,
reeth the in the wombe of the moder" (i. 14). But, for the first "in," the best MSS. have "and." The sense is very different.

I here observe, by the way, that, in his Preface, p. 2, Mr Brae suggests that the Wedge (i. 14) may have been ornamented with the figure of a horse's head. This guess is turned into a certainty by the diagram in MS. ii. 3. 3, which I have copied. See Fig. 7.

In the same section (i. 14) we read in R. that this "hors" straineth all these parts "togyther." The sense is right enough, but togyther is a mere late gloss. The best MSS. have the curious Chaucerian phrase to hepe. So also in the translation of Boethius, ed. Morris, p. 140—"god ðeneþ and departþ to ðer folk prosperites and aduersites ymedeled to hepe;" and in Troil. and Cress. iii. 1770 (ed. Tyrwhitt), we have the complete phrase—"And lost were all, that Love halt now to hepe." Mr Morris's edition (Aldine Series, iv. 297) has "halt now to kepe," which is probably a misprint.

In the last part of i. 17, Mr Brae inserts the words because that the head of Capricorne, which, he says, are not in the copies. But they really do exist in the older MSS.; see i. 17. 34.

In i. 18. 4, where the old MSS. have "is cleped the senyth," Mr Brae (following R.) prints "is cleped the Signet,"—with the remark that "Stevins invariably, but very improperly, altered signet to Zenith." This involves a chronological error of at least three centuries. Mr Brae occasionally attributes to Stevins or Stöffler expressions which may be found in the Latin version of Messahala, three hundred years earlier. It is not a question of opinion, but of fact. In this and many similar instances, we must consult the Latin original, which the reader may now do for himself.

In i. 21, for "the riet of thin astrelabie with thy zodiak," R. has "which is thy Zodiak." The older reading is the better; for the Rete is not identical with the zodiac, but only contains it.

In i. 21. 9, for "by northe the est line," i. e. to the North of the East line (which is clearly right), R. has "by the north-eest lyne;" an obvious corruption of the text.

In i. 21. 42, R. has "transmue" instead of "causen." But signs cannot "transmute in us operations."

1 The double form of the "skale" appears in a MS. dated 1276.
(The curious passage in i. 21. 48—56, found in the old copies, was accidentally omitted in Mr Brae's edition.)

In ii. 3. 29, Mr Brae explains "Alhabor" to be the star Rijel or Rigel (ι Orionis). This was because the numbers in the later MSS. are incorrect. But the numbers in the older MSS. are quite consistent with the usual explanation, which identifies Alhabor with Sirius or the Dog-star. That Alhabor and Rigel are totally different appears from the list of stars printed below, from MS. Camb. ii. 3. 3. As if to preclude all mistake, the diagram in MS. A. represents the Dog-star by a roughly-drawn dog's head, with the name "Alhabor" written on it; see Fig. 2.

In ii. 4. 26, for "infortunyng" R. has "fortune"; this exactly reverses the sense.

In ii. 4. 31, R. omits the necessary words "and that he be."

In ii. 4. 33, for "ioigned," i.e. joined, R. has "reygned;" which gives no sense.

In ii. 11. 5, R. omits "of any of thise howris that ben passed, or elles how many howres or partie of."

In ii. 11. 12, for "laste chapitre of the 4 partie," R. has "fourthe partie of the laste chapitre;" the cart before the horse.

In ii. 13. 5, Mr Brae prints "the highest degre," with the note, "in all the copies this word is lyne. It ought manifestly to be degre." The oldest MSS. have neither line nor degre, but a third word, viz. cours.

So in the rubric to ii. 17, for "longitude" R. has "latitude;" but Mr Brae observes that the object of the problem is longitude. The oldest MSS. have "longitude" rightly enough.

In ii. 17. 24, R. has "after the syght." Mr Brae well says that "it is difficult to interpret after the sight." So it is; but the right reading "after the site" is clear enough.

In ii. 23, Mr Brae has an argument to shew that the two stars used were β Ursæ Majoris and the Pole-star; and that the former was the star from which the latitude was derived, whilst the latter (the pole-star) was merely used to help to find the other's place. This

1 See also Fig. 2 and Fig. 9, where they are marked on the lower rim at some distance apart.
curious inversion was caused by the false numbers in the late copies. The true numbers in the early copies shew (as might have been expected) that it was exactly the other way; the latitude, or rather the elevation of the pole was, naturally enough, derived as usual from observing the pole-star, and the other star (to determine which we have quite insufficient data) was merely used for convenience, to help to fix the pole-star's position.

In ii. 25. 36—40, the old editions are so imperfect that the text has to be guessed at. The old MSS. are clear enough.

In ii. 26. 22, R. has "ouercometh the equinoctial." The right word is "ouerkeruyth," i.e. cuts across, crosses.

In ii. 29. 7, Mr Brae prints "bordure" correctly; but he had to guess at it, for his authorities had "sonne," which he saw to be absurd.

In ii. 30, he attributes to Stevins the notion that the "wey of the sonne" means the sun's apparent diurnal path, and says that it is wrong. However absurd it may seem, I suspect it is what Messahala means; at any rate, the oldest MSS. distinctly say "the wey wher as the sonne wente thilke day" (ii. 30. 10); but the later copies differ from this.

In ii. 31. 2, the phrase "by north the est" is again corrupted (in R.) into "by Northe-est."

In a note on p. 52, Mr Brae says that Stevins has everywhere wrongly altered minute to Azimuth. But the latter reading can be defended; it was so written a century before Stevins was born. The rubric to ii. 34 is corrupt in the later copies; Mr Brae has restored it by conjecture, and the old copies shew that he has done rightly.

In ii. 34. 6, he has "wayte than of which degre the zodiacke is to which the pryck of the altitude of the Mone [applies]." Curiously enough, MS. A. also erroneously has to which, but collation at once shews that it is a mere error for towchith, and the right reading is as I have given it. R. also wrongly has to whiche.

In ii. 35. 18, for "Episicle" R. has "eclyptyke lyne."

In ii. 39. 3, R. has "signet" instead of "lyne Meridional," which cannot well be explained. The last part of ii. 35, viz. II. 19—27, is very badly represented in R.
The whole of ii. 40 is also so badly represented in R. and the late MSS. that Mr Brae was led to reject it. But it occurs in MSS. A., B., C., and others, and is therefore of the same age as all the Conclusions which precede it.

Besides his print of Chaucer's Astrolabe, Mr Brae has reprinted some curious and interesting critical notes of his own, and has added some essays on Chaucer's "prime," on "the Carrenare," and "shippes oppositeres." To some of these I shall refer presently. To all that he has done I am much indebted, and I should, indeed, have abandoned the editing of the present volume but for the fact that I had ascertained the existence of better materials than he happened to meet with.

It is, perhaps, not out of place to observe here that those who are best acquainted with Early English will readily perceive that the spelling, and many turns of expression, are of an older character in the present edition than in any that has preceded it.

§ 27. The works upon, and descriptions of, the astrolabe, are numerous. I have had neither time nor inclination to make researches into the subject; for which reason I here note the names of a few books which may be examined by the curious reader.

In his Universal Lexicon, Zedler explains that astrolabes are of two kinds, "universal" and "particular." He speaks of the astrolabes (1) of Gemma Frisius; see Petri Apiani Cosmographia, per Gemmam Phrysium restituta; (2) of Johan de Rojas, a Spaniard, A. D. 1550; (3) of De la Hire the elder, professor of mathematics at Paris, A. D. 1702; (4) of Johannes Stoflerinus (or Stöffler), A. D. 1510. The last of these differed from the others in adopting a different and more convenient system of projection, viz. that upon the plane of the equator, or one parallel to it, the eye being in the antarctic pole, and the arctic pole being made the centre of the instrument. This projection is the same as that which was used by Ptolemy, and it is adopted in the diagrams which accompany Chaucer's treatise in some of the MSS. It should be observed here that the term "astrolabe" alone is vague; it was originally a general name for any circular instrument used for observation of the stars; but in the sixteenth and seventeenth centuries it was restricted to the...
particular kind called the "Astrolabe Planisphere," or astrolabe on a flat surface, in which sense alone the word is used throughout this volume. See the English Cyclopædia, Arts and Sciences, s. v. Astrolabe.

The simplest work is that by Stöffler or Stofferinus, as he calls himself; see also Gemma Frisius, Metius, Clavius Bambergensis, the Cursus Mathematicus of Dechales, vol. iv. p. 161, Delambre's History of Astronomy, and other works. The plates in Metius are most exquisitely engraved, and on a large scale, and give a better representation of the instrument than any others that I have seen.

One of the MSS. speaks, as I have said, of an astrolabe belonging to Merton College, Oxford. There is a very nice one, made of brass, and by a Dutch engraver, in the library of King's College, Cambridge. It has several discs or plates, or, as Chaucer calls them, "tables." Of this instrument the same library contains a written description, with some account of the problems it will solve, and an investigation of its probable date, by H. Godfray, Esq., of St John's College. There is also a small silver instrument in Trinity College, Cambridge, which has a circular rim like that of an astrolabe.

There is a book entitled "A verie briefe and most plaine description of Mr Blagrave his Astrolabe," &c., by Mr Blundevill; London, printed by William Stansby. It is undated, but mentions the date 1592 several times. This treatise is very much on Chaucer's plan, as it gives a description of the instrument, followed by the Conclusions which it will solve. But it turns out to be of little practical assistance, because Blagrave's astrolabe was on a different principle. Blundevill, in his Preface, says he has seen but three sorts of astrolabes, first, that of Stofflerus, which was much used for a whole century; Secondly, the Catholicon, or universal astrolabe of Gemma Frisius; and thirdly, an improved Catholicon by Mr Blagrave, "a Gentleman of Reading besides London." He goes on to say that broad astrolabes are bad for use at sea, as being affected by the wind; "which thing to auoyde, the Spaniards doe commonly

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1 This word has several senses in Chaucer. It means (1) the discs of an astrolabe; (2) a set of tablets; (3) astronomical tables; and (4) the game of "tables."
make their Astrolabes or Rings narrow and weighty, which for the
most part are not much above five inches broad, and yet doe weigh
at the least four pounds." English astrolabes, he says, are very
heavy, and six or seven inches broad. He recommends that more of
the southern stars should be represented on the "Rete," such as the
Southern Cross, the Southern Triangle, Noah's Dove or Pigeon, and
another called Polophilax, lately found out by mariners. Blagrave's
Astrolabe had 71 stars on the Rete, which Blundevill enumerates.
He alludes to the division of the mariner's compass into 32 parts, as
in Chaucer's time, each part being termed "a Rombe." He always
calls the "rewle" the "Diopter." There is little else in his volume
that illustrates Chaucer.

§ 28. DESCRIPTION OF THE ASTROLABE PLANISPHERE.

There is not, however, much need of reference to books to under-
stand what the astrolabe used by Chaucer was like. The instrument
may be readily understood from a brief description, and from the Plates
in this volume.

The most important part of the "astrolabe planisphere" consisted
of a somewhat heavy circular plate of metal from four to seven inches
in diameter, which could be suspended from the thumb by a ring
(i. 1), working with such freedom as would allow the instrument to
assume a perfectly perpendicular position (i. 2). One side of the plate
was perfectly flat, and was called the back. This is represented in Fig.
1. On it was described a number of concentric rings, marked with
various divisions, which may be readily understood from the figure.
Beginning at the outermost ring, the first two represent the ninety
degrees into which each quadrant of a circle can be divided (i. 7).
The next two represent the signs of the zodiac, each subdivided into
thirty degrees (i. 8). The next two represent the days of the year,
and are rather difficult to mark, as the circle has, for this purpose, to
be divided into $365\frac{1}{4}$ equal parts (i. 9). The next three circles shew the
names of the months, the number of days in each, and the small
divisions which represent each day, which coincide exactly with those
representing the days of the year (i. 10). The two innermost rings shew
the saints' days, with their Sunday-letters. Thus, above the 21st of

ASTROLABE.
December, is written "Thome," i.e. St Thomas's day, its Sunday-letter being E; the rest can easily be traced by the tables in Prayer-book (i. 11). These may be thus briefly recapitulated.

1 and 2. Circles of degrees of the quadrant and circle.

3 and 4. Circles of the zodiacal signs, with their degrees.

5 and 6. Circles of the days of the year, with their numbers.

7, 8, and 9. Circles of the months, with their days and numbers of the days.

10 and 11. Circles of saints' days, with their Sunday-letters.

Within all these, are the Scales of Umbra Recta and Umbra Versa, in each of which the scale is divided into twelve equal parts, for the convenience of taking and computing altitudes (i. 12). This primitive and loose method of computation has long been superseded by the methods of trigonometry. Besides these circles, there is a perpendicular line, marking the South and North points, and a horizontal line from East to West.

The other side of the plate, called the front, and shewn in Fig. 2, had a thick rim with a wide depression in the middle (i. 3). The rim was marked with three rings or circles, of which the outermost was the Circle of Letters (A to Z) representing the twenty-four hours of the day, and the two innermost the degrees of the quadrants (i. 16). The depressed central portion of the plate was marked only with three circles, the "Tropicus Cancri," the "Æquinocialis," and the "Tropicus Capricorni" (i. 17); and with the cross-lines from North to South, and from East to West (i. 15). But several thin plates or discs of metal were provided, which were of such a size as exactly to drop into the depression spoken of. The principal one of these, called the "Rete," is shewn in Fig. 2. It consisted of a circular ring marked with the zodiacal signs, subdivided into degrees, with narrow branching limbs both within and without this ring, having smaller branches or tongues terminating in points, each of which denoted the exact position of some well-known star. The names of these stars, as "Alhabor," "Rigel," &c., are (some of them) written on the branches (i. 21). The "Rete," being thus, as it were, a skeleton plate, allows the "Tropicus Cancri," &c., marked upon the body of the instrument, to be partially seen below it. Another form of the "Rete" is shewn in Fig. 9,
and other positions of the Rete in Fig. 11 and Fig. 12. But it was more usual to interpose between the “Rete” and the body of the instrument (called the “Mother”) another thin plate or disc, such as that in Fig. 5, so that portions of this latter plate could be seen beneath the skeleton-form of the “Rete” (i. 17). These plates are called by Chaucer “tables,” and sometimes an instrument was provided with several of them, differently marked, for use in places having different latitudes. The one in Fig. 5 is suitable for the latitude of Oxford (nearly). The upper part, above the Horizon Obliquus, is marked with circles of altitude (i. 18), crossed by incomplete arcs of azimuth tending to a common centre, the zenith (i. 19). The lower part of the same plate is marked with arcs denoting the twelve planetary hours (i. 20).

At the back of the astrolabe revolved the “rule,” made of metal, and fitted with sights, represented in Fig. 3 (i. 13). At the front of it revolved the “label,” represented in Fig. 6 (i. 22).

All the parts were held together by the central pin (Fig. 4) which passed through the holes in the “moder,” plates, “Rete,” rule, and label,¹ and was secured by a little wedge (i. 14), which was sometimes fancifully carved to resemble a horse (Fig. 7).

Another “table” or disc is shewn in Fig. 14, and was used for ascertaining the twelve astrological houses.

§ 29. USES OF THE ASTROLABE PLANISPHERE.

I here briefly enumerate such principal uses of the instrument as are mentioned by Chaucer.

The back (Fig. 1) shews at once the degree of the zodiac answering to every day in the year (ii. 1). The altitude of the sun can be taken by the “Rule,” elevated at the proper angle (ii. 2). If the Rete be properly adjusted to this altitude, we can thus tell the hour of the day (ii. 3). The duration of twilight can be calculated by observing when the sun is 18° below the horizon (ii. 6). Observe the times of sunrise and sundown, and the interval is the “artificial day” (ii. 7).

¹ “Pertuis: m. A hole. Pertuis de l’Araigne, the centre of an Astrolabe; the hole wherein all the tables thereof are, by a pin or nails, joined together.”—Cotgrave’s French Dictionary.
This day, with the duration of morning and evening twilights added to it, is called the "vulgar day" (ii. 9). The plate in Fig. 5 shews the planetary hours (ii. 12). The placing of the sun's degree on the South-line gives the sun's meridian altitude (ii. 13), and conversely (ii. 14). The back of the instrument can shew what days in the year are of equal length (ii. 15). The degree of the zodiac which souths with any star can be ascertained by observing two altitudes of the star; but the observations must be made when the star is very near the meridian (ii. 17). If the star be marked on the Rete, the said degree is easily found by use of the Rete (ii. 18). We can also find with what degree of the zodiac the same star rises (ii. 19). The use of the Rete also shews the declination of every degree in the zodiac (ii. 20). We can always tell for what latitude a disc such as that in Fig. 5 is constructed, by properly examining it (ii. 21). The latitude of any place can be found by two observations of the altitude of the Pole-star (ii. 23); or of any circum-polar star (ii. 24); or by observing the sun's meridional altitude (ii. 25). The Rete also tells us the "ascensions of signs," or how many degrees of the equinoctial circle pass the meridian with a given sign (ii. 27); as also the "oblique ascensions" of the same (ii. 28). The astrolabe can also be used to discover (but only in an imperfect and approximate manner) the four cardinal points of the compass (ii. 29). We can also compare the altitude of a planet with that of the sun (ii. 30). We can find in what part of the horizon the sun rises (ii. 31); and in what direction to look for a conjunction of the sun and moon (ii. 32); also near what point of the compass the sun is at any given hour (ii. 33). The moon's observed altitude will shew her longitude (ii. 34). We can tell, from two observations of a planet properly made, whether the planet's movement is direct or retrograde (ii. 35). The disc shewn in Fig. 14 helps to shew the "equations of houses" (ii. 36). The four cardinal points can be found without an astrolabe, by an experiment properly conducted (ii. 38). The astrolabe can be used to find the degree of the zodiac with which any planet ascends, even when the planet is not situated in the ecliptic (ii. 40).

By the use of the *Umbra Recta* on the back of the instrument, we can take the altitude of an accessible object by a single observa-
tion (ii. 41); or of an inaccessible object by two observations (ii. 43). Or, the height of an inaccessible object may likewise be taken by two observations, by the scale marked Umbra Versa (ii. 42).

The few conclusions not here referred to are chiefly explanatory, or of minor interest.

§ 30. STARS MARKED ON THE RETE.

Several of the Latin MSS. upon the Astrolabe give a list of the stars marked upon the Rete. The first double list printed below is from the Cambridge MS. which has also furnished us with the Latin version of Messahala. It is given in the form of two tables; the first mentions 49 stars, with the degrees of the zodiac which south along with them, and their declinations from the equinoctial line. The second table mentions some only of the same stars, with their longitudes and latitudes, as referred to the ecliptic.

### TABLE I. FORTY-NINE STARS MARKED UPON A RETE.

[MS. Camb. Univ. Lib. Ii. 3. 3; fol. 70, back.]

Tabula stellarum fixarum que ponuntur in astrolabio, cum gradibus quibus celum mediant, et cum distantia earum ab equinoctiali linea.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Gr. Min.</td>
<td>Gr. Min.</td>
<td></td>
</tr>
<tr>
<td>Aries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Mirach</td>
<td></td>
<td></td>
<td>7* 0</td>
<td>32 30</td>
<td>N†</td>
</tr>
<tr>
<td>(2) Baten kaytoz</td>
<td></td>
<td>venter cethi</td>
<td>18 30 13</td>
<td>13 30 0</td>
<td>S</td>
</tr>
<tr>
<td>(3) Panten kai-</td>
<td></td>
<td></td>
<td>20 0 14</td>
<td>30 0</td>
<td></td>
</tr>
<tr>
<td>toz¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Enif</td>
<td></td>
<td></td>
<td>22 0 23</td>
<td>30</td>
<td>N</td>
</tr>
<tr>
<td>(5) Finis fluxus</td>
<td></td>
<td></td>
<td>29 0 4</td>
<td>30</td>
<td>S</td>
</tr>
</tbody>
</table>

* The MS. has "Gradus O. Minuta 7; " but I have collated its readings with those in MS. Univ. Lib. II. 1. 13, fol. 81, back; and the latter has "Grad. 7. Min. O," which seems rather to be meant.

† The MS. has contractions for "Septentriionalis" and "Meridionalis;" I alter these to "N" and "S" throughout, as being more explicit and less troublesome.

¹ Paten cataytoz in II. 1. 13.
### Nomina signorum.

<table>
<thead>
<tr>
<th>Nomina stellorum.</th>
<th>Ymagines stellorum.</th>
<th>Longitudo</th>
<th>Latitudo</th>
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<td></td>
<td></td>
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<td>Min.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gr.</td>
<td>Min.</td>
</tr>
<tr>
<td>Taurus</td>
<td>(6) Menkar</td>
<td>Naris cethi</td>
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</tr>
<tr>
<td></td>
<td>(7) Algenib</td>
<td>Frons algonis</td>
<td>10 0 49 0</td>
</tr>
<tr>
<td></td>
<td>(8) Algecenar a</td>
<td>Oculus vel cor tauri</td>
<td>22 0 16 0</td>
</tr>
<tr>
<td></td>
<td>(9) Aldebaran</td>
<td></td>
<td>29 0 14 30</td>
</tr>
<tr>
<td></td>
<td>(10) Alhaioth</td>
<td>Hyreus vel humerus sag.</td>
<td>6 0 45 0</td>
</tr>
<tr>
<td></td>
<td>(11) Rigil</td>
<td>Pes orionis</td>
<td>11 0 10 0</td>
</tr>
<tr>
<td></td>
<td>(12) Algezze</td>
<td>Humerus dexter orionis</td>
<td>15 0 8 0</td>
</tr>
<tr>
<td></td>
<td>(13) Alhabor</td>
<td>In ore canis merid.</td>
<td>3 0 15 0</td>
</tr>
<tr>
<td></td>
<td>(14) Razaigeze</td>
<td>Cap. d. geminorum</td>
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<tr>
<td>Cancer</td>
<td>(15) Algomeyza</td>
<td>In collo canis</td>
<td>13 0 7 0</td>
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<tr>
<td></td>
<td>(16) Markep</td>
<td></td>
<td>21 0 22 30</td>
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<td></td>
<td>(17) Egregez</td>
<td></td>
<td>24 0 45 0</td>
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<tr>
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<td>(18) Aldurin 2</td>
<td>In fronte leonis</td>
<td>6 0 6 0</td>
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<tr>
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<td>Eqvs equs cinguclus</td>
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<tr>
<td>Leo</td>
<td>(20) Calbalezde 4</td>
<td>Cor leonis</td>
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</tr>
<tr>
<td></td>
<td>(21) Alrubicaba</td>
<td>Vrsa</td>
<td>20 0 35 0</td>
</tr>
<tr>
<td></td>
<td>(22) Corus</td>
<td></td>
<td>1 0 11 0</td>
</tr>
<tr>
<td></td>
<td>(23) Dubhe</td>
<td>Id est, Vrsa</td>
<td>2 0 6 0</td>
</tr>
<tr>
<td></td>
<td>(24) Deneb alzed</td>
<td>Cauda leonis</td>
<td>15 0 19 30</td>
</tr>
<tr>
<td></td>
<td>(25) Algorab</td>
<td>In centauro</td>
<td>22 0 13 30</td>
</tr>
<tr>
<td>Virgo</td>
<td>(26) Alchimec</td>
<td>Inhermis</td>
<td>10 0 7 0</td>
</tr>
<tr>
<td></td>
<td>(27) Beanenaz</td>
<td>Filie feretri in themone</td>
<td>9 0 43 0</td>
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<td></td>
<td>(28) Alramech</td>
<td>Lanceator</td>
<td>27 0 24 0</td>
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<tr>
<td></td>
<td>(29) Alfeta</td>
<td>In corona adriane</td>
<td>16 0 29 0</td>
</tr>
<tr>
<td>Libra</td>
<td>(30) Alachil</td>
<td></td>
<td>17 0 19 0</td>
</tr>
<tr>
<td></td>
<td>(31) Yed</td>
<td></td>
<td>26 0 3 0</td>
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<tr>
<td></td>
<td>(32) Calbalacrab</td>
<td>Cor scorpii</td>
<td>27 0 23 0</td>
</tr>
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<td>Scorpius</td>
<td>(33) Alhaue 5</td>
<td>Capud draconis</td>
<td>13 0 15 0</td>
</tr>
<tr>
<td></td>
<td>(34) Rahtaben 6</td>
<td>Capud serpentis</td>
<td>25 0 51 0</td>
</tr>
</tbody>
</table>

1 Angesthanar in II. 1. 13.
2 Aldiran in MS. II. 1. 13.
3 Alfarth in MS. II. 1. 13.
4 Calbelezet in the same.
5 Alhaue vel Razailegue in the same.
6 Razracleyn in the same.
### STARS MARKED ON THE RETE.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<td></td>
<td></td>
<td></td>
<td>Gr.</td>
<td>Min.</td>
<td>Gr.</td>
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<tr>
<td>Capricornus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(35) Wega</td>
<td>Vultur cadens</td>
<td>3</td>
<td>0</td>
<td>38</td>
<td>0</td>
</tr>
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<td>Vultur volans</td>
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<td>0</td>
<td>7</td>
<td>0</td>
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<tr>
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<td>In cigno</td>
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<td>0</td>
<td>12</td>
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<td></td>
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<tr>
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<tr>
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<td>59</td>
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<tr>
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<td></td>
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<td>Cauda capricorni</td>
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<td>0</td>
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<td>30</td>
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<tr>
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<td>Crus</td>
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<td>19</td>
<td>0</td>
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<td>Pisces</td>
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<td></td>
</tr>
<tr>
<td>(46) Alferaz</td>
<td>In pegaso ²</td>
<td>6</td>
<td>0</td>
<td>24</td>
<td>0</td>
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<tr>
<td>(47) Mentichel</td>
<td>Humerus equi alati</td>
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<td>35</td>
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<tr>
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<td>Cauda cethi</td>
<td>22</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>(49) Seeder ⁴</td>
<td></td>
<td>28</td>
<td>0</td>
<td>53</td>
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</tr>
</tbody>
</table>

**Notes.** Star (4); Latitude given as 22 in the other MS. (Pi. I. 13). Star (16); Longitude may be 22. Star (17); Longitude is 34 in the MS. Star (38); Longitude 20 in the other MS. Both the numbers and the directions North and South seem to be occasionally incorrect.

**TABLE II. LONGITUDES AND LATITUDES OF SOME OF THE ABOVE STARS.**

Tabula stellarum fixarum uerificatarum per armillos⁵ parisiuss⁶ et est longitudo earum gradus circuli signorum per circulum transuentem polos zodiaci et stellas; latitudo vero earum est arcus eiusmodem circuli cadens inter stellas et gradus longitudinis earum.

---

1. Aldird in the same.  
2. Miswritten pesagi, pesago.  
3. Or (in other MS.), Scarath.  
4. Or, Seder.  
5. Armilla in other MS.  
6. The form parisis, apparently put for parisisos, occurs in Barbour's Bruce, iv. 251.
<table>
<thead>
<tr>
<th>Signa</th>
<th>Nomina stellarum fixarum</th>
<th>Ymages stellarum</th>
<th>Longitudo</th>
<th>Latitudo</th>
<th>Para latitudinis</th>
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<td></td>
<td></td>
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<td>Min.</td>
<td>Gr.</td>
</tr>
<tr>
<td>Aries</td>
<td>(3) Panta kaytoz</td>
<td>Venter cethi</td>
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<td>0</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(9) Aldebaran</td>
<td>Oculus vel cor tauri</td>
<td>20</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Taurus</td>
<td>(7) Algenib</td>
<td>Latus dextrum persei</td>
<td>20</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>(6) Menkar</td>
<td>Naris cethi</td>
<td>2</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>(11) Rigil all-geuze</td>
<td>Pes orionis</td>
<td>5</td>
<td>0</td>
<td>30</td>
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<tr>
<td>Gemini</td>
<td>(10) Alhiaoth</td>
<td>Hyrcus</td>
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<td>0</td>
<td>22</td>
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<td>Humerus dexter orionis</td>
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<td>15</td>
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<td>(13) Alhabor</td>
<td>In ore canicule</td>
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<td>(23) Dubhe</td>
<td>Vrsa</td>
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<tr>
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<td>In corona</td>
<td>1</td>
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<td>Sagittarius</td>
<td>(34) Raztaben</td>
<td>Capud draconis</td>
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<td>0</td>
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</tr>
<tr>
<td>Capricornus</td>
<td>(35) Alwega</td>
<td>Vultur cadens</td>
<td>13</td>
<td>0</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>(36) Altair</td>
<td>Vultur volans</td>
<td>20</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>(39) Addigege</td>
<td>Cauda galline</td>
<td>21</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Aquarius</td>
<td>(44) Denebalgedi</td>
<td>Cauda capri</td>
<td>13</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(41) Delfin</td>
<td>Nubillosior eius &amp; orientior</td>
<td>6</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>(43) Enif elferaz</td>
<td>Musida equi pe gasi</td>
<td>21</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>

¹ Razalegue in other MS
In the above tables I have inserted the numbers (1), (2), &c. for convenience of reference. The 49 stars mentioned are the following. (Compare Ideler, Untersuchungen über die Bedeutung der Sternnamen, &c.) I do not pretend to identify them with perfect exactness.

(1) Mirach; or β Andromedæ.
(2) Perhaps τ Ceti.
(3) ζ Ceti; or, the Whale’s Belly; see Ideler.
(4) α Arietis; also called Alnath. Enif means nose.
(5) A star in Eridanus. But it looks more like ο Ceti.
(6) Menkar; α Ceti; or, the Whale’s Nose.
(7) Algenib; or α Persei.
(8) Perhaps γ Eridani.
(9) Aldebaran; α Tauri, or the Bull’s Eye.
(10) Capella; α Aurigæ; sometimes called Alhakoth.
(11) Rigel; β Orionis.
(12) α Orionis; often called Betelgeux.
(13) Alhabor; Sirius, or the Dogstar.
(14) Razalgeuze; Castor; α Geminorum.¹
(15) Algomeisa; Procyon; α Canis Minoris; the Little Dog.
(16) ι Argous; see Ideler. (Different from Markab, or α Pegasi.)
(17) Uncertain.
(18) Aldurin; a star in the Lion; uncertain which.
(19) Alphard; Cor Hydææ; α Hydææ.
(20) Calbalased; the Lion’s Heart; Regulus; α Leonis.

¹ The name Razalgeuze is commonly applied to Pollux; but Castor seems to be meant here; see Ideler, p. 151.
(21) Perhaps a star in Ursa Major; possibly λ Ursae Majoris, its latitude being wrongly given. Alrucaba was also a name for the Polestar (Ideler, p. 14). Rukhba means knee.

(22) Uncertain; possibly γ Crateræ. See No. 25.
(23) Dubhe; α Ursæ Majoris.
(24) Denebalased; the Lion's Tail; β Leonis.
(25) Algorab; i. e. the Crow; γ Corvi. It is clear that Corvus and Centaurus were not the same as on a modern globe.
(26) Alchimech: Spica Virginis; α Virginis.
(27) Benetnasch; η Ursæ Majoris; the foremost horse in Charles's Wain, which the Arabs likened to a bier with a girl laid on it. (Hence Lat. feretri filie.)
(28) Alramech; Arcturus; α Boötis.
(29) Alphecca; α Coronæ Borealis.
(30) Perhaps β Serpentis.
(31) δ Ophiuchi.
(32) Cor Scorpii; the Scorpion's Heart; Antares; α Scorpii.
(33) α Serpentarii vel Ophiuchi; also called Ras Alhagus.
(34) γ Draconis; Etanim; the Dragon's Head.
(35) Wega; Vega; α Lyrae; Lyra.
(36) Altair; α Aquilæ.
(37) Possibly a Delphini; the four stars α, β, γ, δ, are very close together.
(38) A star in Cygnus; very near the next following. In fact, El-ridf was only another name for Arided (Ideler, p. 74).
(39) Arided; Deneb adigge; a Cygni.
(40) Somewhere near ζ Capricorni.
(41) Probably β Equulei. The name "Delfin" seems to imply that Equuleus was also called Delphinus Minor.
(42) The word "Aldurin" or "Aldira" is meant for Alderamin or a Cephei.
(43) Enif, or Enir; ε Pegasi.
(44) The Goat's Tail; δ Capricorni.

1 It is perfectly clear that the scribe has changed the places of the words "Capud draconis" and "Capud serpentis," or rather, "serpentarii."
(45) δ Aquarii; represented as on the leg of the Waterbearer; hence called "Crus Aquarii."

(46) Alpheraz, or the Horse; β Pegasi.

(47) Meuntichel; α Andromedæ. This star and the former are both called "humerus equi."

(48) The Whale's Tail; β Ceti.

(49) Shedin; α Cassiopeæ.

Even when all allowances are made for the alteration of the position of the pole since this table was made, it must be held to be very faulty. To the numbers given in the "longitude" column we must add always from 7 to 12 degrees, to make them equal to the present longitudes. The second table helps to confirm the interpretation of the first in many cases.

**TABLE III. OTHER TABLES OF THE SAME STARS.**

After Tables I and II were in type, I found that the tables, as given in MS. IIh. 6. 8, were very differently arranged, and had the peculiar merit of being dated, as well as being explicitly calculated for the latitude of 48½ degrees. Their date is A.D. 1223, and I here add them for their curiosity, premising that the extraordinary mis-spellings of the Arabic names are due to the scribe, and not to me. Thus Alqlari is for Algorab; pes canis means pes Orionis; Galbaicd is for Calbalased; Bacelmara is an error for Ras el-marâ, "the woman's head," α Andromedæ; and Bacelgohol is for Ras Algol or Algol. I may here add, that the word In-hermis against star (26) in Table I, is puzzling till explained; nor is it made clearer by being spelt nermius (!), as in MS. II. 1. 13. It is put for inermis, i.e. unarmed, a name given to the hand of Virgo holding the Spica (α Virginis), in Arabic El-simâkh el-a'zal, "the unarmed Simâkh;" as distinguished from α Boötes, in Arabic El-simâkh el-râmih, "the Simâkh with the lance." See Ideler, p. 51.

[MS. Camb. Univ. Lib. IIh. 6. 8, fol. 236.]

Tabula stellarum fixarum que ponuntur in Astrolabio, certificata ad ciuitatem parisius cuius latitude est .48. gradus et .30. Minuta. In anno domini nostri iesu christi .1223.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aries</td>
<td>(3) Pacancaitoz, i., pes caitoz</td>
<td>20</td>
<td>39</td>
<td>28</td>
<td>0</td>
<td>In pede cuiusdam ali-vis (?)</td>
</tr>
<tr>
<td>Taurus</td>
<td>(7) Algen</td>
<td>7</td>
<td>71</td>
<td>88</td>
<td>0</td>
<td>In fronte algonis; immo, in dextro persei lateris.</td>
</tr>
<tr>
<td></td>
<td>(9) Aldebaran</td>
<td>28</td>
<td>49</td>
<td>46</td>
<td>30</td>
<td>In oculo tauri.</td>
</tr>
<tr>
<td></td>
<td>(10) Alhaisos</td>
<td>3</td>
<td>74</td>
<td>87</td>
<td>0</td>
<td>In humero agitatoris.</td>
</tr>
<tr>
<td>Gemini</td>
<td>(11) Ragel</td>
<td>10</td>
<td>39</td>
<td>32</td>
<td>0</td>
<td>In pede orionis.</td>
</tr>
<tr>
<td></td>
<td>(12) Algeuie</td>
<td>14</td>
<td>55</td>
<td>49</td>
<td>0</td>
<td>In pede geminorum.</td>
</tr>
<tr>
<td></td>
<td>(13) Alhaisos</td>
<td>1</td>
<td>36</td>
<td>26</td>
<td>0</td>
<td>In cane meridionali.</td>
</tr>
<tr>
<td></td>
<td>(15) Algomeiza</td>
<td>10</td>
<td>56</td>
<td>48</td>
<td>30</td>
<td>In cane septentrionali.</td>
</tr>
<tr>
<td></td>
<td>(17) Egregez</td>
<td>24</td>
<td>72</td>
<td>87</td>
<td>0</td>
<td>[8. 30,</td>
</tr>
<tr>
<td>Cancer</td>
<td>(18) Aldiraan</td>
<td>6</td>
<td>52</td>
<td>48</td>
<td>0</td>
<td>In fronte leonis.</td>
</tr>
<tr>
<td></td>
<td>(19) Alfar</td>
<td>13</td>
<td>41</td>
<td>35</td>
<td>0</td>
<td>In ydra serpente .35.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30. ad minus.</td>
</tr>
<tr>
<td>Leo</td>
<td>(20) Calbalacet</td>
<td>18</td>
<td>61</td>
<td>57</td>
<td>0</td>
<td>In corde leonis.</td>
</tr>
<tr>
<td></td>
<td>(21) Alrucaba</td>
<td>17</td>
<td>76</td>
<td>90</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Virgo</td>
<td>(25) Alglari</td>
<td>18</td>
<td>38</td>
<td>31</td>
<td>0</td>
<td>In centauro.</td>
</tr>
<tr>
<td>Libra</td>
<td>(26) Alchimech</td>
<td>9</td>
<td>42</td>
<td>35</td>
<td>0</td>
<td>In-hermis .34.</td>
</tr>
<tr>
<td></td>
<td>(27) Benenah</td>
<td>18</td>
<td>74</td>
<td>84</td>
<td>0</td>
<td>Vitra cenith in temone plaustri.</td>
</tr>
<tr>
<td></td>
<td>(28) Alramech</td>
<td>24</td>
<td>65</td>
<td>65</td>
<td>0</td>
<td>Qui tenet lances.</td>
</tr>
<tr>
<td>Scorpius</td>
<td>(29) Elfeta</td>
<td>16</td>
<td>71</td>
<td>72</td>
<td>0</td>
<td>In corona.</td>
</tr>
<tr>
<td></td>
<td>(30) Alielis</td>
<td>17</td>
<td>57</td>
<td>51</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(32) Calbalagrab</td>
<td>27</td>
<td>14</td>
<td>10</td>
<td>0</td>
<td>In corde scorpionis.</td>
</tr>
<tr>
<td>Sagittarius</td>
<td>(33) Allahin</td>
<td>13</td>
<td>57</td>
<td>57</td>
<td>0</td>
<td>In capite alay .56. 30. ad plus.</td>
</tr>
<tr>
<td>Capricornus</td>
<td>(35) Wega</td>
<td>1</td>
<td>72</td>
<td>79</td>
<td>30</td>
<td>In uulture cadenti.</td>
</tr>
<tr>
<td></td>
<td>(36) Altahir</td>
<td>14</td>
<td>55</td>
<td>48</td>
<td>30</td>
<td>In telo vel in aquila</td>
</tr>
<tr>
<td></td>
<td>(38) Alrif</td>
<td>30</td>
<td>73</td>
<td>84</td>
<td>0</td>
<td>In cigno.</td>
</tr>
<tr>
<td>Aquarius</td>
<td>(40) Libideneb</td>
<td>6</td>
<td>34</td>
<td>20</td>
<td>0</td>
<td>In cauda capricorni.</td>
</tr>
<tr>
<td></td>
<td>(41) Delfin</td>
<td>10</td>
<td>45</td>
<td>48</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Pisces</td>
<td>(46) Halferaez</td>
<td>6</td>
<td>65</td>
<td>65</td>
<td>0</td>
<td>In pegaso.</td>
</tr>
<tr>
<td></td>
<td>(47) Humerus equi</td>
<td>17</td>
<td>71</td>
<td>87</td>
<td>0</td>
<td>Vitra cenith. In equo alato.</td>
</tr>
<tr>
<td></td>
<td>(48) Dene[b]caitoz</td>
<td>22</td>
<td>36</td>
<td>32</td>
<td>0</td>
<td>In Canda caitoz.</td>
</tr>
</tbody>
</table>
TABLES OF STARS.

Tabula stellarum fixarum; que est longitudo earum a capite arietis, & que latitudo earum ab equatore diei.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6) Aldebaran .i. oculus tauri</td>
<td>Taurus</td>
<td>28 2 5 10</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>11) Raglesiosen .i. pes canis (sic)</td>
<td>Gemini</td>
<td>4 0 31 50</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>10) Alhainos .i. stella rubea</td>
<td>Gemini</td>
<td>10 23 22 30</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>*Malkanabar .i. scapula canis</td>
<td>Gemini</td>
<td>17 10 17 0</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>13) Asaare vel Alhabor, hec est stella magna</td>
<td>Cancer</td>
<td>2 40 39 10</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>15) Algumeiza</td>
<td>Cancer</td>
<td>14 40 16 10</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>20) Galbaiced .i. cor leonis</td>
<td>Leo</td>
<td>17 40 0 10</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>24) Neirpha .i. cauda leonis, Magna est</td>
<td>Virgo</td>
<td>9 40 11 50</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>26) Azimecalazel .i. stella cum lancea</td>
<td>Libra</td>
<td>11 10 2 0</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>28) Azimecaramech .i. habens lanceam</td>
<td>Libra</td>
<td>12 30 31 30</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>35) Anazaliaka vel Wega .i. aquila cadens</td>
<td>Capricornus</td>
<td>2 30 62 0</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>*Fonmahout .i. os piscis</td>
<td>Aquarius</td>
<td>22 10 23 1</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>47) Bacelmara vel rigel .i. caput femine</td>
<td>Aries</td>
<td>2 40 26 0</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>*Bacelgohol .i. capud demons</td>
<td>Taurus</td>
<td>14 50 23 0</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>32) Galbaragraph .i. cor scorpionis</td>
<td>Scorpius</td>
<td>27 40 3 0</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>36) Araranathair .i. aquila uolans</td>
<td>Capricornus</td>
<td>18 30 29 4</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>39) Panafadigega .i. cauda galline</td>
<td>Aquarius</td>
<td>24 20 9 0</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>46) Machanastaraz .i. scapula equi</td>
<td>Pisces</td>
<td>17 20 31 0</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>1) Galbahahot .i. cor piscis, quod quidam uocant genu femine</td>
<td>Aries</td>
<td>9 3 26 20</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>
In this list, in which the Arabic words are very badly spelt, as I have said, there are only three stars which do not appear in the other lists. They are marked with an asterisk. The position of the first, Malkanabar, is not clear; the syllable abar points to abār and Alhabor, and suggests the star β Canis Majoris; but the position seems nearer to α Leporis. As to the position of the second there can be no doubt, as it is the star Fomalhaut (α Piscis Australis) of the first magnitude. The third is certainly Algol, or Medusa's head. The explanation of this may be found in Ideler, p. 88. The Arabs turned Medusa into a demon; hence the expression "capud demonis."

§ 31. NOTES ON SOME PASSAGES IN CHAUCER.

It is interesting to inquire whether the Treatise on the Astrolabe throws any light upon other passages in Chaucer. This question was taken up by Mr Brae as far back as the year 1851, when he published a series of useful and suggestive articles on the subject in Notes and Queries. Some time afterwards, when making some similar investigations for myself, I came to conclusions of which some were erroneous, and made some mistakes which, if I had sooner become acquainted with Mr Brae's articles, I should not have made.¹ In what I have now to say, I hope the reader will ascribe to Mr Brae's teaching whatever is right, and put down to my own blundering whatever is wrong. I have no desire to claim any credit in the matter, and only make the following observations for the convenience of readers and future editors.

The passages which I quote are cited from the Aldine edition of Chaucer, edited by Dr Morris.

I. — "the yonge sonne

Hath in the Ram his halfe cours ironne." — Prol. 7.

The difficulty here really resides in the expression "his halfe cours;" which means what it says, viz. "his half-course," and not, as Tyrwhitt unfortunately supposed, "half his course." The results of the two

¹ I beg leave to assure Mr Brae that the discrepancy which he remarks upon in his edition of the Astrolabe, p. 81, was wholly accidental. I believe it arose from my having read his articles too hurriedly, and missing the point of some of them. I had too much of my own work to do to attend much to the proofs which Mr Furnivall sent me. It was not till some time afterwards that I felt convinced about Mr Brae's explanation of the "Ram."
explanations are quite different. Taking Chaucer's own expression as it stands, he tells us that, a little past the middle of April, "the young sun has run his half-course in the Ram." Turning to Fig. 1, we see that, against the month "Aprilis," there appears in the circle of zodiacal signs, the latter half (roughly speaking) of Aries, and the former half of Taurus. Thus the sun in April runs a half-course in the Ram, and a half-course in the Bull. The former of these was completed, says the poet; which is as much as to say, that it was past the eleventh of April.1

The sun had, in fact, only just completed his course through the first of the twelve signs, as the said course was supposed to begin at the vernal equinox. This is why it may well be called "the yonge sonne;" an expression which Chaucer repeats under similar circumstances in the Squyeres Tale, part ii. l. 39.

Chaucer makes the sun enter Aries on the 12th of March (Astrol. ii. 1). In 1865, it entered the sign on the 20th, and in 1871 on the 21st. We thus find a difference of 8 or 9 days between the reckoning in his time and ours. In 1871, the sun entered Taurus on the 20th of April; subtracting 9 days, it entered Taurus, in Chaucer's time, on the 11th of April.2 This difference is worth remarking.

If the reader wants further confirmation of this view, he may find it in Mr Brae's edition, pp. 65 to 68, and 81 to 84. Compare the expression—"because a sign rises in the middle of each month;" p. 47 of Essays on Chaucer, Part I (Chaucer Society).

II. "Some wikkhe aspect or disposicioun
Of Saturne, by som constellacioun,"

Knightes Tale, 229.

"But I moste be in prisoun through Saturne;" l. 470.
"My cours, that hath so wyde for to tourne;" l. 1596.
"Myn lokyng is the fadir of pestilens;" l. 1611.

1 This is wholly due to Mr Brae. My own explanation, that Chaucer referred to the constellation, not the sign of the Ram, I now see to be wrong. Mr Brae shews that Chaucer (and perhaps we may add Lydgate and others) never refers to the constellations, but always to the signs. Let this, then, be remembered in future.

2 This is a sufficiently close approximation for our purpose. The difference between Chaucer's reckoning and ours may be said to vibrate, just at present, between 8 and 9 days. For more exact calculations, the hour of the day would have to be taken into account.
Cf. "wykkid planete, as saturne or Mars"; Astrol. ii. 4. 21; notes in Wright's edition, ll. 2453, 2457; and Piers the Plowman, B. vi. 327. Add to these the description of Saturn—"Significat in...quartanis, lepra, scabie, in mania, carcere, ...submersione, &c. Est infortuna." Johannis Hispalensis Isagoge in Astrologiam, cap. xv.

