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AN IRISH
ASTRONOMICAL TRACT

BASED IN PART ON A MEDIEVAL LATIN VERSION OF A WORK

BY

MESSAHALAH

EDITED

WITH PREFACE, TRANSLATION AND GLOSSARY

BY

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P R E F A C E .

THE interest of the following astronomical, or rather cosmographical tract to students of Irish language and literature lies mainly in the fact that it belongs to a division of our literature which has been up to the present but little investigated by those whose labours are directed to the publication of our MS. literature. The investigation and publication of such documents is of special importance for the determination of the state of native education and culture in its relation, at different periods, to that of foreign civilizations.

The translations of mediæval Latin texts into Irish, probably for use as text-books in the schools of the 14th and 15th centuries, would supply material for special study. A comparison of the text now in hand with some of the numerous medical tracts, almost all of which still remain unedited, would doubtless supply much interesting material with respect to the resources of our language in treating of purely scientific and technical subjects.

The present work has not remained altogether neglected hitherto. The late Rev. Maxwell Close caused the text to be translated for him into English, and dealt exhaustively with the subject matter of the tract from a scientific point of view, in a paper read before a meeting of the Royal Irish Academy, in June, 1901, and published in the Proceedings of that body Vol. VI., pp. 457-464. Mr. Close's MS. notes for the paper with a typewritten copy of the above-mentioned translation are now in the Academy Library.

A further article on the subject, containing a synopsis of the contents, chapter by chapter, was published under

the title of "An Irish Astronomical Tract," by J. E. Gore, M.R.I.A., in *Knowledge*, February, 1909. This again deals only with the scientific aspect of the tract, apparently gleaned from the above-mentioned translation, and contains scarcely anything not commented on by Mr. Close.

Chapters 8, 39, and a portion of chapter 9, with another small fragment of the text, were published with the same English translation in *Celtia*, Vol. XI., pp. 54-6; 90-92; 101-03. The text which here follows has been arranged without consulting this small published fragment, and my translation has been made quite independently of the translation from which Mr. Close worked.

SOURCES OF THE WORK.

To the researches of Mr. Close we are indebted for our knowledge of one of the Latin texts which is the source of the major part of the work in hand.

Two-thirds of the tract are part paraphrase and part translation, according to Mr. Close, of a Latin version of an Arabic treatise by Messahalāh or Mascha Allah, a Jewish astronomer of Alexandria, who flourished shortly before 800 A.D. This work was translated into Latin by Gerard of Sabionetta, near Cremona, in the thirteenth century, and, edited by J. Stabius, was printed at Nuremburg in 1504 under the title *De Scientia Motus Orbis*. A transcript of this, obtained by Mr. Close from a copy in the British Museum, is in the Academy Library. My translation of the Irish text had already been made when this was found, but it was not too late to make use of the help it furnished in the rendering of certain passages evidently misunderstood by the Irish translator. This transcript is now numbered 3. B. 32. Gerard's work was again edited by Joachim Heller, under the title *De Elementis et Orbibus Celesti-*

bus, and reprinted at Nuremberg in 1549. A comparison of the opening words of the chapters in these two editions with the Latin headings of the Irish text led Mr. Close to the conclusion that the Irish translator worked from a text different from either of the above. In Mr. Close's MS. notes we read:—"There is a MS. of the Latin of this work of Messahalal in the Bodleian Library (MS. Ashmole, 393). It agrees closely with that edited by Stabius and Heller." However, as Mr. Close has not attempted to define the relationship between this Bodleian MS. and the Irish text, and as I have not had an opportunity of examining this Latin MS., the question of the origin of the different versions cannot at present be pursued further.

The Irish text cannot be said to be a literal translation of Stabius. It is rather an adaptation. In parts the rendering is indeed literal, but there is scarcely a chapter where there is not either more or less matter than in the corresponding Latin version. These additions, if they can be so designated, are not mere interpolations in so far as they are not detrimental to the sense, nor do they differ in language or style from the passages for which we have corresponding Latin. In the same way the omissions do not leave gaps in the arguments, and it is quite probable that this edition of Stabius is not the actual original of the Irish rendering, and the Irish translator may have had some other edition of Gerard of Sabionetta's work before him. The portion of the text not in the Latin of Stabius consists of the introductory remarks down to the table of contents and chapters 7, 8, 9, 10, 11, 12, 14, 15, 17, 35, 36, 37 (34, 35, 36 according to numbering of the English translation from which Mr. Close worked). Of the original of these chapters nothing is known. They are evidently drawn from another Latin text or texts, and some of them are apparently of much later date than Messahalal's

work; for instance in chapter VII., the mention of spectacles, which did not come into use until the early 14th century; but again this may be a mere interpolation of the Irish writer. Mr. Close remarks that in chapter 36 (35) the habitable regions of the earth are carried further north than they would have been in Messahalā's time, and points out some statements in these chapters contradictory to the teachings of Messahalā. It is noteworthy that the interesting chapters on geology (8), that on mineral springs (9), that on volcanoes (10), on the tides (11), on the Nile (12), the seven habitable regions (36) are non-Messahalic and non-astronomical, so it would seem that the source from which these chapters were taken was cosmographical rather than purely astronomical.

The Messahalic astronomy is in the main that of Ptolemy; but I do not propose to discuss the subject here, nor the treatment it has received at the hands of the Irish translator, as Mr. Close deals with it in much detail in his article, to which I again refer my readers.

There is, however, just one error in the same article due to the entire omission of two words in the text which are at first sight unintelligible owing to a mistake on the part of the scribe. Mr. Close was greatly surprised that in chapter 35 (34) the ratio of the circumference of a circle to its diameter is taken as 3 to 1, Archimedes having shown long before even Messahalā's time, that the ratio is between $3\frac{10}{7}$ and $3\frac{10}{11}$, and Alfergani, a contemporary of Messahalā, made it equivalent to $3\frac{1}{7}$. The text here contains a curious error which can be easily corrected. It runs "tri mile 7 feth." It is evident that the scribe intended to write \bar{r} instead of r and, if we read "tri mile 7 seacht[m]adh," we get the fraction correctly.

THE MSS.

The text is contained in three MSS. :—

1. Stowe, B. II. 1. R.I.A.
2. Z. 2. 2. 1. (until recently numbered V. 3. 1. 38), in Marsh's Library, Dublin.
3. 23. F. 13. R.I.A.

1. A vellum MS., in very good preservation, containing 12 leaves, written in a small, neat hand in double columns. With it are bound 5 leaves of a medical tract apparently a translation from Latin. The last page is quite illegible. The text is illustrated by neatly executed diagrams, a few of which, however, are incorrect and do not agree with the text.

The first page is occupied by an astronomical rotula with a movable index, containing names of the Signs of the Zodiac and the planets in Latin; also the names of the months and the numeral figures. At the top of the page is a Lunar Calendar and a list of weights and measures which are very difficult to decipher owing to stains on the MS. At the foot of the rotula is a note in Irish explaining the connection between the signs of the Zodiac and the human anatomy, portion of which is illegible. The contents of this page are entirely absent from the other MSS. It is reproduced as the frontispiece to this volume.

Inside the cover are inserted some sheets of paper written by Col. Vallancey, Dr. Parsons and Mr. Astle on the subject of the MS., which throw some light on its later history. It was bought by Thomas Astle, Keeper of the Records in the Tower of London, in 1763. He evidently asked Dr. Parsons, F.R.S., and member of the Society of Antiquaries, to examine the MS., and report on it to him; which he did in the letter here preserved. With the assurance that accompanies ignorance, Dr. Parsons states that he found it to be "very valuable on several accounts; first for its antiquity, as it was

certainly written within the century of the conversion of the people to Christianity by St. Patrick; for this is the most pure and ancient character of the Magogian tongue from which the Greek and every other alphabet of Europe had its rise." The letter continues in the same strain. It is dated 6th June, 1765.

On Astle's death in 1804 the MS. came into possession of the Marquis of Buckingham at Stowe. About 1849 it was bought by the Earl of Ashburnham, and in 1883 the Ashburnham collection was housed in the Royal Irish Academy Library.

At the foot of Parson's letter Col. Vallancey appends some remarks, dated London, 10th March, 1782, and says "the astronomical essay appears to be the language of the 13th century." He wisely does not venture to support his opinion, or adduce any evidence to prove it. Higher up on the page, on a line with Parson's signature, Vallancey glosses the former's wild statements with a laconic "mi-creadamhuil annso. Cathal Uabhallansi."