III. "The thridde night"—Kn. Ta. 605.
"right as hir day
Is gerful, right so chaungeth hire aray;" l. 680.
"And this day fyfty wykes, fer nee neer;" l. 992.

See note by me, in Notes and Queries, 4 S. ii. 243, reprinted in Mr Furnivall's Temporary Preface to Chaucer, p. 103, and Mr Morris's edition in the Clarendon Press Series, p. 144. I do not yet see any point to correct in it. Mr Brae's explanation of "fyfty wykes" must, however, be also consulted; see Notes and Queries, 1 S. iii. 202, 252. I make out that the year which would give the days mentioned is 1387.

"Nough beth forgeten the infortune of Mart;" l. 1163.
"By manasyng of Martz, right by figure;" l. 1177.

Cf. "wykkid planete, as saturne or Mars;" Astrol. ii. 4. 21; "the infortunyng of an assendent," &c.; ii. 4. 26; notes in Wright's edition to ll. 1749 and 2023; and Tyrwhitt's Glossary, s. v. "Puella." See also Man of Lawes Tale, 203.

V. "As is depeynted in the sterres above;" Kn. Ta. 1179.
"For in the sterres, clerere than is glas," &c. Man of Lawes Ta. 96.
"The heven stood that tyme fortunate."—March. Ta. 726.

See Astrolabe, ii. 4; cf. Tyrwhitt, note to C. T. 4617.

VI. "And after was sche maad the loode-sterre;" Kn. Ta. 1201.
"Hire sone is eek a sterre, as men may see;" l. 1203.

Cf. Ovid's Fasti, ii. 153—192; especially 189, 190—

"Signa propinqua micant. Prior est, quam dicimus Arcton, Arctophylax formam terga sequentis habet."

The nymph Callisto was changed into Arctos, or the Great Bear. This was sometimes confused with the other Arctos, or Lesser Bear, in which was situate the "lodestar" or Pole-star. Chaucer has followed
this error. Callisto's son, Arcas, was changed into Arctophylax or Boötes; here again, Chaucer says "a sterre" when he means a whole constellation; as, perhaps, he does in other passages. See Smith's Classical Dict. s. v. "Arctos" and "Callisto;" also Ideler's remarks on the Greater and Lesser Bears, in his "Untersuchungen über die Bedeutung der Sternnamen;" pp. xv, and 1—32.

VII. "And in hire hour he walketh forth a pas."—Kn. Ta. 1359.

See also ll. 1413, 1509.

See Tyrwhitt's note, C. T. 2219; Astrol. ii. 10 and ii. 12. My note on pp. 23 and 24 shews the whole method of working this. Thus, to find the 23rd hour of Sunday, begin with 1, to the left of the up-right line, and the 23rd figure is 6, i. e. Venus. Hence, when two hours are still wanting to complete Sunday, we are just beginning the 23rd hour of Sunday, or the hour of Venus. Two hours later we come to sunrise and the figure 2, i. e. Diana; so that Emelye sets off in the first hour of Monday, or the hour of the Moon. Three hours later still, we come upon the figure 3, i. e. Mars, being the fourth hour unequal of Monday, as Tyrwhitt explains.

VIII. "al his fantasye
Was torne for to lerne astrologye,
And cowde a certeyn of conclusiouns;" Mill. Ta. 5.

"His almagest, and bookes gret and smale,
His astrylab[i]e, longyng to his art,
His augrym-stoones, leyen faire apart;" id. l. 22.

Observe Chaucer's avowal of his disbelief in astrology, Astrol. ii. 4. 36, and Mill. Ta. 265; note the expression "a certein of conclusiouns;" Astrol. Prol. 10; his mention of "pholome," Astrol. i. 17. 6 (see note to the line), and cf. Wyf of Bath, Prol. 324, and Sompn. Ta. 589; note that the spelling astrylab[e] of the Harl. MS. is clearly wrong; and cf. the expression "nombres in Augrym;" Astrol. i. 9.

3. See also Wright's note to his l. 3210.

IX. "That now on Monday next, at quarter night,
Shall falle a reyn;" Mill. Ta. 330.

When all the day of Monday, and a quarter of the night has past, 15 planetary hours are completed, and the 16th is beginning. Now the 16th hour of Monday (see scheme on p. 24) is the hour of Saturn.
Cf. "Thorwgh flodes and bourgh foule wederes * frutes shull faille,  
And so sayde saturne * and sent 3ow to warne;"  
*Piers the Plowman, B. vi. 326.

X. The adjective *rom*, spacious, ample, and its comparative *rommer* (Reeves Tale, 206, 225), occurs again in Astrol. i. 2. 2.

XI. "Owre hoste sawh [wel] that the brighte sonne  
The arke of his artificial day hath i-ronne,  
The fourthe part, of [*and ?*] half an hour and more, ..  
He wist it was the *eightetene* day  
Of April, that is messanger to May ..  
And therfore by the schadwe he took his wit  
That Phebus, which that schoon so fair and brighte,  
Degrees was five and fourty clombe on highte,  
And for that day, as in that latitude,  
Hit was *ten* of the clokke, he gan conclude ..  
The fourthe party of this day is goon."  
*Man of Lawes Prol. 1—17.

For the "artificial day," i. e. the actual duration of the day from sunset to sunrise, see Astrol. ii. 7. The equality of a shadow with its object of course gives an elevation of 45°; but the reason for alluding to this is made even more clear by noticing that the scale of *Umbra Recta* (Fig. 1) terminates with the equality of the shadow, and with 45°. For *eightetene day*, Tyrwhitt has *eighte and twenty day*, which he could not explain; see his note. But we must certainly read *eightetene*, as in the Harl. MS. On April 18, the sun was in the 6th of Taurus (see Fig. 1), and the use of a globe ¹ will easily shew that the sun's altitude in that degree, at 10 o'clock, was somewhere about 45° or 46° degrees,² speaking roughly. But Mr Brae has calculated it exactly, and his results are, that the time when the sun was 45° high on April 18, was 9h. 58m., or only wanting 2 minutes of 10 o'clock. This is even a closer approximation than we might expect, and leaves no doubt as to the correctness of the numbers "*eightetene*" and "*ten*." See Mr Brae's edition of the Astrolabe, pp. 68 and 80.

April 18 in Chaucer's time corresponds to about April 26 now. On April 26, 1871, the sun rose, at London, at 4h. 45m., and set at

¹ Any scientific person will naturally object to such a rough way of calculation as resorting to the use of a globe, but I prefer it just because it is a rough way of calculating, for we expect no very great exactitude here. Besides, it is so easy, and so useful in checking a closer calculation.

² In Mr Furnivall's Temp. Pref. to Chaucer, p. 91, I wrote "about 47 degrees;" I see now that is too much.
7h. 13m., giving a day of 14h. 28m., the fourth part of which is at 8h. 22m., or, with quite sufficient exactness, at half-past eight. This would leave a whole hour and a half to signify Chaucer's "half an hour and more," which, be it observed, was the host's first rough guess, before taking a more exact observation. But the matter is made much clearer by looking at it more closely. How did the host see that the 4th part of the day was past? Of course he looked at the sun. But what did he know about the sun? He could only (as we shall see) have noted the point of the horizon at which it rose; for I cannot believe that any one can do better than accept Mr Brae's equally simple and ingenious explanation, that the host made his guess from observing the extent of the sun's azimuthal arc from sunrise to sunset. The method was incorrect; but we have clear proof (as Mr Brae again rightly suggests) that Chaucer 1 actually confounded the azimuthal arc with the hour-angle, in Astrol. ii. 29; see the Additional Note. Set the 6th degree of Taurus on the E. horizon on a globe, and it is found to be 22° to the N. of the East point, or 112° from the S. point; doubling this, gives an azimuthal arc of 224° (exactly as Mr Brae calculates it in his edition, p. 70); whilst halving it, gives an azimuthal arc from sunrise of 56°. All, in fact, that the host did, was to observe that the sun had gone more than half the distance from the point of sunrise to the S. point, which he might easily do. In numbers, this gives, as was said, an azimuthal arc of 56° from sunrise, and, therefore, 56° also from the South. This would happen, as may be seen even by a globe, at about a quarter past nine; but Mr Brae has made the calculation, and makes it 20 minutes past nine. This makes Chaucer's "halfe an hour and more" to stand for half an hour and ten minutes; an extremely neat result, and confirming the preceding calculations and assumptions. 2

We conclude then that what "our host saw" was, that the sun had

1 I suppose others did the same. He obviously took it from Messahala, whom he here follows closely.

2 It follows that the day mentioned in the opening lines of the Prologue was either the 17th or the 16th. It was the 17th, if all the tales were told in one day; it was the 16th, if the Man of Lawe began the second day's series of tales. I believe Mr Furnivall is right here, and that the Man of Lawe did begin the second day. For how was the host to observe the azimuthal arc of the sun, if the pilgrims had greatly changed their position since sunrise? And why, if they had been busy tale-telling, should the host have said, "let us nat mowlen thus
gone more than half-way from his point of rising to the southern point of the horizon, and he supposed (from his wrong assumption of the equality of the azimuthal arc with the hour-angle) that more than the fourth part of the day was gone, by more than half an hour. He then further observed the sun’s altitude to be about 45°, from which he pronounced it to be ten o’clock. The latter observation was a more correct and closer one.

XII. “O firste mevyng cruel firmament,  
With thi diurnal swoung that crowdest ay,  
And hurlest al fro est to occident,  
That naturelly wold hold another way.”

Man of Lanes Tu. 197.

See note in this volume, p. 76; and note to the line in “Specimens of English, A.D. 1298—1393,” ed. Morris and Skeat.

XIII. “Infortunat ascendent tortuous,  
Of which the lordes [read lord is] helpes falle, alas!  
Out of his angle into the derkest hous;  
O Mariz Attezere [read O Mars, O Atazir], as in this caas;  
O feeble moone, unhappy been thi paas;  
Thou knetest the ther thou art nat receyved,  
Ther thou wer wel, fro thennes artow weyved;”

Man of Lanes Tu. 204.

For the word “tortuous,” see Astrol. ii. 28. 19; the tortuous signs are from Capricorn to Gemini inclusive; the most tortuous of these are Pisces and Aries. Of these two, Aries is the mansion of Mars. We may then suppose Aries to be the tortuous ascending sign, and the lord of the ascendent to be Mars; see Astrol. ii. 4. The “derkest hous” is perhaps the weakest of the cadent houses, or probably the 6th, which had just set. The “houses,” arranged in order of “power,” are as follows: the four “angles,” or the 1st, 10th, 7th, and 4th; the “succedents,” the 2nd, 11th, 8th, and 5th; and the “cadents,” or 3rd, 12th, 9th, and 6th. In other words, Mars, instead of being in the ascendent, had “fallen helplessly” beneath the western horizon. Atazir or Atacir is the Spanish spelling of an Arabic word denoting

in ydolnesse?” Perhaps there may be some force too in 1.90—“But of my tale how schal I do this day?” The 16th suits the opening lines even better than the 17th does. See Note I, above.

1 The fact was, that the fourth part was gone, by at least an hour and a half; as has been said. But this was a thing which our host could not well have seen, by a mere glance at the sky.
influence; as explained in Dozy, Glossaire des Mots Espagnols dérivés de l'Arabique, p. 207. See note on the line in "Specimens of English, A.D. 1298—1393," ed. Morris and Skeat. With the word "knet-test," cf. "ioigned;" Astrol. ii. 4. 33. With "receyved," cf. Astrol. ii. 4. 30. With "Ther thou wer wel," cf. "he is wel," Astrol. ii. 4. 34. The exaltation of the Moon was in Taurus; its depression, or worst position, in the opposite sign of Scorpio. It seems to have been far from its best position.

I subjoin the following extract from Bailey's Dictionary, vol. ii. ed. 1731—"Angle (in Astrology) certain houses of a scheme of the heavens; the first house or horoscope is called the angle of the East; the seventh, the angle of the West; the fourth house, the angle of the North; the tenth house, the angle of the South." Bailey is not much to be depended on, so I add another authority.

"De Inveniendis xiii. domibus."

"In omni hora firmamentum in duodecim partes distribuitur, quae domus dicuntur, et prima incipit a gradu ascendente, et comprehendit totidem gradus sequentis signi, et sic usque ad duodecim domus per gradus æquales.

"Sed est alia diuisio per inæquales gradus pro terræ latitudine, quæ sic inuenitur. Ponitur gradus ascendens in oriente, qui est principium primæ domus; sed septima incipit ab opposito, per gradus totidem; et gradus tangens lineam meridianam, est initium domus decimæ. Quartum sine imum coeli domicilium incipit ab opposito eius per gradus totidem, et haæ quatuor domus dicuntur Anguli. Et gradus inuentus in fine lineæ horæ decima, est principium secundæ domus. In fine octauæ inuenitur tertia. In fine quartæ, quinta; in fine secundæ, sexta; octauæ uero domus per secundum inuenitur, nona per tertiam, et per quintam undecima, per sextam duodecima, per oppositum. Et secunda, quinta, octaua, undecima sunt post Angulos succedentes. Tertia, sexta, nona, duodecima sunt lapsæ, vel cadentes ab Angulis."—Epitome Astrologiae, a Johanne Hispalensi; cap. xxi.

This useful quotation well illustrates the "Astrolabe," pt. ii. sect. 36, 37; it explains the phrase "as in angle," i. e. "as for instance,
in an Angle, or one of the four principal houses;" Astrol. ii. 4. 28; and also the phrase “in a succedent;” Astrol. ii. 4. 29. Moreover it suggests that “the meridional angle” is only another name for the “tenth house;” cf. note XX below.

XIV. “Of viage is ther noon eleccioun . . .
Nought when a roote is of a birthe i-knowe?

We learn from the third tract in MS. G., p. 10, that there are four “mobill” signs, Aries, Cancer, Libra, and Capricorn; four “fix” signs, Taurus, Leo, Scorpio, and Aquarius; and the rest are called “signes comune.” It is added that the right time for going a journey is when the moon is a “mobill” sign; if it were in a “fix” sign, you may not go a journey, but you may build a city; if in a “comune” sign, you may not travel far, nor yet build, but you may safely go to a city, and live in it; see also Tyrwhitt’s note. The whole of Book iv. of the Epitome Astrologiae of Johannes Hispanensis is “De Electionibus,” and the title of cap. xv. is “Pro itinere.” For the word “roote,” see Astrol. ii. 44, and the Glossarial Index.

XV. “Min asce[nde]nt was Taur, and Mars therinne;”

The sign in the ascendent at her birth was Taurus, the mansion of Venus. Moreover, Taurus was a “feminine” sign. Mars being in the mansion of Venus is sufficiently significant; see Chaucer’s Compleynt of Mars. Cf. “si fuerit [Mars] in Tauro, erit multorum puerorum,” &c. Liber Messahalæ super significationem Planetarum, cap. iii.

XVI. “And thus, god wot, Mercury is desolate
In Pisces, wher Venus is exaltate,
And Venus faylith wher Mercury is reysed.”

The exaltation of Venus is in Pisces, which is also the dejection or depression of Mercury. The exaltation of Mercury is in Virgo, which is also the dejection of Venus. This is because the signs Pisces and Virgo are exactly opposite; see Fig. 1 or Fig. 2. This was explained by Tyrwhitt in his note on the line.
NOTES ON THE CANTERBURY TALES.

XVII. "The moone that at noon was thilke day
That January hadde weddid freissche May
In tuo of Taure, was into Cancro gliden."—March. Ta. 642.

Tyrwhitt altered two to ten, and gave his reason; see his note. He was wrong in making his calculation from the moon’s mean motion, as it differs considerably from her actual motion. The question is simply, can the moon move from the 2nd degree of Taurus to the 1st degree of Cancer (through very nearly two whole signs, or 59 degrees) in four days complete (l. 649)? And, in particular, can the moon do this in the middle of June? Mr Brae (note on p. 93) says decidedly, that examples of it can be found in every almanack. In one of the volumes of the Nautical Almanack, I find one very opposite instance, which I here cite. In June, 1866, the moon’s longitude at noon was 30° 22' on the 9th, and 90° 17' on the 13th; i. e. the moon was in the first degree of Taurus on the former day, and in the first degree of Cancer on the latter day, at the same hour; which gives a degree more of change of longitude than we require. There is therefore no objection to the reading two, which the majority of MSS. (I believe) support.

XVIII. ——"Er that dayes eyght
Were passid of the moneth of Juil" (sic, wrongly);—March. Ta. 888.

"He [the sun] was that tyne in Gemines,¹ as I gesse,
But litel fro his declinacioun
Of Canker, Joves exaltnacioun."—id. l. 978.

The sun had not quite entered Cancer, but was still in Gemini. A glance at Fig. 1 shews that the sun would enter Cancer about June 12.² The former passage must therefore refer to June 8; and the reading Juil is out of the question. We must, of course, read Juin, whatever the scribes of the MSS. may have written to the contrary. But probably some of the MSS. will be found to have the right reading.

His "declination of Cancer" means the sun’s maximum northern declination, which he attains at the period of the summer solstice, exactly upon entering Cancer. Now the summer solstice must of course be in June, not July.

¹ Read "Geminis," the ablative plural.
² The sun entered Cancer in 1871 on June 21. A difference of 9 days, as explained above, gives June 12.
Cancer is the exaltation of Jupiter, and the depression of Mars.

The correction Juin for Jul is due to Mr Brae, and was first published in 1851. See his edition of the Astrolabe, p. 67.

XIX. "The last Idus of March, after the yeer;
Phebus the sonne ful joly was and cleer,
For he was neig his exaltacioun,
In Martes face, and in his mansioun
In Aries, the colerik, the hote signe;"—Squyres Ta. i. 39.

"The last Idus" is the very day of the Ides, i.e. March 15. The sun had entered Aries only three days before, on the 12th; see Astrol. ii. 1. 4. The sun was therefore in the 4th degree of Aries. Aries was called the exaltation of the Sun, and the sun's exaltation was supposed to take place in the 19th degree of the sign in particular, so that he was "nigh his exaltation," and approaching it. The word "face" is technical; it meant the third of a sign; see Astrol. ii. 4. 38. In Aries, the first face is that of Mars (where the Sun was), the second that of the Sun, and the third that of Venus. The word his in "his mansioun" refers of course, as Tyrwhitt says, to Mars, not to Phebus; for Aries was the mansion of Mars. The sign Aries is said in MS. G. Tract 3, p. 11, to be choleric, fiery, and masculine; cf. Tyrwhitt's note.

XX. "Phebus hath laft [read left] the angle merydyonal,
    And yit ascendyng was a best roial,
The gentil Lyoun, with his Aldryan."—Sq. Ta. i. 255.

Four of the astrological houses were called "angles;" of these, the Southern angle, or "angle meridional," was the tenth house, corresponding to the time from 10 A.M. (at the equinox) to noon. Thus, the sun "leaving the angle meridional" is merely another way of saying that it was past noon. Now, at noon on the 15th of March, in Chaucer's time, the first point of Leo would be on the horizon; see Mr Brae's edition, p. 87. We need not lay any stress on the word yit, which is not always equivalent to the modern still, and need not imply any very long continuance. I take the passage to mean merely this, that

1 In Mr Furnivall's Trial-forewords to Chaucer's Minor Poems, there is an unfortunate misprint in footnote 3, p. 87. Read—"Aries is the mansion of Mars, and the exaltation of the Sun," instead of "Venus." The rest of the table is correct.

2 Only nine lines above, and yit is put for nevertheless; yet is used for a very short continuance of time in the Second Nonnes Tale, 1. 442, and for a very long period in the Man of Lawes Tale, 1. 536.
the sun had passed the meridian, and now the sign Leo, with his Aldryan, was ascending. Considering the frequent shifting of *r* in English, as in *brid* for *bird*, &c., we can have little hesitation in identifying Aldryan with the star *Aldurin* or *Aldiran* mentioned in the “List of Stars marked on a Rete” above; Chaucer makes a much greater change than this, when he turns Ariadne into Adriane.

For determining Aldiran’s\(^1\) position, we have, in Table III, its greatest altitude expressed as 48 degrees, for a latitude of about 48 degrees, or a co-latitude of 42 degrees. This makes it 6 degrees north of the equator, showing that in Table I “6. 0. S” is an error for “6. 0. N.” One table makes its longitude 12 degrees, the other 14 degrees less than that of Cor Leonis. The only star I can see near this position is \(\theta\) Hydra, which may have been considered as on the fore-paws of the Lion; a result which may be illustrated from Lane’s Arabic Lexicon, p. 962, which shows that “the Dhirá’án” of the Arabs, or fore-legs of the Lion, were extended even as far as \(\alpha\) and \(\beta\) of Gemini, and \(\alpha\) and \(\beta\) of Canis Minor. The only remarkable point about this small star is that, near London, it rises but a very little before Cor Leonis, and even at Paris would not long precede it. It may therefore have been looked on as a herald of that celebrated star. But this is mere conjecture, and I leave the working out of this question to others better qualified to do it. The reader should, however, see Mr Brae’s remarks in his edition of Chaucer’s Astrolabe, pp. 77, 87. If Cor Leonis were on the horizon, the time would be just 2 P.M., which looks as if Chaucer here makes the “angle meridional” to extend for a couple of hours *after* noon instead of *before* it.

It is not clear what authority Speght had for declaring Aldryan to be “a star on the neck of the Lion.” In the List already referred to, it is said to be “in fronte Leonis.”

\(^1\) *Aldiran* is a dual form, and means “the two fore-paws,” viz. of the Lion. One of these was called the “extended” paw, and reached as far as \(\alpha\) Geminorum; the other, or “drawn up” paw, was bent so as to end with \(\alpha\) and \(\beta\) Canis Minoris. The star named Aldiran must there be sought near the spot whence both fore-legs branch off. Though not very explicit, this does, after a manner, limit its position. The name Aldiran is probably an abbreviation of some longer phrase, just as Algol is put for Ras Algol.
XXI. "Now dauncen lusty Venus children deere;  
For in the fissch her lady sat ful heygh;  
And loketh on hem with a frendly eyghe;"—Sqn. Ta. i. 264.

I take "Venus children" to mean here simply men and women; see a similar expression in the Knightes Tale, ll. 1628 and 1629. In the next line, her means their, corresponding to hem for them below. Their lady Venus was then in Pisces; and Pisces was the exaltation of Venus, which explains "full heygh." See Tyrwhitt's note to C. T. 6284.

XXII. "As rody and bright, as is the yonge sonne  
That in the Ram is ten degrees i-ronne."—Sqn. Ta. ii. 39.

I suppose ten is due to some eccentricity on the part of the scribe of the Harleian MS. Tyrwhitt has "foure degrees;" which can no doubt be supported by MS. authority. On the day before, March 15, the sun was in the 3rd degree; so that on March 16 he was in the 4th degree. "Non heigher was he," in l. 41, means that the sun was only four degrees above the horizon; cf. ll. 47, 48.

XXIII. "And this was on the sixte morwe of May ...  
That yevest, after thy declinacioun,  
To ilk of hem his tyme and his sesoun,  
As that thin herborwe chaungeth low and heighe ...  
That thou next at this apposicioun [read apposicioun]  
Which in the signe shal be of the Leoun," &c.

_Frank. Ta._ 178—330.

We see from Fig. 1, that the 6th of May is opposite the 23rd degree of Taurus, which is sufficiently correct. "After thy declinacioun" means "according to thy declination." The sun's declination changes from day to day, and with it the solar power and heat; so that the vegetable kingdom fails or grows according as the sun's "harbour" or position in the ecliptic makes his daily meridian altitude to be low or high. The power of the moon over the tides is referred to in l. 318; and the dependence of lunar upon solar light in l. 322. Cf. Astrol. ii. 46. The highest tides occur when the sun and moon are either in conjunction or opposition; the latter is here fixed upon. But if the sun be in the 23rd degree of Taurus, the moon, in opposition, is in the 23rd degree of Leo, as Chaucer says. If the sun and moon could remain always in opposition, says Aurelius, we might hope to have always a high tide or
"spring-flode" (l. 342). To secure this, the moon must go no faster than the sun (l. 340); and, as the moon in opposition is full, there would be a full moon all the while (l. 341).

XXIV. "This book spak mochil of operaciouns,1
    Touchyng the xxviii. manciouns
    That longen to the mone."—Frank. Ta. 401.

The 28 "moon-stations" of the Arabs are given in Ideler's Untersuchungen, p. 287. He gives the Arabic names, the stars that helped to fix their positions, &c. See Mr Brae's edition of the Astrolabe, p. 89. For the influence of the moon in these mansions, we must look elsewhere, viz. in lib. i. cap. xi, and lib. iv. cap. xviii, of the Epitome Astrologiae of Johannes Hispalensis. Suffice it to say that there are 12 "temperate" mansions, 6 "dry" ones, and 10 "moist" ones.

XXV. "Phebus wax ² old, and hewed lyk latoun,
    That in his hoote declinacioun
    Schon as the burned gold, with stremes brighte;
    But now in Capricorn adown he lighte," &c.—Frank. Ta. 509.

The sun, in his "hot" or extreme N. declination, shines brightly enough at the summer solstice; but he was now at his lowest altitude, at the winter solstice. He entered Capricorn on the 13th of December, as Chaucer says himself; Astrol. ii. 1. 12. See Fig. 1.

XXVI. "His tables Tollitanes forth he broughte," &c.—Frank. Ta. 537.

See the whole passage.

Here Chaucer mentions the Toletan tables, or tables for the latitude of Toledo; see Tyrwhitt's note. For the "collect" and "expans" years, see Astrol. ii. 44, and the Glossarial Index. Any one who is curious to see such tables may find them in Ptolemy's Almagest, lib. vi. and lib. ix. Ptolemy's expanse years go from 1 to 25, or from 1 to 18, and his collect years by multiples of 25 or 18; whereas Chaucer's go by multiples of 20. For "root," see the Glossarial Index. "Argument" is an astronomical term still in use; see Entere in the Glossary. For the "proportionels convenientis,"

1 Printed "of this operaciouns," which will not scan. Observe that xxviii. in Old English is always to be read "eight and twenty," never "twenty-eight."
2 Read "wex" or "wox."
see Astrol. ii. 44. 22. Next come the lines, which in the Harleian MS. are as follows:—

"And by his thre speeres in his worching,
He knew ful wel how fer Allnath was schove
Fro the heed of thilk fix Aries above,
That in the fourthe speere considred is."

There cannot be a moment's doubt that, as Mr Brae well shows in his Preface, p. 13, we must read eighte for thre, and ninthe for fourthe. As the passage stands, it is mere nonsense. Tyrwhitt has the right readings in both places.¹ The reader has only to glance at Fig. 10, and he will see at once that the seven inner spheres are spheres of planets. The eighth is the sphere of fixed stars, and Alnath, being a fixed star (α Arietis), was in it. But the head of the fixed Aries, or the true equinoctial point, was in the sphere above it, the ninth sphere.

The exact amount of the precession of the equinoxes (which is what Chaucer here alludes to) could be ascertained by measuring from time to time the distance between the true equinoctial point and the nearest convenient bright star. The star Alnath would do well, being of the first magnitude; indeed, in the time of Hipparchus, its distance from the true equinoctial point was but a few degrees. At the present time, it is "schove" some 35° off, in longitude. For the word "face" in l. 552, see Note XIX. Not only every sign, but every "face" had its planet; hence the phrase "in whos face." A "term" is the Lat. terminus. Besides the division of a sign into three equal parts called faces, we find unequal divisions called terms. Thus, of Aries, the first 6 degrees are a term of Jupiter, the next 6, a term of Venus; the next 8, of Mercury; the next 5, of Mars; and the last 5, of Saturn.

XXVII. "By nature knew he ech ascensioun
Of equinoxial in thilke toun;
For whan degrees fyftene were ascendid,
Thanne crew he, it mighte not ben amendid . . .
Whan that the moneth in which the world bigan,
That highte March, when God first makede ² man

¹ I may just observe that thre spoils the scansion of the line, whilst eight-e (A.S. eahta) is a dissyllable, and suits well enough.
² Printed 'makede first,' which scans badly.
Was complet, and y-passed were also,
Syn Marche bygan, *tway months* and *dyses tuo* . . .
Cast up his eyghen to the brighte sonne
That in the signe of Taurus had ironne
Twenty degrees and oon, and somewhat more;
He knew by kynde, and by noon other lore,
That it was prime, and crew with blisful steven;
'The sonne,' he sayde, 'is clombe up on heven
*Twenty degrees and oon,* and more i-wis.'

*Nonne Prestes Tu. 37,367.*

I once proposed an explanation of this which I now entirely give up; it is printed in Mr. Morris's small edition of Chaucer for the Clarendon Press, but it is not worth while to repeat it. My difficulty was wholly caused, I now see, by neglecting the word *ech* in the first line. Chaucer says that the cock knew *each* ascension of the equinoctial, and crew at each. That is, he crew every hour, as 15° of the equinoctial make an hour. Chaucer adds that he knew the hour better than an abbey-clock; see l. 34. This tells us, clearly, that we are to reckon clock-hours, not the unequal hours of the artificial day. Hence the *prime* mentioned below was at a clock-hour, at 6, 7, 8, or 9, suppose. The next point is the date; and here I am again guided, almost wholly, by Mr. Brae's work. The day meant is certainly May 3, because the sun had passed the 21st degree of Taurus; see Fig. 1. The reading *tway monthes and dyses tuo* is certainly wrong; it ought to be *thirty dases and tuo*, as in Tyrwhitt, and in Mr. Morris's edition for the Clarendon Press. The date, May 3, is playfully denoted by saying that 'March was complete, and also (since March began) thirty-two days more had passed.' The words "since March began" are parenthetical; and we are, in fact, told that the whole of March, the whole of April, and two days of May were done with. March was then considered the first month in the year, though the year began with the 25th, not with the 1st; and Chaucer alludes to the idea that the Creation itself took place in March.1

1 This may be illustrated from the Old English Menologium; see Grein's Bibliothek der Angelsächsischen Poesie, vol. ii. p. 2.

"Swylce eac rímcraeftige
On þa ylean tìd · emniht healdad,

On 30 April 1925.
degrees of Taurus. The hour must be had from the sun's altitude, here said to be 'Twenty degrees and oon.' But this is a mere error, due to the scribe repeating the phrase by mistake; most MSS. (see Tyrwhitt's note) have 'Forty degrees and oon.' Oddly enough, as Mr Brae points out, the oldest editions had 'Forty degrees and oon' in both places, till Francis Thynne corrected the text, and gave the correct readings. See Thynne's Animaduersions, &c.; ed. G. H. Kingsley (E. E. T. S.), p. 50. I again use a globe, and find that the sun would attain the altitude of 41° nearly at 9 o'clock. Mr Brae has calculated it, and makes it 'nine o'clock to the minute.' It follows that prime, in this passage, signifies the end of the first quarter of the day, reckoned from 6 A.M. to 6 P.M. What prime means in all cases, I do not pretend to say. It is a most difficult word, and I think was used loosely. It might mean the beginning or the end of a period; and the period might be an hour, or a quarter of a day. I think it was to obviate ambiguity that the end of the period was sometimes expressed by high prime, or 'passid prime,' or 'prime large;' we also find such expressions as half prime, halfway prime, or not fully prime, which indicate a somewhat long period. For further remarks, see Mr Brae's Essay on Chaucer's Prime, in his edition of the Astrolabe, p. 90. I add some references for the word prime, which may be useful. We find prime in Kn. Ta. 1331; Mill. Ta. 368; March. Ta. 613; Pard. Ta. 200 ('Long erst than prime rong of any belle,' which goes to show that prime was a fixed time of day); Schip. Ta. 206; Sir Thopas, 114 ('fully prime'); also passed prime in Re. Prol. 52,¹ Fre. Ta. 178, Schip. Ta. 88; prime large in Sq. Ta. ii. 14. See also prime in Troil. and Cress. ii. 992 (Morris); passed prime, id. ii. 1095; an hour after the prime, id. ii. 1557; prime, id. v. 15.

XXVIII. "The sonne fro the south line is descendid
So lowe, that it nas nought to my sight

Forjan wealdend god · worhte æt frymde
On þý selfan daȝe · sunnan and mónan."

'As also arithmeticians
At that very time consider the equinox,
Because all-ruling God wrought at the beginning,
On that very day, the sun and the moon.'

¹ But Tyrwhitt has half-way prime, as in the Six-text edition.
Rectification.

Degrees nyne and twenty as in height.

*Four* on the cokle it was, so as I gesse . . .

Therewith the mones exaltacioun

*In mena Libra, alway gan ascendre.* . . .

*Persons Proli, 2—11.*

Besides saying that the sun was 29° high, Chaucer says that his shadow was to his height in the proportion of 11 to 6. Changing this proportion, we can make it that of 12 to \(6\frac{1}{11}\); that is, the point of the *Umbra Versa* (which is reckoned by twelfth parts) is \(6\frac{9}{11}\) or \(6\frac{1}{2}\) nearly. This can be verified by Fig. 1; for a straight edge, laid across from the 29th degree above the word "Occidens," and passing through the centre, will cut the scale of Umbra Versa between the 6th and 7th points. The sun's altitude is thus established as 29° above the western horizon, beyond all doubt. Now the day of the month was April 18 (see Note XI) if all the tales were told in one day; or April 20, if Mr Furnivall's scheme of four days be admitted; this makes the sun to be either in the 6th or the 9th degree of Taurus. In either case, even the use of a globe will show that the altitude of 29° corresponds closely to four o'clock in the afternoon. Mr Brae gives all the results of his calculations, and makes the altitude of the sun, at 4 p.m. on April 18, 1388 (which is at least near enough, if not the right date altogether), to be 29° 15'. There can therefore be no doubt that the reading *Four* is right. Some MSS. have *Ten*, which is out of the question, for that would be *after sunset*! Probably (as Mr Brae suggests) the *tenth hour* may have been meant as a gloss to 'Four'; since 4 p.m. is the tenth hour, reckoning from 6 a.m.

We have now to consider the last part of the passage. I make out, merely from the globe, that the point of the zodiac then ascending on the Eastern horizon was about the 4th or 5th degree of Libra. Mr Brae makes the altitude of a certain star which he puts in R. A. 12h. 25m., and N. D. 6° 43', to be 4° 20'; and I believe my result is much the same as his. At any rate, I feel confident in saying that only some few degrees of Libra had ascended. But, granting all this, how are we to read the passage? Mr Brae proposes to alter it, and to read, "In Libra men al awai gan ascendre," which he interprets to mean that the moon was ascending
together with the star Min al auwa, which is the 13th of the 28 Arabic 'moon-stations.' The reader should carefully consider all his arguments. I regret that here, and here only, I cannot follow him. The change seems too bold; yet I have nothing better to offer. I merely give my own impression of the matter, which may, after all, be not worth much. *Gan ascend*de, in Early English, means no more than *did ascend*, and *alway gan ascend*de would mean merely *ever did ascend* or *kept on ascending*. I see nothing unusual in the phrase, though Mr Brae looks upon it as a great difficulty, and objects, in particular, to the word *alway*. Next, Chaucer does not say that the *moon* was ascending, but that the *moon's exaltation* was ascending, which is a very different thing. Again, Chaucer uses *exaltation* in its true astrological sense in other passages (see Notes XVI, XVIII, XIX); but, unfortunately, the Moon's exaltation was in Taurus, a long way off. I have no solution to offer but Tyrwhitt's, that Chaucer did, for once, make a slip (or his scribes have done it for him), and that it ought to be "*Saturnes exaltation.*" Next, *In mene libra* would signify *in the middle of Libra*, just as we find "*mene mote*" (Astrol. ii. 44) for the Latin *medius motus*; but then, the ascending degree was certainly not *in the middle of Libra*, but *near the beginning* of it. This disposes of this reading, and throws us back upon *I mene Libra*, i.e. I refer to Libra; which can be supported by the use of the same phrase—*I mene Venus*—in l. 1358 of the Knightes Tale. This would give—

"Therwith Saturnes exaltacioun,

I mene Libra, alway gan ascende;"

and it would mean no more than that Libra kept on ascending. It had not long before appeared on the horizon. If it be asked, how came Chaucer (or the scribes) to put *mones* for *Saturnes*, I would reply, that a mistake of this kind is easy enough; for the whole of astrology is so technical that no one could be expected to remember it very well; and the *moon* might have been suggested by the fact, that every sign is divided into three equal parts (called *faces*); that the first *face* was then on the horizon; and that the first face of Libra is the *face of the Moon*. Only suppose a momentary confusion between *exaltation* and *face*, and it is done. But this is, perhaps,
very unsatisfactory. The reader should also consult Mr Brae's arguments. Perhaps the MSS. may some day help us out here.

XXIX. I add, by way of finishing these notes, the following miscellaneous remarks.

In the Assembly of Foules, l. 59, Chaucer mentions the nine spheres; see Fig. 10.

In the Flower and the Leaf (not Chaucer's) we are told that the Sun had just entered the Bull; and that the author rose long before sunrise, at daybreak, about three A.M. This would be about the 11th of April; roughly speaking, daybreak would be about three o'clock, and sunrise about five o'clock.

In the 1st (8th in Morris) stanza of Book ii. of Troilus and Creseide, Phebus is in the Bull on the 3rd of May. The sun would have just completed the 21st degree of Taurus. Cf. Note XXVII.

In the first stanza of the proem to Book iii. of Troilus, there is an address to Venus in "the thridde hevene." Now Venus is in the third heaven, if one begins at the innermost of the nine spheres; for we then have the order, Moon, Mercury, Venus, &c., and, in confirmation of this, we have a mention of the seventh sphere, which certainly means that of Saturn; Troil. v. 1823. But it is remarkable that Chaucer also adopted the other mode of reckoning, viz. from the seventh sphere of Saturn inwards, giving the order, Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon. This would place Venus in the fifth sphere; and so we find it in stanza ii. of L'Envoy de Chaucer a Scogan. It would also place Mars in the third sphere, as in the Compleint of Mars, st. v.¹

In the Boke of the Duchesse, l. 198, is the expression—"a quarter before day." I do not know whether this is a quarter of an hour before day, or a quarter of a day (say three hours) before day. I incline to the latter. Chaucer dreamt about the House of Fame (see l. 111) on the 10th night of December. The winter solstice was then very near at hand.

In the Chanones Yemannes Prologue (l. 272) we have the seven metals belonging to the planets, viz. Saturn, lead; Jupiter, tin; Mars, lead; Uranus, tin; Venus, copper; Mercury, silver; Sun, gold.¹

¹ Not having perceived this change in Chaucer's reckoning, I proposed another solution of this expression, which Mr Brae corrected; see Trial Forewords to Chaucer's Minor Poems, by F. J. Furnivall, pp. 85, 121.

ASTROLABE
iron; Sun, gold; Venus, copper; Mercury, quicksilver;\(^1\) Moon, silver.

Observe that, in the House of Fame, iii. 341, the “Saturnine” Josephus is on a pillar partly of lead; cf. ll. 358, 359. The poets who wrote about warriors are on an iron pillar (l. 367), which is the metal of Mars, l. 356. Ovid, the poet of Venus, is on a copper pillar, l. 397; and so on.

The Prologue to the Legend of Good Women mentions May 1; l. 108.

In st. 1 of the Compleint of the Black Knight (which is certainly Lydgate’s, not Chaucer’s) we have the sun in the middle of the Bull in May. It must mean May 1, when the sun was in the 19th degree of Taurus, nearly.

§ 32. ASTROLOGICAL NOTES.

For a general sketch of Astrology, see the English Cyclopedia, s.v. Worthless as the science is, it is useful to have a few “facts” for handy reference. I therefore attempt a synopsis of the chief points of it, drawn from Johannis Hispalensis Isagoge in Astrologiam.

To save space, I give the information in a tabular form, wherein I denote the 12 Signs by A. T. G. C. L. V. Li. S. Sa. Cp. Aq. P.; and the Seven Planets Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon, by St. J. Ms. Sn. V. My. Mo. What the table exactly means shall be explained presently.

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\(^1\) We still have the name mercury for quicksilver; Copper and Venus are both connected with Cyprus. Nitrate of silver is lunar caustic. The sun shines like gold. Mars suggested iron armour. Saturn’s slow motion suggested dull lead.
The first line is to be read thus.

Aries is the mansion (or house) of Mars; the exaltation (or honour) of the Sun, in the 19th degree of the sign; the lord of the Triplicity of Aries with its attendant signs is Saturn by day, Jupiter by night, and Saturn in common, both by day and night; the first Face of Aries (degrees 1 to 10) is that of Mars; the second Face (degrees 11 to 20) is that of the Sun; the third Face (degrees 21 to 30) is that of Venus. And so on for the rest; noting that Gemini is the Exaltation of the Dragon's Head (D. H.), and Sagittarius that of the Dragon's Tail (D. T.).

The meanings of the words are as follows. A Mansion or House appears to be that sign in which the planet is peculiarly at home for some reason or other.

The Exaltation or Honour is that degree of a sign in which the planet named has its greatest power; but the degree was often neglected, and Aries was called the Exaltation of the Sun, simply.

The Fall (Lat. occasus vel detrimentum) of a planet is the sign opposite its mansion. Libra is opposite Aries; therefore Libra is the Fall of Mars.

The Dejection or Depression (Lat. dedecus) of a planet is the sign opposite to that of its exaltation. Libra is opposite Aries; therefore Libra is the Dejection of the Sun. And so on.

A Triplicity is a combination of three signs in the form of a triangle, each 120° apart. Thus Aries, Leo, and Sagittarius form the first triplicity; Taurus, Virgo, Capricorn, the second; Gemini, Libra, Aquarius, the third; Cancer, Scorpio, Pisces, the fourth. Equal divisions of a sign (third-parts, namely) are called Faces. There were also unequal divisions called Terms; see § 31, Notes XIX, XXVI.

The "mobill" or movable signs are Aries, Cancer, Libra, Capricorn.

The "fixe" or fixed signs are Taurus, Leo, Scorpio, Aquarius.

The "common" signs are the four others.

The signs Aries, Gemini, Leo, &c. (taking every other sign) are diurnal or masculine.

The rest, Taurus, Cancer, &c., are nocturnal or feminine.
The first six signs, Aries to Virgo, are northern or sinister signs. The last six, Libra to Pisces, are southern or dexter signs.

The signs Cancer to Sagittarius are western, sovereign, right, or direct signs. Cf. Astrol. ii. 28, and see Fig. 2.

The rest, Capricorn to Gemini, are eastern, obedient, tortuous, or oblique signs.

This is all that a reader is likely to want. For other points, see the authorities.

§ 33. DESCRIPTION OF THE PLATES.

Plate I. Fig. 1. The flat back of the Astrolabe; see Pref. § 28.

Plate II. Fig. 2. The front of the Astrolabe, with raised border. In the wide depression in the middle, the plate called the "Rete" is dropped in, and is shown in its primary position. Other positions of it are sketched in Fig. 11 and Fig. 12.

Plate III. Fig. 3. The "Rewle," carrying two sights, which revolved at the back of the Astrolabe. Astrol. i. 13.

Fig. 4. The central "Pin," shown with the "Wedge" inserted through it. Astrol. i. 14; cf. Fig. 7.

Fig. 5. One of the Tables or discs, used by being dropped within the depression on the front of the Astrolabe; i. 17. They were marked differently, according to the latitude of the place. The one here drawn is suitable for the latitude of Oxford, nearly.

Fig. 6. The "Label," which revolved at the front of the Astrolabe; i. 22.

Plate IV. Fig. 7. Another form of the "Pin," showing the Wedge cut into the shape of a Horse (i. 14); from MS. Camb. ii. 3. 3.

Fig. 8. Diagram, showing how to draw the three "principal circles;" see footnote on p. 10.

Fig. 9. Another form of the "Rete," from MS. ii. 3. 3; cf. Fig. 2. This figure shows the "Almury" very clearly; Astrol. i. 23.

Plate V. Fig. 10. Diagram of the nine spheres; from MS. Camb. ii. 3. 3. Astrol. i. 17.

Fig. 11. Rough sketch of the position of the "Rete" in Astrol.

1 So called because astrologers looked towards the east or ascendent.
ii. 3 (first part). Dienticel opposite C, and first point of Aries opposite X; 9 a.m.

Fig. 12. Rough sketch of the position of the "Rete" in Astrol. ii. 3 (second part). Dienticle near O; first point of Aries near H; 8h. 8m. p.m.

Fig. 13. Diagram of the Elevation of the Pole; Astrol. ii. 23. The arc AN is 56°; A'N is 48°; A'P. is 4°; and PN is 52°. A, A' are two positions of the Pole-star.

Plate VI. Fig. 14. A "Table" or disc showing the twelve astrological "Houses;" Astrol. ii. 36 and 37.

Fig. 15. Diagram showing how to ascertain the meridional line from two shadows of an upright gnomon; Astrol. ii. 38.

Fig. 16. Diagram illustrating the use of the Umbra Recta; Astrol. ii. 41, 41a, and 41b.

Fig. 17. Diagram of the use of the Umbra Versa, at two observations; Astrol. ii. 42, 42a, and 42b.

Fig. 18. Use of the Umbra Recta, at two observations; Astrol. ii. 43, and 43a.

Plate VII. Fig. 19. Diagram showing the influence of the signs upon parts of the human body; Astrol. i. 21. From MS. Trin. R. 15. 18.
Fig. 2.
Fig. 11.

Fig. 12.

Fig. 13.

Fig. 10.

W.W. Skeat fecit
Tractatus de Conclusionibus Astrolabii.

[Red and mylk for children.]

[Fol. 1] Little Lewis my son, I perceive well by certeyne evidences thine abilitie to lerne sciencez touchinge nombres & proportionis; & as wel consider I thy bisi preyere in special to lerne the tretis of the astrelabie. Than, for as mechel as a philosofre seith, he wrappeth him in his frend, pat condescendith to the rihthful preiers of his frend / ther-for haue I geuen the a suffisaunt astralabie as for owre orizonte, compowned after the latitude of Oxenford / vp-on which, by mediacion of this litel tretis, I purpose to teche the a certain nombre of conclusions appertenyng to the same instrument. I seye a certein of conclusions, for thre causes. The furste cause is this: truste wel pat alle the conclusions that han ben fownded, or elles possibli myhten be fownded in so noble an instrument as an astralabie, ben vn-knowe perfityly to any mortal man in this regioun, as I suppose. A-nother cause is this; pat sothly, in any tretis of the astrelabie pat I haue seyn, there ben some conclusions pat wole nat in alle thinges performen hir by-
WHY THE AUTHOR WRITES IN ENGLISH. [PROLOGUE.