Again, at the foot of a letter on the same subject addressed by Vallancey to Astle, evidently written the same day as the foregoing remarks, since it also is dated 10th March, although the year is not mentioned, there is a memorandum in Vallancey's handwriting as follows:—

"Dublin, 20th June, 1785. A copy of this work was found in the MSS. closet of St. Patrick's Library with great additions. Another mutilated copy is in possession of Col. Vallancey."

This memorandum is important for the history of the other MSS.

Before passing on to consider them, it may be mentioned that the name "Donncha O'Connail" is written in ornate Roman capitals at the foot of the last leaf but one. It may be the name of the scribe or former owner of the MS., but is probably not genuine.

2. A vellum MS. of 11 leaves very well preserved, in double columns, in handwriting different from that of B. II. 1. The diagrams are not so neatly carried out as those in B, but all agree with the descriptions in the text, and are therefore more reliable. The last page is entirely illegible, and only the Latin heading and first line of the Irish translation of the last chapter are preserved, since the remainder was continued on this last page. The text of Z is remarkably good. The corrupt passages are few, and any textual difficulties of B have been almost invariably solved by help of it.

How the MS. came to Marsh's Library is not clear. The first record of it I can find is in a MS. Catalogue of the Library compiled by Robert Dougatt, Librarian, 1719-1730.

The entry—"Anonymi Elementa Astronomiae M. 3. 6. 16." is, however, on the left hand side of the page and not in Dougatt's handwriting, and was evidently inserted after 1730. The present Librarian, Dr. Newport White, tells me that the fact of it being lettered "M" would point to its having been in Archbishop Marsh's collection, and that it was probably lost or mislaid when the Catalogue was compiled.

Col. Vallancey, in his *Collectanea*, Vol. VI., part II., p. 316, published 1804, says:—"It is evident that treatises on that science (astronomy) did exist about fifty years since, when Smith and Harris published the histories of Cork (1750) and Down (1757). Both mention that they had seen one in manuscript, and in the Irish character, in the Library of St. Patrick's Cathedral. A strict search was often made at my request, but no such book could be found."

This statement, published in 1804, is certainly strange when taken in conjunction with the memorandum of 1785 quoted above. We are not then sure, when or how

the MS. reached Marsh's Library, but it probably was contained in Bishop Marsh's collection, was lost or mislaid between 1719-1730, was certainly there between 1750-1757, and apparently lost sight of again until 1785, when it was found with other MSS. in a small closet in the wall. The "great additions" mentioned above by Vallancey are imaginary.

3. A vellum MS. of eight leaves, in very bad condition, comprising twenty-seven chapters of the text in handwriting different from that of either of the other MSS. The text, as far as it goes, is also illustrated by diagrams, some of which are very stained and faint, but appear to be correct inasmuch as they agree with the descriptions in the text.

About one-half of this fragment is clear, but somewhat more of it can be read in a very good light, and with the assistance of the other MSS.

Of its history I can find nothing. In the Catalogue of the R.I.A., 23. F. 13. is followed by two blank pages. In O'Curry's *Manuscript Materials of Ancient Irish History*, Dublin, 1861, p. 13 of facsimiles, chapter 19 of the F text:—*Si Autem Sol Minoris esset*, etc., is reproduced with the accompanying diagram.

O'Curry dates the tract "Circa A.D. 1400," without adducing any reason for his opinion, and describes the fragment as "a beautiful vellum MS. of eight leaves, in the finest style of handwriting." In my opinion, the handwriting of either of the other MSS. is much finer, particularly that of B, but of course O'Curry had not seen either of these. The same portion of the text and the diagram were reproduced in *Specimens of Irish National MSS.* Part III. ii. No. XXIII.

I have not been able to discover how the MS. came into the possession of the R.I.A., but it may be the "mutilated copy" mentioned as being in Col. Vallancey's possession in the memorandum of 1785.

The following edition of the text is in the main that of B. Doubtful passages have been emended from Z and F; in the latter case of course only where collation was possible. Scribal errors have been found to be less numerous in Z than in B, but on the whole the two texts differ but slightly. In almost all cases of difference F has been found to agree with Z rather than with B, but occasionally F and B readings differ from those of Z. In the matter of diagrams also Z and F are at one. At the foot of the page the *variae lectiones* of any importance are given, and where the text of B has been emended from that of F or Z the B reading is given in the collation. I have thought it unnecessary to italicise the commoner extensions of compendia except where there was room for doubt. With words like "speir," "cercall," "naduir," etc., which frequently occur in the text, italics have been used only in the first instance where they occur. "Talamh" has been extended throughout in accordance with the consonant declension, which it follows in the two instances where it is written in full in the MS. In no case has the spelling of the text been interfered with; punctuation marks have been added, and capital letters where necessary. I have designated the Stabius transcript 3. B. 32. as S in the footnotes and glossary.

POSSIBLE DATE.

To establish even an approximate date for the text will, I fear, be found almost impossible. Internal evidence furnishes criteria, at best of a negative character. The absence of dated texts, and the present isolation of works in this style, render the task still more difficult. Suffice it to say that no evidence has been found of linguistic peculiarities not in the spoken language of, say, the last five hundred years. The peculiarities associated with middle Irish—the survival

and confusion of infixed pronouns, the persistence of the neuter gender, the fluctuating verbal forms and nominal declension—all these have disappeared. The infixed pronoun (a fair test) does not occur, so that in short the language of the tract may be set down as a good example of the treatment of technical matter in the later schools. The forms have settled down, and are practically those in use amongst good speakers of Irish at the present day.

An exact determination of the state of a language at any period, at all times difficult, is doubly so in the case of Irish. Much of the Irish prose of the modern period, say from 1500 onward, is obviously not the Irish of the period at which it was written. There is a conscious striving after words and forms long since obsolete or at least archaic, with a deliberate avoidance of the language of everyday life, resulting generally in a pedantic mass of bombast, wholly unnatural, and quite valueless artistically or philologically.

The subject-matter of our text precludes all that rhetoric and expansion so popular in translation of narrative matter. Lucidity being the chief object, the style is simple and straightforward, sometimes even bald in description; it bears no trace of affectation, becoming almost colloquial in places, so that one is tempted to put it down as a sample of the spoken Irish of the fourteenth or fifteenth centuries. But any such attempts at dating must be necessarily conjectural. External evidence furnishes us with some information in this respect. The Arabic of Messahalāh was translated into Latin in the thirteenth century—I cannot at present find a more accurate date. If the reference to spectacles in chapter VII. were in the original of the second Latin text, from which the Irish translator worked, and not an interpolation, it could scarcely have been written before 1325, and certainly the Irish text could not have been produced before

then. If then we take 1325 as the superior limit for the Irish translation, it would postulate that it was translated immediately. If we assume the mention of spectacles was not in the original Latin, that date might still remain the superior limit, although their use in Ireland probably began somewhat later than on the Continent and England.

It is, however, unlikely that the Irish translation should follow so quickly on the Latin translation. It would have to get to Ireland, be translated and copied. This process might take place in a few years, and, on the other hand, might take a century to come about. The former is perhaps more likely. Mr. Close, in his already much-quoted article, cites the case of the *Rosa Medicinæ Anglicana*, by John Gaddesden, who died in 1361. Extracts from that work were translated into Irish in the Yellow Book of Lecan in 1390.

That the text of none of the three MSS. is the actual translation is proved, I think, by the mutilation of the Latin spelling in the chapter headings, which could not have come about if the writer had the actual Latin text before him.

I admit that the foregoing proves nothing definite, but it is probable that such translations were made and used for educational purposes in Ireland during the fourteenth and fifteenth centuries, that period which Mrs. J. R. Green associates with the "Second Irish Revival."