These; ¶ & some of hem ben to harde to thy tendre age of .x. yer to conseuye. ¶ this tretis, diuided in 5 partes, wol I shewe the vnder ful lihte rewles & naked wordes in englisshe; for latyn ne 20 kanstow yit but smal, my lite sone. ¶ but natheles, suffise to the these trewe conclusiouns in englisshe, as wel as suffisith to these noble clerkes grekes these same conclusiouns in grek, ¶ & to abraiens in arabik, ¶ & to Iewes in Ebrew, & to the latyn folk in latyn / whiche 24 latyn folk han hem furst owt of othre diuerse langages, & writen in hir owne tonge, pat is to sein, in latyn. ¶ & god wot, pat in alle this[e] langages, & in many mo, han these conclusiouns ben suffi-
santly lerned & tawht / & yit by diuerse rewles, ryht as diuerse 28 pathes leden diuerse folk the rihte wey to Roome. ¶ Now wol I prey mekly every discreet persone pat redith or herith this litel tretis, to haue my rewde endytynge for excused, & my superfluite of wordes, for two causes. ¶ the firste cause is, for that curio[n]s enditing & 32 hard sentence Is ful heuy atones for swich a child to lerne. ¶ & the seconde cause is this, pat sothly me semeth betre to writen vn-to a child twies a good sentence, than he for-get it ones. ¶ And lowis, 3íf so be pat I shewe the in my lihte English as trewe conclusiouns 36 touching this materre, & nawht only as trewe but as many & as subtil [*Fol.1v*] conclusiouns as ben shewed in latyn *in ani* commun tretis of the astrelabie / kon me the more thank ; ¶ and preye god saue the kyng, pat is lord of this langage, & alle that him feyth bereth & obeieth, 40 euerech in his degree, the more and the lasse. ¶ but considere wel, that I ne vsurpe nat to haue fownde this werk of my labour or of myn engin. ¶ I nam but a lewd compilateur of the labour of olde Astro-
log[í]ens, and haue hit translated in myn englisssh only for thi doc-
trine ; ¶ & with this sword shal I slen envie.

(3) are too hard. This treatise, divided into five parts, I write for thee in English, just as Greeks, Arabians, Jews, and Romans were accustomed to write such things in their own tongue. I pray all to excuse my shortcomings; and thou, Lewis, shouldst thank me if I teach thee as much in English as most common treatises can do in Latin. I have done no more than compile from old writers on the subject, and I have translated it into English solely for thine instruction; and with this sword shall I slay envy.
The first partie of this tretis shal reherse the figures & the membres of thin Astrolabie, by-cause pat thow shalt han the grettre knowyng of thin owne instrument.

The second partie shal teche the werken the verrey practik of 48 the forseide conclusiones, as ferforth & as narwe as may be shewyd in so smal an instrument portatif a-boute. For wel wot euery astrologien pat smallest fraccions ne wol nat ben shewid in so smal an instrument, as in subtil tables calculed for a kawse.

The .3. partie shal contienen diuarse tables of longitudes & latitudes of sterres fixe for the Astrolabie, & tables of declinacions of the [sonne], & tables of longitudes of Citeez & of townes ; & as wel for the gouernance of a clokke as for to fynde the altitude Meridian & many [a]-nother notable conclusion, after the kalendres of the reuerent clerks, frere I. Somer & frere N. Lenne.

The .4. partie shal ben a theorik to declare the Moeuynge of the celestial bodies with [pe] causes. The whiche 4 partie in special 60 shal shewen a table of the verray Moeuynge of the Mone from howre to howre, euery day & in euery signe, after thin Almenak [Fol. 2.] vp-on wych table ther folwith a canon, suffisant to teche as wel the maner of the wyryng of pat same conclusion / as to knowe in 64 owre orizonte with wych degree of the zodiac that the Mone arisith in any latitude / & the arising of any planete after his latitude fro the Ecliptik lyne.

The .5. partie shal ben an introductorie after the statutz of owre 68 doctours, in which thow maist lerne a gret part of the general rewles of theorik in Astrologie. In which .5. partie shaltow fynde tables of equacions of howses after he latitude of Oxenford ; & tables of dignetes of planetes / & other noteful thingez / yif god wol vouche 72 sauf & his modur the mayde, mo than I be-hete, &c.

The first part gives a description of the instrument itself.
The second teaches the practical working of it.
The third shall contain tables of latitudes and longitudes of fixed stars, declinations of the sun, and the longitudes of certain towns.
The fourth shall shew the motions of the heavenly bodies, and especially of the moon.
The fifth shall teach a great part of the general rules of astronomical theory.
Her by-gynmeth the description of the Astrelabie.

1. ¶ Thyn Astrelabie hath a ring to putten on the t[h]owmbe of thy ryht hand in takyng the heyhte of thynges. ¶ & tak kep, for from hennes-forthward, I wol clepe the heyhte of any thing pat is 4 taken by thy rewle, the altitude, with-owte mo wordes.

2. ¶ This ring rennyth in A Maner turet, fast to the Moder of thyng Astrelabie, in so Rown a space pat hit desturbith nat the instrument to hangen after his rihte centre.

[Fol. 2 b.] 3. ¶ The moder of thin Astrelabie is [pe] thikkeste plate, perced with a large hole, pat resseyuyth in hir wombe the thynn plates compowned for diuere clymatz, & thi Riet shapen in manere 4 of a net or of a webbe of a loppe; & for the more declaracioun, lo here the figure.

4. ¶ This Moder is deuyded on the bakhalf with a lyne, pat cometh desendengie fro the ryng down to the nethereste bordure. ¶ the whiche lyne, fro pe for-seide Ryng vn-to the centre of the large 4 hole amydde, is cleped the sowth lyne, or elles the lyne Meridional. ¶ & the remenant of this lyne downe to the bordure is cleped the north lyne, or elles the lyne of Midnyht. ¶ & for the more declaracioun, lo here the figure.

Here begins the first part; i.e. the description of the Astrolabe itself.

1. The Ring. See figs. 1 and 2. The Latin name is Armilla suspensoria; the Arabic name is spelt alhahuacia in MS. Camb. Univ. II. 3. 3, but Stöffler says it is Alanthica, Alphantia, or Abalhantica. For the meaning of "rewle," see § 13.

2. The Turet. This answer nearly to what we call an eye or a swivel. The metal plate, or loop, to which it is fastened, or in which it turns, is called in Latin Ansa or Armilla Reflexa, in Arabic Alhabor.

3. The Moder. In Latin, Mater or Rotula. This forms the body of the instrument, the back of which is shewn in fig. 1, the front in fig. 2. The "large hole" is the wide depression sunk in the front of it, into which the various discs are dropped. In the figure, the "Rete" is shewn fitted into it.

4. See fig. 1; Chaucer describes the "bak-half" of the instrument first. The centre of the "large hole amydde" is the centre of the instrument, where a smaller hole is pierced completely through. The South lyne (marked Meridies in figs. 1 and 2) is also called Linea Meridiei; the North lyne is also named Linea Medica Noctis.
5. The *Est* lyne is marked with the word *Oriens*; the *West* lyne, with *Occidens*.

6. The rule is the same as in heraldry, the *right* or *dexter* side being towards the spectator's left.

7. As the 360 degrees answer to 24 hours of time, 15° answer to an hour, and 5° to twenty minutes, or a *Mile-way*, as it is the average time for walking a mile. So also 1° answers to 4 minutes of time. See the two outermost circles in fig. 1, and the divisions of the "border" in fig. 2.
8. Vnder the compas of thilke degres ben written the names of the 12 signes, as Aries, taurus, gemini, Cancer, leo, virgo, libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces; & the 4 nombres of the degres of the signes ben written in Augrime aboue, & with longe deuysiouns, fro 5 to 5; deuyded fro tyme that the signe entreteth vn-to the laste ende. but vnderstond wel, that thise degrees of signes ben euery rich of hem considered of 60 Mynutes, & euery 8 Minute of 60 secondes, & so forth in-to smale fraccions infinit, as seith Alkabucius. & ther-for, know wel, that a degree of the bordure contienith 4 Minutis, and a dege of a signe contienith 60 Mynutis, & haue this in Mynde. & for the more declaracioun, lo here thi 12 figure.

9. Next this folwyth the cercle of the dayes, that ben figured in maner of degrees, that contienen in nowmbrre 365; dyuyded also with longe strikes fro 5 to 5, & the nombre[s] in Augrym written 4 vnder that cercle. and for more declaracioun, loo heere thy figure.

10. Next the cercle of the dayes folweth the Cercle of the names of the Monthes; that is to seyen, laniuare, Februare, Marcius, Aprile, Mayus, Iuyyn, Iulius, Augustus, Septembre, October, Novembre, December. the names of thise Monthes were cleped in Arabyens, somme for hir propretys, & some by statutz of lordes, some by other lorde of Rome. ek of thise Monthes, as liked to Iulius cesar & to cesar Augustus, some were compowned of diuerse 8 nombres of dayes, as Iuyyl and August. thanne hath Ianuare xxxi daies, Februare 28, March 31, Aprille 30, May 31, Iunius 30, Iulius 31, Augustus 31, September 30, Octobre 31, Novembre 30, December 31. Nathewes, al-thow that Iulius cesar tok 2 daies owt of 12 Feuerer & put hem in his month of Iuylle, & Augustus cesar cleped

8. See the third and fourth circles (reckoning inwards) in fig. 1.
9. See the fifth and sixth circles in fig. 1.
10. See the seventh, eighth, and ninth circles in fig. 1. The names of the months are all Roman. The month formerly called Quinctilis was first called Julius in B.C. 44; that called Sextilis was named Augustus in B.C. 27. It is a mistake to say that Julius and Augustus made the alterations spoken of in the text; what Julius Caesar really did, was to add 2 days to the months of January, August (Sextilis), and December,
the Monyth of August After his name & ordeyned it of 31 daies, yit truste wel, pat the sonne dwelleth ther-for neuere the more ne lesse in on signe than in another.

11. ¶ Than folwen the names of the halidayes in the kalender & next hem the lettres of the A. b. c. on wich they fallen. ¶ & for the more declaracioun, loo here thi figure.

[Fol. S] 12. ¶ Next the forside cercle of the A. b. c. vnnder the cros-lyne, is Marked the skale, in Maner of 2 Squyres or elles in Manere of ladders, pat seruith by his 12 poyntes & hiske deuisiouns of ful many a subtil conclusionz. Of this forside skale, fro the 4 cros-lyne vn-to the verre angle, is clepid umbra [versa], & the nether partie is eloped the umbra [recta, or elles umbra extensa.] ¶ & for the more declaracioun, loo here the figure.

13. ¶ Thanne hastow a brod Rewle, pat hath on either ende a Square plate perced with a certein holes, some more & some lesse, to resseyuen the stremes of the sonne by day, and ek by mediacioun of

and 1 day to April, June, September, and November. February never had more than 28 days till he introduced bisextile years.

11. See the two innost circles in fig. 1. The names given are adopt-ed from a comparison of the figures in the Cambridge University and Trinity MSS., neither of which are quite correct. The letters of the “A. b. c.” are what we now call the Sunday letters. The festivals marked are those of St Paul (Jan. 25), The Purification (Feb. 2), The Annunciation (Mar. 25), The Invention of the Holy Cross (May 3), St John the Baptist (June 24), St James (July 25), St Lawrence (Aug. 10), The Nativity of the Blessed Virgin (Sept. 8), St Luke (Oct. 18), St Martin of Tours (Nov. 11), and St Thomas (Dec. 21).

12. The “skale” is in Latin Quadrans, or Scala Altimetra. It is cer-tain that Chaucer has here made a slip, which cannot be fairly laid to the charge of the scribes, as the MSS. agree in transposing versa and recta. The side-parts of the scale are called Umbra versa, the lower part Umbra recta or extensa. This will appear more clearly at the end of Part II.

13. See fig. 3, Plate III. Each plate turns on a hinge, just like the “sights” of a gun. One is drawn flat down, the other partly elevated. Each plate (tabella vel pinnula) has two holes, the smaller one being the lower. This Rewle is named in Arabic Alhidada or Alhidatha; in Latin Verticulum, from its turning easily on the centre; in Greek Dioptra, as carrying the sights. The straight edge, passing through the centre, is called the Linea Fiduciae. It is pierced by a hole in the centre, of the same size as that in the Mother.
4 thyn Eye, to knowe the altitude of sterres by nyhte. ¶ & for the more declaracioun, lo here thi figure.

14. ¶ Thanne is ther a large Pyn in maner of an Extre, pat goth thowr the hole / that halt the tables of the clymates & the Riet in the wombe of the Moder / thorw wich pyn ther goth a litel wegge 4 which pat is cleped the hors, pat streyneth alle thise parties to hepe; this formeide grete Pyn in maner of an extre is ymagyned to be the Pol Artyk in thin Astralabie. ¶ & for the more declaracioun, lo here the figure.

[fol. 5 v.] 15. ¶ The wombe-side of thyne Astrelabie is also deuyded wit[h] a longe crys in 4 quarters from est to West, fro sowth to north, fro riht side to left side, as is the bak-side. & for the more 4 declaracioun, lo here thi figure.

16. ¶ The bordure of which wombe-side is deuyded fro the povnt of the est lyn-e vn-to the povnt of the south lyn-e vnder the ring, in 90 degrees; & by pat same proportion is euery quarter deuyded as ys the bak-side, pat amonteth 360 degrees. ¶ & vnderstand wel, pat degrees of this Bordure ben answering & consentriek to the degrees of the Equynoxial, pat ys deuyded in the same nombre as euery othere cercle is in the heis heuene. ¶ This same bordure is 8 deuyded also with 23 lettres capitals & a smal crys + aboue the south lyn-e, pat shewith the 24 howres equals of the clokke / &, as I hane said, 5 of this degrees maken a Milewey, 3 Milewey maken an howre. ¶ & euery degree of this bordure contineth 4 Mynutes, &

14. See fig. 4, Plate III. The Pin is also called Axis or Clavus, in Arabic Alchitot; it occupies the position of the Arctic or North Pole, passing through the centre of the plates that are required to turn round it. The Wedge is called cuneus, or equus restringens, in Arabic Alpheraz or the horse, because it was sometimes cut into the shape of a horse, as shewn in fig. 7, Plate IV, which is copied from MS. Univ. Camb. Ii. 3. 3. 15. See fig. 2, Plate II. In the figure, the cross-lines are partly hidden by the Rete, which is separate and removable, and revolves within the border.

16. The Border was also called Margilabrum, Margolabrum, or Limbus. It is marked (as explained) with hour-letters and degrees. Each degree contains 4 minutes of time, and each of these minutes contains 60 seconds of time.
euery Minut 60 secoundes; now haue [y] told the twye. ¶ & for the 12 more declaracioun, lo here the figure.

[Fol. 6] 17. ¶ The plate vnder thi Riet is descriued with 3 [prin-cipal] cerclis; of wiche the leste is cleped the cercle of cancer / by-cause pat the heued of cancer turnyth euermor consentrik vp-on the same cercle. ¶ in this heued of cancer is the grettest declinacioun northward of the sonne. ¶ & ther-for is he cleped the Solsticioun of somer; ¶ wiche declinacioun, after pholome, is 23 degrees & 50 Minutis, as wel in cancer as in Capricorne. this signe of cancre is cleped the tropik of Somer, of tropos, pat is to seyn Agaynward, for thanne by-gynneth the sonne to passe fro vs-ward; ¶ & for the more declaracioun, lo here the figure.

[Fol. 6b] ¶ The Middel cercle in wyndnesse, of thise 3, is cleped the cercle equinoxial / vp-on whiche turneth euermo the hedes of 12 aries & libra. ¶ & vnderstood wel, pat euermo this cercle equinoxial turnyth Lustly fro verrey est to verrey west; ¶ as I haue shewed the in the sper solide. ¶ this same cercle is cleped also the weyere, equator, of the day / for whan the sonne is in the heuedes of 16 aries & libra, than ben the daices & the nyhtes illike of lengthe in al the world. ¶ & ther-fore ben thise two signes called the equinoxiis. ¶ & alle pat Moeuyth with-in the heuedes of thise aries & libra, his Moeuyng is cleped north-ward / & alle that Moeuyth with 20 oute thise heuedes, his Moeuyng is clepid sowth-ward as fro the equinoxial. ¶ tak kep of thise latitudes north and sowth, & for-get it nat. ¶ by this cercle equinoxial ben considered the 24 howres of the clokke; for euermo the arisyng of 15 degrees of the equinoxial 24 maketh an howre equal of the clokke. ¶ this equinoxial is cleped

17. We may place under the Rete any plates we please. If only the Mother be under it, without any plate, we may suppose the Mother marked as in fig. 2. The plate or disc (tympanum) which was usually dropped in under the Rete is that shewn in fig. 5, Plate III, and which Chaucer now describes. Any number of these, marked differently for different latitudes, could be provided for the Astrolabe. The greatest declination of the sun measures the obliquity of the ecliptic, the true value of which is slightly variable, but was about 23° 31' in Chaucer's time, and about 23° 40' in the time of Ptolemy, who certainly assigns to it too large a value. The value of it must be known before the three
the gyrdelle of the firste Moeuyng, or elles of the angulus primi motus vel primi mobilis. ¶ And nota, pat firste Moeuyng is cleped “Moeuyng” of the firste Moeuable of the 8 speres, whiche Moeuyng is fro est to west, ¶ & eft agayn in-to est / also it is clepid “girdel” of the first Moeuyng, for it departeth the furste Moeuable, pat is to seyn, the speres, in 2 ilike parties, euene distantz fro the poles of this 32 world.

¶ The wydeste of thisse 3 principal cercles is cleped the cercle of capricorne, by-cause pat the heued of capricorne turnyth euermo consentryk vp-on the same cercle / in the heued of this for-seide capricorne is the gretttest declinacioun southward of the sonne, & ther-for is it cleped the solsticioun of wyntur. this signe of capricorne is also cleped the tropik of wyntur, for thanne bygynnyth the sonne to come agayn to vs-ward. ¶ & for the more declaracioun, lo here thi 40 figure.

[Fol. 7] 18. ¶ Vp-on this forseide plate ben compassed certain cerclis pat hihten Almicanteras / of which som of hem semen perfit cercles, & somme semen inperfit. the centre pat standith a-Middles the 4 narwest cercle is cleped the senyth ; ¶ & the netherest cercle, or the furste cercle, is clepid the orisonte, ¶ pat is to seyn, the cercle

circles can be drawn. The method of finding their relative magnitudes is very simple. Let ABCD (fig. 8, Pl. IV) be the tropic of Capricorn, BO the South line, OC the West line. Make the angle EOB equal to the obliquity (say 23½°), and join EA, meeting BO in F. Then OF is the radius of the Equatorial circle, and if GH be drawn parallel to EF, OH is the radius of the Tropic of Cancer. In the phrase angulus primi motus, angulus must be taken to mean angular motion. The “first moving” (primus motus) has its name of “moving” (motus) from its denoting the motion of the primum mobile or “first moveable.” This primum mobile (by some placed in the ninth sphere) is here identified with the eighth sphere, or sphera stellarum fixarum. See the fig. in MS. Camb. Univ. II. 3. 3 (copied in fig. 10, Plate V). Some authors make 12 heavens, viz. those of the 7 planets, the firmamentum (stellarum fixarum) the nonum caelum, decimum caelum, primum mobile, and caelum empyraeum.

18. See fig. 5, Pl. III. This is made upon the alt-azimuth system, and the plates are marked according to the latitude. The circles, called in Latin circuli progressionum, in Arabic Almicantarath, are circles of altitude, the largest imperfect one representing the horizon (horizon obliqueus), and the central dot being the zenith, or pole of the horizon. In
pat denyeth the two Emysperies / pat is, the partie of the heuene a-boue the Erthe & the partie, be-nethe. ¶ thise almy-kanteras ben compounded by 2 & 2, al be it so pat on diuers Astrelabies some 8 almy-kanteras ben deuydyed by on / & some by two, & somme by .3. aftur the quantite of the Astrelabie. ¶ this forside cenyth is ym- agen to ben the verrey point ouer the crowne of thy heued / & also this senyth is the verrey pool of the orisonte in euery regioun. 12 ¶ & for the more declaracioun, lo here thi figure.

19. ¶ From this senyth, as it semeth, ther come a maner krokede strikes like to the clawes of a lopp, or elles like to the werk of a womanes calle, in keruyng ouerthwart the Almykanteras. ¶ & thise same strikes or diuisions ben cleped Azymuthz. ¶ & 4 they deuyden the Orisonte of thin astrelabie in 24 deuisions. ¶ & thise Azimuth seruen to knowe the costes of the firmament ¶ & to othre conclusiouns, as for to knowe the cenyth of the sonne & of euery sterre. ¶ & for [the] more declaracioun, lo here thi figure. 8

[Fol. 7 b.] 20. ¶ Next thise azymutz, under the cercle of Cancer, ben ther 12 deuyziouns embelif, moche like to the shap of the azimutes, pat shewen the spaces of the howres of planetes / & for mor declaracioun, lo here thi figure. 4

21. ¶ The riet of thin Astrelabie with thy zodiak, shapen in maner of a net or of a lopp-webbe aftur the olde descripcioun, which thaw maist tornen vp and down as thi-self likyth, contienith certein nombre of sterres fixes, with hir longitudes & latitudes determynat ; 4

my figure, they are “compounded by” 5 and 5, but Chaucer’s shewed every second degree, i. e. it possessed 45 such circles. For the method of drawing them, see Stöfler, leaf 5, back.

19. Some Astrolabes shew 36 of these azimuthal circles, as in my figure. See Stöfler, leaf 13, where will be found also the rules for drawing them.

20. If accurately drawn, these embelife or oblique lines should divide the portions of the three circles below the horizon obliquus into twelve equal parts. Thus each arc is determined by having to pass through three known points. They are called arcus horarum inegualium, as they shew the “howres ineuelles.”

21. In fig. 2, Pl. II, the Rete is shewn as it appears when dropped into the depression in the front of the instrument. The shape of it varied much, and another drawing of one (copied from Camb. Univ. MS.
\[ \textit{Thy zodiak of thin Astralabie is shapen as a} \textit{compas wich} \textit{pat} \]

\[ 24 \textit{contienith a large brede, as aftur the quantite of thin astralabie} / \textit{in ensample} \textit{pat} \textit{the zodiak in heuene is ymagened to ben a surfise contienying a latitude of 12 degrees,} \]

\[ \textit{wher[as]} \textit{al the remenant of cerkles in the heuene ben ymagined verrey lynes with-owte eny} \]

\[ 28 \textit{latitude.} \]

\[ \textit{Amiddles this celestial zodiak ys ymagined a lyne, which} \textit{pat} \textit{is cleped the Ecliptik lyne / vndur which lyne is euermo the wey of the sonne.} \]

\[ \textit{Thus ben ther} 6 \textit{degrees of the zodiak on} \textit{pat} \textit{on side of the lyne, and 6 degrees on that other.} \]

\[ \textit{This zodiak is} \]

\[ \text{II. 3, 3, fol. 66 b.) is given in fig. 9, Pl. IV. The positions of the stars are marked by the extreme points of the metal tongues. Fig. 2 is taken from the figures in the Cambridge MSS., but the positions of the stars have been corrected by the list of latitudes and longitudes given by Stöffler, whom I have followed, not because he is correct, but because he probably represents their positions as they were supposed to be in Chaucer's time very nearly indeed. There was not room to inscribe the names of all the stars on the \textit{Rete, and to have written them on the plate below} would have conveyed a false impression. A list of the stars marked in fig. 2 is given at the end of the volume. The Ecliptic is the circle} \]
deuided in 12 principal divisious, pat departen the 12 signes. ¶ & 32 for the streitnes of thin astrelabie, than is euery smal deuiisoun in a signe departid by two degrees & two; I Mene degrees contenying 60 Minutes. ¶ & this forseide heuenissh zodiak is cleped the cercle of the signes / or the cercle of the bestes / for zodia in langage of grek 36 sownyth ‘bestes’ in latyn tonge. ¶ & in the zodiak ben the 12 signes pat han names of bestes; or elles for whan the sonne entrith in any of the signes, he taketh the proprete of swich bestes; or elles for pat the sterres that ben there fixed ben disposed in signes of 40 bestes, ¶ or shape like bestes; ¶ or elles when the planetes ben vnder thilke signes, pei causen vs by hir influence operaciouns & effectes lik to the operaciouns of bestes. ¶ & vnderstonde Also, pat when an hot planete comyth in-to an hot signe, than encreseth his hete; & 44 zif a planete be cold, thanne amenusethe his coldnesse, by-cause of the hote signe. ¶ & by this conclusion maistow take ensample in alle the signes, be they moist or drie, or moeble or fix; rekenyng the qualite of the planete as I furst seide. ¶ & euerych of thes 12 Signes 48 hath respecte to a certein parcelle of the body of a man and hath it in gourenance; as aries hath thin heued, & taurus thy nekke & thy throte / gemyni thyhn armholes & thin armes, ¶ & so forth; as shal be shewed more pleyn in the 5 partie of this tretis. this zodiak, 52 which pat is part of the 8 spere, ouer-kerueth the equinoxial; and he ouer-kerueth hym again in euene parties / & pat on half declinith southward, & pat other northward, as pleynli declareth the tretis of the spere. ¶ & for mor declaracioun, lo here thi figure. 56

which crosses the Equinoctial at its East and West points. In Chaucer’s description of the zodiac, carefully note the distinction between the Zodi-ac of the Astrolabe and the Zodiac of Heaven. The former is only six degrees broad, and shews only the northern half of the heavenly zodiac, the breadth of which is imagined to be 12 degrees. Chaucer’s zodiac only shewed every other degree in the divisions round its border. This border is divided by help of a table of right ascensions of the various degrees of the ecliptic, which is by no means easily done. See Additional Note on this section; which explains Fig. 19, Plate VII. I may add that the Rete is also called Aranea or Voltellum; in Arabic, Alhancabuth. 22. The Label. See fig. 6, Pl. III. The label is more usually used
SAUE pat it is streit & hath no plates on either ende with holes; ¶ but with the smale point of the forseide label, shaltow kalcule 4 thyne equaciouws in the bordure of thin Astrolabie as bi thin almury. ¶ & for the more declaracioun, lo here thy figure.

23. ¶ Thin almury is cleped the denticle of capricorne or elles the kalkuler. ¶ this same Almury sit fix in the hed of capricorne, & it seruyth of many a necessarie conclusion in equaciouws of thynges, as shal be shewed; ¶ & for the more declaracioun, lo here thi figure.

Her endith the description of the Astrolabie.

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[Fol. 9] Her bygynnen the conclusions of the Astrelabie.

1. To fynde the degree in which the sonne is day by day, after hir cours a-bowte.

[Hic incipiunt conclusiones astrolabii; & prima est ad invenien-dum gradus solis in quibus singulis diebus secundum currsum sol est existens.]

¶ Rekene and knowe which is the day of thi monthe ¶ & ley thi reule vp that same day, & thanne wol the verray point of thy rewle sitten in the bordure, vp-on the degree of thy sonne. ¶ En-sample as thus; the yer of oure lord 1391, the 12 day of March at Midday, I wolde knowe the degree of the sonne. ¶ I sowhte in the bakhalf of myn astrelabie, and fond the sercle of the daies, ¶ the which I knowe by the names of the Monthes writen vndur the same 8 Cercle. ¶ Tho leide I my rewle ouer this forseide day, & fond the

on the front of the instrument, where the Rete and other plates revolve. The rule is used on the back, for taking altitudes by help of the scale.

23. The Almury; called also denticulus, ostensor, or “calculer.” In fig. 2, it may be seen that the edge of the Rete is cut away near the head of Capricorn, leaving only a small pointed projecting tongue, which is the almury or denticle, or (as we should now say) pointer. As the Rete revolves, it points to the different degrees of the border. See fig. 9.

Part II, § 1. [The Latin headings to the propositions are taken from the MS. in St John’s College, Cambridge.] See fig. 1. Any straight
point of my rewle in the bordure vp-on the first degree of aries, A litel with-in the degree / & thus knowe I this conclusion. ¶ A-nother day, I wolde knowe the degree of my sonne, & this was at Midday in the 13. day of decembre; I fond the day of the monthe in maner 12 as I seide / tho leide I my rewle vp-on this forside 13. day, & found the point of my rewle in the bordure vp-on the first degree of capricorne / a lite with-in the degree ¶ & than haddy of this conclu- sioun the ful experience / & for the more declaracioun, lo her thi figure.

[Fol. 9 b.] 2. To knowe the altitude of the sonne, or of othre celestial bodies.

[De altitudine solis & aliorum corporum supra celestium.]

¶ Put the ring of thin Astrelabie vp-on thi riht thowmbe & turne thi lift side a-gayn the light of the sonne/ And rém[e]ue thi rewle vp and down til þat the stremes of the sonne shyne thorgh bothe holes of thi rewle. ¶ loke thanne how Many degrees thi rewle is a-reised fro the litel crois vp-on thin est line, & tak ther the altitude of thi sonne. ¶ & in this same wyse maistow knowe by nyhte the altitude of the Mone, or of brihte sterres / this chapitre is so general euer in on, þat ther nedith no more declaracion; but 8 for-get it nat. ¶ & for the more declaracioun, lo here the figure.

[Fol. 10] 3. To knowe every tyme of the day by lyht of the sonne, & every tyme of the nyht by the sterres fixe, & eke to knowe by nyht or by day the degree of any signe þat assendith on the est Orisonte, which þat is cleped communly the assendent or elles oruscupum.

edge laid across from the centre will shew this at once. Chaucer, reckoning by the old style, differs from us by about 8 days. The first degree of Aries, which in his time answered to the 12th of March, now vibrates between the 20th and 21st of that month. This difference of eight days must be carefully borne in mind in calculating Chaucer's dates.

2. Here “thy left side” means the left side of thine own body, and therefore the right or Eastern edge of the Astrolabe. In taking the altitude of the sun, the rays are allowed to shine through the holes; but the stars are observed by looking through them. See figs. 1 and 3.
[Ad cognoscendum quidlibet tempus dei per solis indicationem, & quodlibet tempus noctis per quasdam stellas in celo fixas; ac eciam ad inveniendum & cognoscendum signum super orizon-tem qui communiter vocatur ascendens.]

¶ Tak the altitude of the sonne when the list, as I haue said; ¶ & set the degree of the sonne, in kas pat it be by-forn the Middel of the day, among thin al-my-kanteras on the est side of thin 4 astralabie; & 3if it be after the Middel of the day, set the degree of thy sonne vp-on the west side / tak this manere of settyng for a general rewle, ones for euere. ¶ & when thou hast set the degree of thy sonne vp as many Almykanteras of heyhte as was the alti-
tude of the sonne takyn by thi rewle, ¶ ley ouer thi label, vp-on the degree of the sonne; ¶ & thanne wol the point of thi label sit[t]en in the bordure, vp-on the verrey tid of the day. Ensample as thus / the yer of owre lord 1391, the 12 day of March, I wold knowe the 12 tyd of the day. I tok the altitude of my sonne, ¶ & fond pat it was 25 degrees and 30 of Minutes of heyhte in the bordure on the bak-side. ¶ tho turnede I Myn astrelabie, & by cause that it was by-forn Midday, I turnede Mi riet and sette the degree of the sonne, 16 that is to seyn the .1. degree of Aries / on the riht side of myn Astralabie, vp-on pat 25 degrees & 30 of Minutes of heyhte among myn almy-kanteras / tho leide I my label vp-on the degree of my [* Fol. 10b. ] sonne, & fond the poynte *of my label in the bordure, vp-on 20 a capital lettre pat is cleped an X; tho rekened I alle the capitalles lettres fro the lyne of Midnyght vn-to this forside lettre X, & fond pat it was 9 of the clokke of the day. tho loked I do[w]n vp-on the Est Orisonte, and fond there the 20 degree of gemynis assending;

3. Drop the disc (fig. 5) within the border of the mother, and the Rete over it. Take the altitude by § 2, and let it be 25½°. As the altitude was taken by the back of the Astrolabe, turn it over, and then let the Rete revolve westward till the 1st point of Aries is just within the altitude-
circle marked 25, allowing for the ½ degree by guess. This will bring the denticle near the letter C, and the first point of Aries near X, which means 9 A.M. At the same time, the 20th degree of Gemini will be on the horizon obliquus. See fig. 11, Pl. V. This result can be approximately verified by a common globe thus; elevate the pole nearly 52°; turn the small brass hour-circle so that the figure XII lies on the equinoctial
which pat I tok for Myn assendent, & in this wyse hadde I the 24 experience for euer-mo in wich maner I sholde knowe the tyde of the day / & ek myn assendent. ¶ Tho wold I wyte the same nyght fol-wyng the howr of the nyght / & wrowhte in this wyse / among an heap of sterris fixe, it liked me for to take the altitude of the feire 28 white sterre pat is cleped Alhabor / and fond hir sitting on the west side of the line of Midday, 18 degrees of heyhte taken by my rewle on the bak-side. ¶ tho sette I the centre of this Alhabor vp-on 18 degrees among myn Almy-kanteras, vp-on the west side; by cause 32 pat she was fonden on the west side. tho leide I my label ouer the degree of the sonne pat was descended vnder the weste Orisonte, ¶ & rikened alle the lettres capitals fro the lyne of Midday vn-to pe point of my label in the bordure; ¶ & fond pat it was passed 8 of 36 the clokke the space of 2 degrees / tho loked I down vp-on myn est orisonte, ¶ & fond ther 23 degrees of libra assending, whom I tok for myn assendent; & thus lerned I to knowe ones for euer in which Manere I shuld come to the howre of the nyht / and to myn assendent; 40 as verreyli as may be taken by so smal [an] instrument / but natheles in general wold I warne the for euer / ne mak the neuere bold to haue take a Just Ascendent by thin Astrilabie, or elles to haue sette Iustly a clokke, whan any celestial body by which pat thow wenest 44 gouter e thilke thynges ben ney the sowth lyne / for trust wel, whan pat pe sonne is ney the Meridional lyne, the degree of the sonne reynyth so longe consenstrik vp-on the almy-kanteras, pat sothly thow shalt erre fro the Just assendent / the same conclusioun sey I by 48 pe centre of any sterre fix by nyht; and more-ouer, by experience, I wot wel that in owre Orisonte, from .xi. of the clokke vn-to on of the

colure; then turn the globe till IX lies under the brass meridian. In the next example, by the Astrolabe, let the height of Alhabor (Sirius) be about 18°. Turn the denticle Eastward till it touches the 58th degree near the letter O, and it will be found that Alhabor is about 18° high among the almicanteras, whilst the first point of Aries points to 32° near the letter H, i.e. to 8 minutes past 8 P.M.; whilst at the same time, the 23rd degree of Libra is almost on the Horizon obliquus on the Eastern side. By the globe, at about 8 min. past 8 P.M., the altitude of Sirius is very nearly 18°, and the 23rd of Libra is very near the Eastern horizon. See fig. 12, Plate V.

ASTROLABE.
clokke, in takynge of a Jüst assendent in A portatif Astrelabie, hit is 52 to hard to knowe. I mene, from .xi. of the clokke by-forn the howre of noon til on of the clok next folwyng. ¶ & for the more declaracion, lo her thi figure.

[Fol. 11]

4. Special declaracion of the assendent.

[Specialis declaracio de ascendente.]

¶ The assendent sothly, as wel in alle natiiutez as in questiouns & eleccions of tymes, is a thing which pat thiste Astrologiens gretly obseruen / wher-for me semeth convenient, sin pat I spake of the assendent, to make of it special declaracioun / The assendent sothly, to take it at the [largest], is thilke degree pat assendith at any of thise forseide tymes v[po]n the est Orisonte; & there-for, yif pat any planet assende at pat same tyme in thilke for-seide [degree of] his longitude, Men seyn pat thilke planetes is in horoscoipo. ¶ but sothly, the hows of the assendent, pat is to seyn, the firste hous or the est Angle, is a thing more brod & large. ¶ For after the statutz of Astrologiens, what celestial body pat is 5 degrees a-boue thilk degre pat assendith, or with-in pat nowmbre, pat is to seyn, nere the degree pat assendith / yit rikne thei thilke planet in the Assendent. ¶ And what planete pat is vnder thilke degree pat assendith the space of [25] degrees, ¶ yit sein thei that thilke planetes is lyk to him pat is [in] the hows of the assendent / but sothly, yif he passe the bondes of thise forseide spaces, a-boue or by-nethe, they sein pat the planete is failling fro the assendent; / yit sein thise Astrolog[i]ens, that the assendent ¶ & eke the lord of the assendent, may be shapen for to be fortunat or infortunat / as thus / a fortunat assendent clepen they whan pat no wykked planetes, as saturne or Mars, or elles the [\*Fol. 11 b.] tail of the dragoune, is in [pc] hows *of the assendent, ne pat no wikked planetes haue non aspecte of enemyte vp-on the assendent; but they wol caste pat thei haue a fortunat planetes in hir assendent & zit in his felicite, ¶ & than sey they pat it is wel. ¶ forther-

4. The ascendent at any given moment is that degree of the zodiac which is then seen upon the Eastern horizon. Chaucer says that astrologers reckon in also 5 degrees of the zodiac above, and 25 below;
A MEAN BETWEEN TWO RESULTS.

5. To knowe the verrey equacioun of the degree of the sonne; yif so be pat it falle by-twixe thin Almykanteras.

[Ad cognoscendum veram equacionem de gradu solis, si contigerit fore in duas Almicanteras.]

[fol. 12] For as moche as the almykanteras in thin astrelabie ben compownet by two & two, where-as some Almykanteras in sondri Astrelabies ben compownet by on and on, or elles by 2 & 2, it is necessarie to thy lernyng to tache the first to knowe & worke with thin owne Instrument. Wher-for, whan pat the degree of thy sonne falleth by-twixe two Almykanteras / or elles yif thin Almykanteras ben grauen with ouer gret a point of a compas / for bothe thise thinges may causen error as wel in knowyng of the tid of the day as of the verrey Assendent / thow Most werken in this wise.

the object being to extend the planet's influence over a whole "house," which is a space of the same length as a sign, viz. 30°. See § 36.

5. This merely amounts to taking the mean between two results.
6. To knowe the spring of the dawyng & the ende of the euenyng, the which ben called the two crepusculus:

[Ad cognoscendum ortum solis & eius occasum, que uocatur vulgariter crepusculum.]

If Set the nadir of thy sonne vp-on 18 degrees of heyhte / Among thyn Almykanteras on the west side, & ley thy label on pe degré of thy sonne, & thanne shal the poynyt of thi label schewe the 4 spreng of day. II Also set the nadir of thy sonne vp-on 18 degrees of heyhte a-mong thin Almykanteras on the [est] side, & ley ouer thy label vp-on the degree of the sonne / & with the point of thy label fynd in the bordure the ende of the euenyng, pat is, verrey 8 nyht. the nadir of the sonne is thilke degree pat is opposit to the degree of the sonne, in the 7 signe, as thus / euery degree of aries bi ordre is nadir to euery degree of libra by ordre / & taurus to Scor-pion / gemini to Sagittare / Cancer to Capricorne / leo to aquarie / 12 virgo to pisces / & 3f any degree in thi zodiak be dirk, [h]is nadire shal declare him. II & for the more declaracioun, lo heere thi figure.

6. This depends upon the refraction of light by the atmosphere, owing to which light from the sun reaches us whilst he is still 18° below the horizon. The nadir of the sun being 18° high on the W. side, the sun itself is 18° below the Eastern horizon, giving the time of dawn; and if the nadir be 18° high on the E. side, we get the time of the end of the evening twilight. Thus, at the vernal equinox, the sun is 18° high soon after 8 A.M. (roughly speaking), and hence the evening twilight ends soon after 8 P.M., 12 hours later, sunset being at 6 P.M.
7. To knowe the arch of the day, that some folk kallen the day artificial, from the sonne arisyng til hit go to rest[e].

[Ad cognoseendum archum diei, quem vulgus vocat diem artificiallem in hoc ab ortu solis vsque ad occasum.]

\[\text{§ Set the degree of thy sonne vp-on thin } \text{Est orisonte, } \text{& ley thy label on the degree of the sonne, } \text{& at the poynt of thy label in the bordure set a prikke.} \]

\[\text{¶ Turn thanne thi riet aboute til the degree } \text{[Fol. 13] of the sonne sit vp-on the west Orisonte, } \text{& ley thi label vp-on the same degree of the sonne, } \text{& at the point of thi label set a-nother prikke.} \]

\[\text{¶ rekne thanne the quantite of tyme in the bordure by-twixe bothe prikkes, } \text{& tak ther thin ark of the day.} \]

\[\text{¶ the remenant of the bordure vnder the Orisonte is the ark of the nyht.} \]

\[\text{¶ thus maistow rekne bothe arches } / \text{or euery porcion, of whether pat the liketh.} \]

\[\text{¶ } \text{& by this Manere of wyrkyng } / \text{Maistow se how longe pat any sterre fix dwellith a-boue the erthe, fro tyme pat he risith til he go to reste.} \]

\[\text{¶ but the day natural, pat is to seyn } \text{24 hours, is the reuoluciou of the equinoxiual with as moche partie of the zodiak as the sonne of his propre Moeuinge passeth in the mene while.} \]

\[\text{¶ } \text{& for the more declaracioun, lo her thi figure.} \]

8. To turn the howres in-equales in howres equales.

[Ad conuertendum horas inequales in horas equales.]

\[\text{¶ Knowe the nombre of the degrees in the howris in-equales, } \text{& departe hem by 15, } \text{& tak ther thin howris equales.} \]

\[\text{¶ } \text{& for the more declaracioun, lo here thi figure.} \]

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7. Ex. The sun being in the 1st point of Cancer on the longest day, its rising will be shewn by the point in fig. 5 where the horizon obliquus and Tropicus Cancri intersect; this corresponds to a point between P and Q in fig. 2, or to about a quarter to 4 A.M. So too the sunset is at about a quarter past 8, and the length of the day 16½ hours; hence also, the length of the night is about 7½ hours, neglecting twilight.

8. On the same day, the number of degrees in the whole day is about 247½, that being the number through which the Rete is turned in the example to § 7. Divide by 15, and we have 16½ equal hours.
HOURS UNEQUAL AND EQUAL.

[Part II. § 9.

9. To knowe the quantite of the day vulgare, that is to seyen, from spring of the day vn-to verrey nyht.

[Ad cognoscendum quantitatem diei vulgaris, viz. ab ortu diei vsque ad noctem.]

¶ Know the quantite of thicrepusculis, as I haue tawht in the chapitre by-forn, & adde hem to the arch of thi day artificial / & tak ther the space of alle the hole day vulgar, vn-to verrey nyht. / The 4 same manere maistow worke to knowe the quantite of the vulgar nyht. / & for the more declaracioun, lo here the figure.

10. To knowe the quantite of howres in-equales by day.

[Ad cognoscendum horas inequale[s] in die.]

¶ Vnderstond wel, pat thise howris in-equalis ben cleped howres of planetes, & vnderstond wel pat som tyme ben thei lengere by day [than] by nyht, & som tyme the contrarie. ¶ but vnderstond wel 4 pat euermo generaly pe howr in-equal of the [day with pe howr in-equal of the] nyght contenen [30] degrees of the bordure, whiche bordure is euer-mo answering to the degrees of the equinoxial; wherfor parte the arch of the day artificial in 12, & tak ther the quantit of the howr in-equal by day. ¶ & zif thow abate the quantite of the howr in-equal by daye owt of 30 / than shal the remenant pat leneth performe the howr inequal by nyght. ¶ & for the more declaracioun, lo here the figure.

[Part II. § 11.

11. To knowe the quantite of howres equales.

[Ad cognoscendum quantitatem horarum inequalium.]

¶ The quantite of howres equales, pat is to seyn, the howres of the clokke / ben departid by 15 degrees al-Redy in the bordure

9. The “day vulgar” is the length of the “artificial day,” with the length of the twilight, both at morn and at eve, added to it.

10. If, as in § 7, the day be 16½ hours long, the length of each “hour inequal” is 1 h. 22½ m.; and the length of each “hour inequal” of the night is the 12th part of 7½ hours, or 37½ m.; and 1 h. 22½ m., added to 37½ m., will of course make up 2 hours, or 30°.
of thin astralabie, as wel by nyht as by day, generally for euere.

I What nedith more declaracioun?  If Wher-for, whan the list to know how manye howres of the clokke ben passed, or any part of any of thise howris pat ben passed, I or elles how many howres or partie of howres ben to come, fro swich a tyme to swych a tyme, by day or by nyhte, I knowe the degree of thy sonne, & ley thy label on it / 8 turne thi Riet abowte ioynitly with thy label, & with the point of it rekne in the bordure fro the sonne arise vn-to the same place ther thow desirest, by day as by nyhte / this conclusioun wol I declare in the laste chapitre of the [4] partie of this tretis so openly, pat [per] 12 shall lakke no worde pat nedith to the declaracioun.  I & for the more declaracioun, lo here the figure.

12. Special declaracioun of the howres of planetes.

Specialis declaracio de horis planetarum.