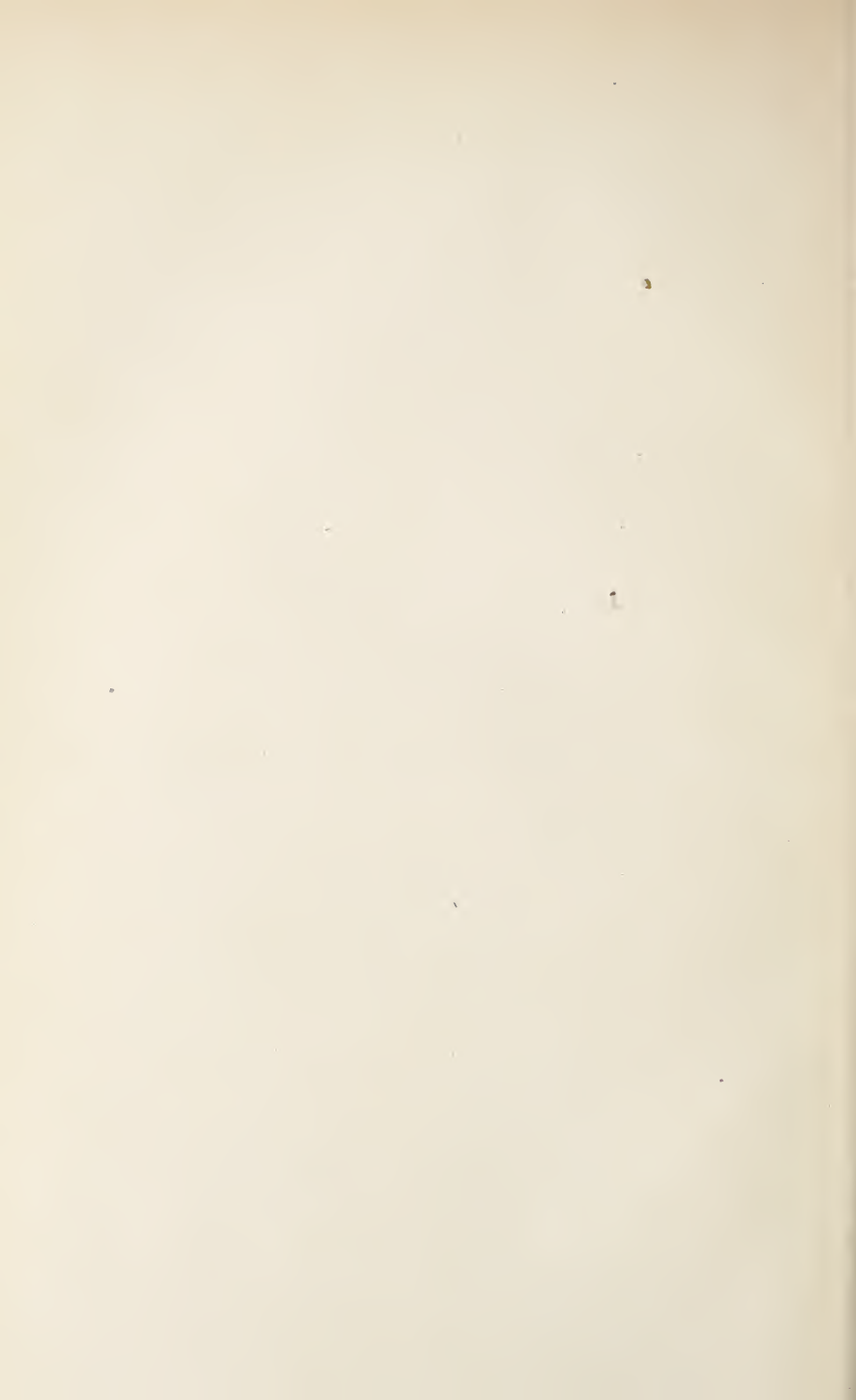
In conclusion, I have to thank Professor Bergin, whose pupil I had the honour to be, and at whose suggestion this edition was undertaken, for much valuable advice and assistance, gladly and readily given. To him fell the thankless task of proof-reading, and without his aid the passage of the work through the press would have been difficult.

MAURA POWER.

March, 1914.

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Sgrubulus	dregma	uncia	libra	punt	lethpunt	lethunsa
3.3.6.3.	.3.	.5.	6.	6.1.8.	6.8.	3.8.2.

lethdregma	punt co leth	unsa co leth	da dregma	dragma co leth
3.8.	6.1.8.8.	3.1.8.8.	3.11.	3.1.8.8.

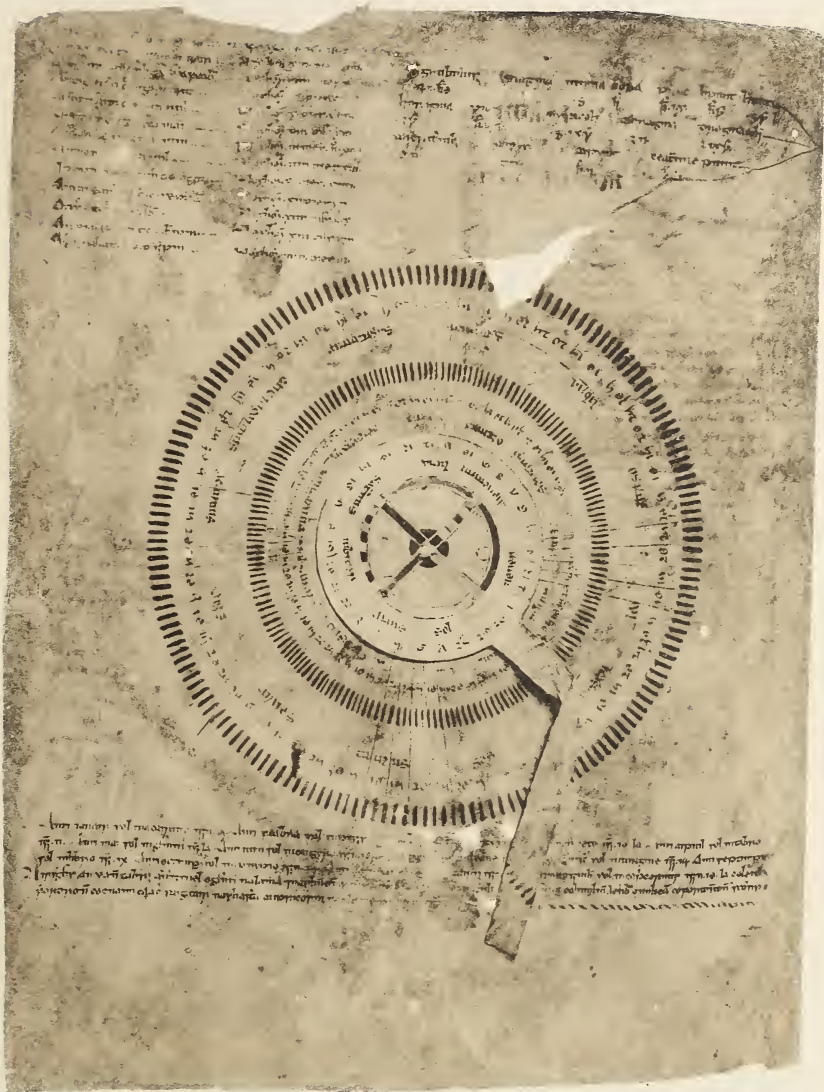
da scrubulus	da unsa	da punt	ceatime punt
3.11.	.5.11.	6.11.	4. . . . (?)

A mi ianair sol in acarius isin .9. A mi feabra sol in pisis is in - - - - .
 [A mi marta] sol in airiete isin 10. la. A mi aipril sol in tabro is in 11.
 A mi mai sol in geimin is in 9 la. A mi iuin sol in cangcro isin - - .
 [A mi iul sol] in leone is in - . A mi aghuist sol in uirgine is in 19.
 A mi Septimpir sol in libro is in IX. A mi octimpir sol in scoirpio isin - .
 A mi [nouimbir sol in sagi]tairius is in - . A mi disimbir sol in
 capricornus isin 10. la co leth.

Airigheis an ceann tabrus an muinel, o geimin na lama 7 na slinnein,
 - - - - - le libra onn lican co fordron (MS. fordordn) scoirp o
 fhordron co cnaim, saightair na sliasta, caipricornus na gl[uine] - - - .

- - - - -	- - - - -
- - - - - uair.	Nox horum [XVI, dies VIII].
- - - - - esca feabra.	Nox horum XIII, dies X.
A nderigh (?) aichi tic esca marta.	Nox horum XII, dies XII.
A medhon (?) aithi tic esca aipril.	Nox horum X, dies XIII.
- - - tic esca mai.	Nox horum VIII, dies XVI.
A medhon lae tic esca iuin.	Nox horum VI, [dies XVIII].
Im noin tig esca iuil.	Nox horum VIII, dies XVI.
Idir medon (?) 7 easpartain tic esca agustus.	Nox horum X, dies XIII.
Annsan easbartain tic esca septimbir.	Nox horum XII, dies XII.
A tosaic aiti tic esca octimbir.	Nox horum XIII, dies uero X.
An VI uair daitchi tic esca noimpir.	Nox horum XVI, dies VIII.
A trian na haithi tic esca disimpir.	Nox horum XVIII, dies VI.

See Frontispiece.



FACSIMILE OF FIRST PAGE B. II. i (R. I. A.), CONSIDERABLY REDUCED.

AN IRISH
ASTRONOMICAL TRACT.

AN IRISH ASTRONOMICAL TRACT.

GLORIA DEO PRINCIPIO .i. Gloir da Dia da tossach gan tosach ⁊ da crích gan deireadh, dan neach da bi ann riamh roimh gach uili ní, bias da sir deis gach en neich ⁊ dan te nach roithenn ciall na resun na daennachta¹ da fis na dha² aichni cade.

Et o nar bail³ leis beith da sir gan e fein dfoillsiugad da na dainib, da mhúin ⁴a oibríthe ⁊ a ealadhna do na heolchaib innus gurub as⁴ na hoibríthibh da hathontai an toibríteoir⁵ ⁊ gurub as na gnímhartaibh da haith-eontaidh an tuismigíteoir ⁊ is uime sin is dingmala do na heolcaibh dar foillsig a seicreidi gloir do tabairt do tar gach uili ní.

Ma sedh tinnscainter annso ceasta cruaiige dosgailte na narsatan ar oibrítibh da scrudadh. Et co sunnradhach da cailibh na firmamintí ⁊ da cailib na ceithre dula ⁊ da suigiugad ⁊ da tuismead maille *re* furtacht an tuismigítheora aderumni, ⁊ da resunaib ⁶rofirinneacha ⁊ darmaintib ecintacha⁶ ⁊ da congluaistib doibríste doscailtí.⁷

Ocus atait annsa leabhur le celi da fichit caibidil ⁊ as i so an ced caibidil dib .i.

Da cruthugud ⁊ foillsiugad na firmaminte.

Da na⁸ *ceithre* duilibh ⁊ da ninedaib ⁹mar dordaidh an tuismigíteoir iad.⁹

Da gluasachtaib ⁊ do na¹⁰ *naduiribh*.

Da naduirib ⁊ do na gluasachtaib.

Do cruinne na ceithre ndula.

Dasaenta na ceitre ndul ⁊ da¹¹ *naduirib*.

¹ Z na daenacht. ² B na da *bis*. ³ Z nac ar bail. ⁴⁻⁴ Z a oibríthe do na heolchaibh ⁊ a ealadhna gor ab as. ⁵ Z tuismíteoir. ⁶⁻⁶ Z firineacha ⁊ damhaintibh indlachtach. ^{7, 9-9, 10} Z *om*. ⁸ B *om*. ¹¹ Z da na.

AN IRISH ASTRONOMICAL TRACT.

GLORIA DEO PRINCIPIO. Glory to God; whose beginning is without beginning, and whose end is without end, to the Person who existed always before everything, who will be eternal after everything, and to Him whom sense or human reason does not attain, to know or recognise what He is.

And since He did not wish to remain for ever without manifesting Himself to men, He instructed the learned in His works and arts, so that the worker would be known from the works and the creator from the deeds, and therefore, it is fitting for the learned ones to whom He revealed His secrets to glorify Him above everything.

Therefore, let us here begin to examine the difficult, obscure questions of the ancients concerning the works, and in particular [we discuss], with the help of the Creator of whom I speak, the characteristics of the firmament and of the four elements, and of their situation and their creation, with very just, forcible arguments and indisputable, irrefutable reasons and conclusions.

There are in this book, inclusive, forty chapters, and this is the first chapter of them:—

The creation and manifestation of the firmament.

The four elements and their positions as the Creator ordained them.

Their motions and natures.

Their natures and motions.

The roundness of the four elements.

The disagreement of the four elements and the nature of them.

Da chruinne na talman 7 d'fís lae 7 aithci.

Da claeclogh na fairrgi 7 na srothan.

Dexamlacht na talman 7 na cnoc.

Dexamlacht na nuscid 7 do gluassacht na talman .

Don da chnoc teineadh ata ar lasadh.

Da linad 7 da tragadh an mara.

Da tuili¹² srotha Nil san Eigeift.

Da cruinne na firmaminti 7 da gluassacht 7 da naduirib.

Dimpodh na firmami[n]te 7 na greine.

Da claechlod na firmaminte.

¹³Da cerclaibh 7 da linibh 7 da poncaibh na firmaminte.¹³

Dexamlacht eirgi 7 dul fai na greine.

D'fís meid¹⁴ na greine.

Da solus an re noc gabus on grein.

Da dorcadus an re.

Da tsolus na nairdrennach.

Da dorcadus na greine.

Dfochainn an re dfaicsin go bec ¹⁵7 go mór ar a primh.¹⁵

Dexamlacht soluis an re.

Da nuimir cercall an re.

Da da¹⁶ speir na greine.

Do na huili cercallib¹⁷ 7 da ngl[uas]acht.

Da gluasacht na speiri romóire.

Da gluasacht speire na comartad.

Da claechlod na naduredh¹⁸ 7 na naimser.

Da nuimir cercall Shaduirn 7 na plaineid eile.

Dimpodh Shaduir[n] 7 na plained¹⁹ ele tar a nais.

Da speir na nairdrinnach.

Da nuimhir milteadh a timceall na talman.

Da claechlodh na nairdreannach²⁰ a nexamlacht na crich.

12 Z do linad tuili. 13-13, 15-15, 16 Z om. 14 Z mede. 17 B cercall. 18 Z naduir. 19 Z speir. 20 Z nuaireann.

The rotundity of the earth and the knowledge of day and night.

The change of the sea and the rivers.

The characteristic of the earth and of the hills.

The characteristic of the waters and the motion of the earth.

The two burning volcanoes.

The flow and ebb of the tide.

The flood of the river Nile in Egypt.

The roundness of the firmament ; its motion and its natures.

The revolution of the firmament and of the sun.

The change of the firmament.

The circles, lines and points of the firmament.

The difference in sunrise and sunset.

The knowledge of the size of the sun.

The light of the moon, which it borrows from the sun.

The eclipse of the moon.

The light of the constellations.

The eclipse of the sun.

The reason why the moon appears small, and large at its prime.

The characteristic of the light of the moon.

The number of the circles of the moon.

The two spheres of the sun.

All the circles and their motion.

The motion of the very great sphere.

The motion of the sphere of the signs.

The change of nature and of the seasons.

The number of the circles of Saturn and of the other planets.

The retrograde movement of Saturn and the other planets.

The sphere of the stars.

The number of miles around the earth.

The change of the stars in different countries.

Do na hocht crichaib soaitreabta an²¹ talman.
 Don da inadh a fuil an bliagain uile na henla 7 na
 henaitheci.²²

Do na gaethaibh 7 da naduirib.
 Don toirnidh 7 do na nellaibh 7 dan feartain²³ 7 don
 teinntigh.²³

Do na plainedaib.*

1. FIRMAMENTUM EST ETCETERA. .i. Ata an firmamint co cruinn ar na tuismead 7 deradh aici, 'ca sir¹ follamnugad² ag a tuismigteoir fein.² Ocus atait airdreannaid a³ secht speir na firmaminnti mar tairngibh daingne⁴ a clar gan gluasacht dilis acu acht gluasacht na cercaille an a fuilid. Ocus as uime sin nach⁵ faicear⁶ a[g] gluasacht tar a ceili iat na a neagaidh a ceile ach en ordugad siraigh⁶ suthain co comfogus da ceili 7 comfada o ceili ag a chonnmil acu caithe. Da derbad co fuil an follamnugad sin ag a connmail ag tuismigteoir an domhain, 7 co mbia co brat ar a oibrechaibh fein, an cursa⁷ da orduigh se doibh a tus an domuin, atait gan meallad ca connmail sin co neimheasbadhach.