I Understond wel, pat euere-mo fro the arising of [the] sonne til it go to reste / the nader of the sonne shal shewe the howr of the planete / & fro that tyme forward / al the nyht til the sonne arise / than shal the verrey degree of the sonne shewe the howr of the 4 planete.  Ensample as thus.  I the xij. day of March fil vp-on a saterday per auenture / & at the arising of the sonne, I fond the secounde degree of aries sitting vp-on myn est Orisonte, al be it pat it was but lite; *than fond I the [2] degree of libra, nadir of [* fol. 14 b.] 8 my sonne, dessending on my west Orisonte, vp-on which west Ori-sonte euery day generally, at the sonne ariste, entrith the howr of any planete, after which planete the day berith his name; I & endith in

11. This merely repeats that 15° of the border answer to an hour of the clock.
12. This "hour of the planet" is a mere astrological supposition, involving no point of astronomy. Each hour is an "hour inequal," or the 12th part of the artificial day or night. The assumptions are so made that the first hour of every day may resemble the name of the day; the first hour of Sunday is the hour of the Sun, and so on. These hours may be easily found by the following method. Let 1 represent both Sunday and the Sun; 2, Monday and the Moon; 3, Tuesday and Mars; 4, Wednesday and Mercury; 5, Thursday and Jupiter; 6, Friday and Venus; 7,
12 the nexte strik of the plate vnder the forside west Orisonte / & euere as the sonne clymbith vppere & vppere, so goth his nadir downere & downere, techyng by swych strikes the howres of planetes by ordre as thei sitten in the heuene. the first howr inequal of euery Sat-
16 terd[a]y is to Saturne; ¶ & the seconde to Iupiter; ¶ the 3 to Mars; the 4 to the sonne; ¶ the 5 to venus; ¶ the 6 to Mercurius; ¶ the 7 to the mone; ¶ & thanne agayn the 8 is to saturne; ¶ the 9 to Iupiter; ¶ the 10 to Mars; ¶ the 11 to the sonne; ¶ the 12 20 to venus; ¶ And now is my sonne gon to reste as for that setter-
day. ¶ Thanne shewyth the verrey degree of the sonne the howr of Mercurie entryng vnder my west orisonte at eue; ¶ & next him succedith the Mone; ¶ & so forth by ordre, planete after planete, 24 in howr after howr, al the nyht longe til the sonne arise. ¶ now risith the sonne pat Sunday be the morwe; ¶ & the nadir of the sonne vp-on the west Orizonte shewith me the entring of the howre of the forside sonne. ¶ & in this maner succedith planete vnder planete, 28 fro saturre vn-to the mone, & fro the mone vp a-gayn to saturre, howre after howre generally. ¶ & thus know[e] I this conclusion. ¶ & for the more declaracioun, lo here the figure.

Saturday and Saturn. Next, write down the following succession of figures, which will shew the hours at once.

1642753|16427531642753164275316.

Ex. To find the planet of the 10th hour of Tuesday. Tuesday is the third day of the week; begin with 3, to the left of the upright line, and reckon 10 onwards; the 10th figure (counting 3 as the first) is 6, i. e. Venus. So also, the planet of the 24th hour of Friday is the Moon, and Saturday begins with Saturn. It may be observed that this table can be carried in the memory, by simply observing that the numbers are written, beginning with 1, in the reverse order of the spheres, i. e. Sun, Venus, Mercury, Moon; and then (beginning again at the outmost sphere) Saturn, Jupiter, Mars. This is why Chancer takes a Saturday; that he may begin with the remotest planet, Saturn, and follow the reverse order of the spheres. See fig. 10, Pl. V. Here, too, we have the obvious reason for the succession of the names of the days of the week, viz. that the planets being reckoned in this order, we find the Moon in the 25th place or hour from the Sun, and so on.
13. To knowe the altitude of the sonne in Middles of the day, that is clesped the altitude Meridian.

[Ad cognoscendum altitudinem solis in medio diei, que vocatur altitude meridiana.]

If set the degree of the sonne vp-on the lyne Meridional, & rikene how many degrees of Almykanteras ben by-twixe thyn est Orisonte & the degree of the sonne. If & tak ther thyn altitude Meridian / this [is] to seyne, the heiest of the sonne as for that day. 4

If so maistow knowe in the same lyne, the heiest cours pat any sterre fix clymbith by nyht ; if this is to seyn, pat w[h]an any sterre fix is passed the lyne Meridional, than by-gynnyth it to descende, & so doth the sonne. If & for the more declaracioun, lo here thi 8 figure.

14. To knowe the degree of the sonne by thy riet, for a maner curiosite, &c.

[Ad cognoscendum gradum solis curiose.]

If sek bysily with thi rewle the heiest of the sonne in Midde of the day ; if turne thanne thyn Astrelabie, & with a prkke of ynk marke the nombre of pat same Altitude in the lyne Meridional. turne thanne thy Ryet a-bowte til thow fynde a degree of thi 4 zodiak acording with the prkke, if this is to seyn, sittyng on the prkke ; if & in soth, thow shalt fynde but 2 degrees in al the zodiak of that condicioun ; if & yit thilke 2 degrees ben in diuerse signes ; if than maistow lyghtly by the sesoun of the yere knowe the 8 signe in whiche pat is the sonne. [If & for the more declaracioun, lo here thi figure.]

13. The reason of this is obvious from what has gone before. The sun's meridional altitude is at once seen by placing the sun's degree on the South line.

14. This is the exact converse of the preceding. It furnishes a method of testing the accuracy of the drawing of the almikanteras.
15. To know which day is lik to wych day as of lengthe, &c.

[Ad cognoscendum quales dies in longitudine sunt similis.]

To know which day is lik to wych day as of lengthe, &c.

16. This chapitre is a Maner declaracioun to conclusiones pat folwen.

[Illud capitulum est quedam declaracio ad certas conclusiones sequentes.]

This merely expresses the same thing, with the addition, that on days of the same length, the sun has the same meridional altitude, and the same declination from the equator.
uyntes also; & the shadwes ilike, & the Altitudes ilike at Midday for euere. ¶ & for more declaracioun, lo here thi figure.

[Fol. 16] 17. To knowe the verrey degree of any maner sterre straunge or vnstraunge after his longitude, thow he be indeterminat in thin astralabie; sothly to the trowthe, thus he shal be knowe.

[Ad cognoscendum verum gradum alicuius stelle alienae secundum eius latitudinem (sic), quamvis sit indeterminata in astro-labio; veraciter isto modo.]

¶ Tak the altitude of this sterre when he is on the Est side of the lyne Meridional, as ney as thow maist gesse; ¶ & tak an assendent a-non riht by som maner sterre fixe which pat pow knowest ¶ & for-get nat the altitude of the firste sterre, ne thy assendent; ¶ & whan pat this is don / espie diligently whan this same firste sterre passeth any-thing the sowth westward, and hath him a-non riht in the same nowmbre of altitude on the west side of this lyne Meridional ¶ as he was kawht on the est side; & tak a newe assendent a-non riht by som Maner sterre fixe which pat thow knowest; & for-get nat this secounde assendent. ¶ and whan pat this is don, rikne thanne how manye degrees ben by-twixe the firste assendent & the seconde assendent / & rikne wel the Middel degree by-twyne bothe Assend-

17. Here passeth any-thing the south westward means, passes somewhat to the westward of the South line. The problem is, to find the degree of the zodiac which is on the meridian with the star. To do this, find the altitude of the star before it souths, and by help of problem 3, find out the ascending degree of the zodiac; secondly, find the ascending degree at an equal time after it souths, when the star has the same altitude as before, and the mean between these will be the degree that ascends when the star is on the meridian. Set this degree upon the Eastern part of the horizon obliquus, and then the degree which is upon the meridional line souths together with the star. Such is the solution given, but it is but a very rough approximation, and by no means always near to the truth. An example will shew why. Let Arcturus have the same altitude at 10 P.M. as at 2 A.M. In the first case the 4th of Sagittarius is ascending, in the second (with sufficient accuracy for our purpose) the 2nd of Aquarius; and the mean between these is the 3rd of Capricorn. Set this on the Eastern horizon upon a globe, and it will be
entes, & set thilke Middel degree vp-on thin est Orisonte; ¶ & waite thanne what degre pat sit vp-on the line Meridional, & tak ther the verrey degr of the Ecliptik in which the sterre stondeth for 16 the tyme. ¶ For in the Ecliptik is the longitude of a celestial body rekene, euene fro the heued of aries vn-to [the] ende of pisces. ¶ & his latitude is Rikned after the quantite of [h]is declinacion, north or sowth to-warde þe poles of this world / as thus. ¶ yif it be 20 of the sonne or of any fix sterre / rekene [h]is latitude or his declinacioun fro the Equinoxial cercle; ¶ & yif it be of a planete, rekne than the quantite of [h]is latitude fro the Ecliptik lyne. ¶ Al be it so þat fro [the] Equinoxial may the declinacion or the latitude of any 24 body celestial be rekned, after the site north or south, & after the quantite of [h]is declinacion. ¶ & riht so may the latitude or the declinacion of any body celestial, saue only of the sonne, after his site north or south, & after the quantite of his declinacioun, be rekned fro 28 the Ecliptik lyne; ¶ Fro which lyne alle planetes som tyme declinen north or south, saue only the for-seide sonne. ¶ & for the more declaracioun, lo here thi figure.

seen that it is 20 min. past midnight, that 10° of Scorpio is on the meridian, and that Arcturus has past the meridian by 5°. At true midnight, the ascendent is the 29° of Sagittarius. The reason of the error is that right ascension and longitude are here not sufficiently distinguished. By observing the degrees of the equinoctial, instead of the ecliptic, upon the Eastern horizon, we have at the first observation 272°; at the second 332°, and the mean of these is 302°; from this subtract 90°, and the result, 212°, gives the right ascension of Arcturus very nearly, corresponding to which is the beginning of the 5° of Scorpio, which souths along with it. This latter method is correct, because it assumes the motion to take place round the axis of the equator. The error of Chaucer’s method is that it identifies the motion of the equator with that of the ecliptic. The amount of the error varies considerably, and may be rather large. But it can easily be diminished, (and no doubt was so in practice), by taking the observations as near the south line as possible. Curiously enough, the rest of the section explains the difference between the two methods of reckoning. The modern method is to call the co-ordinates right ascension and declination, if reckoned from the equator, and longitude and latitude, if from the ecliptic. Motion in longitude is not the same thing as motion in right ascension.
18. To knowe the degrees of the longitudes of fixe sterres after pat they ben determinat in thin astralabie, yif so be pat they ben trewly set.

[Ad cognoscendum gradus longitudinis de stellis fixis que determinantur in astralabio, sicut in suis locis recte locentur.]

\[1\] Set the centre of the sterre vp-on the lyne Meridional, & tak kep of thi zodiak, \[2\] \& loke what degree of any signe pat sit on the same lyne Meridional at pat same tyme, & tak the degree in which the sterre standith; \[3\] \& with that same degree com[e]th pat same 4 sterre vn-to that same lyne fro the Orisonte. \[4\] \& for more declaracioun, lo here thi figure.

19. To knowe with which degree of the zodiak any sterre fixe in thin Astrelabie arisith vp-on the est Orisonte, Al-they [h]is dwellyng be in a-nother signe.

[Ad cognoscendum cum quibus gradibus zodiaci que stella fyxa in astralabio ascendit super orizontem orientalem, quamuis eius orizon (sic) sit in alio signo.]

\[1\] Set the Sentre of the sterre vp-on the est Orisonte, \[2\] \& loke what degre of any signe pat sit vp-on the same Orisonte at pat same tyme. \[3\] And vnderstond wel, pat with pat same degre arisith pat same sterre; and thys *merueyllous arising with a strange de- [\* Fol. 17] \degree in another signe is by-cause pat the latitude of the sterre fix is either north or sowth fro the equinoctial. \[4\] but sothly, the latitudes

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18. The "centre" of the star is the technical name for the extremity of the metal tongue representing it. The "degree in which the star standeth" is considered to be that degree of the zodiac which souths along with it. Thus Sirius or Alhabor has its true longitude nearly equal to that of 12° of Cancer, but, as it souths with the 9th degree, it would be said to stand in that degree. This may serve for an example; but it must be remembered that its longitude was different in the time of Chaucer.

19. Also it rises with the 19th degree of Leo, as it is at some distance from the zodiac in latitude. The same "marvellous arising in a strange sign" is hardly because of the latitude being north or south from the equinoctial, but rather because it is north or south of the ecliptic. For example, Regulus (α Leonis) is on the ecliptic, and of courses rises
of planetes ben conu[ey]ly rekned fro the Ecliptik, bi-cauce \( \text{fat non} \)
8 of \( \text{hem declinet[h]} \) but fewe degrees owt fro the brede of the zodiak.
\( \text{T} \& \text{tak god kep of this chapitre of arising of the celestial bodies;} \)
for truste wel, \( \text{fat neyther mone ne sterre as in owre Embelif} \)
orisonte arisith with \( \text{fat same degree of his longitude, saue in O cas;} \)
12 \( \text{T} \& \text{that is, whan they haue no latitude fro the Ecliptik lyne.} \)
but natheles som tyne is eueriche of thes planetes vnder the same lyne.
\( \text{T} \& \text{for more declaracioun, lo here thi figure.} \)

20. To knowe the declinacioun of any degree in the zodiak fro
the equinoctial cercle, &c.

[Ad cognoscendum declinacionem alicuius gradus \( \text{in} \) zodaco
\( \text{[a]} \) circulo equinoctiali.]

\( \text{T} \) Set the degree of any signe vp-on the lyne Meridional, &
rikne \( \text{[h]} \)is altitude in Almykaneteras fro the Est Orizonte vp to the
same degree set in the forside lyne, \( \text{&} \) set ther a prikke. \( \text{T} \)
turne vp
4 thanne thy Riet, and set the heued of aries or libra in the same
Meridional lyne, \( \text{&} \) set ther a-nother prikke. \( \text{T} \& \) whan \( \text{fat} \) this is
\( \text{[\text{*Fol. 17 b.]} \) don, considere the \( \text{*} \)Altitudes of hem bothe; \)
for sothly the
difference of thilke altitudes is the declinacion of thilke degre fro
8 the equinoxial. \( \text{T} \& \text{yif so be \( \text{fat} \) thilke degree be northward fro the}
equinoxial, than is his declinacion north; \( \text{T} \) yif it be sowthward,
than is it sowth. \( \text{T} \& \) for the more declaracioun, lo here thi figure.

with that very degree in which it is. Hence the reading \text{equinoctial}
leaves the case in doubt, and we find a more correct statement just be-
low, where we have “whan they haue no latitude fro the Ecliptik lyne.”
At all places, however, upon the earth’s equator, the stars will rise with
the degrees of the zodiac in which they stand.

20. Here the disc (fig. 5) is supposed to be placed beneath the Rete
(fig. 2). The proposition merely tells us that the difference between
the meridian altitudes of the given degree of the zodiac and of the 1st point
of Aries is the \text{declination} of that degree, which follows from the very de-
finition of the term. There is hardly any necessity for setting the second
prick, as it is sufficiently marked by being the point where the equino-
czial circle crosses the south line. If the given degree lie \text{outside} this
circle, the declination is \text{south}; if \text{inside}, it is \text{north}. 
21. To knowe for what latitude in any regioun the Almikanteras of any table ben compowned.

[Ad cognosceendum pro qua latitudine in aliqua regiune almi-
cantre tabule mee sunt composite.]

If Rikne how manie degrees of Almikanteras in the Meridional lyne be fro the cercle equinoxial vn-to the senyth; ¶ Or elles fro the pool artik vn-to the north Orisonte; & for so gret a latitude or for so smal a latitude is the table compowned. ¶ & for more declaracion, 4 lo here thi figure.

[Fol. 18] 22. To knowe in special the latitude of owre countray,
I mene after the latitude of Oxenford, & the heyhte of owre pol.

[Ad cognosceendum specialiter latitudinem nostri centri (sic),
scilicet latitudinem Oxenie, et altitudinem poli nostri.]

Vnderstood wel, pat as fer is the heued of aries or libra in the equinoxial from owre orisonte as is the cenyth fro the pole artik; ¶ & as hey [is] the pol Artik fro the Orisonte as the Equinoxial is fer fro the senyth. ¶ I proue it thus by the latitude of Oxenford / 4 vnderstood wel, pat the heyhte of owre pool Artik fro owre north Orisonte is 51 degrees & 50 Minutes; than is the cenyth from owre pool Artik 38 degrees & 10 Minutes; than is the equinoxial from owre senyth 51 degrees & 50 Minutes; ¶ than is owre south Orisonte 8 from owre equinoxial 38 degrees & 10 Minutes. ¶ vnderstood wel

21. In fig. 5, the almicantaras, if accurately drawn, ought to shew as many degrees between the south point of the equinoctial circle and the zenith as are equal to the latitude of the place for which they are described. The number of degrees from the pole to the northern point of the horizon obliquus is of course the same. The latitude of the place for which the disc is constructed is thus determined by inspection.

22. In the first place where "orisonte" occurs, it means the South point of the horizon; in the second place, the North point. By referring to fig. 12, Plate V, it is clear that the arc ϕS, representing the distance between the equinoctial and the S. point is equal to the arc ZP, which measures the distance from the pole to the zenith; since PO ϕ and ZOS are both right angles. Hence also Chaucer's second statement, that the arcs PN and ϕZ are equal. In his numerical example, PN is 51° 50' ;
this Recknyng. ¶ Also for-get nat \( \text{pat} \) the cenyth is 90 degrees of
heuyhte fro the Orisonte, & ovre equinoxial is 90 degrees from ovre
12 pool Artik. ¶ Also this shorte rewle is soth, \( \text{pat} \) the latitude of
any place in a regioun is the distance fro the senyth vnto the Equi-
oxial. ¶ & for more declaracioun, lo here pi figure.

23. To proye euidently the latitude of any place in a Regioun,
by the preue of the heyhte of the pol Artik in \( \text{pat} \) same place.

[Ad probandum euidenter latitudinem aliciuus loci in aliqua
regione, per probacionem altitudinis de polo artico in eodem
loco.]

In some wynters nyht, whan the firmament is clere & thikke-
sterred / waite a tyme til \( \text{pat} \) any sterre fix sit lyne-riht perpendiculer
[* Fol. 18 b.] ouer *the pol Artik, & clepe \( \text{pat} \) sterre A. ¶ & wayte a nother
4 sterre \( \text{pat} \) sit lyne-riht vnder A, \& vnder the pol / \& clepe \( \text{pat} \) sterre
F. And vnnderstond wel, \( \text{pat} \) F is nat consideret but only [to] declare
\( \text{pat} \) A sit euene ouere the pool. ¶ tak thanne a-non riht the alti-
tude of A from the Orisonte / \& forget it nat. ¶ Lat A & F go far-
8 wel til agayns the dawenyng a gret while / \& come thanne agayn &
Abid til \( \text{pat} \) A is euene vnder the pol \& vnder F ; ¶ for sothly, than
wole F sit ouer the pool / \& A wol sit vnder the pool. ¶ tak than
eft-sones the altitude of A from the Orisonte ¶ & note as wel [h]is
12 seconde altitude as his furste Altitude / \& whan \( \text{pat} \) this is don,
¶ rikne how manye degrees \( \text{pat} \) the firste altitude of A excedith his
seconde altitude, ¶ & tak half thilke porciouz \( \text{pat} \) is excedit, \& adde
it to his seconde altitude ; ¶ & tak ther the eleuacioun of thi pool,
16 & eke the latitude of thy regioun ; ¶ for thise two ben of a nombre;
¶ this is to seyn, as manye degrees as thy pool is eleuat / so michel

and therefore ZP is the complement, or 38° 10'. So also Z is 51° 50';
and ZS is 38° 10'. Briefly, Z measures the latitude.

23. Here the altitude of a star (A) is to be taken twice; firstly, when
it is on the meridian in the most southern point of its course, and secondly,
when on the meridian in the most northern point, which would be the
case twelve hours later. The mean of these altitudes is the altitude of
the pole, or the latitude of the place. In the example given, the star A
is only 4° from the pole, which shews that it is the Pole-star, then farther
PART II. § 24. ELEVATION OF THE POLE.

is the latitude of the Region. ¶ Ensample as thus: par aventure the altitude of A in the euening is 56 degrees of heyhte ¶ than wol his seconde altitude or the dawynge be 48 / pat is [8] lasse than 56, 20 pat was his furste altitude at euene. ¶ take thanne the half of 8 / & adde it to 48, pat was [h]is seconde altitude, and [than] hastow 52. ¶ now hastow the heyhte of thy pol and the latitude of the region. ¶ but vnderstond wel pat to proue this conclusioun & many a-wther 24 fair conclusion, thow most haue a plomet hanging on a lyne heyer than thin heued on a perch ¶ & thilke lyne mot hange euene perpendiculer by-twixe the pool & thin eye / & thanne shal-tow sen yif A sitte euene ouer the pool & ouer F at euene / & also yif F sitte euene 28 ouer the pool & ouer A or day. ¶ & for more declaracion, lo here thi figure.

[Fol. 19] 24. Another conclusioun to proue the heyhte of the pool Artik fro the orizonte.

[Alia conclusio ad probandum altitudinem de polo artico ab orizonte.]

Tak any sterre fixe pat neuere dissendith vnder the Orisonte in thilke regioun, & considere his heiest altitude & his lowest Altitude fro the Orisonte ; ¶ & make a nombre of bothe this altitude ; tak thanne & abate half pat nombre, & tak per the eleuacioun of the pol 4 Artik in pat same Regioun / & for more declaracioun, lo here thi figure.

from the Pole than it is now. The star F is, according to Chaucer, any convenient star having a right ascension differing from that of the Pole-star by 180°; though one having the same right ascension would serve as well. If then, at the first observation, the altitude of A be 56, and at the second be 48, the altitude of the pole must be 52. See fig. 13, Plate V.

24. This comes to much the same thing. The lowest or northern altitude of Dubhe (a Ursæ Majoris) may be supposed to be observed to be 25°, and his highest or southern altitude to be 79°. Add these; the sum is 104; "abate" or subtract half of that number, and the result is 52°; the latitude.
23. Another conclusion to prove the latitude of the Region, &c.

[Alia conclusio ad probandum latitudinem regionis.]

If Vnderstond wel pat the latitude of any place in A Region is verreyly the space by-twixe the senythe of hem pat dwellen there & [the] equinoxial cerkle, north or sowthe, takynge the mesure in the 4 Meridional lyne, as sheweth in the Almykanteras of thin Astrelabie. If & thilke space is as moche as the pool artik is hey in the same place fro the Orisonte. If And than is the depressioun of the pol antartik, pat is to seyn, than is the pol antartik by-nethe the 8 Orisonte the same quantite of space, neither mor ne lasse. thanne, yif thow desire to knowe this latitude of the Region, tak the altitude of the sonne in the Middel of the day, whan the sonne is in the heuedes of aries or of libra / for thanne Moeuyth the sonne in the 12 lyne equinoxial; If & abate the nombre of that same sonnes Altitude [\^T Fol. 19 b.] owt of 90, & thanne is the remenaunt * of the noumbre pat leuyth the latitude of the Region, as thus: I suppose that the sonne is thilke day at noon 38 degrees And 10 minutes of heyhte. Abate 16 thanne thees degrees And minutes owt of 90; so leueth there 51 degrees and 50 minutes, the latitude. If I sey nat this but for ensample; for wel I wot the latitude of Oxenforde is certain minutes lasse, as y myght proue. If Now yif so be pat the semith to long a 20 tarienge, to abide til pat [pe] sonne be in the heuedes of aries or of libra, thanne whaite than when the sonne is in any other degree of the zodiak, & considere the degree of [h]is declinacion fro the equinoxial lyne; If & yif it so be pat the sonnes declinacion be northward fro the 24 equinoxial, abate thanne fro the sonnes altitude at noon the nombre

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25. Here, as in § 22, Chaucer says that the latitude can be measured by the arc Zφ or PN; he adds that the depression of the Antarctic pole, viz. the arc SP' (where P' is the S. pole), is another measure of the latitude. He explains that an obvious way of finding the latitude is by finding the altitude of the sun at noon at the time of an equinox. If this altitude be 38° 10', then the latitude is the complement, or 51° 50'. But this observation can only be made on two days in the year. If then this seems to be too long a tarrying, observe his midday altitude, and allow for his declination. Thus, if the sun's altitude be 58° 10' at noon when he is in the first degree of Leo, subtract his declination, viz. 20°, and the result is 38° 10', the complement of the latitude. If, how-
of his declinación, ¶ & thanne hastow the heyhte of the heuedes of aries & libra; as thus / My sonne is, par Auenture, in pe firste dege of leoun, 58 degrees and 10 Minutes of heyhte at noon / & his declinación is almost 20 degrees northward fro the equinoxiai; 28 abate thanne thilke 20 degrees of declinacion owt of the altitude at noon, than leueth the 38 degrees and odde Minutes; lo ther the heued of aries or libra, & thin equinoxiai in that Regioun. ¶ Also yif so be pat the sonnes declinacioun be sowthward fro the Equinoxiai; ¶ Adde thanne thilke declinacion to the altitude of the sonne at noon / and tak ther the heuedes of aries & libra & thin Equinoxiai. ¶ abate thanne the heyhte of the Equinoxiai owt of 90 degrees, & thanne leueth there pe distans of the pole, 51 degrees & 50 36 Minutes, of that regioun fro the Equinoxiai. ¶ Or elles, yif the lest, take the heiest altitude fro the equinoxiai of any sterre fix that thow knowest, & tak his nethere elongacioun lengthing fro the same eqvinoxial lyne, & wirke in the maner forseid. ¶ & for more declara-40 cion, lo here thi figure.

[26. Declaracioun of the assensioun of signes, &c.]  

[Declaracio de ascensione signorum.]  

The excellence of the spere solide, amonges other noble conclusiouns, shewyth Manifeste the diuerse assenioues of signes in diuere places, as wel in the rihte cercle as in the Embelif cercle. ¶ thise Auctours writen pat thilke signe is cleped of riht Ascensioun, with which more part of the cercle Equinoxiai & lasse part of the zodiak ascendith / & thilke signe assendith Embelif, with whiche lasse part of the Equinoxial and more part of the zodiak ascendith.

ever, the sun’s declination be south, the amount of it must be added instead of subtracted. Or else we may find γ F’, the highest altitude of a star F’ above the equinoctial, and also γ F, its nether elongation extending from the same, and take the mean of the two.

26. The “Sphere Solid” answers nearly to what we now call a globe. By help of a globe it is easy to find the ascensions of signs for any latitude, whereas by the astrolabe we can only tell them for those latitudes for which the plates bearing the almicanteras are constructed. The signs which Chaucer calls “of right (i.e. direct) ascension” are those signs of
8 [Ferther ouer they seyn, that in thilke cuntrey where as the senith of hem that dwellen there is in the equinoctial lyne and her orisonente passyng by the poles of this worlde, thilke folke han this right cercle and the right orisonente;] ¶ & euere mo the Arch of the day & the arch 12 of the nyht is ther ylike long, & the sonne twyes euery yer passinge thorow the cenyth of her heued; & 2 someres & 2 wynteres in a yer han this forseide peopole. ¶ And the Almykanteras in her Astrolabies ben streyht as a lyne / so as shewyth in this figure. ¶ The vtilite to 16 knowe the Assenciouuns in the rihte cercle is this / truste wel pat by mediacioun of thilke assenciouns thise Astrologiens by hir tables &

the zodiac which rise more directly, i.e. at a greater angle to the horizon than the rest. In latitude 52°, Libra rises so directly that the whole sign takes more than 2 1/4 hours before it is wholly above the horizon, during which time nearly 43° of the equinoctial circle have arisen; or, in Chaucer's words, "the more part" (i.e. a larger portion) of the equinoctial ascends with it. On the other hand, the sign of Aries ascends so obliquely that the whole of it appears above the horizon in less than an hour, so that a "less part" (a smaller portion) of the equinoctial ascends with it. The following is a rough table of Direct and Oblique Signs, shewing approximately how long each sign takes to ascend, and how many degrees of the equinoctial ascend with it, in lat. 52°.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Capricornus</td>
<td>26°</td>
<td>1 h. 44 m.</td>
<td>Cancer</td>
<td>39°</td>
<td>2 h. 36 m.</td>
</tr>
<tr>
<td>Aquarius</td>
<td>16°</td>
<td>1 h. 4 m.</td>
<td>Leo</td>
<td>42°</td>
<td>2 h. 48 m.</td>
</tr>
<tr>
<td>Pisces</td>
<td>14°</td>
<td>0 h. 56 m.</td>
<td>Virgo</td>
<td>43°</td>
<td>2 h. 52 m.</td>
</tr>
<tr>
<td>Aries</td>
<td>14°</td>
<td>0 h. 56 m.</td>
<td>Libra</td>
<td>43°</td>
<td>2 h. 52 m.</td>
</tr>
<tr>
<td>Taurus</td>
<td>16°</td>
<td>1 h. 4 m.</td>
<td>Scorpio</td>
<td>42°</td>
<td>2 h. 48 m.</td>
</tr>
<tr>
<td>Gemini</td>
<td>26°</td>
<td>1 h. 44 m.</td>
<td>Sagittarius</td>
<td>39°</td>
<td>2 h. 36 m.</td>
</tr>
</tbody>
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These numbers are sufficiently accurate for the present purpose.

In l. 8, there is a gap in the sense in nearly all the MSS., but the Bodley MS. 619 fortunately supplies what is wanting, to the effect that, at places situated on the equator, the poles are in the horizon. At such places, the days and nights are always equal. Chaucer's next statement is true for all places within the tropics, the peculiarity of them being that they have the sun vertical twice in a year. The statement about the "two summers and winters" is best explained by the following: "In the tropical climates... seasons are caused more by the effect of the winds (which are very regular, and depend mainly on the sun's position) than by changes in the direct action of the sun's light and heat. The seasons are not a summer and winter, so much as recurrences of wet and dry periods, _two in each year._" —English Cyclopedia; _Seasons, Change of._ Lastly, Chaucer reverts to places on the equator, where the stars all seem to move in vertical
hir instrumentz knowen verreyly the Assencioun of euery degree & Mynut in al the zodiak, as shal be shewyd. ¶ And nota, pat this forseid rihte orisonte, pat is clepid orison rectum / diuideth the 20 equinoxial in-to riht Angles; & the embelif orisonte, wher as the pol is enhawsed vp-on the orisonte, ouerkeruyth the equinoxial in Embelif Angles, as shewith in the figure. ¶ & for the more declaracioun, lo here the figure.

27. This is the conclusioun to knowe the Assenciouns of signes in the riht cercle, pat is, circulus directus, &c.

[Ad cognoscendum ascenciones signorum in recto circulo, qui vocatur circulus directus.]

[Fol. 206 b.] Set the heued of what signe the liste to knowe his Assending in the riht cercle / vp-on [the] lyne Meridional, ¶ & waite wher thin Almury towchiet[h] the bordure, & set ther a prikke / turne thanne thy riet westward til pat the ende of the forseide signe sitte vp-on the Meridional lyne / & eft-sones waite wher thin almury towchith the bordure, & set ther Another prikke. Rikne thanne the nombre of degrees in the bordure by-twye bothe prikkes, ¶ & tak the Assencioun of the signe in the riht cercle. And thus maistow 8 wyrke with euery porcioun of thy zodiak, &c. ¶ & for the more declaracioun, lo her thi figure.

28. To knowe the assencions of signes in the Embelif cercle in euery regioun, I Mene, in circulo obliquo.

[Ad cognoscendum ascenciones signorum in recto (sic !) circulo in omni regione, hoc est, in circulo obliquo.]

¶ Set the heued of the signe which as the list to knowe his As-
circles, and the almicanteras are therefore straight lines. The line marked Horizon Rectus is shewn in fig. 5, where the Horizon Obliquus is also shewn, cutting the equinoctial circle obliquely.

27. The real object in this section is to find how many degrees of the equinoctial circle pass the meridian together with a given zodiacal sign. Without even turning the rete, it is clear that the sign Aries, for instance, extends through 28° of the equinoctial; for a line drawn from the centre, in fig. 2, through the end of Aries will (if the figure be correct) pass through the end of the 28th degree below the word Oriens.

28. To do this accurately requires a very carefully marked Astro-
censioun vp-on the est Orisonte, ¶ & waite wher thyn Almury towchith the bordure, & [set] ther a prikke. ¶ turne thanne thy riet vpward til þat the ende of the same signe sitte vp-on the Est Orisonte / and waite eft-sones wher as thin almury towcheth the bordure, & set ther a-nother prikke. ¶ Rikne thanne the nowmbre of degrees in the bordure by-twixe bothe prikkes, & tak ther the 8 Assencioun of the signe in the Embelif cercle. ¶ & vnderstand wel, þat alle signes in thy zodiak fro the heued of aries vnto the ende of virgo ben cleped signes of the north fro the Equinox[i]al, ¶ & the[se] signes arisen by-twixe the verrey est & the verrey north in 12 owre Orisonte generaly for euere ; & alle signes fro the heued of libra vn-to þe ende of pisces ben cleped signes of the sowth fro the Equinoxial ; ¶ & thise signes arisen euer-mo by-twixe the verrey est & the verrey sowth in owre orisonte. ¶ Also euery signe 16 by-twixe the heued of capricorne vn-to the ende of geminis ariseth on owre Orisonte in lasse than 2 howres equales; ¶ & thise same signes, fro the heued of capricorne vn-to the ende of geminis, ben cleped tortuos signes or kroked signes / for they arisen embelif on 20 oure Orisonte ; ¶ & thise crokede signes ben obedient to the signes þat ben of riht Assencioun. ¶ The signes of riht assencioun ben fro the heued of cancer to þe [ende] of sagittare ; ¶ & thise signes arisen more vpriht, & they ben called eke soureyn signes; ¶ & 24 euerich of hem ariseth in mor space than in to howres. ¶ Of which labe, on as large a scale as is convenient. It is done by observing where the ends of the given sign, estimated along the outer rim of the zodiacal circle in fig. 2, cross the horizon obliquus as the rete is turned about. Thus, the beginning of Aries lies on the horizon obliquus, and as the rete revolves to the right, the end of it, on the outer rim, will at last lie exactly on the same curved line. When this is the case, the rete ought to have moved through an angle of about 14°, as explained in § 26. By far the best way is to tabulate the results once for all, as I have there done. It is readily seen, from fig. 2, that the signs from Aries to Virgo are northern, and from Libra to Pisces are southern signs. The signs from Capricorn to Gemini are the oblique signs, or as Chaucer calls them, "tortuous," and ascend in less than 2 hours; whilst the direct signs, from Cancer to Sagittarius, take more than 2 hours to ascend; as shown in the table in § 26. The eastern signs in fig. 2 are said to obey to the corresponding western ones.
signes gemini obeith to Cancer, 🅱️ & taurus to leo / Aries to virgo / pisces to libra, 🅱️ Aquarius to Scorpioun, and Capricorne to Sagittare. 🅱️ & thus euermo 2 signes that ben illike fer fro the heued of capricorne / obeien euerich of hem til other. 🅱️ & for more declara-28 cioun, lo here the figure.

29. To knowe Iustly the 4 quarters of the world, as est, west, north, & sowth. [Ad cognoscendum euidenter quatuor partes mundi, scilicet, orientem, austrum, aquilonem, & occidentem.]

 † Take the altitude of thy sonne whan the list / & note wel the quarter of the world in which the sonne is for the tyme by the Azymutz.   turne thanne thin Astrolabie / & set the degree of the sonne in the Almykanteras of his altitude on thilke side   pat the 4 sonne stant / as is the manere in takyng of howres;   & ley thy label on the degree of the sonne, And rikene how many degrces of the bordure ben by-twixe the lyne Meridional & the point of thy label; & note wel   pat nowmbre.   *Turne thanne a-gayn [*Fol. 21 b.] 8 thyn Astralabie, & set the point of thy gret Rewle ther thaw takest thyne Altitudes / vp-on as many degrees in his bordure fro his Meridional as was the point of thy label fro the lyne Meridional on the wome-side.   tak thanne thy Astralabie with bothe handes sadly 12 & slely, & lat the sonne shyne thorow bothe holes of thy rewle;   & slely in thilke shynynge lat thyn Astralabie kowch adown euene vp-on a smothe grond, & thanne wol the verrey lyne Merydional of thy

29. Here both sides of the Astralabe are used, the “rewle” being made to revolve at the back, and the “label” in front, as usual. First, by the back of the instrument and the “rewle,” take the sun’s altitude. Turn the Astralabe round, and set the sun’s degree at the right altitude among the almicanteras, and then observe, by help of the label, how far the sun is from the meridian. Again turn the instrument round, and set the “rewle” as far from the meridian as the label was. Then, holding the instrument as near the ground and as horizontal as possible, let the sun shine through the holes of the “rewle,” and immediately after lay the Astralabe down, without altering the azimuthal direction of the meridional line. It is clear that this line will then point southwards, and the other points of the compass will also be known.
16 Astrolabie lye euene sowth, & the est lyne Wolfe lie est, & the west lyne west, & north lyne north, so that thow werke softly & avisely in the cowchynge; & thus hastow the 4 quarters of the firmament. ¶ & for the more declaracioun, lo here the figure.

30. To knowe the Altitude of planetes fro the wey of the sonne, whether so they be north or sowth fro the forside wey.

[Ad cognoscendum altitudinem planetarum a cursu solis, utrum sint in parte australi vel boreali a cursu supra dicto.]

¶ Lok whan pat a planete is in the lyne Meridional, yif pat hir altitude be of the same heyhte pat is the degree of the sonne for pat day, & than is the planete in the verrey wey of the sonne, ¶ & hath 4 no latitude. ¶ & yif the altitude of the planete be heyere than the degree of the sonne, pan is the planete north fro the wey of the sonne swych a quantite of latitude as [shewith] by thyn Almy-kanteras. & zif the altitude of the planete be lasse than the degree 8 [* Fol. 22] of the sonne / thanne * is the planete sowth fro the wey of the sonne swich a quantite of latitude as [shewith] by thin almykanteras; ¶ This is to seyn, fro the wey wher as the sonne wente thilke day / but nat from the wey of the sonne in euery place of the zodiak.

12 ¶ & for the more declaracioun, lo here the figure.

31. To knowe the senyth of the arysing of the sonne, this is to seyn, the partie of the Orisonte in which pat the sonne arisith.

[Ad cognoscendum signum de ortu solis, scilicet, illam partem orientis in qua oritur sol.]

¶ Thow most first considere pat the sonne ariseth nat al-vey verrey est, but some tyme by north the est, and som tyme by sowthe

30. This turns upon the definition of the phrase “the wey of the sonne.” It does not mean the zodiacal circle, but the sun’s apparent path on a given day of the year. The sun’s altitude changes but little in one day, and is supposed here to remain the same throughout the time that he is, on that day, visible. Thus, if the sun’s altitude be 61½°, the way of the sun is a small circle, viz. the tropic of Cancer. If the planet be then on the zodiac, in the 1st degree of Capricorn, it is 47° S. from the way of the sun, and so on.
the est / Sothly the sonne ariseth neuer-mo verrey est in owere Orisonte, ¶ but he be in the heued of aries or libra. now is thin 4 Orisonte departed in 24 partiez by thi azymutz, in significacion of 24 partiez of the world; al be it so patent shipmen rikne thilke partiez in 32 / thanne is ther no more but waite in which azymut patent thi sonne entreteth at [h]is arisyng / & take ther the senyth of the arising of the 8 sonne. ¶ the manere of the deuision of thin Astralabie is this / I Mene as in this cas. ¶ First is it deuided in 4 plages principialx with the lyne patent goth from est to west, ¶ & than with another lyne patent goth fro sowthe, whereas is the firste Azimutz aboue the est lyne ; ¶ & so forth fro partie to partie / til patent thow come agayn vn-to the est lyne / thus maistow vnderstood also the senyth of any sterre, in which partie he riseth, &c. ¶ & for the more 16 declaracion, lo here the figure.

[Fol. 22 b.] 32. To knowe in which partie of the firmament is the coniunccioun.

[Ad cognoscedandum in qua parte firmamenti sunt coniuncciones solis & lune.]

¶ Considere the tyme of the coniuncc[i]on by thy kalender / as thus ; lok how many howres thilke coniunccion is fro the Midday of

31. The word "senyth" is here used in a peculiar sense; it does not mean, as it should, the zenith point, or point directly overhead, but is made to imply the point on the horizon, (either falling upon an azimuthal line, or lying between two azimuths), which denotes the point of sunrise. In the Latin rubric, it is called signum. This point is found by actual observation of the sun at the time of rising. Chaucer's azimuths divide the horizon into 24 parts; but it is interesting to observe his remark, that "shipmen" divide the horizon into 32 parts, exactly as a compass is divided now-a-days. The reason for the division into 32 parts is obviously because this is the easiest way of reckoning the direction of the wind. For this purpose, the horizon is first divided into 4 parts; each of these is halved, and each half-part is halved again. It is easy to observe if the wind lies half-way between S. and E., or half-way between S. and S.E., or again half-way between S. and S.S.E.; but the division into 24 parts would be unsuitable, because third-parts are much more difficult to estimate.
the day precedent, as shewith by the canoun of thi kalender; ¶ rikne 4 thanne thilke nombre of howres in the bordure of thyn Astralabie / as thow art wont to do in knowyng of the howres of the day or of the nyht; ¶ & ley thy label owr the degree of the sonne; ¶ & thanne wol the point of thy label sitte vp-on the hour of the conjunciun. ¶ loke thanne in which Azymut the degree of thy sonne sittith, & in that partie of the firmament is the conjuncioun. ¶ & for the more declaracioun, lo here thy figure.

[Fol. 23] 33. To knowe the senyth of the Altitude of the sonne, &c.

[Ad cognoscendum signa de altitudine solis.]

This is no mor to seyn but any tyme of the day tak the altitude of the sonne, & by the Azymut in which he stondith, ¶ Maistou sen in which partie of the firmament he is ¶ & [in] the same wyse 4 maistou sen, by the nyht, of any sterre, whetter the sterre sitte est or west or north, or any partie by-twene, aftar the name of the Azimuth in which is the sterre. ¶ & for the more declaracioun, lo here the figure.

34. To knowe sothly the degree of the longitude of the mone, or of any planete pat hath no latitude for the tyme fro the Ecliptik lyne.

32. The Latin rubric interprets the conjunction to mean that of the sun and moon. The time of this conjunction is to be ascertained from a calendar. If, e.g. the calendar indicates 9 A.M. as the time of conjunction on the 12th day of March, when the sun is in the first point of Aries, as in § 3, the number of hours after the preceding midday is 21, which answers to the letter X in the border (fig. 2). Turn the rete till the first point of Aries lies under the label, which is made to point to X, and the label shews at the same moment that the degree of the sun is very nearly at the point where the equinoctial circle crosses the azimuthal circle which lies 50° to the E. of the meridian. Hence the conjunction takes place at a point of which the azimuth is 50° to the E. of the S. point, or 5° to the eastward of the S.E. point. The proposition merely amounts to finding the sun's azimuth at a given time.

33. Here “senyth” is again used to mean azimuth, and the proposition is, to find the sun's azimuth by taking his altitude, and setting his degree at the right altitude on the almicanteras. Of course the two co-ordinates, altitude and azimuth, readily indicate the sun's exact position; and the same for any star or planet.
[Ad cognoscendum veraciter gradum de longitudine lune, vel alicuius planete qui non habet longitudinem pro tempore causante (sic) linea ecliptica.]

¶ Tak the altitude of the mone, & rikne thin altitude vp among thyne Almykanteras on which side that the Mone stande, & set there a prikke. ¶ Tak thenne anon riht, vp-on the mones side, the Altitude of any sterre fix which pat thoukowest, & set his Centre vp-on his altitude Among thin Almykanteras ther the sterre is fownde. ¶ Waite thanne which degree of the zodiak [towchith] the prikke of the altitude of the mone, & tak ther the degree in which the mone standith. ¶ this conclusion is verrey soth, yif the sterres in thin Astrolabie stonden aftur *the trowthe ; of comune, tretis of [* Fol. 25 b.] Astralabie ne make non excepcioun wheyth[er] the mone haue latitude, or non / ne on whether side of the mone the Altitude of the sterre fix be taken. ¶ And nota, pat yif the Mone [shewe] himself by liht of day, than maistow wyrke this same conclusioun by the sonne, as wel as by the fix sterre. ¶ & for the more declaracioun, lo here thy figure.

35. This is the workinge of the conclusioun, to knowe yif pat any planete be directe or retrograde.

[Hece conclusio operatur ad cognoscendum si aliqua planeta sit directa uel retrograda.]

¶ Tak the altitude of any sterre pat is cleped a planete, ¶ & note it wel. ¶ & tak ek anon the altitude of any sterre fix that thow

34. The moon's latitude is never more than $5\frac{1}{2}^\circ$ from the ecliptic, and this small distance is, "in common treatises of Astrolabie," altogether neglected; so that it is supposed to move in the ecliptic. First, then, take the moon's altitude, say 30°. Next take the altitude of some bright star "on the moon's side," i.e. nearly in the same azimuth as the moon, taking care to choose a star which is represented upon the Rete by a pointed tongue. Bring this tongue's point to the right altitude among the almcanceras, and then see which degree of the ecliptic lies on the almcancer which denotes an altitude of 30°. This will give the moon's place, "if the stars in the Astrolabe be set after the truth," i.e. if the point of the tongue is exactly where it should be.

35. The motion of a planet is called direct, when it moves in the
knowest, & note it wel also. ¶ Come thanne agayn the thridde or 4 the ferthe nyht next folwyng; for thanne shaltow aperceyue wel the Moeuyn of a planete, wheither so he Moeue forthward or bakward. ¶ Awaite wel thanne w[h]an pat thi sterre fix is in the same altitude pat she was w[h]an thow toke hir firste altitude; ¶ and tak than eft-s ones the Altitude of the forseide planete, & note it wel. ¶ for trust wel, yif so be pat the planete be on the riht side of the Meridional lyne, so pat his seconde altitude be lasse than [h]is firste altitude was, thanne is the planete directe. ¶ And yif he be on the west side in 12 that condicioun / thanne is he retrograd. ¶ And yif so be pat this [* F ol. 28*] planete be vp-on the Est side whan [h]is altitude is *taken, so pat his seconde altitude be more than [h]is firste altitude, thanne is he retrograde, & yif he be on the west side, than is he directe. ¶ but 16 the contrarie of this parties is of the cours of the Moone; for [sothly] the Moone Moeuyth the contrarie from othes planetes as in hire Episicle, but in non other manere. ¶ & for the more declaracioun, lo here thi figure.

36. The conclusioun of equaciouns of howses, after the astrala-bie, &c.

[Conclusio de equacione domorum.]

Set the by-gynnyng of the degree pat assendith vp-on the ende of the 8 howre inequal; thanne wol the by-gynnyng of the 2 hows sitte vp-on the lyne of Midnyht. ¶ rem[e]ue thanne the degree pat 4 assendith, & set him on the ende of the 10 howr inequal; & thanne
direction of the succession of the zodiacal signs; retrograde, when in the contrary direction. When a planet is on the right or east side of the Meridional line, and is moving forward along the signs, without increase of declination, its altitude will be less on the second occasion than on the first at the moment when the altitude of the fixed star is the same as before. The same is true if the planet be retrograde, and on the western side. The contrary results occur when the second altitude is greater than the first. But the great defect of this method is that it may be rendered fallacious by a change in the planet's declination.