Da derbadh sin bidh fis gach neich nadurtha ag na heolchaibh sul tigid siad ann, oir ata a fis acu co neimheasbatach sibhal na nairdrinnach 7 na plained gacha bliadna 7 gacha mis 7 gacha sechtmaine 7 an gach la 7 in gach moimint. Et na egmais bidh fis na naimsir⁸ fein acu sul tigid siad⁹ ann .i. fis tsamraigh 7 fogmuir 7 geimrid 7 earraidh 7 fis gach neich is nadurtha da teacht inntu sin; ocus as ardomaint deimhin sin da derbadh co fuil an te da tuismidh an domhan fos ga follamnugad, oir muna beith, da claechleofadais na neiche adubrumar

21 Z na. 22 Z oighte 23-23 Z om. 1-1 Z aga. 2-2, 4 Z om. 3 B ann. 5 B daingne add. 6-6 Z a gluasacht roim acu no a ndedh acu ach en ordugad faighti siraig. 7 Z nadurtha add. 8 B na haimsire. 9 B tigi.

*Sic. MSS. leg. plandaib.

Chap. i.]

The eight habitable regions of the earth.

The two places where the whole year is one day
and one night.

The winds and their nature.

Thunder, clouds, rain and lightning.

The plants.

1. FIRMAMENTUM EST, ETCETERA. The firmament is round according to its creation, and will come to an end, and is ever ruled by its own Creator.

There are stars in the seven spheres of the firmament, like firm nails in a plank, without motion of their own, except the motion of the circle in which they are. On that account they are not seen moving past each other or after each other, but they always preserve one constant, everlasting order at equal distances to and from each other.

As a proof that that government is preserved by the Creator of the world, and that it will depend upon His works for ever, they observe without deception and without fail the course He ordained for them at the beginning of the world.

As a proof of that, the learned have knowledge of every natural phenomenon before it occurs, for they understand fully the motion of the stars and of the planets for every year and every month and every week and for every day and every moment. And besides they even have knowledge of the seasons before they are entered upon, knowledge of summer and autumn, winter and spring, and knowledge of everything that occurs naturally in them; and that is a sure argument to prove that He who created the world is still governing it, otherwise the things I have mentioned would have altered

costrasta an toibriugad dinnsemar do beith acu. Et as mar sin da beidis na hairdrinnaigh 7 na plainceid uair budh luaithi uair budh maille iat na ceili 7 uair ele na combnaighi gan en cor do chur dibh. Et as ar in nos cedna da ticfadais na haimsera a ninadh a ceile 7 da bedis laeite nadurtha budh sia na ceili ann. Agus da rer sin da beidis tortha 'na talman ¹⁰uair and¹⁰ ar techt 7 uair ele gan en raed da techt dibh. Et as mar sin da beith gach uile ni idir nemh 7 talmain buaidhertha measgaithi¹¹ gan iul ag feallsamain na ag eolach cad aderadh ru. Et da ticfadh as sin aris co scrifaide¹² na healadhna saera da rinneadh,¹³ 7 ar sibal 7 ar comnaidhi ar nuimhir 7 ar suigiugad 7 ar ordugad oibrigtedh De.

Ma sedh o dachiamaid co fuilid na healadhna saera ann 7 co fuil gach uile ni ele co nembuaigertha nemeascaithi da rer en ordaithi ac tiacht co deimhin an a naimseraibh fein, as as so tuicter ¹⁴co fuil¹⁴ an te do crutaidh an doman fos aca ordugad ¹⁵7 ag a follam-nug[ad].¹⁵

¹⁶[Do] na cethri duilibh 7 da ninadaibh 7 mar da orduig an tuismiteoir iat.¹⁶

2. TERRE EST IN MEDIO MUNDI ET-CETERA .i. ¹ata an talam¹ na ponc cruind a cert medon an domain mar² mod liatroide cruinne, gan tsustaint fai, ca congmail, 7 ata an tuisci da rer naduir ³da gach aen leithe³ de na timceall 7 gideadh da tuismaidh an tuismiteoir an ⁴cuid tuas⁴ don talmain mar inadh aitreabtha do na dainibh 7 da na hainminntib nar fed⁵ beith beo fa usci. Et ata an taer na timchill ar aen. Et ata an tene na dimcheall a⁶ triur. Et ata an firmamint gach aen taebha a timcill an ceathrair sin. Et as i so tuarascbail na ceithre ndul sin .i.

10-10, 14-14 B om. 11 B measargaithi. 12 B scrifadh. 13 Z do rinne. 15-15 F om. 16-16 Z, F cm. 1-1 B om. 2 Z a. 3-3 Z an gach aen leth. 4-4 Z taeb huas. 5 Z nach fedaid. 6 Z na.

Chap. ii.]

by this the function I related them to have; the stars and the planets would be each at one time swifter, at another slower than the other, and at another time stationary, not stirring at all. In the same manner the seasons would come (one) instead of another, and there would be natural days longer than one another. And, accordingly, the fruits of the earth would be growing at one time and at another time would be non-productive. Accordingly, everything in heaven and earth would be confused and confounded, neither philosopher or seer knowing what to say of them. And, again, the result would be that the exact sciences, which were drawn up concerning the motion and stopping and number and position and order of the works of God, would be set at nought.

Then, since we see that the exact sciences exist, and that everything else occurs definitely in its own season, regularly and without confusion according to one order, from this we know that He who created the world still orders and governs it.

The four elements, and their positions as the Creator ordained them.

2. TERRA EST IN MEDIO MUNDI, ETCETERA.

The earth is a round point in the very middle of the universe, fashioned as a perfect sphere with no substance beneath to support it and the water, as is natural, around it on every side, and, moreover, the Creator created the upper part of the earth as a dwelling place for men and for the animals that cannot live under water. And air surrounds both. And fire surrounds the three of them, and the firmament is on all sides around those four.

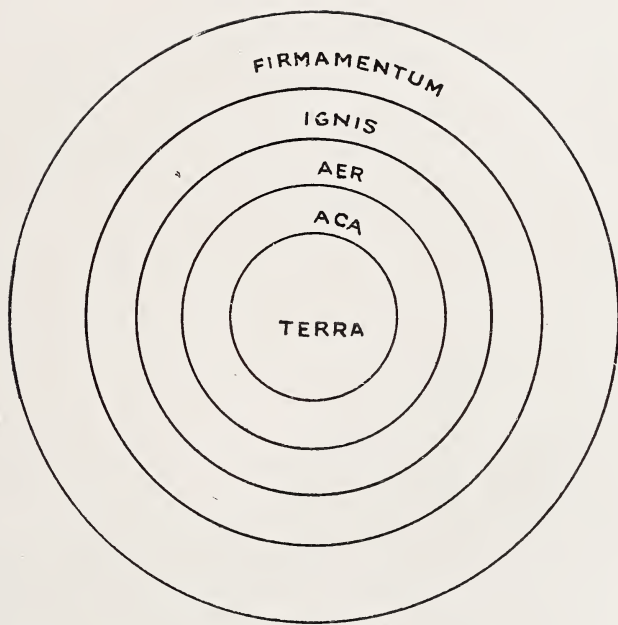
The following is a description of those four elements :—

tuarasgabhaíl na teineadh .i. corp te tirim loisgnech edrom silteach sogluasta fa fuil an taer. Tuarascbail an aeir .i. corp te *fliuch* siltec sogluasta, trom ⁷an aithfehadh na teinedh⁷ 7 etrom a naithfehadh an uisci. Tuarascbail an uisci .i. corp *fuar fliuch* siltec sogluasta, trom ac fecain an aeir 7 edrom ac fechain⁸-na talman, ⁹fa fuil an talamh.⁹ Tuarascbail na talman .i. corp *fuar, tirim*, trom dogluaiste ata¹⁰ fon domun uili 7 is mar sin as tusca an talamh nan tuisci ¹¹7 an tuisce nan taer¹¹ 7 an taer nan teine 7¹² in teine nan firmamint oir as i an firmamint as imillige acu mar foillsiges an fidair so tis.

3. DICUNT PHILOSOPHI¹ ETCETERA. Aderaid na feallsamain¹ co fuilit tri gluasachta ann .i. gluasacht o meadhon 7 gluasacht cu meadhon 7 gluasacht a timcill medhoin.

IS e is gluasacht o meadhon ann .i. an gluasacht teit o talmain amach co cotrom dinnsaighe gach uile rainn don cercaill timcill. IS e as gluasacht cu meadhon ann an gluasacht teit sis on cercaill ²timcill co talmain.² IS e as gluasacht a timcill mhedhoin ann .i. an gluasacht noch gluaisis da rer na cercaille timcill 7 is o na primhgluasachtaibh sin genter gach uili gluasacht ele da fuil is an domhan 7 is dib sin gluasacht na ceithre dula, oir gluaisidh cuid aca o meadhon 7 cuit co meadhon 7 ni gluaisind en raed co nadurtha a timcill medoin acht an firmaminnt na rann da rannaibh. An da duil gluaisis cu meadhon .i. talman 7 uisci, as luaithi an gluasacht co meadhon talmain na an uisci. Don da duil gluaisis o meadhon .i. aer 7 teine is luaithe gluaisis in teine o meadhon nan taer. Et is mar sin atait na duili gluaisis go meadhon trom 7 na duili gluaisis o meadhon etrom. Et ³tuictear mar *congluais*

7-7, 9-9, 11-11 Z om. 8 Z in athfega. 10 Z noc ata. 12 Z 7 is tusca an tine. 1 Z Filosofi. 2-2 Z co talmain timcill.



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Chap. iii.]

Description of fire—A warm, dry, burning, light, liquid, movable body, beneath which is the air.

Description of air—A warm, wet, liquid, movable body, heavy in comparison with fire, and light in comparison with water.

Description of water—A cold, wet, liquid, movable body, beneath which is the earth, heavy in comparison with air and light in comparison with the earth.

Description of earth—A cold, dry, heavy, immovable body that is beneath the whole of creation, and thus the earth comes before the water and the water before the air and the air before the fire and the fire before the firmament, because the firmament is the outermost of them, as this figure below shows.

3. DICUNT PHILOSOPHI, ETCETERA. The philosophers declare that there are three motions, *i.e.*, the motion from the centre, the motion towards the centre, and the motion around the centre.

Motion from the centre is the motion that proceeds equally out from the earth to every portion of the surrounding circle.¹ Motion to the centre is the motion that proceeds downwards from the surrounding circle to the earth. Motion around the centre is the motion that revolves with the circle,² and from its prime motions is produced every motion that is in the world, and one of these is the motion of the four elements, for some of them move from the centre, and some to the centre, and nothing moves around the centre naturally but the firmament or some portion of it.

Of the two elements that move to the centre, earth and water, the motion to the centre is swifter in earth than in water. Of the two elements that move from the centre, air and fire, fire moves more swiftly from the centre than air. And thus the elements that move to the centre are heavy, and the elements that move from the centre are light. From these facts

¹ = Coelum of S.

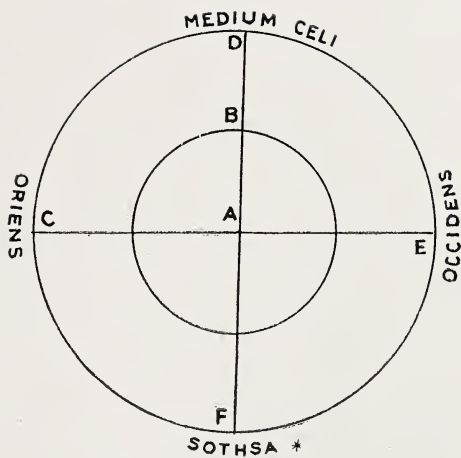
² S. quod revolvitur circa terram.

as na neicib sin³ gurab e an talam duil as troma⁴ acu
 7 gurab i an teine duil as roetroma aca. Et ge ta an
 tuisci 7 an taer mesardha⁵ atorra aga⁶ comortus re
 ceili 7 ris na duilib ele, dagabar truma 7 etruma innta
 oir ge trom an tuisci ag a comoradh⁷ re haer as
 hedrom e ga comoradh⁷ re talmain 7 is mar sin gidh
 etrom an taer ag a comoradh re huisci as trom e ca
 comoradh re teine.

Dfoillsiugad an adbair⁸ so nis mo dagen fidair
 annso this scailfis amach brig na raiteadh so. Dagen
 ar dus fidair na talman⁹ 7 scribfad¹⁰ A na meadhon 7
 curfead B litir¹¹ na mullach 7 daden na dedaidh¹² sin
 cercall na firmaminti a dimcill na talman 7 cuirfed¹³ C
 na oirrcher 7 D na mullach 7 E na hiartar 7 F na
 hichtar 7¹⁴ ar cuma na fidrach atait da corp do na
 corpaid duilidhi¹⁵ noch gluaisis o medon ann na
 cercaille timcill .i. o A go B 7 is iat sin tine 7 aer. Et
 atait an da corp ele gluaisis on cercaill timcill go
 medhon .i. o B go hA 7 is iat sin talam 7 uisci. An
 treas primgluasacht ata ann .i. gluasacht do rer an
 cercaill¹⁶ timcill 7 is e sin gluasacht na firmaminnti 7
 is amlaid gluaisis o C go D 7 o D go E 7 o E go F
 7 o F go C 7 is leor¹⁷ sin do na heolcaib.

4. CALOR ET FRIGHEDITAS¹ ETCETERA
 .i. tes *fuacht fliche* 7 *tirime* as iat sin as ceithre
 primcaile do na ceithre duilibh 7 atait na naicidib
 doscailte uatha 7 atait da cail gnimhacha dib so .i. tes
 7 *fuacht*.² Agus as uime aderur caile gnimaca ru oir
 an tan glacmaid iat foillsigid siat duinn an uair sin
 gan fuireach annsa momint a nglactar iad a mbrig fein;
 oir an tan glacmaid an tene foillsigid an uair sin dun
 brig a teasigachta³ 7 as mar sin an trat glacmaid an

3-3 Z tuigter mar gluaisid na neithe sin. 4 Z, F rotroma. 5 Z mesura.
 6 Z, F a. 7 Z comparaid. 8 Z na nadbor. 9 Z 7 is i so i *add*.
 10 Z cuirfed. 11 Z *om*. 12 Z diaigh. 13 Z, F *om*. 14 Z is *add*.
 15 Z duilita. 16 Z na circaille. 17 Z lor. 1 Z Frigidus, F frigidus.
 2 Z *tesighecht* 7 *fuardhacht* (?), tes—i, fuar—. 3 F tes—i B Z teas—ia



* F Sotrifa .

To face page 12,

Chap. iv.]

let us conclude that earth is the heaviest element and fire the lightest. And although the water and the air are temperate between them, compared with each other and with the other elements, heaviness and lightness are found in them, for, although water is heavy compared to air, it is light compared to earth, and thus though air is light compared to water, it is heavy compared to fire.

In order to demonstrate this subject more clearly I shall make a figure here below that will elucidate the meaning of these words. First I shall make a figure of the earth and write A in the middle of it and I shall put the letter B at the top of it, and then I shall make the circle of the firmament around the earth and put C on the east side of it, and D on the top of it, and E on the west of it, and F on the lower part of it, and on the model of the figure there are two of the elemental bodies moving from the centre to the surrounding circle from A to B and these are fire and air.

There are also the two other bodies which move from the surrounding circle to the centre, *i.e.*, from B to A, and these are earth and water. The third prime motion that exists, *i.e.*, the motion around the surrounding circle, which is the motion of the firmament, moves thus, from C to D and from D to E and from E to F and from F to C, and that is sufficient for the experienced.

4. CALOR ET FRIGIDITAS, ETCETERA. *i.e.*, heat and cold, wetness and dryness, are the four principal properties of the four elements, and they are accidents inseparable from them, and two of these properties are active, *i.e.*, heat and cold. The reason why they are designated active qualities is that when we touch them, they make known to us then immediately at that very moment their own essence, for when we touch fire, it makes known to us then the essence of its heat. So, when we touch hoar frost it makes known to us

cuisne reoigh foillsigid se duinn an uair sin gan fuirec sa mo[m]int cedna brig a fuardhachta.⁴ Et as i cuis fa mothaigmaidni na neice ainmesarda sin naduir mesarda da beth againn fein.