36. See fig. 14, Plate VI. If the equinoctial circle in this figure be supposed to be superposed upon that in fig. 5, Plate III, and be further supposed to revolve backwards through an angle of about 60° till the point
wol the by-gynnyng of the 3 howis sitte vp-on the Midnyht lyne. ¶ bryng vp agayn the same degree pat assendith first / & set him vp-on the Orisonte / & thanne wol the by-gynnyng of the 4 howys sitte vp-on the lyne of Midnyht. ¶ tak thanne the nadir of the 8 degree pat first Assendith / & set him on the ende of the 2 howre inequal / & thanne wol the by-gynnyng of the 5 howys sitte vp-on the lyne of Midnyth; set thAnne the nadir of the assendent on the ende of the 4 howre, þan wol the bygynnynge of the 6 house sitte on 12 the Midnyht lyne. ¶ þe bygynnynge of the 7 hows is nadir of the Assendent / & the bygynnynge of the 8 hows is nadir of the 2; & þe by-gynnynge of the 9 hows is nadir of the 3; & þe by-gynnynge of þe 10 hows is the nadir of the 4; & þe bygynnynge of the 11 howys is 16 nader of the 5; & the bygynnynge of the 12 hows is nadir of the 6. ¶ & for the more declaracion, lo here the figure.


[De aliqua forma equacionis domorum secundum astrolabium.]

¶ Tak thin assendent, & thanne hastow thi 4 Angles; for wel thow wost þat the opposit of thin assendent, þat is to seyn, thy by-gynnynge of the 7 howis, sit vp-on the west orizonte; ¶ & the bygynnynge of the 10 howis sit vp-on the lyne Meridional; ¶ & his 4 opposit vp-on the lyne of Mydnyht. ¶ Thanne ley thi label ouer

1 (fig. 14) rests upon the point where the 8th hour-line crosses the equinocial, the beginning of the 2nd house will then be found to be on the line of midnight. Similarly, all the other results mentioned follow. For it is easily seen that each "house" occupies a space equal to 2 hours, so that the bringing of the 3rd house to the midnight line brings 1 to the 10th hour-line, and a similar placing of the 4th house brings 1 to the 12th hour-line, which is the horizon obliquus itself. Moving onward 2 more hours, the point 7 (the nadir of 1) comes to the end of the 2nd hour, whilst the 5th house comes to the north; and lastly, when 7 is at the end of the 4th hour, the 6th house is so placed. To find the nadir of a house, we have only to add 6; so that the 7th, 8th, 9th, 10th, 11th, and 12th houses are the nadirs of the 1st, 2nd, 3rd, 4th, 5th, and 6th houses respectively.

37. Again see fig. 14, Plate VI. Here the 10th house is at once seen to be on the meridional line. In the quadrant from 1 to 10, the
the degree pat assendet[h] / & rekne fro the point of thy label alle
the degrees in the bordure, til thow come to the Meridional lyne / &
departe alle thilke degrees in 3 euene parties, & take the euene
equacion of 3 ; for ley thy label ouer eueric of 3 parties, & [than]
maistow se by thy label in which degree of the zodiak [is] the by-
gynnyng of eueric of thise same howses fro the assendent / pat is to
12 seyn, the begynnyng of the [12] howse nex[t] aboue thin assendent /
And [thanne] the begynnyng of the 11 howse, & thanne the 10 vp-
on the Meridional lyne / as I first seide. ¶ The same wyse wurke
thow fro the assendent down to the lyne of Mydnyht / & thanne
16 thus hastow other 3 howses, pat is to seyn, the bygynnyng of the 2
& the 3 And the 4 howses ; thanne is [the] nader of thise 3 howsez
the by-gynnyng of the 3 howses pat folwen. ¶ & for the more de-
claracioun, lo here thi figure.

[Fol. 25] 38. To fynde the lyne Merydional to dwelle fix in any
certein place.

[Ad inueniendum lineam meridionalem per subtiles operaciones.]

Tak a rond plate of metal, for [warpyn] the brodere the bettre ;
¶ & make ther-vpon [a] Iust compas, a lite with-in the bordure / &
ley this ronde plate vp-on an euene grond or on a[n] euene ston or on
4 a[n] euene stok fix in the gronde / & ley it euyn bi a leuel ¶ & in centre
of the compas stike an euene pyn or a whir vp-riht / the smallere þe
betere ¶ set thy pyn by a plom-rewele euene vpryht ¶ & let this pyn
be no lengere than a quarter of the diametre of thi compas, fro the
8 centre. ¶ & waite bisily aboue 10 or 11 of the clokke, & whan the
even division of the quadrant into 3 parts shews the 12th and 11th houses.
Working downwards from 1, we get the 2nd and 3rd houses, and the
4th house beginning with the north line. The rest are easily found
from their nadirs.

38. This problem is discussed in arts. 144 and 145 of Hymers’s As-
tronomy, 2nd ed. 1840, p. 84. The words “for warpyng” mean “to
prevent the errors which may arise from the plate becoming warped.”
The “broader” of course means “the larger.” See fig. 15, Plate VI.
If the shadow of the sun be observed at a time before midday when its
extremity just enters within the circle, and again at a time after midday
sonne shynyth, when the shadwe of the pyn entreth any-thyng with-in the cercle of thi plate an her-mele, ¶ & mark ther a prikke with inke. Abide thanne stille waitying on the sonne aitwr 1 of the clokke, til that the schadwe of the wyr or of the pyn passe ony-thyng 12 owt of the cercle of the compas, be it neuer so lite / & set ther a-nother prikke of ynke. ¶ take than a compas, and mesure euene the Middel by-twixe bothe prikkes, & set þer per a prikke. ¶ take thanne a rewle / & draw a strike, euene alyne fro the pyn vn-to the 16 Middel prikke; ¶ & tak ther thy lyne Meridional for euere-mo, as in that same place. ¶ & yif thow drawe a cros-lyne ouer-thwart the compas Iustry over the lyne Meridional, than hastow est and west & sowth / &, par consequence, than the nader of the sowth lyne is 20 the north lyne. ¶ & for more declaracioun, lo here thi figure.

[fol. 25 b.] 39. Descripcion of the Meridional lyne, of longitudes, & latitudes of Citees and townes from on to a-no[t]her of clymatz.

This lyne Meridional ys but a Maner description [of lyne] ymagined, that passeth vpon the pooles of pis world And by the cenyth of owre heued / And hit is [ycleped the] lyne Meridional / for in what place pat any maner man [ys at] any tyme of the yer / when that the sonne [by moeuyn] of the firmament cometh to his verray [meridian] place / than is hitULATOR Midday, pat we clepen owre noon, ¶ As to thilke man; ¶ And therfore ys it clepid þe lyne of

when it is just passing beyond the circle, the altitude of the sun at these two observations must be the same, and the south-line must lie half-way between the two shadows. In the figure, S and S' are the 2 positions of the sun, OT the rod, Ot and Ot' the shadows, and OR the direction of the south line. Ott' is the metal disc.

39. This begins with an explanation of the terms "meridian" and "longitude." "They chaunegen here Almikanteras" means that they differ in latitude. But, when Chaucer speaks of the longitude and latitude of a "climate," he means the length and breadth of it. A "climate" (clima) is a belt of the earth included between two fixed parallels of latitude. The ancients reckoned seven climates; in the sixteenth century there were nine. The "latitude of the climate" is the breadth of this belt; the "longitude" of it he seems to consider as measured along lines lying equidistant between the parallels of latitude of
8 Midday. ¶ And nota, for euermo, of [2 citees] or of 2 Townes, of
whiche þat o town aprochith [more] towarde the Est þan doth þat
other town, ¶ Truste wel that thylke townes han diuere Meridians.
¶ Nota also, that the Arch of the Equinoxial that is [conteyned] or
12 bowed by-twyxe the 2 Meridians ys cleped þe longitude of the
town. ¶ And [yf] so be þat two townes haue illike Meridian, or on
Meridian, ¶ Than is the distance of hem bothe ylike fer fro the Est /&
the contrarie. And in this Manere they chaunge nat her Meridian,
16 ¶ But sothly they chaungen here Almikanteras, For the enhausyng
of the pool and the distance of the sonne. ¶ The longitude of a
clymat ys a lyne ymagined fro Est to west, illike distant by-twene
them alle. ¶ þe latitude of a climat is a lyne ymagined from north
20 [*Fol. 26] to south þe space of the erthe, fro the byginnynge * of the firste
clymat vnto to the verrey ende of the [same] climat, euene directe
agayns [þe poole Artik.] ¶ Thus seyn some Auctours / And somme
of hem seyn þat yif men clepen þe latitude, thay mene the arch meri-
24 dian þat is contiened or [inter]cept by-twixe the cenyth and the
equinoxial. Thanne sey þey that the distaunce fro the equinoxial
vnto þe ende of a climat, euene agayns þe pool aretyk, ys the latitude
of a climat for sothe. ¶ & for more declaracion, lo here thi figure.

the places from which the climates are named. See Stöffler, fol. 20 b.;
and Petri Apiani Cosmographia, per Gemmam Phrysium restituta, ed.
1574, fol. 7 b. The seven climates were as follows:—
1. That whose central line passes through Meroë (lat. 17°); from
nearly 13° to nearly 20°.
2. Central line, through Syene (lat. 24°); from 20° to 27°, nearly.
3. Central line through Alexandria (lat. 31°); from 27° to 34°, nearly.
4. Central line through Rhodes (lat. 36°); from 34° to 39°, nearly.
5. Central line through Rome (lat. 41°); from 39° to 43°, nearly.
6. Central line through Borysthenes (lat. 45°); from 43° to 47°.
7. Through the Riphaean mountains (lat. 48°); from 47° to 50°. But
Chaucer must have included an eighth climate (called ulula Maeotides
paludes) from 50° to 56°; and a ninth, from 56° to the pole. The part of
the earth to the north of the 7th climate was considered by the ancients
to be uninhabitable. A rough drawing of these climates is given in
MS. Camb. Univ. Lib. II. 3. 3, fol. 33 b
40. To knowe with which degree of the zodiak pat any planete Assendith on the Orisonte, wheyther so that his latitude be north or sowth.

 Folwyngue in special / maistow wyrke for [sothe] in euery signe of the zodiak. the degree of [longitude] par auenture, of venus or of another planete was 6 of Capricorne, & the latitude of him was northward 2 degrees fro the Ecliptik lyne. I tok a subtil compas, & cleped pat on poynct of my compas A, & pat other poynct F. Than [tok] I the point of A, & set it in [the] Ecliptik line euene in my zodiak, in the degree of the longitude of venus / pat is to seyn, in the 6 degree of Capricorne & thanne set I the point of F vpward in the same *signe, bycause pat the latitude was north, vp-on [° Fol. 26 b] the latitude of venus, that is to seyn, in the 6 degree fro the heued of capricorne ; & thus hauy 2 degrees by-twixe my to prikkes; than leide I down softely my compas, & sette the degree of the longitude / tho tok I vp my compas, & sette the point of A in the 20 wex on my label, as euene as y kowde gesse ouer the Ecliptik lyne, in the ende of [the] longitude / & sette the point of F endlang in my label vp-on the space of the latitude, inwarde & ouer the zodiak, that

40. The longitude and latitude of a planet being ascertained from an almanac, we can find with what degree it ascends. For example, given that the longitude of Venus is 6° of Capricorn, and her N. latitude 2°. Set the one leg of a compass upon the degree of longitude, and extend the other till the distance between the two legs is 2° of latitude, from that point inward, i. e. northward. The 6th degree of Capricorn is now to be set on the horizon, the label (slightly coated with wax) to be made to point to the same degree, and the north latitude is set off upon the Astrolabe.
24 is to seyn, north-ward fro the Ecliptik // than leide I down my compass & lokede wel in the wey vpon the prikke of A & of F; tho turned I my Riet til that the prikke of F sat vp-on the Orisonte / than saw I wel that the body of venus, in hir latitude of [2] degrees

28 septentrionalis, assendid, in the ende of the 6 degree, in the heued of capricorne. ¶ And nota, that in the same maner maistow wyrke with any latitude septentrional [in alle] signes; but sothly the latitude Meridional of a planete in Capricorne may not be take, by

32 cause of the litel space by-twixe the Ecliptik / & the bordure of the Astrelabie; but sothly, in alle other [signes] it May.

[Fol. 27] ¶ Also the degree, par aventure, of Iuppiter or of a-nother planete, was in the firste degree of pisces in longitude / & his latitude was 3 degrees Meridional; tho tok I the point of A / & set it in the firste degree of pisces on the Ecliptik / & thanne set I the point of F downward in the same signe, by cause that the latitude was southward 3 degrees / that is to seyn, fro the heued of pisces / & thus hauy

40 3 degrees by-twixe bothe the prikkes; thanne sette I the degree of the longitude vp-on the Orisonte; tho tok I my label / & leide it fix vp-on the degree of the longitude; tho sette I the point of A on my label, euene ouer the Ecliptik lyne in the ende euene of the degree of

44 the longitude / & set the point of [F endlang] in my label the space [of] 3 [degrees] of the latitude fro the zodiak, this is to seyn, southward fro the Ecliptik, toward the bordure; and turned my

wax by help of the compass. The spot thus marking the planet's position is, by a very slight movement of the Rete, to be brought upon the horizon, and it will be found that the planet (situated 2° N. of the 6th degree) ascends together with the head (or beginning of the sign) of Capricorn. This result, which is not quite exact, is easily tested by a globe. When the latitude of the planet is south, its place cannot well be found when in Capricorn, for want of space at the edge of the Astrolabe.

As a second example, it will be found that, when Jupiter's longitude is at the end of 1° of Pisces, and his latitude 3° south, he ascends together with the 14th of Pisces, nearly. This is easily verified by a globe, which solves all such problems very readily.

It is a singular fact that most of the best MSS. leave off at the word "howre," leaving the last sentence incomplete. For the last five words —"you shalt do wel ynow"—which I quote from the MS. in St. John's College, Cambridge, see p. 52.
Riet [til] the prikke of F sat vp-on the Orisonte; thanne [saw] I wel pat the body of Iuppiter, in his latitude of 3 degrees Meridional, 48 ascendit with 14 degrees of pisces in horoscope / & in this Maner maistow wyrke with any latitude Meridional, as I first seide, saue in Capricorne / And yif thow wolt pleie this craft with the arisying of the Mone, loke thow rekne wel her cours howre by howre; for she ne dwellith nat in a degree of [hire] longitude but [a] litel while, as thow wel knowest / but natheles, yif thow rekne hir verreye Moeuyng by thy tables howre after howre—

Explicit tractatus de Conclusionibus Astrolabii compilatus per Galfridum Chauciers ad Filium suum Lodewicum scolarem tune temporis Oxonie ac sub tutela illius nobilissimi Philosophi Magistri N. Strode, &c.
41. Vmbra Recta.

[* Fol. 32] If it so be that you wilt write be *umbra* recta, & you may come to the base of the tower, in this manner you shalt write. Take the altitude of the tower be bope holes, so that whether reule ligge euyn in a point. Ensample as thus: y see hym porw at the point of 4; then mete y the space betwixt me & the tower, & y fynde yt 20 feet; then be-holde y how 4 ys to 12, 457 so is the space betwixt the & the tower to the altitude of the tower. [For] 4 is the part of 12, so is the space betwixt the & the tower the pridde part of the altitude of the tower; than pries 20 feet ys the heyzt of the tower, wip addyng of yyn owne persone to yyn eye; & pis reule is so general in umbra recta, fro the poynt of oon to 12. And if the reule falle vppon 5, than is 5 12 12-partyes of the heyzt the space betwixt the & the tower; wip addyng of yyn owne heyzt.

42. Vmbra Versa.

Another maner of werkyng, be umbra versa. If so be that you may nat come to the base of the tower, y [see] hym porw the nombre of 1; y [* Fol. 32 b.] sette yer a prikke at my foote; than goo [y] yer to the tower, 4 & y see hym porw at the point of 2, & yere ye sette another prikke; &

---[you shalt do well ynow.

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41. Sections 41—43 and 41a—42b are from the MS. in St John's College, Cambridge. For the scale of umbra recta, see fig. 1, Plate I. Observe that the umbra recta is used where the angle of elevation of an object is greater than 45°; the umbra versa, where it is less. See also fig. 16, Plate VI; where, if AC be the height of the tower, BC the same height minus the height of the observer's eye (supposed to be placed at E), and EB the distance of the observer from the tower, then \( \text{bc} : \text{Eb} : : \text{EB} : \text{BC} \). But EB is reckoned as 12, and if be be 4, we find that BC is 3 EB, i.e. 60 feet, when EB is 20. Hence AC is 60 feet, plus the height of the observer's eye. The last sentence is to be read thus—"And if thy 'reule' fall upon 5, then are 5-12ths of the height equivalent to the space between thee and the tower (with addition of thine own height)." The MS. reads "5 12-partyes the heyzt of the space," &c.; but the word of must be transposed, in order to make sense. It is clear that, if \( \text{bc} = 5 \), then \( 5 : 12 : :\text{EB} : \text{BC} \), which is the same as saying that \( \text{EB} = \frac{12}{5} \text{BC} \). Conversely, \( \text{BC} = \frac{12}{5} \text{EB} = 48 \), if \( \text{EB} = 20 \).

42. See fig. 1, Plate I. See also fig: 17, Plate VI. Let \( \text{EB} = 12 \),
y be-holde how 1 hath hym to 12, & per fynde y pat yt hath hym twelwe sithes; þan be-holde y how 2 hath hym to 12, & þou schalt fynde it sexe sypes; þan þou schalt fynde þat [as] 12 [above] 6 [is þe] numbre of 6, Ryþt so is þe space be-twen þi too prikkis þe space of 6 tymes þyn altitude. & note, þat at þe ferste altitude of 1, þou settest a prikke, & afterwàrd, whan þou [seest] hym at 2, per þou settest an-opër prikke, þan þou fyndest betwen too prikkys [60] fett; þan þou schalt fynde þat [10 is þe 6-party of 60. And þen is 12 10 fete] þe altitude of þe tour. [For] oper poynþis, 3if yt fylle in umbra versa, as þus: y sette caas it fill vppon [2], & at þe secundë vppon [3]; þan schalt þou fynde þat [2] is [6] partyes of 12; [and 3 is 4 partyes of 12]; þan passeþ 6 4, be nombre of 2; so ys þe space 16 be[twen] too prikkes twyse of þe tour, & 3if þe differens were þries, þan schulde it be [þre] tymes; & þus mayst þou werke fro 2 to 12; & 3if yt *be 4, 4 tymes; or 5, 5 tymes, & sic de ceteris. [* Fol. 33]

43. Vmbra [Recta].

An oper maner of wyrkyng be vmbra [recta]. 3if it so be þat þou mayst nat come to þe baas of þe tour, yn þis maner þou schalt werke. Sette þi Rewle vppon [1] till þou see þe altitude, & sette at þi foot a prikke. þan sette þi Rewle vppon 2, & be-holde what ys þe diff[e]rense 4 be-twen 1 and 2, & þou shalte fynde þat it is 1. þan mete þe space be-twen too prikkes, & þat ys þe 12 partie of þe altitude of þe tour; & 3if per were 2, yt were þe 6 partye; & 3if per were 3, þe 4 partye, & sic deineþeþ. And note, 3if it were 5, yt were þe 5 party of 12; 8 & 7, 7 party of 12; and note, at þe altitude of þi conclusion, adde þe stature of þyn heythe.

* * * * *

bc = 1; also E'b' = 12, b'c' = 2; then EB = 12 BC, E'B = 6 BC; therefore EE' = 6 BC. If EE' = 60 feet, then BC = \frac{1}{8} EE' = 10 feet. To get the whole height, add the height of the eye. The last part of the article, beginning "For oper poynþis," is altogether corrupt in the MS.

43. Here versa (in the MS.) is certainly miswritten for recta. See fig. 18, Plate VI. Here Eb = E'b' = 12; b'c' = 1, bc = 2. Hence E'B = \frac{1}{8} BC, EB = \frac{3}{8} BC, whence EE' = \frac{1}{6} BC. Or again, if bc become = 3, 4, 5, &c., successively, whilst b'c' remains = 1, then EE' is successively = \frac{1}{8}, \frac{3}{8}, \frac{1}{4}, \frac{3}{4}, &c. Afterwards, add in the height of E.
44. Another maner conclusion, to knowe the mene mote & pe argumentis of any planete. To know the mene mote & the argumentis of euer planete fro 3ere to 3ere, from day to day, from owre to owre, And from smale fraccionis infinite.

[Ad cognoscendum medios motus & argumenta de hora in horam cuinislibet planete, de anno in annum, de die in diem.]

[* Fol. 106*] In this maner shalt þou worche: consider thy rote furst, *the wyche is made the begynning of the tabelis fro the 3ere of owre lord 1397, & entere hit in-to thy slate for the laste merydye of December; 4 and þan consider þe 3ere of owre lord, what is þe date, & be-hold wheþer thy date be more or lasse þan þe 3ere 1397. And yf hit so be þat hit be more, loke how many [3eris] hit passith, & with so many entere into thy tabelis in þe furst lyne þer as is wretten anni collecti 8 & expansi. And loke [where] the same planet is wretten in the hede of thy tabele, and than [loke] what þou findest in directe of the same 3ere of owre lord wyche is passid, be hit 8, or 9, or 10, [or what nombre þat euere it be, tyl þe tyme þat þou come to 20, or] 40, or 60.

12 And that þou fyndest in directe [wryte] in thy slate vnnder thy rote, & adde hit [to-geder], and þat is thy mene mote, for the laste meridian of the decembe, for the same 3ere wyche þat þou [hast] purposid. And yf hit so be [þat] hit passe 20, consider welle þat fro 16 [1] to 20 ben anni expansi, And fro 20 to 3000 ben anni collecti; and yf thy numbere passe 20, þan take þat þou findest in directe of 20, & yf hit be more, as 6 or 18, than take þat þou findist in directe there-of, that is to sayen, signes, degreis, Minutes, & secundis, and 20 adde [to-geder] vn-to thy rote; and thus to make rotes; and note,

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44. Sections 44 and 45 are from MS. Digby 72. This long explanation of the method of finding a planet's place depends upon the tables which were constructed for that purpose from observation. The general idea is this. The figures shewing a planet's position for the last day of December, 1397, give what is called the root, and afford us, in fact, a starting-point from which to measure. An "argument" is the angle upon which the tabulated quantity depends; for example, a very important "argument" is the planet's longitude, upon which its declination may be made to depend, so as to admit of tabulation. The planet's declination for the given above-mentioned date being taken as the root, the planet's declination at a second date can be found from the
45. Another manere to knowe the mene mote.

Whan þou wolte make the mene mote of eny planete to be by arscheiels tables, take thy rote, the wyche is for the 3ere of ovre lord 1397; and yf so be that thy 3ere be passid the date, wryte that date / and than write that nombere of the 3eris. Þan wyth-drawe þe 3eris oute of the 3eris that ben passid that rote. Ensampulle as thus: the 3ere of ovre lord 1400, I-wryton precise, my rote; Þan wrote I
tables. If this second date be less than 20 years afterwards, the increase of motion is set down separately for each year, viz. so much in 1 year, so much in 2 years, and so on. These separate years are called anni expansi. But when the increase during a large round number of years (such as 20, 40, or 60 years at once) is allowed for, such years are called anni collecti. For example, a period of 27 years includes 20 years taken togethe, and 7 separate or expanse years. The mean motion during smaller periods of time, such as months, days, and hours, is added on afterwards.

45. Here the author enters a little more into particulars. If the mean
furst 1400. And under that numbere I wrote a 1397; & had with-
8 drowe I the laste numbere owte of ſat, and ſan fond I ſat residue was
3 zere; I wyst ſat 3 zere was passid fro the rote, ſe wyche was
wreten in my tabelis. Than after-ward so3th I in my tabelis ſe annis
collectis & expansis, & amonge myne expanse 3eris fond I 3 zere. ſan
12 toke I alle ſe signes, degreis, & minutes, ſat I fond directe under ſe
same planete ſat I wro3th fore, & wrote so many signes, degreis, &
Minutes in my slate, & after-ward added I too signes, degreis,
Minutes, & Secundis, ſe wiche I fond in my rote the 3ere of owre
16 lord 1397; And kepte the residue; & ſan had I the mene mote for
ſe laste day of Decembere. And yt ſou woldest wete ſe mene mote of
any planete in March, Aprille, or may, ſer in any ſer tyme or monyth
[*FOL. 107 B.] of the 3ere, loke how many monethes & dayes *ben passid
20 from ſe laste day of Decembere, the 3ere of owre lord 1400; and soe
with monithis & dayes enter in-to ſer table ſer ſou findist thy mene
mote I-wreten in monethis & dayes, and take alle ſe signes, degrees,
Minutes, & secundis ſat ſou findest I-wrete in directe of thy monethis,
24 and [adde] to signes, degreis, Minutes, & secundis ſat ſou findest with
thy rote ſe 3ere of owre lord 1400, and the residue ſat leuyth is ſe
mene mote for that same daye. And note yt hit so be that ſou woldest
[wete ſe] mene mote in ony 3ere ſat is lasse ſan thy rote, with-drawe
28 ſe numbere of so many 3eris as hit is lasse ſan ſe 3ere of owre lord a
1397, & kepe ſe residue; & so many 3eris, monythis, & dayes enter
in-to thy tabelis of thy mene mote. And take alle the signes,
degreis, and Minutes, [and] Secundis, ſat ſou findest in directe of alle
32 ſe 3eris, monythis, & dayes, & wryte hem in ſer slate; and abowe
pilke numbere write ſe signes, degreis, Minutes, & secundis, ſe wyche
ſou findest with thy rote ſe 3ere of owre lord a 1397; & with-drawe
alle ſe nethere signis & degreis fro ſe signes & degrees, Minutes, &
36 Secundis of ſer signes with thy rote, and thy residue ſat leuyth is
thy mene mote for ſat day.

motion be required for the year 1400, 3 years later than the starting-
point, look for 3 in the table of expanse years, and add the result to the
number already corresponding to the “root,” which is calculated for the
last day of December, 1397. Allow for months and days afterwards. For
a date earlier than 1397 the process is just reversed, involving subtrac-
tion instead of addition.
41a. Umbra Recta.

[Vol. 34 b.] 3If pi rewle falle vppon pe 8 poyn[t on ri3t schadwe, pan make pi figure of 8; pan looke how moche space of feet ys be-twen pe & pe tour, & multiplie pat be 12, & whan pou [hast] multiplied it, pan diuide yt be pe same nombre of 8, & kepe pe residue, & adde perto 4 vp to lyn eye to pe residue, & pat schal be pe verry hey3t of pe tour, & pus mayst pou werke on pe same wyse, fro 1 to 12.

41b. Umbra Recta.

An-oPHER maner of werkyng vppon pe same syde. Loke vppon whych poyn[t pi Rewle fallip whan pou seest pe top of pe tour porow too litil holes, & mete pan pe space fro pi foot to pe baas of pe tour; & ry3t *as the nombre of py poyn[t hath hym-self to 12, ry3t so *Fol. 33. 4 pe mesure be-twen pe & pe tour haP hym-self to pe heite of pe same tour. Ens[e[ple: y sette caas pi rewle falle vpon 8, pan ys 8 to-pridd partyes of 12; so pe space ys pe too-pridl partyes of pe tour.

42a. Umbra Versa.

To knowe pe [heyth by py] poyn[tes of vmbra versa. 3If py rewle falle vppon 3, whan pou seest pe top of pe tour / sett a prikke pere-as pi foot stont; & goo ner tyl pou mayst see pe same top at pe poyn[t of 4, & sette per anoPHER lyk prikke / pan mete how many foot 4 ben be-twen pe too prikki[s, & adde pe leng[pe vp to lyn eye per-to; & pat schal be pe hey3te of pe tour. And note, pat 3 ys fourpe party of 12, & 4 is pe pridde party of 12. Now passe[ 4 pe nombre of 3 be pe distaunce of 1; perfore pe same space, wyP lyn hey3t to 8

41a. This comes to precisely the same as Art. 41, but is expressed with a slight difference. See fig. 16, where, if \( bc = 8 \), then \( BC = \frac{16}{3} \) EB.

41b. Merely another repetition of Art. 41. It is hard to see why it should be thus repeated in almost the same words. If \( bc = 8 \) in fig. 16, then \( EB = \frac{16}{3} \), \( BC = \frac{8}{3} \) BC. The only difference is that it inverts the equation in the last article.

42a. This is only a particular case of Art. 42. If we can get \( bc = 3 \), and \( b'c' = 4 \), the equations become \( EB = 4 \) BC, \( E'B = 3 \) BC; whence \( EE' = BC \), a very convenient result. See fig. 17.
yn eye, ys fe heyzte of fe tour. & zif it so be pat per be 2 or 3 dis-
taunce in fe nombres, so schulde fe mesures be-twen fe prikkes be
twyes or pries fe heyzte of fe tour.

43a. Ad cognoscendum altitudinem alicuius rei per vmbram
[rectam].

[Fol. 36 b.] To knowe fe heyzte of pynges, zif jou mayst [nat] come
to fe bas of a pyng. sette py rewle vppon what jou wylt, so pat
jou may see fe topp of fe pyng porw fe too holes, & make a marke
4 per py foot standep; and goo neer or forper / till jou mayst see porw
anoper poyn, & marke per a-noper marke; & loke pan what ys fe
difference be-twen fe too poynes in fe scale; & riȝt as pat difference
hap hym to 12, riȝt so fe space be-twen fe & fe too markys hap hym
8 to fe heyzte of fe pyng. Ensample: y set caas jou seest it porw a
poyn of 4; aftyr, at fe poyn of 3. Now passip fe nombre of 4 fe
nombre of 3 be fe difference of 1, and riȝt as pis difference 1 hap
hym-self to 12, riȝt so fe mesure be-twen fe too markis hap hym to
12 fe heyzte of fe pyng, puttyng to fe heyzte of pi-self to pyyn eye; &
jou mayst jou werke fro 1 to 12.

42b. Per vmbram versam.

Furpermore, zif jou wilt knowe in umbra versa / be fe craft of
umbra recta, y suppose jou take fe altitude at fe poyn of 4, &
makest a marke, & jou goost neer tyl jou hast yt at fe poyn of 3,
4 [* Fol. 37] & pan makyst *jou per an-noiper mark. pan muste jou deuide
144 be eche of fe poynes be-formseyd, [as] pus: zif jou deuide 144

43a. The reading versam (as in the MS.) is absurd. We must also
read "nat come," as, if the base were approachable, no such trouble need
be taken; see Art. 41. In fact, the present article is a mere repetition of
Art. 43, with different numbers, and with a slight difference in the
method of expressing the result. In fig. 18, if $b'c' = 3$, $bc = 4$, we have
$EB = \frac{3}{12}$ BC, $EB = \frac{4}{12}$ BC; or, subtracting, $EE' = \frac{\frac{3}{12}}{\frac{4}{12}}$ BC; or BC
$= 12$ EE'. Then add the height of E, viz. Ea, which $= AB$.

42b. Here, "by the craft of Umbra Recta" signifies, by a method
similar to that in the last article. In fig. 17, if $bc = 3$, $b'c' = 4$, then
$EB = \frac{4}{12}$ BC, and $E'B = \frac{4}{12}$ BC. Hence $EE' = (\frac{4}{12} - \frac{4}{12})$ BC. This
may be written, $EE' = (-\frac{1}{12} - \frac{1}{12}) \frac{BC}{12}$, or $EE': BC : \frac{1}{12} - \frac{1}{12} : 12$;
46. For to knowe at what houre of pe day, or of the night, shal be
Flode or ebbbe.

First wite thou certeinly, how that haven stondith, that thou list
to werke fore; pat is to say in whiche place of the firmament the
mone beyng, makyth fulle see. Than awayte pou redily in what
degree of pe zodiak pat pe mone at pat tyme is yffe. Bringe furth 4
than pe labelle, & sett the point thereof in pat same cost pat the mone
makyth flode, and sett pou pere pe degree of pe mone according wip pe
egge of pe label. Than afterward awayte where is than pe degree of
the sonne, at pat tyme. Remeue pou than pe label fro the mone, & 8
bringe & sette [it] justly vpon pe degree of pe sonne. And pe point of pe
label shal þan declare to pe, at what houre of pe day or of pe night
shal be flode. And pere also maist pou wite by pe same point of pe
label, wheþir it be, at þat same, flode or ebbbe, or half flode, or 12
quarter flode, or ebbbe, or half or quarter ebbbe; or ellis at what houre
it was last, or shalbe next by night or by day, þou þan [maist] esely
or : : 12 : 12; whence EE' = BC. This is nothing but Art. 42 in a rather
clumsier shape.

Hence it appears that there are here but 3 independent propositions, viz. those in articles 41, 42, and 43, corresponding to figs. 16, 17,
and 18 respectively. Arts. 41a and 41b are mere repetitions of 41; 43a
of 43; and 42a and 42b, of 42.

43. This article is probably not Chaucer's. It is found in MS.
Bodley 619, and perhaps nowhere else. What it asserts comes to this.
Suppose it be noted, that at a given place, there is a full flood when the
moon is in a certain quarter; say, e.g. when the moon is due east. And
suppose that, at the time of observation, the moon's actual longitude is
such that it is in the first point of Cancer. Make the label point due
east; then bring the first point of Cancer to the east by turning the
Rete a quarter of the way round. Let the sun at the time be in the first
point of Leo, and bring the label over this point by the motion of the
TIMES OF FLOOD AND EBB.

PART II. § 46.

knowe, etc. Furthmore if it so be that thou happe to worke for this matter aboute this tyme of conjunction, bringe furthe this degree of this monie with this labelle to that coste as it is before seyde. But than thou shalt understande that thou may not bringe furthe this label fro this degree of this monie as thou dide before; For why the sonne is pan in this same 20 degree with the monie. And so thou may at that tyme by this point of the labelle vnremevide knowe this houre of this flode or of this ebb as it is before seyd, &c. And euermore as thou findest this monie passe fro this sonne, so remewe thou this labelle pan fro this degree of this monie, and 24 bringe it to the degree of this sonne. And worke thou pan as thou dide before, etc. Or ellis knowe thou what houre it is that thou art inne, by this instrument. Than bringe thou furthe fro themes this labelle and ley it vpon this degree of this monie, and perby may thou wite also when this was flode, or when it wol be next, be it nyght or day; &c.

label only, keeping the Rete fixed. The label then points nearly to the 32nd degree near the letter Q, or about S.E. by E.; showing that the sun is S.E. by E. (and the moon consequently due E.) at about 4 A.M. In fact, the article merely asserts that the moon's place in the sky is known from the sun's place, if the difference of their longitudes be known. At the time of conjunction, the moon and sun are together, and the difference of their longitudes is zero, which much simplifies the problem. If there is a flood tide when the moon is in the E., there is another when it comes to the W., so that there is high water twice a day. It may be doubted whether this proposition is of much practical utility.
CRITICAL NOTES.

TITLE. Tractatus, &c.; adopted from the colophon. MS. F has "tractatus astrolabii." The other title, 'Bred and mylk for children,' is in MSS. B and E.

[The MSS. are as follows:—A. Cambridge Univ. Lib. Dd. 3. 53.—B. Bodley, E Museo 54.—C. Rawlinson 1370.—D. Ashmole 391.—E. Bodley 619.—F. Corpus 424.—G. Trin. Coll. Cam. R. 15. 18.—H. Sloane 314.—I. Sloane 261.—K. Rawlinson Misc. 3.—L. Addit. 23002. (B. M.)—M. St. John's Coll. Cam.—N. Digby 72.—O. Ashmole 385.—P. Camb. Univ. Lib. Dd. 12. 51.—Q. Ashmole 393. See the descriptions of them in the Preface.]

PROLOGUE. 1. 26. these B; these C; miswritten this A; see above, ll. 21, 22.

31. curious BC; miswritten curios A.

36. nawht B; nouht C; miswritten nahwt A.

42. Astrologiens] miswritten Astrologens ABC; but see l. 50 below.

48. practik B; practyk CM; miswritten practic A.

55. sonne BM; miswritten som A. The seven words, & tables—sonne—are omitted in C.

57. another B; nther A; oper C.

58. clerks AB; clerkus C; but the best spelling is clerkes.

59. theorik BC; thiorik A; but A has theorik in l. 70.

60. þe C; þe B; A omits.

PART I. § 1, l. 1; thowmbe B; þombe CM; miswritten towme A.

3. wol B; wolde AC.

§ 2, l. 2. Astrelabie] here miswritten Asterlabie A.

N.B. Room is here an adjective, meaning large, ample. It is the right reading; we find Rowm AB; rowme C; rvn M.

§ 3, l. 1. AB omit þe; in C, it is inserted in the margin; in M, it is found in the text.

2. resseyuyth B; resseyueþ C; receyueþ M; miswritten rescieued A.

3. shapen B; shapen CM; miswritten spapen A.

4. declaracion] here written declaracion A. See sect. 4, l. 6.

§ 4, l. 5. remenant (see sect. 5, l. 5)] remenaunt C; miswritten remenanaunt A; remenant B. downe BC; doun M; dowene A.
§ 5, l. 2. lenghe C; miswritten lenghte A; lenghte B.
§ 6, l. 2. litul B; lytel C; lite A.
§ 7, l. 6. by-twene BC; by-thwene A.
8. that is] this B; his is [is in margin] C; this, altered to that A. Perhaps the right reading is 'this is'; but it is immaterial.
§ 9, l. 3. nombre AB; nombre C; but the sense requires the plural.
§ 10, l. 3. Septembre B] miswritten Sextembre A. 13. August BCM; Augist A.
§ 12, l. 5. The MSS. all¹ read—"vmbra recta or elles vmbra ex-
tensa, & the nether partie is cleped the vmbra versa." This is wrong; see the note on p. 7.
§ 13, l. 2. a certein] so in AB; CM omit a. But Chaucer certainly uses the phrase 'a certain'; cf. 'of unces a certain', C. T. 16244; 'a certain of gold', C. T. 16492.
§ 14, l. 4. streynet C; miswritten streynet AB.
N.B. The word halt for holdeith, and the expression to hepe, together, both occur in Troil. iii. 1770:—

'And lost were al, that Love halt now to hepe.'

5. ymagyned C; ymaginet B; ymagyned A.
§ 15, l. 2. with BC; wit A.
§ 16, l. 12. haue I C; haue y M; hauey B; haue A.
§ 17, l. 1. principal C; tropikal AB; M om. The reading tropikal is absurd, because there are but two such; besides which, see l. 33 below.
6. ptholome] ptolomeys almagest M.
9. by-gyneth B; bygynne C; by-gynned A.
17. the nyht (over an erasure) B; thee nyht (over an erasure) A; be nijtes C; be nyjtes M.
20. cleped C; clouud A; cheped B.
25. makep CM; maked AB.
34. turnyng G; turny C; turned AB.
§ 19, l. 3. ouerthwert M; ouerbewart C; ouerward A; ouerthart B. Read ouerthwart; see Ch. Knightes Tale, 1133.
8. for the more; A has fore more here; but see last lines of sections 17 and 18.
§ 20, l. 1. azymutz C; Azamutz B; miswritten azymitz A; so in l. 3, A has the bad spelling azmites.
4. figure; here (and sometimes elsewhere) miswritten vigur A. Throughout the whole treatise, the scribe has commonly written "vigur"; in many places, it has been corrected to "figure".
§ 21, l. 14. the supplied from BC.
15. is B; ys C; miswritten his A.
26. where as C; wher AB.
28. ymaginet AB; ymagyned C; see l. 25, where, however, it is spell ymagened.

¹ As far as I can ascertain.
35. Minutes C; Minutes B; Minites A.
39. swich B; sich C; which A.
43. understonde CM; vnderstonden AB.
53. ouerkeruyd A; ouerkerned B; ouerkerneth (the latter part of
the word over an erasure) C; see l. 54.
56. here] so elsewhere; hir AB, in this place.

PART II. § 2, l. 2. remewe CM; remue AB.
3. thorgh; written thorghw A; porw M; porwe C; to zow (!) B.
8. euer M; euere C; euery (wrongly) AB.
§ 3, l. 9. sitten] written siten AB; sitte C; sittyn M.
11. owre] written howre AB; oure C.
22. down B; don A.
30, 31. A has 12 degres, corrected to 18 degres; B has 12 degrees;
C has 18. The numbers in the MSS. in these propositions are some-
what uncertain; it seems probable that some alteration was made by
Chaucer himself.
The readings in MS. B give one set of calculations, which are no
doubt the original ones; for in MS. A the same set is again found, but
altered throughout, by the scribe who drew the diagrams. The sets
of readings are these:—
Ll. 30, 31. 12 degrees B; so in A, but altered to 18; C has 18.
36. passed 9 of the clocke the space of 10 degrees B; so in A, with
9 altered to 8, and 10 altered to 2; C has ij for 9, but agrees with A in the
reading 2.
38. fond ther 10 degrees of taurus B; so in A originally, but 10 has
been corrected to 23, and libra is written over an erasure. C agrees with
neither, having 20 for 10, but agreeing with A as to libra. The later MSS.
sometimes vary from all these. See Chaucer's Astrolabe, ed. E. A.
Brae, p. 34.
41. an supplied from C; AB omit.
§ 4, 5. largest C; largesse AB.
6. vpon] upon C; miswritten vn AB.
7. forseide degre of his longitude] forseyde same degre of hys lon-
gitude C; forseid same gre of his longitude P; forseyde latitude his
longitude (sic !) AB.
8. planete ys C; miswritten planetes AB, but is is added in margin of A.
14. For "25 degrees," all the MSS. have "15 degrees." The mis-
take is probably Chaucer's own; the correction was made by Mr Brae,
who remarks that it is a mere translation from the Latin version of
Ptolemy's Tetrabiblos, which has—"Signum ascendentis, quod est a
quinae gradibus qui super horizontem ante ipsum ascenderant usque
ad virginii quinque qui ad ascendentem remanserint"; Lib. iii. c. 10.
In fact, it is clear that 25 must be added to 5 to make up the extent of
a "house," which was 30 degrees.
15. ys like C; is lik P; miswritten illyk AB. in is supplied from
GM; ABC omit it.
18. Astrologiens B; Astrologens AC.
22. be supplied from CP; AB omit.
30. wel supplied from CPM; AB omit.
34. than] lan CM; penne P; AB omit.
37. The number 10 is supplied from C; AB omit. It is obviously right, since the third part of 30 is 10.
39. some folk supplied from CPG; AB omit.
41. yat is] AB wrongly have yat it is; but CPGM omit it.
§ 5, l. 3. by 2 & 2 ACG; by 3 & 3 P; left blank in B. Either reading makes sense, but it is clear that divisions representing three degrees each must have been very awkward.
10. of supplied from CPGM; AB omit.
11. towcheth A; touche\$ C; towcheth B.
§ 6, l. 1. nadir B; nadair AC.
5. est C; west A (which is absurd); west (corrected to est) B.
9. signe CGP; signes ABM.
§ 7, l. 1. orisonte B; miswritten oriensonte A.
§ 10, l. 3. than B; \$an C; A has & by nyht, which is absurd.
4. A omits day with pe howr unequal of pe, which is supplied from BCP; the number 30 is also supplied from BCM, as A has a blank space there; see l. 9.
6. answering] answerynge C; answeryng P; miswritten answeringe A; answerit B.
§ 11, l. 8. by nyht B; be nyhtle A; see l. 3 above, and l. 11 below.
12. The number 4 is from CP; AB omit. per supplied from PM; \$ere C; AB omit.
§ 12, l. 1. the supplied from BC; A omits.
8. The figure 2 is from BCP; G has secunde; A omits.
10. entrith] entri\$ P; entrithy G; entre\$ CM; miswritten entrist AB.
§ 13, l. 4. this ys C; this is G; \$is is M; \$at is P; AB omit is.
§ 14, l. 9. The last line supplied from B.
§ 15, l. 5. varieith] varie\$ CM; varyi\$ P; variet ABG.
6. pointe] point P; pointes A; pointz B; poynes C; but grammar requires the singular.
the supplied from CP; AB omit.
§ 16, l. 5. AB wrongly insert the before Cancer; CP omit it.
8. ilike] Ilyke G; ilk P; y-like C; ilke AB; see l. 7.
§ 17. Latin rubric; for latitudinem (as in M) read longitudinem.
1.17. heued B; hed ACP; see sect. 16, l. 3. The word “the” (rightly placed in BCM) is, in A, wrongly placed before “aries” instead of before “ende.”
23. the] be C; AB omit.
25. his] miswritten is in A; here, and in l. 18, 20, and 22.
§ 18, l. 2. on B; upon C; vpon MP; vn A. Probably the form “vn” points to the reading “vpon” as being the correct one; cf. note above to sect. 4, l. 6.
4. come\$ C; comy\$ P; comth AB.
§ 19. Latin Rubric; for orizon (as in M) read statio.
7. comunely B; comunely C; comuly A.
8. decline p CP; declinet AB.
§ 20. Latin Rubric; the MS. (M) transposes the words in and a, having a zodiaco in circulo, which contradicts the sense.
2. his CP; is AB.
§ 22. Latin Rubric; for centri (as in M) read contrade, or regionis.
3. as hey is] as he∫ is C; as hy is P; as hey as (wrongly) AB.
13. distance B] distaunce CP; distance A.
§ 23, l. 20. The figure "8" is omitted in AB. It is obviously re-
quired.
22. than] A omits; thanne inserted afterwards in B.
§ 25. Latin Rubric. For altitudinem, M has latitudinem, an obvious
error, due to the rubric of the preceding section.
3. the] supplied from B; AC omit.
15. CP om. And 10 minutes.
16. CP om. And minutes owt. For 51 degrees and 50 minutes, C
has 52; þan is 52 degrees; and P has 52. þenne is .52. grees.
19. CP om. as y myght prove.
20. þe supplied from CP; AB om.
21. whaiete] so in A; waite B; wayte C.
26. þe firste degre] 10 degrees C; 10 gree P.
27. 58 degrees and 10 Minutes] almost 56 C (meaning 56 degrees);
almost .56. grees P.
28. almost 20] almost 18 C.
It thus appears that there is a second set of readings, involving a
different calculation. The second set supposes the Sun to be in the
10th degree of Leo, his altitude to be 56°, and his declination 18°; the
difference, viz. 38°, is the latitude. Either set of readings suits the
sense, but the one in the text agrees best with the former latitude, viz.
51°. 50°.
33. sonne C; miswritten sonnes AB.
36. After there, C inserts 38 grees, þat is; and omits the words of the
pole, 51 degrees & 50 Minutes. But this is a mere repetition of the
"height of the Equinoctial," and is obviously wrong. After pole, A
inserts an that, which is unmeaning, and omitted in B.
39. nethere] neperest CP.
§ 26, l. 8. The missing portion appears in MS. Bodley 619; I have
not found it elsewhere. It is obviously correct, and agrees sufficiently
closely with the conjectural addition by Mr Brae, in his edition of
Chaucer's Astrolabe, p. 48. He supplied the evident hiatus by the
words—"A right circle or horizon have those people that dwell under
the equinoctial line."
13. cenyth BC; cenytht A. A inserts the between 2 and wynteres;
absurdly.
15. scheweþ CM; miswritten swewyth AP.
ASTROLABE.
22. ouerkereu\ön C; ou erkeru\yt (sic) A; on ekir nyht (!) B; ouerkernf P.