Et atait in da cail ele dib sin fuilngtec ⁊ is uime aderar caili fuilngtaca ru ar ⁵son gan⁵ cumhachta dfoillsiugad an uair sin ga nglacadh; oir an trath glaccamaid raed ⁶fliuch no⁶ raed tirim ni mhothaigmid a fliche na a tirmigacht⁷ co hobann mar mhothaighmid teas na teineadh no fuardhacht⁸ an cusne. As i sin an cuis fa nabartar blod do na cailib sin do [beth]† gnimhach ⁊ blod⁹ fuilngtec. Et ata gach uile corp o speir na teinedh anuas cumaisce astu so ⁊ atait siat fein neamhcumusca a negmais co nabartar a mbeth¹⁰ cumasca as a cailib fein mar ata an teine te¹¹ tirim cumusca as an da cail sin oir as iat an da cail sin tigernaighes is an teine. Et as a tirime ⁊ a fliche cumuisgter an taer oir as iat sin tigernaighes ann. Et as mar sin ata tigernas an da duil ele timcill a caili fein. Et ge tait na ceithre duili so cumasca as na¹² primcailib aderar¹³ neamchumasca ru¹⁴ a naithfeghadh na corp nduilita cumuscter asta fein. Et as mar sin atait an ceithre so cumasca ⁊ neamcumasca le ceili. Neamhcumasca ag fecain gach neich¹⁵ cumaister asta fein. Cumasca ac fecain na primhcailedh ata da ririb. Et mar sin as coir gluasacht nemcumusca da beth ag an corp neamcumusca ⁊ gluasacht cumasca da beth¹⁶ ag an corp cumusca.

Et is follus gac uili corp a tigernaighinn teasigacht¹⁷ as o medhon suas gluaises. Et gach uili corp a tigernaiginn fuardhacht¹⁸ as dinnsaighidh medhon gluaises. Et as e an tes oibriges edromacht is na

4 B fuar—, Z fuar—a. 5-5, 6-6 B torn. 7 F tirime. 8 Z fuaracht, F fliche an usci. 9 Z ele do beth add. 10 B om. 11 B teas—i. ZF te. 12 Z a. 13 Z a mbeth add. 14, 16 Z om. 15 Z na nethe. 17 Z tes. 18 Z fuacht.

† B torn.

[Chap. iv.]

then immediately at that same moment the essence of its coldness. The reason why we feel those immoderate things is that we have a moderate nature.

The remaining two properties are passive, and the reason why they are designated passive qualities here is because they do not make known their powers when touched, for when we touch a wet object or a dry object we do not feel its wetness or its dryness suddenly as we feel the heat of the fire or the cold of the hoar frost. That is why some of those properties are said to be active and some passive. Every body from the sphere of fire downwards is compounded of these (qualities) and they themselves (the bodies) are simple, even though they are said to be compounded of their own properties as hot, dry fire is a compound of those two properties [*i.e.*, of heat and dryness], since it is those two properties that preponderate in fire. And air is a compound of dryness and dampness, because it is they that preponderate in it, and thus is the preponderance of the other two elements with regard to their own properties.

Although these four elements are compounded of the principal properties, they are termed simple in comparison with the elemental bodies that are compounded of themselves. Thus these four are both compound and simple. Simple compared to every object that is compounded of themselves. Compound compared to the prime qualities which are essential. Thus it is fitting for a simple body to have a simple motion, and for a compound body to have a compound motion.

And it is clear, that every body in which heat preponderates, moves from the centre upwards; and every body in which cold preponderates, moves in the direction of the centre. It is the heat that causes lightness in the natural

corpaib nadurtha. Et as i an *fuardhacht* oibriges tromduct 7 is i an *tirimaigeacht* oibriges luas cumscraithi dinnsaidhe an inaidh nadurtha is na corpaibh edroma. Et mar sin as i an *fliche* oibriges¹⁹ maille cumscraithi is na corpaibh an a mbi. Et as na raitibh sin timsaigter gorab naduir da gac uili²⁰ duil dib sin comnaighe do denamh a na ninadaib nadurtha fein a na fuil cric a ngluasachta fein,²¹ oir da curtai duil aca sin da hainndeoin as a hinadh nadurtha fein amach²² da tarrongadh a nduchas aris dinnsaighe an inaidh cedne.²³

5. TERRA EST IN MEDIO ETCETERA .i. As amlaidh ata an talam a cert medhon na firmaminti a fidhair dul¹ sis na corp trom mar sheantrom .i. ponc medhonach a raed crinn. Et mar adubramar as e² inadh nadurtha an usci beit a timceall na talman 7 da fadadh³ slighe gan oilbeim on talmain, o ta fein na corp trom siltec siblach ni anfadh co roitfedh⁴ seantrum na talman 7 danfad annsin oir as e sin, mar adubrumar, inadh deiginach sibail na corp trom. Et atait ranna⁵ an usci ac dinge⁶ a ceili da dul tar a ceili diarraidh seanntroim an domain mar inadh nadurtha doib fein da ligeadh 7daingne na talman doib.⁷ As egin, o ta an talam comcruinn daingean a gabail risin uisci gan a dul cum an tseantruim, co fuil an tuisci comcruinn a dimceall na talman 7 as mar sin ata fidair cruinn⁸ ag an da duil ele gluaisis suas on tseantrom co ruic⁹ an cercaill timcill.

Oir ata an tene ar son a hedruime ac tarraing suas no co ngabann cercall¹⁰ daingean dotruailligte an re ria 7 o nach fadhann slidhi tairis do coimed 7 da comhdaigh hi fein fo ascaill cruinn na cercaille¹¹ sin 7 as uime sin as egin di fein beith cruinn mar ata cercall

19 Z foillsiges. 20, 21, 22 Z *om.* 23 Z inadh nadurtha fein. 1 Z dula. 2 Z gorobe. 3 Z fada. 4 Z roithed. 5 Z o tait randadh 6 Z a dingeadh. 7-7 B daingean a gabail doib. F daingne, *rest illeg.* 8 F *om.* 9 Z conuige. 10 B an cercall. 11 Z na cercall.

Chap. v.]

bodies and it is the cold that causes heaviness and it is the dryness that causes rapidity of movement towards their natural place in light bodies. In the same way dampness causes slowness of motion in the bodies in which it is. From these statements we conclude that it is the nature of every one of those elements to remain in its own natural position in which is the end of its own motion, because if one of those elements were displaced by force from its own natural position, the nature of it would draw it again to the same position.

5. TERRA EST IN MEDIO, ETCETERA. The earth is in the very middle of the firmament as a centre for the descent of heavy bodies, *i.e.*, a middle point in a round thing.

As I mentioned, the natural position of the water is around the earth, and if it got space without obstruction from the earth, since it is a heavy, liquid, movable body, it would not stop until it would reach the centre of the earth, and it would remain there, because that, as we mentioned, is the last point of the motion of heavy bodies. And the parts of the water are pressing against each other, seeking the centre of the universe as a natural position for themselves if the firmness of the earth permitted them. Since the earth is round and firm, contending with the water, preventing it going to the centre, the water must be spherical around the earth, thus the other two elements that move upwards from the centre to the surrounding circle have a round shape.

For fire, on account of its lightness, keeps drawing upwards until the firm indestructible sphere of the moon meets it, and since it cannot pass it, it keeps and covers itself¹ under the round axle of that circle, therefore it must itself be round as is the circle of the moon that

¹ lit. has kept and covered; this and remainder of sentence an interpolation.

an ré cumdaighes astig innte fein hí. Et as i an cercall sin as re deridh gluasta na corp nedrom. Et as e ní doni an taer cruinn, druim an uisci cruinn sa glotain ichtaraidh suas aige 7 an cuit uachtarach de fein sa glotain ichtaraidh don tene; 7 o ta an tene 7 an tuisci comcruinn mar da derbamar as egin dan aer ata ar na cumdach etorra beth cruinn da rer a fidrach sin. Et as amlaid ata an suighiugad sin na ndul andluite sin a nglotain a ceili nac¹² feadann ní ele beth aturra 7¹³ is mar sin nach fedann inad folamh beth sa domhan uili.