§ 27, 1. 2. the] supplied from BCPM; A om.

3. towchieth] towchiet A; towchet B; towchip P; towche\ep C; see 1. 6.

§ 28. Latin Rubric. The word recto is obviously wrong; read obliqu\ö, and omit the last five words of the rubric.

2. thyn] so in B; \yon P; \bin C; miswritten thyin A.

3. set] sett C; sete P; AB omit.

11. these] these C; thise B; the A.

22. ende] heed A; heued C. In fact, heed, heued, or hed seems to be the reading of all the MSS. and printed copies, and may have been a slip of the pen in the first instance. The reading ende is, however, amply justified by its previous occurrence, four times over, in lines 9, 13, 16, 18. We thus have

Six Northern signs. From head of Aries to end of Virgo.

Six Southern signs. From head of Libra to end of Pisces.

Six Tortuous signs. From head of Capricorn to end of Gemini.

Six Direct signs. From head of Cancer to end of Sagittarius.

Opposite "sagittare" is written "sagittarie" in the margin of A, probably as a correction; but it is left uncorrected in 1. 26.

§ 29, 1. 3. turne thanne] Turne pan C; turne thanne AB; where "the" is wholly superfluous; see 1. 8.

9. thow] tow C; two AB.

13. thow] so in B; thowv C; thowr A. rewle] rule CP; misswritten rewles AB; see 1. 9.

§ 30. English Rubric; whether] whe\efer CP; miswritten whether AB.

6, 9. shew] schew P; schewb C; schewyf M; swewith AB.

11. wey A; place C. After zodiac C inserts—for on \e morowe wol \e some be in a-noper degre \pan pan, & cetera; P inserts—For \n \e morowe wol \e some be \n an oper gree, & norper or souper par aventure. Nothing can be plainer than that "the way of the sun" in this passage means the small circle formed by the sun's apparent path during a day; the text says expressly—"the wey wher as the sonne wenete thilke day." We need not argue about the impossibility of a planet being found in "the way of the Sun" at midnight at the time of the Summer solstice, because Chaucer makes no assertion whatever here about the relative positions of the sun and planet; indeed, he carefully repeats "if" three times. He is only concerned with defining the phrase—"the latitude of a planet from the way of the sun"; and in every possible case, it is clear that a planet can be either (1) situate in the small circle called in the Latin rubric cursus solis, or (2) to the north of such a circle, or (3) to the south of such a circle. About this there need be no difficulty at all. It is all copied from Messahala.

§ 31, 1. 7. azymutz] azymutz ABC; but it is clear that the singular must be used, as in sect. 32, 1. 8. P has minute.

12. sowth B] \e soupe C; soth A.
§ 33, l. 2. Azymut] Azymut ABC; minutis P; the same error as in sect. 31, l. 7; but see sect. 32, l. 8. stondith] stonde\(\text{p}\) C; shal stondith (sic) A; where shal is over an erasure.

3. in] yn P; ABC omit. It is of no consequence whether the word in be inserted or not; we find, on the one hand—"& in this same wyse maistow knowe by nyhte;" sect. 2, l. 6; and on the other—"the same wyse wyrke thow;" sect. 37, l. 14.

4. the nyht] so in AB; CP om. the; and perhaps it is better omitted, as in sect. 2, l. 6.

5. After north, B inserts or sowith; C inserts or southe.

6. is the sterre A; þe sterre stonde\(\text{p}\) CP.

§ 34. English Rubric; latitude for] so in CP; latitude and for AB, where and is superfluous, though perhaps it points to the reading latitude as for.

5. is BC; his A.

6. towchith] touch\(\text{p}\) P; to which (sic) ABC; see sect. 27, l. 6. In A, the word assendente is neatly written above zodiak.


10. wheythuer] wheþer CP; wheyth AB.

12. shewe] so in BP; schewe CM; swewe A.

13. this] þis P; thise AB; þese C; moreover, C has conclusive.

But the singular seems intended; see l. 8.

§ 35, l. 1. sterre BC; sterree A.

6, 7. whan C; wan AB (twice).

10, 13, 14. his C; is AB (thrice).

15. After west side, AB add & yf he be on the est syde, a mere superfluous repetition; see l. 11.

17. sothly] soply CP; miswritten he settes (!) AB.

18. hire Episicle] so in CP; by an odd mistake, AB put hire after manere, instead of before Episicle.

§ 36, l. 3. remeue] Remewe CP; remue AB.

5, 7, 10, 16. I leave the spelling howys (or hows) as it stands in the MS.; see house in l. 12; hous in l. 13; hous (as in C) in l. 15.

16. Here A inserts the before nadir; it might have omitted, as in ll. 13, 14, 15, and 17. Indeed, MS. B omits it.

§ 37, l. 6. the degree] þe degree C; thee degree A. assendeth] ascende\(\text{p}\) C; assendet A; assendent B.

9. than] þan C; AB omit.

10. is] AB omit; but it is obviously wanted; C varies here.

12. 12 howse next] 12 hous next C; howses nex (sic) AB.

13. thanne] þan C; fro (!) B; A omits. howse] hous C; howses AB.

16. AB absurdly insert fro before the bygynnynge.

17. the] þe C; AB omit.

§ 38, l. 1. warpyng MP; werpyng C; weripinge (sic) A; wernipinge (sic) B.

2. a CP; AB omit.
3. 4. an euene C; a euene AB (twice).
7. fro the centre; i. e. above the centre. The length of the pin, measured from the centre in which it is inserted, is to be not more than a quarter of the diameter, or half the radius. This would make the ratio of the gnomon to the shadow (or radius) to be one-half, corresponding to an altitude $\alpha$, where $\tan \alpha = \frac{1}{2}$; i. e. to an altitude of about $26^{1}\frac{1}{2}^\circ$. As Chaucer talks about the sun's altitude being $25^{1}\frac{1}{2}^\circ$ at about 9 o'clock, at the time of the equinoxes (sect. 3), there is nothing that is particularly absurd in the text of this section. For Mr Brae's conjectural emendations, see p. 56 of his edition.

15. tak thanne] so in P; tak me thanne AB; take me ſan C. But there seems no sufficient reason for thus inserting me here. Cf. "Tak a rond plate," l. 1; "tak than a compas," l. 14; "tak ther thy lyne," l. 17.

§ 39. At this point MS. A, which has so far, in spite of occasional errors of the scribe, afforded a very fair text, begins to break down; probably because the corrector's hand has not touched the two concluding sections, although section 40 is much less corrupt. The result is worth recording, as it shews what we may expect to find, even in good MSS. of the Astrolabe. The section commences thus (the obvious misreadings being printed in italics):—

"This lyne Meridional ys but a Maner descripcion or the ymagined, that passeth upon the pooles of pis the world And by the cenyth of owre heued / And hit is the same lyne Meridional / for in what place ſat any maner man [omission] any tyme of the yer / whan that the sonne schyneth any thing of the firmament cometh to his verrey Middel lyne of the place / than is hit verrey Midday, ſat we clepen owre noon," &c.

It seems clear that this apparent trash was produced by a careless scribe, who had a good copy before him; it is therefore not necessary to reject it all as unworthy of consideration, but it is very necessary to correct it by collation with other copies. And this is what I have done.

MS. B has almost exactly the same words; but the section is considerably better, in general sense, in MSS. C and P, for which reason I here quote from the former the whole section.

[Rawl. MS. Misc. 1370, fol. 40 b.]

Descripcioun of ſe meridional lyne, of ſe longitudes and latitudes of Citees and townes, as well as of a (sic) clymatz.

39. conclusio. This lyne meridional is but a maner descripcion or lyne ymagyned, ſat passef upon ſe pooles of pis worlde, and by ſe Cenith of oure heued. ¶ And yt is cleped ſe lyne meridional, for in what place ſat any man ys at any time of ſe zere, whan ſat ſe sonne by meunye of ſe firmament come to his verrey meridian place / ſan is it ſe uerrey mydday ſat we clepe none, as to ſilke man. And berefore is yt cleped ſe lyne of mydday. And nota, ſat euermo of any .2.
cites or of 2 townes, of which pat oo towne a-procheb neer pe est pan
dob pe o[p]er towne, trust wel pat pilke townes han divers meridians.
Nota also, pat pe arche of pe equinoxial, pat is contened or bouned
by-twixe pe two meridians, is cleped pe longitude of pe towne. ¶ &
3if so be / pat two townes haue I-like meridian or one merydian,
¶ Than ys pe distance of hem bope I-like fer from pe est, & pe contra-
rye. ¶ And in pis maner pei chaunge not her meridyean, but soply, pei
chaungen her almykanteras, For pe enhaunysynge of pe pool / and pe
distance of pe some. ¶ The longitude of a clymat ys a lyn
ymagyned fro pe est to pe west, I-like distaunte fro pe equinoxial.
¶ The latitude of a clymat may be cleped pe space of pe erpe fro pe
by-gynnyng of pe first clymat unto pe ende of pe same clymat / euene-
directe a-zens pe pool artyke. ¶ Thus seyn some aucours / and
some clerkes seyn / pat 3if men clepen pe latitude of a contrey,\(^1\) pe
arche mer[\(i\)]dian pat is contened or intercept by-twixe pe Cenyth & pe
equinoxial; pan sey pei pat pe distance fro pe equinoxial unto pe ende
of a clymat,\(^2\) euene a-gaynes pe pool artik, is pe latitude off pat clymat\(^2\)
forsope.

The corrections made in this section are here fully described.
1. of lyne P ; of a line I ; or lyne C ; or the AB.
2. pis] pis the AB, absurdly ; CP omit the, rightly.
3. ycleped the] y-clupid pe P ; cleped pe C ; the same (sic) AB.
4. ys at ; supplied from PCI ; AB omit.
5. by moeuyn] by meuyng C ; by mevyng PI ; schyneth any
thing (sic) A ; schyned any thing B ; for the spelling moeuyn, see sect.
35, 1. 5.
6. meridian CP ; meridianale I ; Middel lyne of the (sic) AB.
8. 2 cites CI ; too cites P ; any lynes (sic) AB.
9. aprochith] a-procheb C ; aprochib P ; miswriten aprochid AB.
more toward] neer C ; ner P ; neerer I ; thward AB.
11. conteyned I ; conteynyd P ; contened C ; consideered (sic) A ;
contined B.
13. yf P ; 3if C ; if it I ; AB omit. N.B. It would have been
to have used the spelling yif, as the word is commonly so spelt
in A.

21. same CPI ; seconde AB. The reading same is right; for the
"latitude of a climate" means the breadth of a zone of the earth, and
the latitude of the first climate (here chosen by way of example) is the
breadth as measured along a line drawn perpendicular to the equator,
from the beginning of the said first climate to the end of the same.
The words "euene-directe agayns pe poole Artik" mean in the direction
of the North pole; i.e. the latitude of a climate is reckoned from its
beginning, or southernmost boundary-line towards the end of the same,
viz. its northern boundary-line.

\(^1\) Here insert—[pey mene]—which CP omit.

\(^2\) The words from euene to climat are added at the bottom of the page in
the MS.
22. the poole Artik P; the pool artike I; the pole artike L; from north to south AB. Observe that this singular error in A, "euene directe agayns from north to south," probably arose from a confusion of the text "euene directe agayns be poole Artik" with a gloss upon it, which was "from north to south." It is important as throwing light on the meaning of the phrase, and proving that the interpretation of it given above (note to l. 21) is correct.

24. intercept CP; intercepte I; except (over an erasure) AB.

The only reading about which there is any doubt is that in line 18, which may be either "illike distant by-twene them alle" (A), or "I-like distaunte fro the equinoxial" (C). But it is immaterial which reading be adopted, since "illike-distant" is here used merely in the sense of parallel, and the boundaries of the climates are parallel both to one another, and to the equinoctial. The climates themselves were of different breadths.

§ 40, l. 4. this samples AB; these ensamples C. For this read these.

5. for sothe miswritten for sonne AB; in general C; yn special P; the reading sonne points to sothe, and makes it very probable that for sothe is the true reading.

6. longitude be longitude C; latitude AB (absurdly); see l. 11. Perhaps we should read "the longitude"; but it is not very material.

7. planete; miswritten that A, but corrected to planete in the margin; C has planete, correctly. The figure 6 is omitted in C; so are all the other figures further on. him] hir C.

8. I tok] Than toke I C. 8, 15. 2 degrees A; 3 degrees B.

9. Than tok I] Than toke I C; for tok AB wrongly have stykke, afterwards altered to stokke in A. the] supplied from C, which has the; AB omit.

15. hauy A; haue I C.

22. the] be C; AB omit.

25. prikke] prickes C; perhaps prickes would be a better reading.

27. AB omit the figure 2; but see l. 8.

30. in alle] in al C; A has septentrionalle, an obvious mistake for septentrical in all, by confusion of the syllable "al" in the former with "al" in the latter word; B has septentrional, omitting in alle.

33. sothly] so in B; soply C; miswritten sothly A; see l. 30. signes C] tymes AB (wrongly); see l. 30.

39. hauy AB; haue I C.

43. Perhaps euene before of should be omitted, as in C. AB have in the ende euene ouer of thee, where euene ouer is repeated from the former part of the line.

44. F endlang] F endlonge C; A euene AB; but see l. 22.

45. A omits of and degrees, yet both are required; BC omit of 3 degrees altogether.

47. til] tyl pat C; tho AB (absurdly). saw] sey C; may AB; see l. 27.
53. hire] his ABC.  a] ABC omit.
54. At the word howr four of the best MSS. break off, viz. MSS. ABCE, although E adds one more section, viz. sect. 46; others come to a sudden end even sooner, viz. MSS. DFGHK. But MS. P carries us on to the end of sect. 43, and supplies the words—pu shalt do wel ynow.

§ 41, 6. betwen] be M (wrongly); by-twye L; see l. 5.
7. M inserts & before to be altitude; a mere slip. For; miswritten
Fro M. pridde; miswritten ridde M.
11. poynt L; miswritten poyn M.
12. LM wrongly place of after pe hey3t instead of before it; see the footnote.

§ 42, l. 2. see] so in L; miswritten sette M; see sect. 41, l. 4.
3. y] I L; M omits.
7. M omits as, above, and is pe; L has 12 passethe 6 the.
10. seeset] so in L; miswritten settest M; cf. l. 2; P has sixt (a common old form for seest).
11. 60] LN; sexe M.
12. M omits from 10 is to 10 fete, which is supplied from NLP.
13. For] so in LN; fro M.
14. For 2, M has 6.
15. For 3, M has 4; for 2, M has 6; for 6, M has 2; and the words and 5 is 4 partyes of 12 are omitted, though L has—& 4 is the thrid partye of 12.
17. betwen] by-twene L; bitwixe P; miswritten be M; cf. sect. 41, 6.
18. pre] 3 LP; miswritten be M.

§ 43. Rubric, Vnbra Versa; obviously a mistake for Recta. The error is repeated in l. 1. LP rightly read Recta.
3. M omits 1, which is supplied from LP; see l. 5.
10. After heythe, LN add to thyne eye. In place of lines 8—10, P has—and so of alle oper, &c.

§ 44. From MS. Digby 72 (N). Also in LMO.
2. fro] so in LO; for M.
3. in-to] so in L; in M. for] so in O; fro M.
6. 3eris M; LNO omit.
7. tabelis NO; table M; tables L.
8. where L; qwere O; whepher N.
9. loke LM; N omits.
10. NM omit from or what to or; supplied from O, which has—or qwat nombre hath enere it be, tyl pe tyme hath poun come to 20, or 40, or 60. I have merely turned qwat into what, as in L, which also has this insertion.

12. wretten N; the alteration to wryte is my own; see l. 22.

vnder] so in L; vndirnep M.
13. to-geder] too-geder M; miswritten to 2 degres N; to the 2 degrees L.
14. hast M; miswritten laste N; last L.
15. *pat*; supplied from M; LN omit.
16. *For 1 (as in M)* LN have 10.
20. to-gedere M; to the degreis N; 2 grees O; to degrees L.
21. *pat*; supplied from M; LNO omit.

*lass* passid LNO; M omits. Of course *passid* is wrong, and equally of course *lass* is right; see l. 5, 6 above, and l. 24 below.

24. *pat*] so in L; *pat MO*; if hit N.
25. entrynge] entre M; entre L.
26. *per*] so in M; *miswritten* the 3ere N; the 3eer L.
28. merydie LM; merdie N.
30. for LM; fro N (twice).
32. thathe N; haue tau3t M; haue tawt O; haue tauht L.
33. *pe*; *supplied from* M; LNO omit.
34. with *pe*] so in M; wyche N; see l. 36.
38. in-to N; ynt M.

§ 45. From MS. Digby 72 (N); also in LO; but not in M.
4. that] the L; *pe* O.

6. I-wryton] wrytoun O; Iwyton N. But L has I wold wyttyn, and I would therefore, on second thoughts, propose to read—I wolde wyten precise my rote.

7. 1397] *miswritten* 1391 LN; O has 1391, corrected to 1397; see l. 3.
10. so3th N; sowte O; sowthe L.
12. vnder N; vndyr-nethe O; vndre-nethe L.
18. o*per* in any o*per* tyme or monyth N; or any o*der* tymys or montheys O; or in eny other moneth L.
24. adde] *supplied from* L; NO omit. There is no doubt about it, for see l. 14.
27. wete *pe*] so in O; wete thi L; *miswritten* with thy N; see l. 17.
31. and] *supplied from* LO; N omits.
32. abowe N; abowe LO.
36. lewyth N; leuyth LO.

§ 41a. This and the remaining sections are almost certainly spurious. The last occurs in MS. Bodley 619 (E) only; the others are in LMN, the first (41a) being also found in O. The text of 41a—42b is from M.
3. hast] *supplied from* L; M omits.

§ 42a, 1. heyth by *by* N; heyth by the L; M om.
4. lyk] lykk M; L omits. mete] mette M; mett L.
9. *ys*] is L; *miswritten* lys M.

§ 43a, 1. nat] nott L; M omits; see the footnote. In the rubric, M has versam; but L has the rubric—*Vmbra Recta.*

§ 42b, 5. as] so in L; *miswritten* & M.
6. 4 is *supplied from* L; M omits.

§ 46, 9. it] E omits.
ADDITIONAL NOTES.

PROLOGUE. l. 7. suffisaunt, sufficiently good. In the best instruments, the Almicanteras, or circles of altitude, were drawn at distances of one degree only; in less carefully-made instruments, they were drawn at distances of two degrees. The one given to his son by Chaucer was one of the latter; see Part II. sect. 5.

10. a certein, i.e. a certain number; but the word nombre need not be repeated; cf. a certein holes, Pt I. sect. 13, l. 2, and see the very expression in the Milleres Tale, l. 7.

20. suffise, let them suffice.

58. "Nicolaus de Lynna, i.e. of Lynn, in Norfolk, was a noted astrologer in the reign of Edward III., and was himself a writer of a treatise on the Astrolabe. See Bale—who mentions 'Joannes Sombe' as the collaborateur of Nicolans—' Isto ob eruditionem multiplex, non vulgaribus in suo Astrolabio celebrat laudibus Galfridus Chaucer poeta lepidissimus;' Bale (edit. 1548), p. 152."—Note by Mr Brae, p. 21 of his edition of the Astrolabe.

Warton says that "John Some and Nicholas Lynne" were both Carmelite friars, and wrote calendars constructed for the meridian of Oxford. He adds that Nicholas Lynne is said to have made several voyages to the most northerly parts of the world, charts of which he presented to Edward III. These charts are, however, lost. See Hakluyt's Voyages, i. 121, ed. 1598; Warton, Hist. E. P. ii. 357; ed. 1871.

Tyrwhitt, in his Glossary to Chaucer, s. v. Somer, has the following.

"The Kalendar of John Somer is extant in MS. Cotton, Vesp. E. vii. It is calculated for 140 years from 1367, the year of the birth of Richard II., and is said, in the introduction, to have been published in 1380, at the instance of Joan, mother to the king. The Kalendar of Nicholas Lenne, or Lynne, was calculated for 76 years from 1387. Tanner in v. Nicolaus Linensis. The story there quoted from Hakluit of a voyage made by this Nicholas in 1350 ad insulas septentrionales antehac Europaeis incognitas, and of a book written by him to describe these countries a gradu .54. usque ad polum, is a mere fable: as appears from the very authorities which Hakluit has produced in support of it." It seems probable, therefore, that the "charts" which Warton says are "lost" were never in existence at all. The false spelling "Some" no doubt arose from neglecting the curl of contraction in Somere.
PART I. § 5, l. 5. the remanant, &c. i.e. the rest of this line (drawn, as I said,) from the foresaid cross to the border. This appears awkward, and we should have expected "fro the forside centre," as Mr Brae suggests; but there is no authority for making the alteration. As the reading stands, we must put no comma after "this lyne," but read on without a pause.

7. principals. It is not unusual to find adjectives of French origin retaining s in the plural; only they commonly follow their nouns when thus spelt. Cf. lettres capitals, i. 16. 8. On the other hand, we find principal cerkles, i. 17. 33.

§ 7. 4. novombres of augrym; Arabic numerals. The degrees of the border are said to contain 4 minutes of time, whilst the degrees of the signs are divided into minutes and seconds of angular measurement, the degrees in each case being the same. There is no confusion in practice between these, because the former are used in measuring time, the latter in measuring angles.

§ 8. 9. Alcabucius; i.e. (says Warton, Hist. E. P. ii. 357, ed. 1871) Abdilazi Alchabitius, whose Introductiorium ad scientiam judicialem astronomiae was printed in 1473, and afterwards. Mr Brae quotes the very passage to which Chaucer refers, viz. "Et unumquidque istorum signorum dividitur in 30 partes equales, quae gradus vocantur. Et gradus dividitum in 60 minuta; et minutum in 60 secunda; et secunda in 60 tertia; similiterque sequuntur quarta; similiter et quinta; ascendendo usque ad infinita;" Alchabitii Differentia Prima.

These minute subdivisions were never used; it was a mere affectation of accuracy, the like of which was never attained.

§ 10. 5. in Arabys, amongst the Arabians. But he goes on to speak only of the Roman names of the months. Yet I may observe that in MS. ii. 3. 3, at fol. 97, the Arabian, Syrian, and Egyptian names of the months are given, as well as the Roman.

§ 16. 12. & every Minut 60 secondes; i.e. every minute contains 60 seconds. The sentence, in fact, merely comes to this. "Every degree of the border contains four minutes (of time), and every minute (of time) contains sixty seconds (of time)." This is consistent and intelligible. Mr Brae proposes to read "four seconds"; this would mean that "every degree of the border contains four minutes (of time), and every minute (of the border) contains four seconds (of time)." Both statements are true; but, in the latter case, Chaucer should have repeated the words "of the bordne." However this may be, the proposed emendation lacks authority, although the reprint of Speght changed "lxx" into "fourtie," which comes near to "four." But the reprint of Speght is of no value at all. See Mr Brae's preface, p. 4, for the defence of his proposed emendation.

§ 17. 6. Ptolomeo. The John's MS. has ptolomeys almagest. "Almagest, a name given by the Arabs to the μεγάλη σύνταξις, or great collection, the celebrated work of Ptolemy, the astronomer of Alexandria [floruit A.D. 140—160]. It was translated into Arabic about the year
A.D. 827, under the patronage of the Caliph Al Mamun, by the Jew Alhazen ben Joseph, and the Christian Sergius. The word is the Arabic article al prefixed to the Greek megistus, 'greatest,' a name probably derived from the title of the work itself, or, as we may judge from the superlative adjective, partly from the estimation in which it was held."—English Cyclopaedia; Arts and Sciences, i. 223. The Almagest "was in thirteen books. Ptolemy wrote also four books of judicial astrology. He was an Egyptian astrologist, and flourished under Marcus Antoninus. He is mentioned in the Somnour's Tale, l. 1025, and the Wif of Bathes Prologue, l. 324."—Warton, Hist. E. P. ii. 355, ed. 1871. The word almagest occurs in the Milleres Tale, near the beginning, and twice in the Wif of Bathes Prologue.

Chaucer says the obliquity of the ecliptic, according to Ptolemy, was 23° 50'. The exact value, according to Ptolemy, was 23° 51'. 20"; Almagest, lib. i. c. 13. But Chaucer did not care about the odd degree, and gives it nearly enough. See note to ii. 25. 18.

8. tropos, a turning; Chaucer gives it the sense of agaynward, i.e. in a returning direction.

14. The equinoctial was supposed to revolve, because it was the "girdle" of the primum mobile, and turned with it. See note below to l. 27.

14. "As I have shewed thee in the solid sphere." This is interesting, as shewing that Chaucer had already given his son some lessons on the motions of the heavenly bodies, before writing this treatise.

26. angulus. We should rather have expected the word spera or sphere; cf. "the sper solide" above, l. 15.

27. "And observe, that this first moving (primum motus) is so called from the first movable (primum mobile) of the eighth sphere, which moving or motion is from East to West," &c. There is an apparent confusion in this, because the primum mobile was the ninth sphere; but it may be called the movable of the eighth, as giving motion to it. An attempt was made to explain the movements of the heavenly bodies by imagining the earth to be in the centre, surrounded by a series of concentric spheres, or rather shells, like the coats of an onion. Of these the seven innermost, all revolving with different velocities, each carried with it a planet. Beyond these was an eighth sphere, which was at first supposed to be divided into two parts, the inner part being the firmamentum, and the outer part the primum mobile; hence the primum mobile might have been called "the first moving of the eighth sphere," as accounting for the more important part of the motion of the said sphere. It is simpler, however, to make these distinct, in which case the eighth sphere is the firmamentum or spera stellatarum fixarum, which was supposed to have a very slow motion from West to East round the poles of the zodiac to account for the precession of the equinoxes, whilst the ninth sphere, or primum mobile, whirled round from East to West once in 24 hours, carrying all the inner spheres with it, by which means the ancients accounted for the diurnal revolution.
This ninth sphere had for its poles the north and south poles of the heavens, and its "girdle" (or great circle equidistant from the poles) was the equator itself. Hence the equator is here called the "girdle of the first moving." As the inner spheres revolved in an opposite direction, to account for the forward motion of the sun and planets in the ecliptic or near it, the primum mobile was considered to revolve in a backward or unnatural direction, and hence Chaucer's apostrophe to it (Man of Lawes Tale, 295)—

"O firste moeuyng cruel firmament,
With thy diurnal sweigh that crowdest ay
And hurlest al from Est til Occident,
That naturely wolde holde another way."

That is—"O thou primum mobile, thou cruel firmament, that with thy diurnal revolution (or revolution once in 24 hours round the axis of the equator) continually forcest along and whirlest all the celestial bodies from East to West, which naturally would wish to follow the course of the sun in the zodiac from West to East." This is well illustrated by a sidenote in the Ellesmere MS. to the passage in question, to this effect:—"Vnde Ptolomeus, libro i. cap. 8. Primi motus celi duo sunt, quorum vnus est qui mouet totum semper ab Oriente in Occidentem vno modo super orbis, &c. Item aliter vero motus est qui mouet orbem stellarum currencium contra motum primun, videlicet, ab Occidente in Orientum super alios duo polos." ¹ That is, the two chief motions are that of the primum mobile, which carries everything round from East to West, and that of the fixed stars, which is a slow motion from West to East round the axis of the zodiac, to account for precession. This exactly explains the well-known passage in the Frankeleines Tale (C. T. ed. Tyrwhitt, 11592)—

"And by his eightsphere in his werking,
He knew ful wel how fer Alnath was shove
Fro the hed of thilke fix Aries above
That in the ninthe spere considered is."

Here the eight spheres are the eight inner spheres which revolve round the axis of the zodiac in an easterly direction, whilst the ninth sphere, or primum mobile, contained both the theoretical or fixed first point of Aries from which measurements were made, and also the signs of the zodiac as distinct from the constellations. But Alnath, being an actual star, viz. α Arietis,² was in the eighth sphere; and the distance between its position and that of the first point of Aries at any time afforded a measure of the amount of precession. Mr Brae rightly re-

¹ This is doubtless quoted from some gloss upon Ptolemy, not from the work itself. The reference is right, for the "motus celi" are discussed in the Almagest, lib. i. c. 8.
² This star (α Arietis) was on the supposed horn of the Ram, and hence its name; since El-nātīh signifies "the butter," and "El-nath" is "butting" or "pushing." See Ideler, Die Bedeutung der Sternnamen, p. 135.
marks that Tyrwhitt's readings in this passage are correct, and those of Mr Wright and Mr Morris (from the Harleian MS.) are incorrect.

It may be as well to add that a later refinement was to insert a crystalline sphere, to account for the precession; so that the order stood thus: seven spheres of planets; the eighth, of fixed stars; the ninth, or crystalline; the tenth, or primum mobile; and, beyond these, an empyrean or theological heaven, so to speak, due to no astronomical wants, but used to express the place of residence of celestial beings. Hence the passage in Milton, iii. 481.

"They pass the planets seven, and pass the fix'd,
And that crystalline sphere whose balance weighs
The trepidation talk'd, and that first mov'd."

i.e. They pass the seven planetary spheres; then the sphere of fixed stars; then the crystalline or transparent one, whose swaying motion or libration measures the amount of the precession and nutation so often talked of; and then, the sphere of the primum mobile itself. But Milton clearly himself believed in the Copernican system; see Paradise Lost, viii. 121—140, where the primum mobile is described in the lines—

"that swift
Nocturnal and diurnal rhomb supposed,
Invisible else above all stars, the wheel
Of day and night."

§ 18. 8. compounded by 2 & 2. This means that in the best astrolabes, every alhumantarath for every degree of latitude was marked; as may be seen in Metius. In others, including the one given by Chaucer to his son, they were marked only for every other degree. See Part II. sect. 5, l. 2.

§ 19. 7. cenyth, as here used, has a totally different meaning from that of sensyth, in l. 1 above. The sensyth in l. 1 is what we still call the sensyth; but the cenyth in l. 7 means the point of the horizon denoting the sun's place in azimuth. Contrary to what one might expect, the latter is the true original meaning, as the word zenith is corrupted from the root of the word which we now spell azimuth. The Arabic as-samt is a way or path; al-samt, a point of the horizon, and, secondly, an azimuthal circle. The plural of al-samt is assumût, whence azimuth. But zenith is a corruption of semt, from samt al-ras, the Arabic name of the vertex of heaven (râs meaning a head); and the qualifying al-ras, the most important part of the phrase, has been improperly dropped. So far from the reading cenyth being wrong here, it is most entirely right, and may be found in the same sense in Messahala. See p. 41, footnote. For cenyth, some late copies have signet, evidently taken from the

1 Well expressed by Dante, Parad. xxx. 38—

"Noi semo usciti fuore
Del maggior corpo al ciel ch'è pura luce."

Dante, like Chaucer, makes the eighth sphere that of fixed stars, and the ninth the primum mobile or swiftest heaven (ciel veloceissimo); Parad. xxvii. 99.
Latin word *signum*. They make the same mistake even in l. 10 of section 18.

§ 21. 4. *sterres fixes*, fixed stars; here the *s* again appears in a plural adjective of French derivation. In MSS. II. 3. 3 and II. 1. 13 in the Cambridge University Library, is an interesting list of the 49 stars most usually placed upon the Astrolabe, which I have printed in the Preface to this volume. The stars which are represented by the points of the tongues in Fig. 2 are the same as those in the diagram from which Fig. 2 is copied, the original of which is in MS. A. I have slightly altered the positions of the points of the tongues, to make them somewhat more correct. The following is the list of the stars there shewn; most of their names are written in the MS. Cf. footnote on p. 12.

**Within the Zodiac.** In *Aries*, *Mirach*, or β *Andromeda*, shown by a short tongue above *Aries*; in *Taurus*, *Algol*, or β *Persei*, as marked; in *Libra*, *Aliot* or *Alioth*, i.e. ε *Ursa Majoris* (the third horse, next the cart, in Charles's Wain), as marked; also Alramech, Arcturus, or α Boötes, shewn by the tongue projecting above *Libra*; in *Scorpio*, *Alpheta*, Alphecca, or α *Corona Borealis*, as marked; in *Sagittarius*, Raz Allagus, or α Ophiuchi, near Alpheta; in *Capricornus*, Altair or α Aquilæ and Vega or α Lyrae, as marked, whilst near Vega is the unmarked Aridex, or α Cygni; and in *Pisces*, Markab or α Pegasii.

**Without the Zodiac.** In *Aries*, under *Oriens*, the slight projection marks β Ceti or Deneb Kaitos, the Whale's Tail, and the next curiously shaped projection (with side-tongues probably referring to other stars) means Batukaitos or Batnkaitos, the Whale's Belly, apparently ζ Ceti; next come the long tongue for Menkar or α Ceti, the Whale's Nose; the star Aldebaran or Bull's Eye, a Tauri; Rigel or β *Orionis*, Orion's Foot; Alhabor or Sirius, the Dog-star, marked by a rude drawing of a dog's head, the star itself being at the tip of his tongue; then Algemeisa, Procyon, or α Canis Minoris, marked by a tongue pointing to the left, whilst the long broad tongue pointing upwards is Regulus, Kalbalaased, or α Leonis; the small tongue above the letter I in the border is Alphard or Cor *Hydrae*. Above *Occidens*, in *Libra*, the first tongue is Algorab or δ *Corvi*, and the next Spica Virginis or Azimeech; close to the 8th degree of *Scorpio* is a *Librae*, and close to the beginning of *Sagittarius* is a small head, denoting the Scorpion, at the tip of the tongue of which is the bright Kalbalacrab or Antares. The last, a projection below the letter X, is Deneb Algebi or the Goat's Tail, i.e. δ *Capricorni*.

7. That is, the little point at the end of each tongue of metal is technically called the “centre” of the star, and denotes its exact position.

9. The stars of the North are those to the North of the *zodiac*, not of the *equator*.

12. *Aldebaran*, &c.; the stars Aldebaran (α Tauri) and Algomeisa (α Canis Minoris) are called stars of the south, because they are to the south of the ecliptic; but as they are meanwhile (see Fig. 2) also to the north of the equator, they of course rise to the N. of the Eastern point of the horizon. The longitude of stars was always measured
along the ecliptic, which is denoted in Fig. 2 by the outermost circle of the metal ring on which the names of the signs are written.

In one of the tracts in MS. G (dated A.D. 1483), p. 30, we find "Aldebaran, in the first gre of geminis (sic), of the nature of Mars and Venus;" and "Algomeisa, canis minor, in the xvj gre of Cancer, of the nature of Mars and Mercury."

28. Amiddles, &c. Observe that the Ecliptic line, though in the midst of the celestial zodiac, a belt 12° broad, is on the outer edge of the zodiac as shewn in the astrolabe, which is only 6° broad and shews only the northern half of that belt. The "way of the sun" is elsewhere used of the sun's apparent diurnal path (see Part ii. sect. 30); but it here probably refers, as is more usual, to the annual path.

33. streitas, narrowness, closeness, smallness of size. In Fig. 2, I have marked every degree in the southern half of the zodiac, but only every fifth degree in the northern, in order to avoid an appearance of crowding in so small a figure. In Chaucer's own astrolabe, every other degree was marked all round.

38. Here Chaucer gives at least three reasons for the name of "zodiac." The true one is the second, "for that the sterres that ben there fixed ben disposed in signes of bestes, or shape like bestes." But these imaginary shapes are very absurd and arbitrary.

49. Not only the influences here assigned to the signs, but others due to planets, may be found in "Porphyrii Philosophi introductio in Claudii Ptolomaei opus de affectibus astrorum," fol. Basileae, n. d. p. 198. I here add a few extracts from the MS. in Trinity College, Cambridge (marked R. 15. 18), to shew the nature of the old astrology. I choose them with especial reference to Aries. The other signs are spoken of in a similar manner. "It is principally to be considered that the signes of hevyn haue their strenght and propre significacions vpon the membris of any man; as, Aries hath respect to the hed, taurus to the neck, geminis (sic) the Armys, Cancer the brest, leo the berte, virgo the bowels, &c; as it shall shew in the Chapiters folowyng. 1 Secundarily it is to be noted that plotholomee (sic) saith, that to touche with instrument of yron while the mone is in the signe of the same membre, is for to be dred; let the surgen beware, and the letter of blode, let hym be aferd to touche that membre with yrene, in the which the mone shall be."—MS. G (see the preface); Tract C. p. 12.

"Thenne Aries hath respect to the hed; And this signe is hote and dry, fiery & colerik. Saturne hath ij witnes in Ariete, a triplicitate and a terme. Jupiter also hath ij, a triplicitate and a terme. Mars hath ij testimonials or ij fortitudis in Ariete, A hows, A face, and A terme. The sonne hath iij fortitudis in Ariete, scilicet, an exaltacioum, a triplicite, and a face. Venus hath ij testimonials, A terme and a face. Mercury hath one testymony, that is to say, a terme. And luna

1 From this same MS. I have copied the figure of a man shewn in Fig. 19. The copy was hurriedly made, and is by no means a good one; but it may serve to shew the manner of denoting the influence of the signs upon a man's body.
in Ariete hath no testimoniall. For the which it is to know, that the influens of the planetis may be fortyfied v maner of wayes. And these v maner be called v fortitudis of planetis, or testimonials, which be these: domus, exaltacio, triplicitas, terminus, and facies. Domus gevith to a planet v fortitudis; And a planet in his hows is lyke a kynge in his hall, And in the high trone of his glorie. A planet in his exaltacio is lyke a kynge when he is crowned. A planet in his triplicita is like a kynge in honour; Amonge his sencible people. A planet in his terme is As a man amonges his kynnesmen; And fyndis. Facies gyvith to A planet that thynge the which rowme gyvith to a maistre. Wherfore facies gyvith only on fortitude, Terminus ij, Triplicitas iij, Exaltacio iij, And domus v. And for the more clere declaracioun, the dignytes of planetis in signes be comprehendid in this figure ensuynge, &c.  

The dignytes of planetis in the signes, most speciall they be to be noted in judicials. When the mone is in Ariete, it is not gode, but utterly to be exshewed, both for seke And disesid, for to shafe their hede or to boist in the eris or in the nek; nor loke pou let no blode in the vayn of the hede. How-be-it, benfyiciall it is to begynne evry worke that pou woldest bryng aboute sone. But that thynge that is stabill ought to be eschewed. In this signe it is necessary to dele with noble estatis And rich men, And for to go in-to A bayne [bath]. —Same MS., Tract C. p. 14.

52. See Prologue, l. 68. As the zodiak is here called a part of the eighth sphere, so we have been before told that the equinoctial is the girdle of the ninth sphere; see note above to sect. 17. l. 27.

54. euene partes, equal parts. That is, the equinoctial bisects the zodiac. But the northern half looks much smaller than the southern on the Astrolabe, owing to the manner in which the zodiac is there represented, viz. by projection on the plane of the equator.

PART II. § 1. Rubric. hir cours. The gender of the sun was feminine in Anglo-Saxon, and that of the moon masculine; but in Chaucer's time, the gender was very variable, owing to the influence of Latin and French.

§ 3. Between sections 2 and 3, a section is inserted in the late

1 Here follows a table, shewing that, in Aries, the value of Saturn is 5, of Jupiter 5, &c.; with the values of the planets in all the other signs. The value 5, of Saturn, is obtained by adding a triplicita (value 3) to a terme (value 2), these being the "witnesses" of Saturne in Aries; and so on throughout.

2 So on p. 12 of another tract (D) in the same MS., we find—

Aries calidum § suum; bonum,
Nill capiti noceas, Aries cum luna refuglet,
De vena minus & balnea tutius intres,
Non tangas Aures, nec barbam radere debes.

Each of the signes is described in similar triplets, from the grammar of which I conclude that Aries is here put for in Ariete, in the first hexameter.
copies, which merely repeats section 1, and is clearly spurious. It does not appear at all in the best MSS. I quote it here from MS. L.

"To knowe the degre of thyndeonne in thyndziark by the days in the baksyde of the Astrolabye.

[T]hanne iff þou wylte wete thatt / reyn & knowe / qwych is the day off the monyth thow arte yne, & ley thy rewle of thy astrolabye, that is to say, the allydatha, vpon þe day in the kalendre of the Astrolabye, & he schall schewe the thy degree of the sonne."

26. After "assendent," the following additional paragraph occurs in MS. Bodley 619; fol. 21. It is worthy of notice, because the original of it appears in Messahala's treatise, with the title "De noticia stellarum incognitarum positarum in astrolabio." The paragraph runs thus:—

"Nota. þat by þis conclusion þou may knowe also where ben at þat samme tyme alle oþir sterres fixed þat ben sett in thin Astrelabie, and in what place of þe firmament; And also her arising in thy orizonte, and how longe þat thei wol ben aboue þe erthe wip þe Arke of þe nyght / And loke enermore how many degrees þou fynde any sterre at þat tyme sitting vpon þin Almycanteras, and vp-on as many degrees sette þou þe reule vpon þe altitude in þe bordere; And by the mediacioun of þy eye through þe 2. smale holes shalt thou se þe same sterre by the same altitude aforseid, And so by this conclusion may þou redely knowe whiche is oo sterre from a-noþer in the firmament / for as many as ben in the Astrelabie. For by þat same altitude shal thou se that same sterre, & non othir / for þere ne wolle non othir altitude accurde þerto."

29. Alhabor; i. e. Sirius or the Dog-star, as is evident from the fact of its being represented by a dog's head on the Astrolabe; see also the table of stars on the Astrolabe, which give the declination 15° S, the latitude 30° S, and place the star in Cancer. It is also plainly described in the same table as being "in ore canis," so that it is difficult to resist the conclusion of the identity of Alhabor and Sirius. Mr Brae, following later copies that have different readings of the numbers employed, identifies Alhabor with Rigel or β Orionis. This is impossible, from the fact that Rigel and Alhabor both occur in the diagrams and tables; see, for instance, fig. 2. It is true that Rigel was sometimes called Algebar, but Alhabor stands rather for the Arabic El-abûr. The Arabic name for the constellation Canis Major was El-khelb el-akhir, "greater dog," as distinguished from El-khelb el-ezer, or "lesser dog;" and the star a Canis Majoris was called El-schira el-abûr, from the former of which terms (el-schira) we get Sirius, and from the latter (el-abûr) we have Alhabor. See Ideler, über den Ursprung und die Bedeutung der Sternnamen, pp. 237, 256.

§ 4. "The houses [in astrology] have different powers. The strongest of all these is the first, which contains the part of the heaven about to rise: this is called the ascendant; and the point of the ecliptic which is just rising is called the horoscope."—English Encyclopædia; art. Astrology.

ASTROLABE.
20. In the English Cyclopædia, art. Astrology, a quotation is given from an astrological work, in reply to the question whether the "querent" should succeed as a cattle-dealer. It contains some words very similar to Chaucer's. "If the lord of the sixth be in quartile, or in opposition to the dispositor of the part of Fortune, or the Moon, the querent cannot thrive by dealing in small cattle. The same if the lord of the sixth be afflicted either by Saturn, Mars, or the Dragon's Tail; or be found either retrograde, combust, cadent, or peregrine. [See l. 31.] The Dragon's Tail and Mars shew much loss therein by knaves and thieves, and ill bargains, &c.; and Saturn denotes much damage by the rot or murrain." The evil influence of the Dragon's Tail is treated of in the last chapter of "Hermetis Philosophi de revolutionibus nativitatum," fol. Basileæ; n. d.

30. "May see the ascendant." Cf. "Cum dominator ascendens videt, res quae occulta est secundum ascendentis naturam erit; quod si non videt, illud erit secundum naturam loci in quo ipse est dominator;" Cl. Ptolemæi Centiloquium; sect. 90.

38. Face. See note to Part I. sect. 21. l. 48. The late copies are very incorrect hereabouts.

§ 6. 9. Mr Brae well calls attention here to the absurd errors in the printed copies. Thynne has "in the 320 signe," and Speght "in the xxiii signe." The signs of the zodiac are only twelve, and the one opposite to the 1st is the 7th.

§ 8. I see no reason for supposing this proposition to be an interpolation, as Mr Brae suggests. Though similar to § 11, it is not identical with it. Moreover, it occurs in Messahala.

§ 9. 1. the chapitre beform, i.e. a previous chapter, viz. in sect. 6. The expression supplies no argument for altering the order of the "conclusions."

4. same manere, i.e. a like manner. The "vulgar night" clearly means that the quantity of the "crepuscules" must be subtracted from the "arch of the night."

§ 13. 5. cours, course; heiest cours, highest point of the path. Late copies have lyne; for which Mr Brae suggested degre.

§ 14. 6. but 2 degrees. Suppose the sun's midday altitude is 49°, in latitude 52°. Then the co-latitude is 38°, and the sun's declination 11° North. This corresponds nearly (roughly speaking) to the 1st degrees of Taurus and Virgo. Which is right can "lightly" be known by the time of year, for the sun cannot be in Virgo, if the month be April. Compare sect. 15.

§ 17. This conclusion, as pointed out in the footnote, is not correct in theory, but can be made nearly so in practice, by taking the two altitudes very near the meridian. This is directly implied in the words "passeth any-thing the sowth westward," i.e. passes ever so little westward of the south line; cf. note below to 38. 9. Consequently, the first observation must also be taken very near the meridian.

24. site, situation. Late copies, sight.
§ 18. Instead of reckoning a star’s right ascension by referring it to
the equator, it was reckoned by observing the degree of the zodiac
which southea along with it. This is expressed in the first “Table of
fixed stars” (in the Preface) by the phrase “cum gradibus, quibus
celum mediant;” the other co-ordinate of position was the star’s de-
clination from the equator, as in the modern method. The ancients also
used the co-ordinates of longitude and latitude of a star, the longitude
being reckoned along the ecliptic, and the latitude along great circles
through the poles of the ecliptic; as appears from the second Table in
the Preface.

§ 19. 6. equinoxial. This, as explained in the footnote, should be
“ecliptik;” but I can find no MS. authority for the alteration.

§ 22. 13. place. Late copies planet; absurdly. Latitudes of several
places are given in old Latin MSS. They are frequently incorrect.

§ 23. 3. The star A is shewn by the numbers to be the Pole-star,
and is obviously the one to be observed in order to find the altitude of
the Pole. What the star F is, is of no consequence. The numbers used
in other copies are different, and much less satisfactory. That the star
A is the Pole-star or some star near the pole in this “conclusion,” is
rendered probable also by the wording of the next “conclusion;” which
extends the working of it to the case of any other star, provided it be a
star that never sets.

§ 25. 18. When Chaucer says that the latitude of Oxford is “certain
minutes less,” he probably means no more than that the latitude of
Oxford was 51 degrees and 50 minutes, as in the text. For I suspect
the original reading of the passage made the sun’s altitude 38 degrees
only, and the latitude 52 degrees; indeed, the passage stands so in MSS.
C and P, both good authorities. But he added the statement that the
latitude of Oxford was less than 52 degrees. It is probable that, on
second thoughts, he put in the number of minutes, and forgot to strike out
the clause “I say nat this,” &c., which was no longer necessary. Minutes
were seldom reckoned otherwise than by tens; “a few minutes less than
50” (say 47) is a refinement to which the ancients seldom attained.
Hence the amount of 10 minutes is vaguely spoken of in l. 30 as “odde
Minutes.” Minutes were clearly not much considered. In the present
case, we are assisted by Chaucer’s express statement in sect. 22. l. 6.

§ 26. 8—11. It is singular that this sentence, obviously wanted,
should appear only in one MS., and has, accordingly, been deficient in
all previous editions. There can be no doubt about the genuineness of
it, as it so exactly gives the right sense, and happily supplies the words
“right orisonte” in l. 11; thus enabling the author to say, as in l. 20
he does say—“this forscid rihte orisonte.”

15. this figure. Here occurs, in some of the MSS., a diagram repre-
senting a circle, i. e. a disc of the astrolabe, with straight lines drawn
across it from left to right.

16. Assensious in the rihte cercle. This exactly answers to our
modern “right ascension.” We hence obtain the true origin of the
phrase. "Right ascension" was, originally, the ascension of stars at places situate on the equator, and was most conveniently measured along the equatorial circle, by observation of the times of transit of the various stars across the meridian. In other latitudes, the ascension of every degree of the zodiac could be easily tabulated by observing what degree of the equator came to the meridian with the said degree of the zodiac; see l. 18. It hence appears that, whilst persisting in using "longitudes" and reckoning along the zodiac, the ancients were obliged, in practice, to refer the degrees of longitude to the equator. The modern method of recognizing this necessity, and registering right ascensions as of more importance than longitudes, is a great improvement. The ancients were restrained from it by their unnecessary reverence for the zodiac. Cf. Ptolemy's Almagest, lib. i. c. xiii.

§ 29. Chaucer omits to say that the experiment should be made when the sun is very nearly on the meridian. Otherwise, the confusion of the azimuth with the hour-angle might cause a considerable error.

§ 30. That the phrase "wey of the sonne" really means the sun's apparent diurnal course in this conclusion, may be further seen by consulting the Latin of Messahala. Mr Brae objects to this; but I see no limit to the planet's position in the words of the conclusion. Cf. the Critical Note.

§ 31. In my footnote, I have used the expression "it does not mean, as it should, the zenith point." I mean—"as, according to our modern ideas, it should;"—for the derivation of zenith shews that the meaning used in this proposition is the older meaning of the two. See note above to i. 19. 7.

5. 24 parties. These 24 parts were suggested by the 24 hours of the day. The "32 parts" used by "shipmen" are due to the continual halving of angles. Thus, the four cardinal points have points half-way between them, making eight points; between which, we can insert eight more, making sixteen; and between these, sixteen more, making thirty-two. Hence the 32 points of the compass.

§ 33. 5. We should probably insert or south after the word north. Cf. the Critical Note.

§ 34. 5. That "vpon the mones side" means nearly in the same azimuth as the moon is apparent from l. 11 below, where Chaucer says that some treatises make no exception even if the star is not quite in the same azimuth. This was certainly a rough mode of observation.

§ 35. 9. riht side, East side. See i. 6. 1.

18. Epicycle, epicycle. To account for the planetary motions, epicycles were invented. The moon, for instance, was supposed to revolve round a moving centre, which centre itself moved round the earth in a perfect circle. This came a little nearer to the true motion in some instances, but was hopelessly wrong, and nothing could be made of it, even when a second epicycle, revolving about a centre which moved in the first epicycle, was superadded. All that Chaucer says here is, that, whilst the centre of the moon's epicycle had a direct
motion, the moon's motion in the epicycle itself was a reverse one, unlike that of the other planetary bodies. The subject is hardly worth further discussion, so I merely refer the reader to the Almagest, lib. iv. c. 5; and lib. ix. c. 5.

§ 36. The "equations of houses" means the dividing of the sphere into equal portions, and the right numbering of those portions or houses. The most important house was the first, or ascendent, just rising; the next in importance was the tenth, which was just coming on the meridian; then come the seventh or descendent, just about to set, and the fourth, just coming to the line of midnight. The next in importance were the succedents, or houses immediately following these, viz. the second, the eleventh, the eighth, and the fifth. See Succedent in the Glossary.

§ 37. 17. thise 3 houses. That is, the nadirs of the 2nd, 3rd, and 4th houses give the houses that "follow," i.e. the 8th, 9th, and 10th. The word "follow" here seems to refer, not to position, but to the order in which the houses may most conveniently be found. Chaucer omits to add that the beginnings of the 5th and 6th houses can be found in a similar way, because it is sufficiently evident. See the original in Messahala.

§ 38. 1. for warpyng, the broder the bettre. This may mean, either (1) to prevent warpyng, the thicker the better; or (2) to prevent the errors arising from warping (because of warping) the larger the better. I believe the latter to be the true interpretation; for it is better thus to guard against possible errors than to make the plate very thick and, at the same time, small. Besides which the usual meaning of broder is wider, larger, more ample. Indeed, we find the very expression "non sit tamen nimis parvus" in the 4th section of the Practica Chilindri of John Hoveden, published by the Chaucer Society; which see.

7. fro the centre, i.e. sticking up above the centre, the length of the wire being equal to a fourth of the diameter, or half the radius, of the circle. This proportion would do for many days in the year; but in the summer time, the pin would bear to be rather longer. Still, we need not alter the text. Cf. the Critical Note.

9. any-thyng, i.e. ever so little; so ony-thyng in l. 12.

§ 39. Though MS. A. is rather corrupt here, there is little doubt about the corrections to be made. See the Critical Notes.

19. That is, the latitude, or breadth, of a climate, or belt, is measured along a line which goes from North to South as far as the earth extends; so that the latitude of the first climate, for example, is measured from the beginning of it to the end of the same, in a due northerly direction. Other authors, he explains, reckoned the latitude of a climate always from the equinoctial line, instead of from the parallel of latitude which terminated the climate immediately to the south of it. Thus the latitude of the fourth climate might mean, either the breadth of that belt itself, or the whole breadth from the equator to the Northern limit of that climate. The MS. E. 2 in St John's College, Cambridge,
contains (besides Chaucer’s “Astrolabe”) a Latin treatise entitled “De septem climatibus expositio.” We find mention of the “climates” also in MS. Camb. II. 3, 3, fol. 33 b, where a diagram appears representing a hemisphere, divided by parallels of latitude into 9 climates or belts, which, beginning from the equator, are as follows. 1. Inhabitable propter Calorem. 2. Primum clima dia Meroes. 3. Secundum clima dya cienes. 4. Tertium clima di’ alexandrios. 5. Quartum clima dia rodos. 6. Quintum clima dia romes. 7. Sextum clima dia boristenes. 8. Septimum clima dia rifesos. 9. Inhabitabile. This agrees with the list in the footnote on p. 48.

There is a passage in Mandeville which well illustrates Chaucer; I quote the part of it which more immediately relates to the Climates.

“For the Superficialtee of the Erthe is departed in 7 parties, for the 7 Planetes; and the parties ben cleft Clymates. And our parties be not of the 7 Clymates: for they ben descendynge toward the West. And also these yles of Ynde, which beth evene azenst us, beth noght reckned in the Climates: for thei ben azenst us, that ben in the lowe Contree. And the 7 Clymates strechen hem, envyrounynge the World,” &c. Mandeville’s Voiage, ed. Halliwell, p. 186. See also Ptolemy’s Almagest, lib. ii.

As regards the longitudes of towns, it may be observed that in MS. F. 25 in St John’s College, Cambridge, the longitudes of Rome, Cordova, London, Paris, and Malta, are said to be 34°. 24', 9°. 30', 19°, 20°, and 38° respectively. These do not well agree together, but they suggest a reckoning from a meridian situated some 20° W. from that of Greenwich. Chaucer says nothing as to what meridian was used for reckoning longitudes from; and Messahala is but vague.

§ 40. It is possible that this conclusion was really intended to belong to the fourth part of the treatise, and was written by way of instalment. See the Prologue, II. 63—67. It is curious that in all the best MSS. (P excepted) the last sentence should be incomplete.

12. This sentence is very awkward. It seems to mean—“and then set I the point of F upward in the same sign, because that the latitude was north, upon the latitude of Venus; that is to say, (I set it upward) keeping it in the 6th degree of Capricorn.” Upward means inward, i. e. towards the centre or towards the north; the opposite being expressed by southward, or outward, or toward the border, as in I. 46 below. Upon the latitude of Venus means that the point F of the compass was set upon the second degree of latitude, so that the space between the legs of the compass became equal to 2 degrees, as said in I. 15. Lastly, the words that is to seyn, in the 6 degree, &c., are an explanation of the vaguer expression in the same signe. The repetition of the words that is to seyn, &c. (II. 11 and 14), is intended to draw attention to the necessity of keeping both legs of the compass in the same degree of longitude.

55. Possibly Chaucer left the sentence incomplete. The words “thou shalt do well enough” may easily have been added by another hand to bring the sentence to an apparent, though not wholly satisfac-
tory, conclusion. Colophon. This colophon is written (in a later hand) in MS. A at the bottom of the page, a part of which, after the words "howre after howre," is left blank.

41—43. I have mended the text as well as I could by words, &c., inserted between square brackets. Nearly all the emendations rest on authority; see the Critical Notes. The text is not a good one, but I do not see why these sections may not have been written by Chaucer. For a definition of the terms "Umbra Extensa" and "Umbra Versa," see sections 5 and 6 of the Practica Chilindri of John Hoveden, published by the Chancer Society. The umbra extensa or recta is the shadow cast on a plain by any perfectly upright object; but the restriction is commonly introduced, that the altitude of the sun shall exceed 45°. The umbra versa is the shadow cast perpendicularly downwards along a wall by a style which projects from the wall at right angles to it; the restriction is commonly introduced, that the sun's altitude shall be less than 45°. The umbra versa is the one which appeared on the "chylindre"; hence John de Hoveden explains how to calculate the altitude of an object by it.

44. This article and the next may possibly be Chaucer's. It is well-known that he speaks of "collect" and "expans yeres" and "rotes" in the Frankeleines Tale; Cant. Ta. l. 11587; the note upon which in the glossary to Urry's Chancer may be found also in Tyrwhitt's Glossary, s. v. Expans; but it is worth while to repeat it here. "In this and the following verses, the Poet describes the Alphonsine Astronomical Tables by the several parts of them, wherein some technical terms occur, which were used by the old astronomers, and continued by the compilers of those tables. Collect years are certain sums of years, with the motions of the heavenly bodies corresponding to them, as of 20, 40, 60, &c., disposed into tables; and Expans years are the single years, with the motions of the heavenly bodies answering to them, beginning at 1, and continued on to the smallest Collect sum, as 20. A Root, or Radix, is any certain time taken at pleasure, from which, as an era, the celestial motions are to be computed. By 'proporcionel convenientes' [C. T. l. 11590] are meant the Tables of Proportional parts.' To which Tyrwhitt adds, from Chambers's Encyclopædia, with reference to C. T. l. 11589, that "Argument in astronomy is an arc whereby we seek another unknown are proportional to [or rather, dependent upon] the first." See also Entere in the Glossary.

Tables of mean motions of the Sun are given in Ptolemy's Almagest, lib. iii. c. 2; of the Moon, lib. iv. c. 3; of the Planets, lib. viii. c. 3; also in MS. TI. 3. 3, fol. 88b, &c.

41a—42b. The fact that these articles are mere repetitions of sections 41—43 is almost conclusive against their genuineness. I do not suppose that sect. 46 is Chaucer's either, but it is added for the sake of completeness.
Nomina instrumentorum sunt hec. ¹ Primum est armilla suspensoria ad capiendam altitudinem, et dicitur arabice alhahucia. ² Secundum est alhabor, id est, ansa quae iungitur ei. ³ Postea mater, ⁴ rotula scilicet, in se continens omnes tabulas cum aranea, cui coniungitur margolabrum scilicet in .360. gradus diuisum. ⁴ Tabule autem ab hac contente figurantur tribus circulis quorum minor est circulus cancri, et medius est circulus equinocitialis, et maximus 8 circulus capricorni. ⁵ Postea circulus almucantherath, qui sunt circuli in medietate superiori descripti quorum quidam sunt integri, quidam apparent imperfecti; quibus prior est orizon, et diuidit duo emisperia. Centrum autem interioris almucantherath cenit caputum ¹² nominatur. ⁶ Deinde est azimuth, qui sunt partes circulorum almucantherath intersecantes. ⁷ Post quas sunt hore, in medietate inferiori descripte. In[ter] horas .2. sunt crepusculorum linee. ⁸ Postea linea medii celi, que est linea descendens ab armilla per centrum in ¹⁶ oppositam partem astrolabii, cuius medietas a centro in armillam dicitur linea meridiei; et alia dicitur angulus terre et medie noctis. ⁹ Post hec et sequitur alhanthabuth, id est aranea, in quo sunt signa cum zodiaco constituta, stelle quoque fixe, in quo via dicitur esse ²⁰ solis; et quicquid fuerit infra motum capitis arietis et libre, ex hoc zodiaco, septemtrionale; quod autem extra, meridianum. ¹⁰ Sequitur

almuri, quod ostensor dicitur latine, denticulus scilicet, extra circulum capricorni; in alhanthabuth relictus deinde almenath, id est, foramen quod est in medio rethis; in quo est axis retinens tabulas 24 climatum, in quam intrat alphiaeraez, id est, equus restringens araneam cum rotula, quasi cuneus. Et in illa parte matris sunt 2. circuli equationis solis exterius, quorum enim continet numerum dierum anni .365., et scribentur sub eo nomina mensium. Et alius signorum 28 gradus, et infra eum scribuntur nomina signorum. Postea quarta capiende altitudinis. Postea quadrans, cuius latera in 12. puncta diuisa sunt. Sequitur regula, que circumuoluitur in dorso astrolabii, in qua sunt tabule perforate, ad capiendum altitudinem solis 32 in die, stellarum in nocte.

Cum volueris scire gradum solis, pone regulam super diem mensis presentis, et gradus a summitate eius tactus erit gradus solis, qui cuius signi sit uidebis, et eum ex alia parte nota in zodiaco in 36 rethi. Notabis et nadayz eius, quod est simul gradus .7. signi. Diem quoque mensis per gradum solis inuenies; posita enim regula super gradum solis diem quesitum ostendet.

De altitudine solis et stellarum inuenienda capitulum.

Cum vis altitudinem solis scire, Suspende astrolabium de manu tua dextra per eius armillam, et sinistro tuo latere soli opposito, subleua vel deprime regulam, donec radius solis per utriusque tabule foramen transeat; quo facto, vide quot gradus a linea orientali 44 eleuatur regula, et est solis altitudo; similiter facies in nocte, per stellas fixas.

Si autem vis scire certitudinem hore et etiam ascendentis, pone gradum solis super almucantherath altitudinis, ex parte orientis, si 48 altitudo sit ante meridiem; aut ex parte occidentis, si altitudo sit accepta post medium diem; et super quam horam ceciderit nadayz gradus solis erit hora presens, et signum quod fuit ex parte orizontis orientalis, est oriens, id est, ascendens; quod uero in occidentali, 52

1 Pt I. § 14. 2 Pt I. § 9. 3 Pt I. § 10. 4 Pt I. § 7. 5 Pt I. § 8. 6 Pt I. § 12. 7 Pt I. § 13. 8 Pt II. § 1. 9 Pt II. § 2. 10 Pt II. § 3.
occidens. Quod uero ceciderit in linea medii celi est in medio celo, et eius nadays angulus terre.

1 Et si ceciderit inter duo almuchantherath, vide differentiam numeri inter almuchantherath precedentem et altitudinem solis, et denomina differentiam de numero longitudinis almuchantherath, quod est .6., si almuchantherat continet .6. gradus et .6.; quod si almuchantherath contineat .3. gradus et .3., denomina partem illorum de .3.; et 60 sic de alis. Postea scito motum almuri ab initio primi almucantheranthusque ad inicium secundi de gradibus marginis; et pone super illorum partem denominatam ab eis, secundum proportionem differentie dicte, ex .6. vel de .3. gradibus; et tunc habebis certum 64 gradum inter duo almuchantherath; et tunc considera eas horas, &c., sicut dictum est superius. Si illud idem in noxte scire desideras, accipe altitudinem alcius stelle, in alhanthabuth descriptive, que transit ex parte orientis uel occidentis; et pone cacumen illius stelle 68 in almucantherath sue altitudinis, et gradus solis indicabit tibi horas noctis, sicut nadayz eius diei; de alis fac omnibus sicut dictum est in superioribus.

De crepusculo vespertino et matutino.

72 Cum volueris scire finem crepusculi uespertini et inicium matutini, vide cum uenerit gradus solis ad lineam crepusculi occidentalis; tunc est finis eius; et cum ad orientalem, est inicium crepusculi.

2 Aliter idem.

Uel sic; vide quam nadayz solis uenerit ad .18. gradum almuchantherath in oriente, erit finis crepusculi uespertini; et cum venerit ad .18. gradum almuchantherath in occidente, est inicium crepusculi matutini; et hec est leuis.

3 De inuencione arcus diurni et nocturni: Rubrica.

Si vis scire arcum diei et noctis, pone locum solis, id est, gradum in quo est super primum almucantherath; et nota locum almuri 84 inter gradus limbi; post hec moue gradum solis usque ad occidentem;

1 Pt II. § 5. 2 Pt II. § 6. 3 Pt II. § 7.
et nota etiam locum eiusdem in ipsis gradibus; et motus eius ab una
nota in aliam est arcus diei; reliqua uero pars circuli est arcus
noctis, quia illa duo continebunt .360. gradus, que est quantitas diei
et noctis; similiter facies de stellis fixis, si uolueris scire earum 88
moram super terram.

1 De quantitate horarum diei inequalium.

Si volueris quantitatem horarum inequalium diei scire, diuide
arcum diei per .12., et habebis numerum graduum hore diurne; 92
quem si subtrahis a .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.

Si horas diei uolueris querere equales, diuide arcum diei per .15., 96
et habebis numerum horarum equalium; similiter in nocte.

De parte hore partita inuenienda per almuri capitulum.

Cum transient pars hore, et uolueris scire quota pars sit hore,
scito numerum graduum in labro ab inicio hore illius in almuri; et 100
quomodo ille numerus se habebit ad numerum totius hore, sic pars
transacta se habebit ad totam horam.

2 De numero horarum diei equalium preteritarum inueniendo
capitulum.

Si volueris scire quot hore equales transierunt de die, accipe
gradum solis, et pone super almuchanthanth altitudinis et signa
locum almuri in gradibus. Postea uolue retro gradum solis usque ad
primaum gradum almuchantherath in oriente; et secundo nota eius-108
dem locum; post hec diuide gradus qui sunt inter .2. notas per .15.,
et habebis horas equales. Similiter facies de noche; postquam enim
inueneris horam inequalem per gradum et altitudinem alieuius stelle,
signato loco almuri, reduces gradum solis ad orizontem occidentalem,112
et notabis iterum locum almuri. Spacium inter hec duo loca
diuides, sicut prius, per .15. scilicet, et inuenies. Eodem modo
scies quot sint hore equales inter meridiem et quemlibet punctum
alium, et quodlibet instans.

1 Pt II. § 10. 2 Pt II. § 11.
De conversione horarum inequalium in horas equales: Rubrica.

Si volueris reducere horas inequales in horas equales, scito gradus horarum inequalium, quot sint; et diuide eos per .15., et 120 habebis horas equales; similiter facies de horis equalibus.

De altitudine solis in meridie habenda capitulum.

Si volueris scire altitudinem solis in media die, quod est inicium recessionis, pone gradum solis super lineam mediit celi; et numerus 124 graduum almucantherath a loco solis in orizontem est altitudo eiusdem medie diei. Similiter fac cum stellis fixis.

Inuencio hore diei per allidadam: capitulum.

Si per allidadam horariam uis scire horam diei naturalem, pone 128 allidadam super altitudinem medie diei illius in dorso astrolabii suspensi; et uerte dorsum ad solen tam diu donec umbra vnius-cuiusque anguli superioris pinnule cadat in allidada, quelibet in directo sui lateris; et vbi occiderit in divisionibus erit hora quesita.

De eodem inueniendo per lineas.

Item per allidadam in dorso et lineas horarum inter latera gnomonis, si sint posite ut in quadrante, sic. Super altitudinem solis meridianam in illa die pone allidadam; et nota vbi meridianus 136 circulus, id est, linea finis .6. hore, secuerit lineam fiducie ipsius allidade; et pone ibi signum de incausto; et illud signum valet situationem margarite in quadrante; deinde accipe altitudinem solis in quacunque hora vis, et illud signum inter horas dabit horam 140 naturalem, ut in quadrante.

Capitulum preambulum ad quedam sequencia.

Amplius scito quod circulus signorum diuiditur in .2. semi-circulos, quorum vnus est a capite capricorni in caput cancri, et alius 144 a capite cancri in caput capricorni; et caput capricorni est solsticiun
hyemale, caput cancri estuiale. Scito et quod omnis duo equidistantes gradus ab aliquo horum solsticiorum sunt vnius declinacionis versus septentrionalem vel meridiem; et dies eorum vel noctes sunt equales, et umbre et altitudines in media die sunt equales.

1 De gradu solis ignoto per rethe habendo.

Si volueris cognoscere gradum solis ignotum, pone notam super altitudinem medie diei, quam sumpsisti prius per regulam in dorso astrolabii; deinde uolue rethe, cadentque duo gradus super ipsam notam; quorum vnum scies esse gradum solis per signum mensis cuius fuerit dies.

2 Quis dies cui diei sit equalis.

Si volueris scire, que dies cui diei sit equalis, scies hoc per gradum equedistantem a solsticiis, quia eorum dies sunt equales, sicut dictum est superius.

3 De Inuencione gradus stelle cum quo celum mediat.

Si uolueris scire cum quo gradu uenit stella aliqua ad medium diem, uel oritur; pone stellam super lineam medie diei, quia gradus qui cecidit super eandem lineam est gradus quesitus; similiter fac ad lineam orientalem et occidentalem. Gradum uero longitudinis habebis per filum positum super polum zodiaci, per totam declinacionem inuentum.

4 De altitudine cenith solis habendi.

Si uolueris cénith solis scire, accipe altitudinem eius hora qua uolueris hoc scire, et pone gradum solis super almucanthanth altitudinis in parte qua fuerit, sicut facis ad inuentionem horarum. Post hec, accipe quid congruit gradui solis de azimuth, et super quem gradum sit cenith de quarta que opponitur; et necesse est ut hec quarta sit meridiana orientalis, uel septentrionalis orientalis; aut occidentalis meridiana, uel septentrionalis occidentalis; et similiter facies de stellis fixis per earum altitudines.

1 Pt II. § 14.  2 Pt II. § 15.  3 Cf. Pt II. § 18.  4 Pt II. § 33.
1 De cenith ortus solis habendo, et aliorum planetarum.

176 Et si uolueris scire cenith ortus solis, vel alicuius stelle fixe, pone gradum solis uel stellam super orizontem orientalem, et aspice quid sibi accidat de azimuth, similiter quam sit ortus; et hoc est cenith ortus, et super simile eius erit occasus in simili eius quarta, siue 180 orientalis, siue meridionalis fuerit.

2 De quatuor plagis mundi: Rubrica.

Ad habendas quatuor plagas mundi veraciter, accipe altitudinem solis ut supra, et vide in quota quarta sit; deinde vide in qua 184 altitudine ipse gradus solis sit inter lineas azimuth in principio quarte orientalis, que incipit a colouro septentrionali siue a medie noctis linea, a qua incipies computare; et quotus fuerit numerus, tantum sume in dorso astrolabii, ab ipso colouro uersus armillam, pro-

188 cedendum per orizontem, si est ante meridiem, vel per occidentem, si est post meridiem; et vbi numerus idem finitur, ibi pone regulam; deinde astrolabium utraque manu tenens, sursum uersa eius posteriori superficie, diligenter te oppone soli, donec radius solis transeat per 192 ambo foramina; tunc caute illud pone super terram, ut non moueatur ad aliquam partem; habebis quatuor lineas in centro astrolabii concurrentes, quatuor mundi plagas directe oppositas indicantes, scilicet orientalem, occidentalem, &c.; similiter operabis in nocte per 196 stellam fixam. Vel locata iam regula in dorso astrolabii, sursum uersa eius facie, eque distantor orizonti ut proximo dictum est, fac umbram amborum angulorum pinnule cadere super .2. latera regule, scilicet, dextram umbram super latus dextrum, et sinistram umbram 200 super sinistrum latus; et statim habebis quatuor lineas et quatuor plagas mundi predictas.

3 De declinacione cuiuslibet gradus habenda.

Si scire uolueris declinacionem cuiuslibet gradus signorum, pone 204 super lineam medi i cel i uel diei, et scito eius altitudinem ab oriente; postea scito altitudinem capitis arietis et libre in eadem linea; deinde scito altitudinem utramque, et differentia ipsarum altitudinum

1 Cf. Pt II. § 31. 2 Pt II. § 29. 3 Pt II. § 20.
est declinatio eiusdem gradus ab equinoctiali linea. Si autem gradus signi fuerit septentrionalis, est declinacio septentrionalis; si 208 meridiana, meridiana. Scito etiam quod gradus signorum septentrionalium sunt altiores equinoctio, quod est in capite arietis et eius opposto; et meridionalium inferiores, secundum declinationes eorum ab eo. Maior autem declinacio est in capite cancri et capricorni: 212 eodem modo inuenies declinacionem stellarum fixarum.

1 De altitudine poli vel latitudine regionis.

Scito quod altitudo regionis sit latitudo cenith capitum 2 ab equinoctiali circulo versus septentrionalem vel meridiem, que similis 216 est altitudini poli septentrionalis, et depressioni eius oppositi ab orizonte, que duo sunt in parte equales. Cum ergo latitudinem cuiusque regionis scire volueris, altitudinem solis in media die considera, quam minues de .90., si fuerit sol in inicio arietis et libre, et 220 quod est residuum erit latitudo regionis; tunc enim motus solis erit in equinoctiali linea. Si uero in alio gradu fuerit sol, eiusdem gradus declinationem considera per tabulam declinationis solis, vel per regulas ante datas; quam minues de altitudine solis in medio 224 die, si fuerit septentrionalis; si uero meridionalis, adde illam; et habebis altitudinem inicii arietis in regione illa, quam subtrahes sicut predictum est a .90., et quod remanserit est distance regionis ab equinoctiali linea.

De eodem, scilicet aliter, capitulum: Rubrica.

Uel si volueris accipere altitudinem cuiusvis stelle altiorem, et eius elongacionem ab equinoctiali linea considera; cum qua fac ut supra dictum est. 3 Vel quere cuiusvis stelle non occidentis in eadem 232 regione altitudinem altiorem et inferiorem, et utriusque insimiliter collecte tolle medietatem, que est altitudo poli in eadem regione.

4 De noticia tabule almucanterat.

Si uis scire ad quam latitudinem facta sit tabula almucantheralis, 236 vide in linea meridiana quot almucantherath sint in circulo equi-

1 Pt II. § 25.  2 cum eius (sic); MS. Hh. 6. 8 has capitum; see l. 11. 3 Pt II. § 24. 4 Pt II. § 21.
noctiali usque ad cenith, vel ab axe ad orizontem in septentrione; et super tantam latitudinem facta est tabula: altitude uero arietis est 240 tot graduum quot fuerint ab eodem circulo ad orizontem, vel a cenith ad axem.

De horis inueniendis per tabulas latitudinis: Rubrica.

Cvm in aliquo regione, cuius latitudo in tabulis astrolabii non 244 fuerit descripta, uolueris inuenire per illud astrolabium horas illas, regionis latitudinis et latitudinis maioris propinquioris sibi et minoris ibi descripte nota differentiam; deinde proportionem illius differentiae ad differentiam que est inter minorem latitudinem ibi 248 descriptam et maiorem, inter quas videlicet est latitudo regionis illius, memorie commenda. Postea uero accepta solis altitudine in eadem regione, quere horas per latitudinem minorem, et similiter per latitudinem maiorem, et harum horarum diversarum differentie tolle 252 partem proportionalem, secundum proportionem differentiae superius sumptam; quam partem addes horas minoris latitudinis, si fuerint pauciores horas maioris latitudinis, vel subtrahes ab eisdem, si fuerint plures; et que tunc remanserint erunt hore illius regionis; similiter 256 facies in horis noctis et in aliis operibus.

1 De gradu solis ignoto habendo.

Cvm qualibet die gradum solis per alhanthabuth uolueris inuenire, altitudinem eius in media die considera, quam notabis in 260 almucanthurth in meridiana linea; tunc quartam circuli signorum in qua fuerit sol gira;2 et graduus qui continget notam altitudinis in media linea est graduus solis.

De longitudine inter duas regiones habenda per eclepsim.

264 3 Longitudo regionis ab alia est distansia meridiani circuli vnius a meridiano circulo alterius. Cumque uolueris scire longitudinem inter .2. regiones, considera inicium eclepsis lunaris, per quot horas equales distet a medio precedentis diei in utrisque regionibus. Deinde minue horas vnius regionis de horas alterius, et que reman-

1 Pt II. § 14.  
2 Written giza; but MS. Hh. 6. 8 has gira.  
3 Cf. Pt II. § 39. 1. 11.
serint erunt hore longitudinis inter utrasque; multiplicata ita ea in .15., et habebis quot gradus sit earum longitudo ab inuicem. Longitudines quarundam regionum, hoc est, elongationes circulorum earum meridianorum a meridiano circULO ultime regionis habitabilis in 272 occidente, et earum longitudines et distancias ab equinoctiali circulo notabimus in quadam tabula sufficienter.

**De eodem in miliaribus capitulum.**

Si quot miliaria sint in[ter] .2. regiones a se inuicem distantes 276 noscere queris, longitudinem et latitudinem inter utrasque considera; deinde longitudinem in se ductam latitudini in se multiplicate aggrega, et collige; inde summe tolle radicem, et unicuique gradu ipsius radicis et dimidio da .100. miliaria; et per tot [miliaria] distat vna regio ab alia. 280 Si autem earum latitudo fuerit cadam, fac cum gradu longitudinis tantum, sicut deberet fieri cum gradu radicis. Si uero longitudo fuerit vna, fac cum latitudine tantum, et inuenies quod queris.

1 Scientia ascensionis signorum in circulo directo. 284

Si autem ascensiones signorum in circulo directo scire desideras, inicium cuiuisuis signi super lineam meridianam pone, et locum almuri in margine nota; postea moue rethe donec finis signi cadat super lineam meridiei, et gradus quibus mouebitur almuri erunt 288 ascensiones eiusdem signi; et similiter facies ad quamlibet portionem circuli.

2 De ascensionibus signorum in circulo obliquo.

Ascensiones autem signorum in qualibet regione sic poteris 292 inuenire; moue rethe ab inicio signi usque ad finem eiusdem, et gradus quibus mouetur in margine almuri erunt ascensiones signorum in eadem regione; mouebis enim signum in orizontis parte orientali, ut scias eius ascensionem: vt autem scias eius moram in occasu, 296 mouebis illud in orizontis parte occidentali; ita etiam fiet in qualibet circuli portione. Gradibus eciam ascensionum diuisis per .15., et residuo pro horis fractibus (sic) computato, habebis horas equales, uel eis diuisis per numerum graduum hore inequalis, patebit per quot horas 300

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1 Pt II. § 27.  2 Pt II. § 28.
De noticia stellarum incognitarum positarum in astrolabio.

Ut habeatis noticiam stellarum incognitarum que posite sunt in astrolabio, sume primo altitudinem alcuuis stelle note, et pone eam in almucantherath, super similem altitudinem; postea vide stellam quam uolueris scire, super quantam altitudinem iaceat inter almucantherath, et in qua parte sit, scilicet, in oriente vel occidente; quo uiso, pone eam in dorso astrolabii super eandem altitudinem, et verte illud ad eandem plagam celli in qua accepiisti stellam; et maior stella quam vides per foramina regule ipsa est quam quieris.

De noticia stellarum incognitarum non positarum in astrolabio.

Scire uolens gradum stelle ignote, in astrolabio non posite, uel planete, expecta donec ille planeta vel stella sit in meridie; deinde visa aliqua stella cuius locum pro certo scias et astrolabio insignite, secundum altitudinem eius retie dispone, ponendo stellam inter almucantherath super similem altitudinem; et directo gradus signorum qui erit in linea medii celli erit stella de qua dubitas, et est longitudo eius nota; latitudo patet, computatis almucantherath a nota illius altitudinis usque ad equinocialem. Potes eciam per occasum solis retie tuum disponere, si nullam stellam cognoueris, et sic cognosces omnes stellas.

Ad sciendum in quo gradu signi luna sit: Rubrica.

Cvm in quo gradu signi luna sit scire uolueris, altitudinem lune considera; et eam in almucantherath, in parte in qua fuerit, nota; deinde stellam aliquam in rethi constitutam super altitudinem suam in eadem hora cum altitudine lune acceptam, in parte qua fuerit, pone; et gradus circuli zodiaci qui ceciderit inter almucantherath super altitudinem lune, eritque gradu lune. Si autem apparuerit in die, idem facies cum altitudine illius et altitudine solis, Considera

1 See Additional Note to Pt II. § 3. 1. 26. 2 Pt II. § 34. 3 Written stella; but MS. Hh. 6. 8 has luna.
igitur cuius signi sit gradus. Idem poteris quoque eodem modo planetarum loca investigare, si eorum altitudinem in nocte poteris notare.

De loco lune inueniendo capitulum.

Cvm in quo gradu sit luna scire desideras, quot dies habeat mensis lunaris in eadem die considera, quibus duplicatis, quod col-lectum fuerit distribue per .5., dando cuilibet signo .5., et incipias a signo in quo fuerit sol; et vbi numerus finierit, in eodem signo est luna; et si remanserit, id est, infra .5., iam perambulauit luna .6. gradus.

De locis planetarum inueniendis.

Loca planetarum poteris in alio modo inuestigare, et verius. Sume altitudinem planete quum est iuxta lineam medii celi, et serua eam. Item, sune ad eandem horam ascendens per aliquam stellarum fixarum, et hoc serua eciam cum hora; posthec vide quam ille planeta incipiat descendere a linea medii celi, et sume eius altitudinem quem 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 ascendens primum et secundum per almuri in limbo; et gradus qui ceciderit tunc super lineam medii celi, in illo est planeta.

De latitudine planetarum a via solis inuenienda.

Scire uolens utrum planeta sit australis uel septentrionalis in 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 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.

De directione et retrogradacione planetarum.

Utrum planeta sit retrogradus uel directus sic poteris inquirere; cuiusuis eorum altitudinem et altitudinem stelle quoque fixe memorie

1 Pt II. § 17. 2 Pt II. § 30. 3 MS. planeta. 4 Pt II. § 35.
De equacione .12. domorum per astrolabium.

Cvm .12. domos uolueris adequare, gradum ascendentem super lineam .8. hore pone; tunc gradus qui ceciderit super lineam medie noctis est inicium secunde domus. Deinde reducto gradu ascendentis ad finem .10. hore, gradus inuentus super predictam lineam medie noctis est inicium .3. domus. Reduces quoque eundem gradum ad orizontem orientalem, et erit eius nadayz in orizonte occidentis; gradus uero in eadem prenominata linea existens erit inicium .4. domus. Pones etiam nadayz gradus ascendentis super finem .2. hore, et tunc predicta linea indicabit tibi inicium .5. domus. Si autem posueris idem nadayz super finem .4. hore, cadet inicium .6. domus super eandem lineam medie noctis. Inicium autem .7. domus est nadayz ascendentis. Et inicium .8. nadayz secunde; principium .9e nadayz .3e; et .10e nadayz quarte. Principium vndecime nadayz .5e et .12. nadayz sexte.

De eodem, scilicet aliter, capitulum.

Item, habito ascendente et aliis tribus angulis, pone regulam nouiter super retbe constitutam super gradum ascendentem, et gradus limbi inter eam et armillam uel punctum meridianum diuisi in .3. partes sunt ascensiones trium domorum ab ascende in meridiem; vnde si posueris eam super primam .3. ab ascende, habebis in zodiaco inicium .12. domus, et super secundam .3., inicium .11. domus. Eodem modo de gradibus limbi inter eam in ascende et punctum in angulo terre facies, et habebis alias .3. domos, scilicet,

1 Pt II. § 36. 2 Pt II. § 37.
De aspectibus planetarum.

Si autem aspectus duorum planetarum, uel .2. graduum quorum-libet seire uolueris, pone eandem regulam super ipsos, et vide gradus 400 limbi intermedios, qui si fuerint .60., est aspectus sextilis; si .90., quartilis; si .120., trina; si .180., oppositionis; si nichil fuerit, coniuncti. Si autem citra hos terminos .5. minus fuerit, erit applicatio ad aspectum; si plus, separatio ab eodem. Secundum quosdam, 404 hiidem aspectus habentur ex gradibus equalibus. Secundum phtholomeum fit aliter, secundum gradus ascensionum, quemadmodum equatio domorum sic atque numeris. Radiationum alia dextra, alia sinistra; pro sinistra quidem radiatione, gradum planete super lineam 408 meridianam pone, atque almuri signa; deinde ipsum almuri motu dextro, pro radiatione exagonali, .60. gradus procedat; pro tetragonali, .90.; pro triagonalie, .120.; et notetur medii celi gradus, ipse enim radiationis prime locus est; deinde gradum planete super almucan-412 therath orientale pone, atque almuri signa, procedatque almuri motu dextro pro exagonali quidem .60., pro triagonalie .120., pro tetragonali .90.; et notetur gradus ascendens, ipse enim radiationis secunde locus est; accipe itaque differentiam istarum duarum radiationum, et 416 serua eam. Deinde gradum medii celi hora acceptionis operis super meridianam pone, atque signetur alius; procedatque motu dextro, donec planete gradus meridiano insideat, fiatque nota in almuri et capiatur numerorum .2. intersticium, ducaturque in differentiam radiationum; 420 quale inde producetur per arcum lucis siue dei ipsius planete diuidatur, si super terram fuerit radiatio planete; si uero sub terra, per arcum noctis eius; et quod de diuisione exerit, erit radiationis equatio; que equatio minuetur a radiatione maiori, si fuerit planeta 424 inter .10. et .7. aut inter .4. et primum; addetur equatio super radiationem minorem; sicque post additionem [vel] subtractionem habebis radiationem quesitam; pro dextra autem radiatione inuenienda, erit processus almuri motu sinistro promouendus; cetera ut 428 supra.
Scientia anni mundani vel naturalis.

Cvm uolueris anni naturalis vel meridiani revolutionem scire, 432 gradum ascendentis transacti anni pone super orizontem in oriente, et locum almuri in margine signa; posthec almuri ab eodem loco in .93. gradu moue, et gradu qui ceciderit supra orizontem est gradus ascendentis eiusdem anni. Si autem planetes fuerint anni, pro vno-436 quoque anno reduces almuri .93. gradus, et gradus existens in orizonte in parte orientali erit ascendens ipsius anni.

Quot hore equalis sunt inter annum preteritum et revolutionum.

Si autem uolueris scire quot hore equales sint inter annum pre-440 teritum et annum revolutionum, gradum perambulationis almuri diuide per .15., et numerus qui exierit de divisione est numerus equalium horarum inter utrumque annum exientium.

De Gnomonis officio; et primo, de umbra altitudinis.

444 Quadrantis in astrolabio constituti .2. sunt latera, in .12. partes equales diuisa, que uocantur puncta umbre. Sed notandum, quod latus inferius uocatur umbra extensa; et aliud latus vmbra uersa;1 quia vnum representat puncta vmbra extense, et aliud uersa. Cum 443 ergo per hoc opus uolueris scire quot punctorum gnomonis fit umbra uersa vel extensa, considera altitudinem solis; si fuerint .45. graduum est vnaqueque earum .12. punctorum equalium, scilicet, suo gnomoni. Si autem fuit major altitude solis, tanget regula latus vmbre extense; 452 et si diuiseris per ea .144., inuenies puncta uersa. Si uero solis altitude fuerit minor .45. graduum, tactus regule in vmbra uersa ostendet eius puncta; per que diuide, et habebis puncta umbre extense; nam si puncta umbre uerse multiplicaueris in puncta umbre extense, 456 prouenient ex multiplicatione .144., que proueniunt eciam ex multiplicatione .12. in semet ipsis, que sunt partes gnomonis vnius. Scien-dum est eciam quod si in acceptione umbre per altitudinem ceciderit regula in parte alicuius puncti, et uolueris eam denominare a toto, 460 moue regulam ab inicio illius puncti in partem ipsam, et vide quot

1 Cf. Part I. § 12.
gradus moueatur regula, qui erunt gradus illius partis. Deinde moue regulam ab inicio illius partis in finem illius, et vide iterum quot gradus moueatur regula, qui erunt gradus totius; tanta proportione se habet pars puncti ad totum punctum.

**Inuencio altitudinis rerum per puncta vmbre; capitulum.**

Ut autem per umbram inuenias altitudinem, pone regulam supra puncta vmbre extense, si fuerint pauciora .12., et tactus eius in quarta altitudinis ostendet altitudinem. Si autem fuerint plura .12., diuide per ea .144., et inuenies puncta umbre verse; super que pone regulam, et tactus eius in quarta altitudinis ostendet tibi altitudinem. Si fuerit vmbra .12. punctorum, est altitudo .45. Si uero cum predictis habueris fractiones, vide quid debeatur sibi de gradibus, ut supra demonstratum est.

**Inuencio vmbre meridiei per altitudinem.**

Cum uolueris medie dici umbram scire, altitudinem solis in medio eiusdem dici quere, et per ea inuenies umbram, ut supra dictum est. 476

**Inuencio altitudinis rei accessibilis sequitur apponenda.**

Cvm eleuate rei altitudinem uolueris scire, regula[m] super .45. gradum in quarta altitudinis pone, et tam ante uel retro moue, donec per vtriusque tabule foramen rei eleuate vides summaitatem; tunc 480 quanta est longitudo a loco in quo fueris in radicem rei, cum additione stature tue a visu usque ad terram, tanta est procul dubio altitudo rei. 1Si autem eius altitudinem, ita ut non remouearis a loco vno, uolueris inuenire, tam diu regulam subleua uel deprime quod per 484 utriusque foramen vides cacumen; tunc si regula ceciderit super puncta umbre extense, considera quanta proportione se habeant .12. ad ista puncta; et tanta proportione se habebit altitude rei ad longitudinem inter et ipsam, cum statura tua addita longitudini. Si 488 uero ceciderit super puncta umbre uerce, quota pars erit altitude rei illius longitudinis inter se et eius radicem, coniuncta longitudini statura tua. Vnde notandum, quod

1 Part II. § 41.
si fuerit regula super dyametrum quadrantis, est rei altitude equalis longitudini, sibi addita statura. Et si fuerit super umbram extensam, est altitude maior longitudine; si uero est super uersam, minor longitudine.

De altitudine rei inaccessibilis mecienda capitulo.

Si uero rei inaccessibilis altitude fuerit metienda, per utrumque regule foramen metiende rei summittatem respice, quia inspecta puncta quot sint meciuntur, que, exempli causa, dicantur .3., que in 500 latere umbre quater continentur; quo pacto, retro ab eodem loco perge, ut mensurande rei cacumen iterum per utrumque foramen videas; quo viso, numerum punctorum umbre denuo vide, que scilicet erunt .2. puncta, que in .12. punctis continentur sexies; et 504 interuallum stationum .12. pedum notabis esse. Hijs itaque pactis, minus continens ternarij, scilicet .4., a maiori continente binarij, scilicet .6., auferatur, et binarius qui pertransierit memorie commendetur; et interuallum .2. stationum, quia ex proportionibus 508 remansit binarius, duplum altitudini inaccessibili pro certo habeatur. Est enim omnibus hec vniuersalis regula: subtractione continencium facta, si unum remanserit, interuallum stationum metientis erit altitudini rei equalis; si duo, duplum; si tria, triplum; et sic de 512 ceteris intellige.

De mensuracione plani: Rubrica.

Si queris cum astrolabio metiri planiciem, per utrumque foramen limitem eius ex aduerso posito considera; post hec puncta umbre supra 516 [quam] steterit regula ad .12. compara; et qualis fuerit comparatio punctorum ad .12., talis est comparatio stature tue ad planiciem.

Explicit astrolabium messehalle.

1 Part II. § 42. As here expressed, it is suitable only for the umbra vera, because of the expression "retro perge"; but it may easily be altered so as to suit the umbra recta, which would give § 43 in Chaucer's treatise. Such an additional section does, in fact, appear in MS. Hh. 6. 48, in the margin.
NOTES.

Observe that I have only printed here the latter part of the treatise; see the Preface, p. xxiv. The former part is longer and less to the point. I add a few notes on some of the readings of the MSS.; denoting MS. 3, 3 by the letter S, and MS. Hh. 6, 8 by T, to avoid confusion with the MSS. already mentioned.

L. 3. alhabor; so in T. But written alhaboz, very plainly, in S; indeed, the scribe clearly confused r with s, for he writes nadazy throughout for nadayr, or (as in 1. 54) he writes nadays; cf. footnote to l. 261.

14. inter T; in S. So also in l. 276.
37. nadayz S; nadayr T; see note to l. 3.
126. allidadam; i.e. the "rewle" for taking altitudes. See footnote on p. 7; and the first Additional Note to Part ii, sect. 3.

155. Quis dies (sic). But in the next line it is que dies.

247. inter uxorem minorem latitudinem S; but T omits uxorem. The scribe seems to have been thinking of something else besides his work.

299. Perhaps we should read fractionibus, or cum fractionibus. The passage is wanting in T.

329. opparuit (sic) S; apparuerit T.
342. poteris S; poterit T.
461. gradus moueatur; for gradus, T has gradibus.
500. retro T; recto S.
506. auferatur T; auferantur S.
516. quam; supplied from T.
GLOSSARIAL INDEX.

Abate, 2 p. s. pr. subj. subtract, ii. 10. 8.
Abid, imp. s. wait, ii. 23. 9.
Above, prep. above, ii. 45. 32.
According, pres. part. agreeing, ii. 14. 5.
Addyng, sb. (the) addition, ii. 41. 9.
After, pr. 62.
Agayn-ward, adv. backward, at the point of return, i. 17. 8.
Agayns, prep. against, near to, ii. 23. 8.
Al be it so that, although, ii. 31. 6.
Almenak, sb. almanac, pr. 62.
The real origin of this word is still unknown; it is probably not of Arabic origin, and the fact of its beginning with al has probably led inquirers astray. The word occurs in a passage in a lost work of Porphyry, cited by Eusebius, de Præpar. Evangelica, iii. 4. ed. Gaisford. See Dozy, Glossaire des mots Espagnols dérivés de l'Arabe; 2ud ed. p. 154.
Almicanteras, sb. pl. small circles of declination (in the celestial sphere), i. 18. 2; Almykanteras, i. 18. 7. Arabic muqantarat, a solar quadrant, solar clock; pl. muqantarât, circles parallel to the horizon; from qantarâ, he bent.
Almury, sb. the "denticle" or tooth-like point or pointer situate on the Rete near the "head" of Capricorn, i. 23. 1. Arabic al-muri, the shewer, part. of the 4th or causal conjugation of rad, to see.
Altitude, sb. the elevation of a celestial object above the horizon, measured along a vertical arc, pr. 56.
Alyne, adv. in an exact line, ii. 38. 16.
Amenuseth, pr. s. diminishes, becomes less, i. 21. 45. O.F. amenuisir, to become less, from menut, menu, minute, small.
A-middles, in the midst of, i. 18. 3.
Amydde, adv. amidst, in the middle, i. 4. 4.
Angle, sb. angular distance (from the meridian), ii. 4. 28. "Angle of longitude (in astrology) is the angle which the circle of a star's longitude makes with the meridian, at the pole of the ecliptic."—Bailey. This is not explicit, as the pole of the ecliptic is seldom in the meridian; the pole of the equator and a circle of right ascension would answer better.
Anni collecti, collected years, ii. 44. 16. When a table contains quantities denoting the amount of a planet's motion during round periods of years, such as 20, 40, or 60 years, such a change is entered under the heading Anni Collecti.
Glossarial Index.

Anni expansi, expande years, ii. 44. 16. When a table contains quantities denoting the amount of a planet's motion during only a few years, viz. from 1 to 20 years, such changes are entered separately under the headings 1, 2, 3, &c. years, which are designated the expance (or separate) years.

Antartik, adj. southern, ii. 25. 7.

Anything, adv. in any degree, at all, to any appreciable extent, ii. 17. 6; Anything, ii. 33. 9.

Aperceyue, v. to perceive, ii. 35. 4.

Arabyens sb. pl. Arabians; hence, in Arabyens, among the Arabians, i. 10. 5.

Arch, ii. 9. 2. See Ark.

Areisid, pp. raised, ii. 2. 5.

Ariste, sb. arising, rising, ii. 12. 10.

Ark, sb. are, the angular distance apparently passed over by the sun during a day or a night, ii. 7. 7, 8; Arch, ii. 9. 2; pl. Arches, ii. 7. 9.

Armholes, sb. pl. i. 21. 51.

Artificial, adj. ii. 7. rub. The day artificial is the length of the day, from the moment of sunrise to that of sunset.

Artik, adj. arctic, northern, ii. 22. 2.

Ascendit, pt. s. ascended, rose above the horizon, ii. 40. 49; Ascendit, ii. 40. 28.

Ascensioni, sb. ascension, ii. 26. 4; pl. Assensiouns, ii. 26. 2. For the signs of right and oblique ascension see note on pp. 35, 36.

Aspectys, sb. pl. aspects, ii. 4. 30. An aspect is the angular distance between two planets. The principal aspects are five, viz. conjunction, sextile, quartile, trine, and opposition, corresponding to the angular distances 0°, 60°, 90°, 120°, and 180° respectively.

Assendent, sb. ascendent, ii. 3. 24. The "ascendent" is that point of the ecliptic which, at a given moment, is ascending above the horizon.

Astrelabie, sb. an astrolabe, pr. 4; Astralabie, pr. 7; Astrolabie, pr. 46.

Astrologie, sb. astrology, pr. 70.

Astrologien, sb. astrologer, or rather, astronomer, pr. 50; pl. Astrologiens, pr. 42.

Atones, adv. at once, at one and the same time, pr. 32.

Auctours, sb. pl. authors, ii. 39. 22.

Auenture, sb. chance; per aventure, peradventure, perchance, perhaps, ii. 12. 6.

Augrym, sb. arithmetic, numération, i. 7. 4; Augrim, Arabic numerals, i. 8. 4. O.F. algorithmes, O.Sp. alguarismo, either from Gk. ἀριθμός, number, with the Arabic article (al) prefixed; or, as is much more probable, from Al Khawdresmi, the surname of an Araban writer on algebra, the translation of whose work was the means of introducing the decimal notation into Europe in the 12th century. See the authorities for this in Dozy, Glossaire des mots Espagnols derivés de l'Arabe.

Avisely, adv. advisedly, carefully, ii. 29. 16.

Awaite, imp. s. watch, ii. 35. 6.

Azimuth, sb. azimuths, i. 19. 4, &c. Arabic as-sama't, pl. assimul, a way or path; as-sama't, a point of the horizon, and hence, an azimuth, or arc extending from the zenith to the horizon. We find also samal ar-ras, the vertex of heaven; hence zenith, a corruption of semt (al-ras being dropped).

Bakhalf, sb. the back or flat side of the Astrolabe, i. 4. 1; ii. 1. 6.
Bak-side, sb. the back of the Astrolabe, i. 15. 3.
Bas, sb. base, ii. 41. 2; Baas, ii. 43. 2.
Be, prep. by, ii. 41. 3.
Beformseyd, pp. aforesaid, ii. 42b. 5.
Behete, 1 p. s. pr. promise, pr. 73. A.S. behát, a promise, behétan, to promise.
Bestes, sb. pl. the "beasts" or animals in the zodiacal signs, i. 21. 37.
Bisily, adv. diligently, ii. 38. 8.
Bordure, sb. outer border or raised rim on the front side of the astrolabe, i. 4. 2; 16. 1; ii. 53. 2.
Brede, sb. breadth, i. 21. 24.
Brodere, sb. larger, ii. 38. 1.
By, prep. with reference to, ii. 3. 48.
Byform, prep. before, ii. 3. 15.
Byhestes, sb. pl. promises, i.e. what they profess to prove, pr. 16. A.S. behetes, a promise.
By-twyxe, prep. between, ii. 28. 11, 14.

Caas, sb. case; sette caas, suppose, ii. 42. 14.
Calkuled, pp. calculated, pr. 52.
Calle, sb. caul, a net used to confine women's hair, i. 19. 3. "Maydens were sylen callis, with the whiche they kepe in orden theyr heare, made yeloie with yle;" Hormani Vulgaria, leaf 115.
Canon, sb. a rule, explanation, pr. 63; Canoun, a canon, rule, table, ii. 32. 3.
Capitalles, adj. pl. capital, ii. 3. 20; Capitals, i. 16. 8.
Centre, sb. the "centre" or small point at the very end of which is the position of a fixed star in the Rete of the Astrolabe, i. 21. 7.
Cenyth, sb. (1) zenith, i. 18. 10; (2) a word denoting the point where a given azimuth-circle meets the horizon, i. 19. 7. See Azy-muthz, and Senyth.
Certein, adj. certain; a certein (used without a sb.), pr. 10; a certain hole, i.e. a certain number of holes, i. 13. 2. So also 'o' unces a certain," C. T. 16244; 'a certain of gold,' C. T. 16492.
Chapitre, sb. chapter, ii. 9. 2.
Clepen, pr. pl. name, mention, ii. 39. 23; pp. Cleped, named, i. 4. 4.
Clokke, sb. clock, pr. 56.
Clymat, sb. a belt or zone of the earth included between two given lines of latitude, ii. 39. 18; Climat, ii. 39. 19; pl. Clymatz, climates, i.e. zones of latitude, i. 3. 3; Clymates, sets of almanaceras calculated for various terrestrial latitudes, i. 14. 2.
Combust, adj. quenched, viz. by being so near the sun as to be obscured by his superior light, ii. 4. 31.
Compas, sb. broad circle, zone, i. 21. 23; a circle, ii. 38. 2.
Compassed, pp. drawn with compasses, fashioned circularly, i. 18. 1.
Compilatour, sb. compiler, pr. 42.
Compowned, pp. compounded, i.e. composed, constructed, drawn, pr. 7; described, marked, i. 18. 8; Compownet, ii. 5. 2.
Comunly, adv. commonly, ii. 19. 7.
Conclusions, sb. pl. mathematical propositions, either problems or theorems, pr. 9.
Conforted, pp. comforted, supported, strengthened, ii. 4. 29.
Coniuncion, sb. conjunction, ii. 32. 1. It means a very close apparent approach of two celestial bodies.
Consentrik, adj. having the same
centre, i. 17. 3; Consentryk, i. 17. 3‡; Consentrik, tending to the same centre, i. 16. 5; at an unchanging altitude, ii. 3. 47.

Contienen, v. to contain, pr. 53; pr. s. Contienith, i. 7. 7; pr. pl. Contienen, i. 9. 2.

Cost, sb. quarter, direction, ii. 46. 5; Coste, ii. 46. 17; pl. Costes, coasts, directions, i. e. parts of the sky to be observed, i. 19. 6.

Cowchyng, sb. laying down, letting the Astrolabe lie flat on the ground, ii. 29. 18.

Crepusculus, sb. pl. twilights, durations of twilight, ii. 6. rub.; Crepusculus, ii. 9. 1.

Cross-lyne, sb. cross-line, the line from right to left through the centre in Fig. 1; i. 12. 5.

Curious, adj. ornate, pr. 31.

Dawenyng, sb. dawning, dawn, ii. 23. 8.

Dawyng, sb. dawning, ii. 23. 20.

Declaracioun, sb. explanation, i. 3. 3, &c.

Declinacioun, sb. the angular distance of a celestial object N. or S. of the equator, measured along an arc at right angles to it, i. 17. 4; pl. Declinacions, pr. 54.

Declinen, pr. pl. possess declination, i. e. pass either to the north or south of the ecliptic, ii. 17. 28; pr. s. Declineth, possesses declination, ii. 19. 8.

Denticle, sb. pointer, i. 23. 1. See Almury.

Departen, pr. pl. separate, i. 21. 32; imp. s. Depart, divide, ii. 8. 2; pr. s. Departeth, divides, i. 17. 30; pp. Departid, divided, marked by lines, i. 21. 3‡; divided, ii. 4. 37.

Depressioun, sb. the angular distance of the southern pole from the horizon, ii. 25. 6.

Descencioun, sb. descension, ii. 4. 32; Descencioun, ii. 4. 33. The technical signification seems to be —the "house" or portion of the sky just above the western horizon, so that perhaps a planet in his descent is about to set. (?)

Descriued, pp. described, marked, i. 17. 1.

Desturbith, pr. s. disturbs, prevents, i. 2. 2.

Determynat, adj. properly ascertained, i. 21. 4; properly placed upon the Astrolabe, ii. 18. rub.

Dignite, sb. dignity, ii. 4. 29; pl. Dignetes, pr. 72. A term in astrology. Bailey defines Dignities as "the advantages which a planet has on account of being in a particular place in the zodiac, or in such a station with other planets, &c."

Directe, adj. direct, ii. 35. 11. A planet's motion is direct when it moves in the same direction as the sun along the signs.

Directe, in directe, in a line with, ii. 44. 9.

Distantz, adj. pl. distant; euene distantz, equidistant, i. 17. 31.

Doctrine, sb. instruction, pr. 43.

Downere, adv. more downward, ii. 12. 14.

Ebreev, adj. Hebrew, pr. 23.

Ecliptik, sb. ecliptic, pr. 67. A great circle of the sphere, drawn along the middle of the zodiac, making an angle with the equator of about 23°. 28'; the apparent path of the sun, nearly.

Eft-sones, adv. soon after, immediately, ii. 23. 11.

Egge, sb. edge, ii. 46. 7.

Eleccioun, sb. pl. elections, choice of fit times, ii. 4. 2. "Of viage is ther non eleccioun;" Chaucer; M. of L. Ta. 312.
Eleuacioun, sb. the altitude above the horizon of the north pole, ii. 23. 15.

Eleuat, pp. elevated, ii. 23. 17. See Eleuacioun.

Elles, adv. otherwise, i. 19. 2.

Elongacioun, sb. angular distance, ii. 25. 39.

Embelif, adj. oblique, i. 20. 2; (as applied to angles), angles that are not right angles, ii. 26. 23. I cannot find the word elsewhere, nor can I guess to what language it belongs; it looks like an extraordinary corruption of the word oblique.

Embelif, adv. obliquely, ii. 26. 6.

Emysperies, sb. pl. hemispheres, i. 18. 6.

Endlang, adv. along, lengthways, ii. 40. 22, 44.

Endytyng, sb. inditing, style of composition, pr. 30.

Engin, sb. ingenuity, skill, pr. 41. Lat. ingeniun, whence F. engin.

Enhausyng, sb. elevation, ii. 39. 16.

Enhawsed, pp. exalted, elevated, lifted above (the horizon), ii. 26. 22. O.F. enhauster, to elevate, haut, high.

Ensample, sb. token; in ensample, to signify, i. 21. 25.

Ensampulle, sb. example, ii. 45. 5.

Entere, imp. s. enter, ii. 44. 7.

To "enter with" is to keep in mind and search for, as a help to finding something else. "Argument, in astronomical tables, is the angle on which the tabulated quantity depends, and with which, therefore, in technical language, the table must be entered."—Eng. Cycl. Arts and Sciences, s. v. Argument. In l. 3. entere hit = set down in writing.

Entres, sb. pl. entries, ii. 44. 26.

Episicle, sb. epicycle, ii. 35. 18.

A small circle, the centre of which moves along the circumference of a larger one.

Equacion, sb. equal partition, ii. 37. 9; pl. Equacions, ii. 36. 2. The "equations of houses" means the method of dividing the sphere equally into "houses" for astrological purposes; Equacions, pr. 71; Equacions, calculations, i. 23. 8.

Equales, adj. pl. of equal length; bowris equales, hours each containing 60 minutes, ii. 8. 2; Equals, equal, i. 16. 9.

Equinoxial, adj. equinoctial; said of the equinoctial circle or equator, the great circle of the sphere whose poles are the arctic and antarctic poles, i. 17. 12.

Equinoxis, sb. pl. equinoxes, i. 17. 18.

Est, adj. East, i. 5. 4.

Eue, sb. evening, ii. 12. 22.

Euene, adv. equally. See Distantz.

Euerch, pron. every one, pr. 40.

Euer-mo, evermore, ii. 3. 25.

Evidently, adv. by observation, ii. 23. rub.

Expanse, adj. expanse or separate, ii. 45. 11. See Anni expansi.

Experience, sb. knowledge acquired by trial, ii. 1. 16.


Face, sb. a third part of a "sign," a portion of the zodiac 10 degrees long, ii. 4. 38.

Faillign, pres. part. failing, remote, ii. 4. 18.

Farwel; go farwel, be dismissed, be let alone, ii. 23. 7.

Felicite, sb. favourable position or aspect, ii. 4. 25.
Fer, adj. far, ii. 16. 1.
Ferforth, adv. far-forth, i. e. far, pr. 49.
Ferthe, fourth, ii. 35. 4.
Ferther-oner, conj. moreover, ii. 26. 8.
Figures, sb. pl. figures, i. e. markings, pr. 45.
Fixe, pp. fixed, pr. 54.
Fond, 1 p. s. pt. found, ii. 1. 6.
For, prep. against, to prevent, ii. 38. 1; to have for excused, i. e. to excuse, pr. 30.
Forfer, adv. further, ii. 43a. 4.
Forthward, adv. forwards, ii. 35. 5.
For-why, conj. because, ii. 46. 19.
Frere, sb. friar, pr. 58.
Fro, prep. from; fro vs-ward, away from us, used to express that the sun having reached the nearest point to our zenith, begins to descend from it, i. 17. 9. Cf. i. 17. 39.
Furth, adv. forward, ii. 46. 4; Furthe, ii. 46. 16.
Geuen, pp. given, pr. 6.
God, adj. good, ii. 4. 28.
Gouernance, sb. regulation, pr. 56; subjection, i. 21. 50.
Grek, adj. Greek, pr. 22; pl. Grekes, pr. 20.
Gyrdelle, sb. girdle, cincture, central line or great circle, i. 17. 26; Girdle, i. 17. 29.
Haddy, for Hadde y, had I, ii. 1. 15.
Halidayes, sb. pl. holydays, i. 11. 1.
Halt, pr. s. holdeth, holds, i. 14. 2.
Han, pr. pl. have, possess, pr. 24.
Hastow, for hast thou, i. 5. 6.
Hath himself, pr. s. bears a ratio, is in proportion, ii. 41b. 5.
Hauy, for haue y, have I, ii. 40. 15.
Hedes, sb. pl. heads, or first points of signs, i. 17. 12. See Heued.
Heie, adj. high, i. 16. 7.
Heiost, adj. highest, ii. 13. 4.
Hem, pron. pl. them, i. 8. 7.
Hennes-forthward, adv. henceforth, i. 1. 3.
Hepe, sb. heap; hence, to hepe, in a heap, all close together, i. 14. 4. See the Preface, p. xxviii.
Her-mele, sb. the thickness of a hair, a hair's breadth; l.; a hair part, ii. 38. 10. A.S. mēl, a portion.
Heued, sb. head; the beginning or first point of a zodiacal sign, i. 17. 3; pl. Heuedes, i. 17. 16.
Heuenissh, adj. heavenly, i. 21. 35. Cf. Compl. of Mars, st. 5.
Heuy, adj. heavy, difficult, pr. 32.
Heyer, adj. higher, ii. 23. 26.
Heyhte, sb. height, altitude, i. 1. 2; ii. 3. 13; Heyste, ii. 41. 9; Heyth, ii. 41. 13.
Hihten, pr. pl. are called, i. 18. 2.
Hir, pron. her (applied to a star), ii. 3. 29.
Hir, pron. their, pr. 16; i. 21. 4.
His, pron. its, i. 2. 3.
Hise, pron. pl. his, i. 12. 3.
Hit, pron. it, i. 2. 2.
Hole, adj. whole, ii. 9. 3.
Horoscoypo; in horoscopo, within that part of the sky considered as the ascendent, ii. 4. 8; see note on p. 18. Gk. ὥροσκόπως, observing hours; also, as sb., a nativity, a horoscope; from ὥρα, time, an hour, σχέπτωμα, to consider.
Horoscopum, sb. horoscope, ii. 4. 36. See above.
Hors, sb. the "horse," a name for the little wedge that passes
through a hole in the end of the “pyn,” i. 14. 4. Called in Arabic *alpheraz*, the horse.

*Howis*, sb. house, ii. 36. 5; *Howys*, ii 36. 7; *pl. Howses*, pr. 71. The whole celestial sphere was divided into twelve equal portions, called *houses*, by six great circles passing through the north and south points of the horizon; two of these circles being the meridian and the horizon.

*Ilike*, adj. equal, i. 17. 31; *Il lik* like, equal, i. 17. 17. A.S. *gelic*, G. *gleich*.

*Ilik*, adv. equally, ii. 15. 1; the same, ii. 39. 13.

*Ilike* distant, at an even distance, i. e. parallel, ii. 39. 18. (Not equidistant, because the climates varied in breadth.)

*In*, prep. into, i. 16. 2; among, i. 10. 5.

*Indeterminat*, adj. not marked upon the Astrolabe, ii. 17. *rub.*

*Inequal*, adj. ii. 10. 4; *pl. Inequales*, of unequal length; *howris* inequales, hours formed by dividing the duration of daylight by twelve, ii. 8. 1; *Inequalis*, ii. 10. 1.

*Infortunat*, adj. unlucky, ii. 4. 34.

*Infortunyng*, sb. unlucky condition, ii. 4. 26.

*In perfait*, adj. imperfect, incomplete, i. 18. 3.


*Introductorie*, sb. introduction, pr. 68.

*Ioigned*, pp. joined, nearly or altogether in conjunction, ii. 4. 31.

*Joynalty*, adv. jointly, together, ii. 11. 9.

*Judical*, adj. judicial, ii. 4. 35. *Judical astrology* pretended to forecast the destinies of men and nations; *natural astrology* foretold natural events, such as the weather and seasons.

*Just*, adj. just, exact, ii. 3. 43.

*Iustly*, adv. exactly, ii. 3. 44.

*I-wreten*, pp. written, ii. 45. 22; I-wrete, ii. 45. 23.

*I-wryton*, probably an error for I wolde witen, I would know, ii. 45. 6. See the Critical Note.

*Kalcul* e, v. to calculate, i. 22. 3.

*Kalender*, sb. a calendar, i. 11. 1; *pl.* Kalendres, pr. 57. Lat. *calendarium*. The old calendars answered nearly to our modern almanacks.

*Kalkuler*, sb. the calculator or pointer, i. 23. 2. See Almury.

*Kanstow*, 2 p. s. pr. knowest thou, pr. 20.

*Kas*, sb. case; in kas pat, in case, ii. 3. 2.

*Kawht*, pp. caught, perceived, ii. 17. 8.

*Kep*, sb. heed; tak kep, take heed, i. 1. 2.

*Keruyng*, carving, i. e. cutting, crossing over, i. 19. 3.

*Knowyng*, sb. knowledge, pr. 47.

*Kon*, imp. s. grant; kon me thank, grant me thanks, thank me, pr. 38. “To con one thanks, Fr. *savoir gré*, to feel thankful and make the feeling known to the object of it.”—Wedgwood. A.S. *cunnan*, to know.

*Kowch*, v. to lie; kowch adown, lie down, ii. 29. 14.

*Krokede*, adj. crooked, i. 19. 2.

*Label*, sb. the narrow revolving rod or rule on the front of the Astrolabe, i. 22. 1. See Fig. 6.

*Lasse*, adj. less, pr. 40.

*Lat*, imp. s. let, ii. 29. 13.
Latitude, sb. breadth (without any astronomical sense), i. 21. 26; the breadth of a “climate;” or rather, a line along which this breadth is measured, ii. 39. 19. See below.

Latitude, sb. (1) astronomical; the angular distance of any body from the ecliptic, measured along a great circle at right angles to the ecliptic, pr. 66; (2) terrestrial, the distance of any place on the globe, N. or S. of the equator, ii. 39. 23; (3) the breadth of a “climate,” ii. 39. 19.

Leden, pr. pl. lead, conduct, pr. 28.

Lengere, adj. pl. longer, ii. 10. 2.

Lengthing, pres. part. extending, ii. 25. 39.

Leoun, sb. Leo (the sign), ii. 25. 27. From Lat. acc. leonem.

Lest, impers. pr. s. it pleases, ii. 25. 33. See List.

Leste, adj. least, i. 17. 2.

Leuyth, pr. s. remains, ii. 25. 14; Leuth, ii. 25. 16.

Lewd, adj. unlearned, pr. 42.

Leuyth, pr. s. remains, ii. 44. 28. See Leuyth.

Ligge, pr. s. subj. may lie, ii. 41. 3.

Lihte, adj. pl. light, i. e. easy, pr. 19; dat. sing. Lihte, pr. 35.

Liked, pt. s. impers. it pleased, i. 10. 6.

List, pr. s. impers. it pleases (thee), ii. 3. 1. See Lest.

Lite, adj. as sb. a little, ii. 1. 15. A.S. lyt.

Lite, adj. little, pr. 20.

Lite, adv. a little, ii. 12. 8.

Longitude, sb. the distance between two given meridians, ii. 39. 12; the length or extent of a “climate,” in a direction parallel to the equator, or rather (as it would appear), a line along which to measure this length; ii. 39. 18.

Longitudes, sb. pl. longitudes, pr. 53, 55. The longitude of a star is measured along the ecliptic; that of a town, from a fixed meridian.

Loppe, sb. a spider, i. 3. 4; 19. 2. A.S. lobbe, a spider.

Lop-webbe, sb. cobweb, i. 21. 2. See Loppe.

Lyhtly, adv. easily, ii. 14. 8.

Lyne, sb. a line, cord, ii. 23. 25.

Lyne-riht, adj. in an exact line, exactly in a line with, i. 21. 18.

Maistow, pr. s. mayest thou, i. 21. 46.

Maner, sb. kind; used without of following, as maner turet, kind of “turet,” i. 2. 1; maner strikes, sort of strokes, i. 19. 1.

Matiere, sb. matter, subject, ii. 4. 35.

Mechel, adv. much; for as mechel, for as much, pr. 4.

Mediacion, sb. means, assistance, pr. 8; Mediacioum, use, i. 13. 3.

Membres, sb. pl. parts, pr. 46.

Mene, adj. mean, ii. 44. 13. See Mote.

Meridian, adj. meridional, at the moment of southing, exact southern, pr. 56; southern, on the meridian, ii. 39. 6.

Meridional, adj. southern, i. 4. 4.

Mete, 1 p. s. pr. measure, ii. 41. 5.

Michel, adv. much, ii. 23. 17.

Mile-wey, sb. a space of 5 degrees, which answers to 20 minutes of time, the average time for walking a mile; hence the term, i. 7. 7; pl. Mile-wey, i. 16. 10.

Minutes, sb. pl. (1) minutes of time, i. 7. 8; (2) Minute, i. e. a sixtieth part of a degree, i. 8. 8; see i. 8. 10.

Mo, adj. more, pr. 26.
Moder, sb. lit. mother; the thickest plate forming the body or principal part of the Astrolabe; called in Latin mater or rotula, i. 3. 1.

Modur, sb. mother, pr. 73.

Moeble, adj. movable, i. 21. 47.

Moeuyng, sb. moving; pr. 61; Moeuyng, pr. 59; firste Moeuyng, the “primum mobile,” i. 17. 26.

Mone, sb. moon, pr. 61. A.S. mona.

Moneth, sb. month, ii. 44. 34; Monith, i. 10. 12; pl. Monythis, ii. 44. 33.

More, adj. greater, pr. 40; ii. 26. 7.

Morwe, sb. morning, ii. 12. 25.

Mote, sb. motion (Lat. motus), ii. 44. 13. The “mene mote” or mean motion is the motion of a planet during a given period as stated in the tables.

Nadir, sb. the point of the ecliptic exactly opposite to that in which the sun is situate, ii. 6. 1; see i. 8. Arabic nadhir’s-samit, i.e. opposite to the zenith, for which the term an-nadhir simply, signifying “opposite,” was commonly used.

Naked, adj. simple, plain, pr. 19.

Nam, for Ne am, am not, pr. 42.

Narwe, adv. closely, lit. narrowly, pr. 49.

Narwest, superl. adj. narrowest, smallest, i. 18. 4.

Nat, adv. not, pr. 16.

Natheles, conj. not the less, never the less, pr. 20. A.S. ná, not.

Nativitez, sb. pl. nativities, castings of nativity in astrology, ii. 4. 1.

Nawht, adv. not, pr. 36.

Neer, adv. nearer, ii. 43a. 4; 42 b 3; Ner, ii. 42. 3.

Nether, adj. lower, i. 12. 6.

Netherest, adj. superl. lowest, i. e. outermost, i. 18. 4; Nethereste, lowest, i. 4. 2.

Neuer-mo, adv. never oftener, never (with two exceptions), ii. 31. 3.

Ney, adj. nigh, ii. 3. 46.

Nombre, sb. a number, pr. 9; amount, sum, ii. 24. 3; pl. Nombres, pr. 2.

Notable, adj. noteworthy, pr. 57.

Noteful, adj. useful, pr. 72. A.S. notu, use.

Nowmbres, sb. pl. numbers, i. 7. 4. See Nombre.

O, one, one single, ii. 19. 11.

Obedient, adj. answering to, or subject to, ii. 28. 20. A technical term, applied to the eastern signs of the zodiac, as being respectively correspondent to the western ones.

Obeieth, pr. s. obeys, ii. 28. 25. See Obedient.

Occidentale, adj. Western, i. 5. 6. From Lat. occidens, setting.

Of, prep. by, pr. 41; for, i. 12. 4; from, i. 17. 28.

On, one, i. 10. 15; one o’clock, ii. 3. 50; in on, in one and the same condition, unchangeably, ii. 2. 8.

Onces, adv. once, pr. 34.

Onythyng, ii. 38. 12. See Anythyng.

Or, prep. ere, before, ii. 23. 20.

Orientale, adj. eastern, i. 5. 4. From Lat. oriens, rising.

Orizon rectum, or right horizon, ii. 26. 20. This means the horizon of any place situate on the equator, which could be represented by a straight line upon a disc or “table” of the Astrolabe.

Orizonte, sb. horizon, pr. 7. Lat. acc. horizontem; Gk. ἀπὸ ὄριον, bounding.

Ouerkerueth, pr. s. cuts across,
crosses, i. 21. 53; Ouerkeruyth, ii. 26. 20.


Oxenford, sb. Oxford, pr. 8, 71.

Paiens, sb. pl. pagans, ii. 4. 35.

Parcelle, sb. parcel, i. e. part, i. 21. 49.

Partie, sb. part, pr. 45; pl. Parties, pr. 18.

Passep, pr. s. exceeds, ii. 42. 15; 42a. 7.

Perced, pp. pierced, i. 3. 2.

Perche, sb. a rod placed high up in a horizontal position, ii. 23. 26. Lat. pertica.

Perfit, adj. perfect, complete, i. 18. 2.

Perfitly, adv. perfectly, pr. 13.

Performe, v. to shew, constitute, be equivalent to, ii. 10. 10.

Peyre, sb. a "pair," a set, ii. 40. 18. A pair by no means implies that the set of similar things to which it is applied is limited to two. Cf. Prol. to Cant. Tales, 159.

Plages, sb. pl. quarters of the compass, i. 5. 7; ii. 31. 10. Lat. plega, a region, space.

Planetes, sb. pl. planets, pr. 72.

The seven planets, in order, are the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn.

Plate, sb. the "sight" on the "rewle," i. 13. 2.

Pleie, v. to play; hence, to use, apply, ii. 40. 57. A.S. plegan, to play, apply.

Plomet; sb. plummet, heavy weight, ii. 23. 25.

Plom-rewle, sb. plummet-rule, ii. 38. 6.

Pol, sb. pole, i. 14. 6; Pool, i. 18. 12.

Portatif, adj. portable, pr. 50.

Practik, sb. practice, practical working, pr. 49.

Precedent, adj. preceding, ii. 32. 3.

Preue, sb. test, verification, experimental proof, ii. 23. rub.

Prikke, sb. a small mark, such as a little stick stuck in the ground, ii. 42. 3; a dot, ii. 5. 12.

Principalx, cardinal, ii. 31. 10.

Principalx, cardinal, ii. 31. 10.

Proporciouns, sb. pl. proportions, ratios, pr. 3.

Propre, sb. own, ii. 7. 14.

Propretes, sb. pl. properties, i. 10. 5.

Proue, v. to test, ii. 23. rub. Lat. probare, to test, verify.

Puttyng to, i. e. adding, ii. 43a. 12.

Pyn, sb. the pin which passes through the central hole in the Astrolabe and its plates, i. 14. 1.

Quantite, sb. largeness, size, i. 21. 24.


Reherse, v. to rehearse, enumerate, pr. 45.

Remenant, sb. remnant, rest, i. 4. 5.

Remeue, imp. s. move backwards and forwards, ii. 2. 2.

Rennyth, pr. s. runs, continues, ii. 3. 47.

Resceiued, pp. received; wel receiued, favourably situated with respect to other planets, &c.; ii. 4. 30.

Respecte, sb. regard, i. 21. 49.

Resseyuyth, pr. s. receives, i. 3. 2.

Retrograd, adj. moving in a
direction contrary to that of the sun’s motion in the ecliptic, ii. 4. 31; 35. 12. Spoken with reference to a planet’s apparent motion.

Reuuerent, adj. reverend, pr. 58.

Revoucioun, sb. complete circuit, ii. 7. 13.

Rewde, adj. rude, plain, unadorned, pr. 30.

Rewle, sb. the revolving long and narrow plate or rod used for measuring and taking altitudes, i. 13. 1. See Fig. 3. It revolves at the back of the Astrolabe.

Rewles, sb. pl. rules, pr. 19.

Riet, sb. the “reto” or net; the topmost plate on which some of the stars were figured, and the northern half of the zodiac shewn, i. 3. 3.

Rikened, 1 p. s. pt. reckoned, counted, ii. 3. 35.

Rond, adj. round, circular, ii. 38. 1; ronde, ii. 38. 2.

Rote, sb. root, the tabulated quantity belonging to a given fixed date, from which corresponding quantities for other dates can be calculated by addition or subtraction, ii. 44. 1; pl. Rotes, ii. 44. 20.

Rowm, adj. roomy, large, wide, i. 2. 2. A.S. rim, spacious.

Rytes, sb. pl. observances, ii. 4. 35.

Sadly, adv. carefully, steadily, with as little movement as possible, ii. 29. 12. W. sad, firm, steady.

Samples, sb. pl. examples, ii. 40. 4.

Sein, gerund; that is to sein, that is to say, pr. 25. See Seyen.

Semeth, impers. vb. it seems; me semeth, it seems to me, pr. 33.

Sen, v. to see, ii. 23. 27.

Senyth, sb. (1) the point of the horizon where a given azimuthal circle meets it; hence, the point of sunrise, ii. 31. 8; (2) the zenith, or visible pole of the horizon, i. 18. 4. Arabic al-samt, a point of the horizon (shewing the first meaning to be the original one); whence Arabic samt al-ras, the zenith. See Azymuthz.

Septentrional, adj. northern, ii. 40. 30; pl. Septentrionalis, ii. 40. 28.

Sexe, six, ii. 42. 7.

Seyen, gerund; that is to seyen, that is to say, i. 10. 2. See Sein.

Shaltow, for shalt thou, pr. 70; i. 7. 2.

Shewith, pr. s. appears (used for the modern is shewn), i. 7. 5; ii. 25. 4; 30. 6; 32. 3; Shewyth, ii. 26. 15.

Shipmen, sb. pl. sailors, ii. 31. 6.

Shrewe, sb. evil planet, planet of evil influence, ii. 4. 31.

Sin, conj. since, ii. 4. 3.

Sit, pr. s. (for Sitteth), is situate, ii. 7. 4; 37. 3. See Sitte.

Site, sb. position, situation, ii. 17. 24. Lat. situs.

Sithes, sb. pl. times, ii. 42. 6; Sypes, ii. 42. 7. A.S. sita, a path, a journey, a time.

Sitte, pr. pl. are placed, are set, i. 21. 6; pres. part. Sittinge, situate, i. 21. 8. See Sit.

Skale, sb. scale, or rather, double scale, for measuring both by umbra recta and umbra versa, i. 12. 2.

Slate, sb. a slate for writing upon, ii. 44. 3.

Slely, adv. slily, i. e. with great sleight or skill, skillfully, ii. 29. 13; Slely, ii. 29. 14.

Slen, v. to sly, pr. 44.

So pat, conj. provided that, ii. 29. 17.

Solsticioun, sb. the solstice, or point of the ecliptic most remote from the equator, i. 17. 5, 37. Lat. solstitium.
Sonne, sb. sun, pr. 55; used as a feminine noun, ii. 1. rub. A.S. sunne, G. sonne, Du. zon, Sw. sol, are all feminine nouns.

Sothly, adv. verily, soothly, pr. 15. A.S. soðlice, verily; from soð, sooth, truth.

Soureyn, adj. superior, ii. 28. A technical term, applied to the western signs of the zodiac, as superior to the “obedient” eastern ones. See Obedient.

Sowny, pr. pl. sounds as, i.e. means, i. 21. 37.

So3th, 1 p. s. pt. sought, ii. 45. 10.

Sper, sb. sphere, globe, i. 17. 15; Spere, sphere, i. 17. 28.

Spyng, sb. first beginning, dawn, ii. 6. 4.

Squyres, sb. pl. measuring-rules, i. 12. 2. Shakespeare and Spenser have squire; from O.F. esquire, F. équerr, a square, measuring-rule, from Lat. quadratus.

Stande, pr. s. subj. may stand, happen to be, ii. 34. 2; pr. s. Stant, stands, is situate, ii. 29. 5.

Statutz, sb. pl. statutæ, rules, pr. 68.

Stike, imp. s. stick, fasten by insertion, ii. 38. 5.

Stok, sb. a stump or block of wood, ii. 38. 4.

Stont, pr. s. stands, ii. 42a. 3. See Stant.

Strange, adj. not its own, ii. 19. 4. Every star has its own degrees in the equator and ecliptic, viz. the degrees in which a great circle passing through the star and through the N. and S. poles cuts these circles respectively.

Stranget, adj. not well-known, ii. 17. rub. A strange star is one that is not represented upon the Rete of the Astrolabe.

Streitnes, sb. narrowness, smallness, i. 21. 33.

Streimes, sb. pl. rays of the sun, i. 13. 3.

Streyeth, pr. s. holds together, compresses, i. 14. 4.

Strikes, sb. pl. strokes, lines, i. 19. 2; Strykes, long marks, i. 7. 6. G. strich.

Succedent, sb. a “succeedent” house, ii. 4. 29. The succedent houses are the second, fifth, eighth, and eleventh, as these are about to follow the most important houses, which are the first (just ascending), the fourth (just coming to the nadir), the seventh (just descending), and the tenth, just coming to the meridian.

Succideth, pr. s. succeeds, follows, ii. 12. 27.

Suffisant, adj. sufficient, sufficiently good, pr. 7.

Suffisaunt, adj. sufficient, sufficiently, pr. 26.

Suffisantly, adv. sufficiently, pr. 20.

Superfluite, sb. superfluity, superabundance, pr. 30.

Swich, adj. such, pr. 32.

Table, sb. one of the thin plates on which almanacantes are engraved, ii. 21. 4; pl. Tables, plates, i. 14. 2; tablets, ii. 40. 18. “Tables [in the last sense] be made of leues of yuery, boxe, cyprus, & other stouffe, daubed with waxe to wrytte on,” Honorani Vulgaria, leaf 81.

Tak, imp. s. know, accept as a result, ii. 25. 34.

Take, pp. taken, ii. 3. 43; Taken, ii. 3. 41.

Tarienge, sb. delay, ii. 25. 20.

Tau3th, 1 p. s. pt. taught, ii. 44. 24; Tha3the, ii. 44. 32.
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Ther, *adv.* where, wherewith, ii. 29. 9.

Thikkesterred, *adj.* thickly covered with stars, ii. 23. 1.

Thilke, *pron. pl.* those, i. 7. 5.

Thise, *pron. pl.* these, *pr.* 21.

Tho, *adv.* then, ii. 1. 8.

Tho, *pl.* those, i. 8. 4.

Thowmbe, *sb.* thumb, i. 1. 1.

Thridde, third, ii. 35. 3.

Tid, *sb.* time, hour, ii. 3. 10; Tyd, ii. 3. 12.

To, *adv.* too, ii. 25. 19; Too, besides, ii. 45. 14.

Too, *num.* two, ii. 42. 16.

Tornen, *v.* to turn, i. 21. 3.

Tortuos, *adj.* lit. tortuous, i. e. oblique, applied to the six signs of the zodiac (Capricorn to Gemini), which ascend most rapidly and obliquely, ii. 28. 19.

To-pridd, two-third; to-pridd parties, two-third parts, two thirds, ii. 41b. 7; Too-pridd, *ib.*

Towchieth, *pr. s.* touches, ii. 27. 3; Towchith, ii. 27. 6; Towcheth, ii. 28. 5.

Towre, *sb.* tower, ii. 41. 2; Tour, ii. 41. 3.


Tropik, *sb.* the turning-point, a name for the solstitial points, i. 17. 8, 38.

Tropos, *sb.* a turning; but interpreted by Chaucer to mean "agaynward," i. e. backward, i. 17. 8. Gk. *πρόςως,* a turn.

Turet, *sb.* the eye in which the ring of the Astrolabe turned, i. 2. 1. Cotgrave has, "*Touré,* the little ring by which a Hawkes *lune* or *leash* is fastened unto the Jesses." See the note in Warton (Hist. E. P. ii. 315, ed. 1871), which seems to make the word equivalent to a *swivel.* Cotgrave gives "a drill" as another meaning, which clearly connects it with *tour,* a turn. It seems to mean both a ring which turns round, and an eye in which a ring can turn.

Twies, *adv.* twice, *pr.* 34; Twye, i. 16. 12.

Verray, *adj.* very, exact, true, *pr.* 61; Verre, exact, i. 12. 5.

Verreyli, *adv.* truly, exactly, ii. 3. 41.

Vembra extensa, or *recta,* the lower part of the "skale;" *Vembraversa,* the upper part of the same, or the part perpendicular to the "cross-line," i. 12. 6. See Fig. 1.


Vnremeviid, *pp.* unremoved, without (its) being moved, ii. 46. 21.

Vnstrauinge, *adj.* wellknown, familiarly known, ii. 17. *rub.* The *unstrange* stars are those which are represented upon the Rete of the Astrolabe. See Determynat.


Vp, *prep.* upon, ii. 1. 2.


Vsurpe, 1 *p. s.* *pr.* usurp, claim, *pr.* 41.

Vs-ward; *fro* vs-ward, away from us, i. 17. 9; to vsward, towards vs, i. 17. 39.
Vulgar, adj. ii. 9. 3. The day vulgar is the length of the "artificial" day, with the durations of morning and evening twilight added to it.

Waite, imp. s. watch, look, observe, ii. 5. 11.

Waityng on, pres. part. observing, ii. 38. 11.

Webbe, a cobweb, i. 3. 4.

Wegge, sb. a wedge, i. 14. 3. A.S. wægc.

Wenst, 2 p. s. pr. expectest, ii. 3. 44.

Were, pr. s. subj. should be; also, would be, ii. 43. 7.

Weten, v. to know, ii. 44. 30.

Wex, sb. wax, ii. 40. 21.

Wexede, 1 p. s. pt. waxed, coated with wax, ii. 40. 17. See Tables.

Wey, sb. (1) the sun's apparent way or path during a given day, ii. 30. 3; see i. 10; also (2) the sun's apparent path or annual course, i. 21. 30.

Weyere, sb. the "weigher," a translation of the Lat. equator, because it weighs equally the night and day, since the days and nights, at the equinoxes, are equal; i. 17. 16.

Wahte, imp. s. watch, observe, ii. 25. 21. See Waite.

What—bat, i. e. which, ii. 17. 14; 18. 2.

Whereas, adv. where that, where, ii. 31. 13.

Whir, sb. wire, thin metal rod, ii. 48. 5. A.S. wîr. The word should be spelt wir; the MS. spelling whir is faulty.

With-drawe, imp. s. subtract, ii. 44. 27; Wyth-drawe, ii. 45. 4; 1 p. s. pt. With-drowe, ii. 45. 7.

Wol, 1 p. s. pr. (1) will, pr. 28.

Wombe-side, sb. the front of the Astrolabe, i. 6. 6. See Fig. 2.

Wot, 1 p. s. pr. know, ii. 3. 50; pr. s. knows, pr. 25. 50.

Wreten, pp. written, ii. 44. 7.

Wrowhte, 1 p. s. pt. wrought, worked, ii. 3. 27; Wroth, was working, ii. 45. 13.

Wyte, v. to know, ii. 3. 26.

Ycleped, pp. called, ii. 39. 3. See Clepen.

Yif, conj. if, pr. 72.

Yit, adv. as yet, hitherto, pr. 20.

Ylike, adv. equally, ii. 26. 12.

Ynke, sb. ink, ii. 5. 12.

Zodia, sb. pl. beasts, i. 21. 36. Gk. pl. ζώια, from ζώιον, dimin. of ζώιον, a creature.

Zodiac, sb. zodiac, pr. 65. An imaginary belt in the heavens, of the breadth of 12°, along the middle of which runs the ecliptic. The Astrolabe only shewed the northern half of this belt; see note on p. 13. Named from the imaginary creatures formed by the constellations situate in it; from Gk. ζώιον, dimin. of ζώιον, a living creature. See a drawing in the English Cyclopædia, Arts and Sciences, viii. 1054, which shews the figures of the animals in the zodiacs as represented on a ceiling in the great temple of Denderah in Egypt, sculptured about 716 B.C. There is a beautiful copy of this sculpture, in white marble, in the Fitzwilliam Museum at Cambridge. The twelve "beasts" there shewn are all identical with those which appear in a modern almanac.

Zere, sb. year, ii. 44. 2; pl. 3eris, ii. 42. 6.

Zif, conj. if, pr. 35.
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