6. NOTUM EST UNUM QUODQUE QUATUOR ELEMENTORUM ETCETERA.¹ As follus gach duil do na ceithre duilib² na naduiribh 7 na ninadaibh 7 na ngluasachtaibh² da beith contrara da ceili, oir idir gach ní da ngluaisinn o medhon is i an tene as roluaithe acu 7 mar sin idir gach ní da ngluaisinn co medhon as e an talam as roluaithe acu, 7 is mar sin ata an talam 7 an teine contrara da ceili³ ar son caili teasigheachta na teinedh³ ac oibriugad edromachta innte 7 ar son caili fuardhacht[a]⁴ na talman ag oibriugad truimidheachta innte. ⁵Et tuig an tan aderar talam 7 teine no da duil ele da beith contrarda da ceili gorab⁵ iat caili na ndul tuicter ⁶an tan sin⁶ ⁷da beit contrartha da ceili⁷ 7 nach iat a sustainnte. Oir adeir an feallsam in libro predicamentorum, substainte nicel est contrarium, oir ní fuil en ní contrarda ag an⁸ tsubstaint. Oir is uime sin an trath aderar an tene da beth te tirim 7 an talam fuar tirim ⁹ata tes 7 fuacht in da duil sin contrara da ceile 7 atait aentaghach da ceile oir is i in tirmigacht⁹ oibrighes luas indtu.

12 Z o nach. 13 Z om. 1 Z Notandum est unam quoque quatuor elementorum. 2-2 Z do beth nadurtha 7 a ninad 7 a ngluasacht. 3-3 Z ar son tes na tine. 4 Z fuair, FB fuar—. 5-5 Z Et an tan tic gorab. 6-6 Z annsin. 7-7, 8, Z om. 9-9 B Tirmaideacht 7 fuacht an da duil sin asaentadach. Et atait aentadach da ceili na tirmecht.

Chap. vi.]

envelopes it (the fire) inside in itself. That circle is the last course of the motion of light bodies. What makes the air spherical is that it has the surface of the spherical water forced up (?) into its lower embrace (?) and the upper part of the air itself is in the lower embrace (?) of the fire, and since the fire and the water are spherical according to my proof, the air which is enclosed by them must be spherical in accordance with the shape of them.

Such is the position of those very close elements in each other's embrace (?), that nothing else can be between them, therefore there can be no vacuum in the whole of creation.

6. NOTUM EST UNUM QUODQUE ELEMENTORUM, ETCETERA. It is clear that each of the four elements are opposed to each other in their natures, their positions and their motions, for of all things that move from the centre, fire is swiftest, and likewise, of all the things that move to the centre, earth is swiftest; thus, earth and fire are opposed to each other on account of the heating properties of fire producing lightness in it, and on account of the cold properties of earth producing heaviness in it. Observe, when we say that earth and fire, or two other elements, are opposed to each other, that it is the properties of the elements that are understood then to be opposed to each other and not their substances, for the philosopher says in the "Liber Praedicamentorum," "*Substanti nihil est contrarium*,"—the substance has nothing of contrariety.

Thus when we say that fire is hot and dry, and earth cold and dry, the heat and cold of those two elements are opposed to each other; while they are in agreement with each other, inasmuch as the dryness effects speed in them.

Et is mar sin ata an taer 7 an tuisci co haentadach 7 co hasaentadhach da ceili¹⁰ 7 atait co haentadhach is na cailibh fuilngteca .i. an *fliche* noch oibrighes a¹¹ moille innta ar aen. Et atait asaentadach da ceili is na cailibh *gnimaca* .i. a *teasigacht* oibriges edromacht is in aer 7 a *fuardhacht* oibriges tromidacht¹² is in¹³ usci. Et as mar sin ata an tene 7 an tuisci co hasaentadach da ceili a na cailibh *gnimhacha* 7 fuilngteca, oir as amlaid ata an tene te *tirim* luath edrum 7 is amlaid ata an tuisci *fuair fliuch* mall trom. Et as follus fa deoigh na neice ac a fuil gluasacht direach co nanait na inadaib nadurtha fein acht muna curtar as da nainneoin iat. Et an trat *claechlighter* duil dib an¹⁴ duil ele tri nert na dula sin no an trat curter duil acu da hainneoin as a hinadh nadurtha fein, mar as tusca dagib cuis no becan cunganta le no gan *gabail* re doni caisimpodh casluath obann dinnsaige a¹⁵ naduir 7 a inaid ducusa fein.¹⁵

Et as follus aris gurab te gach uili ni gluaises o medhon 7 gorab fuar gach uili ni gluaiseas co medhon; et gorab *tirim* gan comortas ris gach ni luataiges an gluasacht 7 gurab *fliuch* gan comortas gach ni mallaighes an gluasacht.¹⁶ Et as mar sin da thuismid 7 dordaigh an tusmigteoir beannaithi an doman na ceithre duilibh.

7. ARGUMENTUM¹ AD ROTUNDITATEM TERRAE ETCETERA. As arrdamhaint² deimin domeallta do dearbad cruinne na talman na srotha da beit co³ siblach silteach ar fud aithchi⁴ na talman. Oir da mbeith an talamh na clar comtrom gan atmaireacht ann, mar adubradar na haineolaidh, co ningnad⁵ an ferthainn ⁶thig as na nelaib o tigid na

10 B. ina cailibh *gnimhacha* *add.* 11 Z *om* 12 B *tirimidecht*, F *illeg.* 13 B an usci co haentadach. 14 Z *on.* 15-15 Z a inaidh nadurtha ducusa fein. 16 B comortas. 1 ZF *est add.* 2 Z arrdomaine. 3 Z *om.* 4 Z aighti. 5 Z ndingnad. 6 Z ani *add.*

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Thus air and water agree with each other and are opposed to each other. They agree in the passive properties, *i.e.*, the dampness that is the cause of tardiness in both. They are opposite in the active properties, *i.e.*, the heat which is the cause of lightness in air and coldness which is the cause of heaviness in water. Thus fire and water are opposite to each other in their active and passive qualities, since fire is warm, dry, swift and light, and water is cold, wet, slow and heavy. Finally, it is clear that things which have a direct motion remain in their own natural places, provided they are not forced out of them.

When one element is changed into another by the force of the second element, or when one element is displaced by force from its own natural position, as soon as it gets an opportunity or a little help, or when there is no opposition to it, it returns quickly and suddenly to its own nature and its own natural position.

Again, it is clear that everything that moves from the centre is hot and everything that moves to the centre is cold, and that everything that accelerates the motion is unquestionably dry and that everything that retards the motion is unquestionably wet.

Thus the Blessed Creator created and arranged the world with its four elements.

7. ARGUMENTUM AD ROTUNDITATEM TERRAE, ETCETERA. It is a certain indisputable argument to prove the roundness of the earth, that the rivers run and flow over the surface of the earth. Because if the earth were a flat level surface with no convexity on it, as ignorant men have declared, the rain, which comes from the clouds and which is the cause of rivers, would form

srotha enloch mor ⁷fairgi comnaidhe⁷ ar agaid na talman
 7 ni rithfedh o inadh co hinadh mar dani anis.
 Ma sedh o ritid⁸ 7 nach anann a nen inadh, tuicter co
 deimhin co fuil cruinne 7 atmairecht is in talmain.
 Arrdomaint⁹ ele da derbadh a[n] neith¹⁰ cedna, da
 ngluaistea¹¹ o medhon an domain co fairrgi budh tuaigh
 da foillseocaidi doit annsin retlanna¹² nach facaid tu
 riamh a medhon an domhain 7 da foileocaidi¹³ ort blodh
 do na retlannaibh theas daconncadais a medhon an
 domuin. Mar sin da nernta¹⁴ an sibhal cedna budh
 dheas da foillseocaidi duit retlanna nach facais don
 taeb tuaidh na¹⁵ a medhon an domhuin 7 do foileochaidi¹⁶
 ort na retlanna doconncadhais is na hinadaibh sin.

Ma sedh is deimin gorab i atmhaireacht na talman
 ag eirghe tar teis¹⁷ annsa tsibal a mbi foillsiges duit
 na retlanna bis romat 7 ceilis¹⁸ ort na retlanna bhis tar
 teis.

Tuilledh ar in adbar cedna .i. gach uile inad a mbi¹⁹
 tu don talmain daci tu cuid egin dan firmamint nach
 faicaid tu a nen inad ele 7 derbtar as sin co fuil an
 boga²⁰ ata a timcill na talman comhcruinn 7 go fuil an
 talam mar sin ar a lar. Et adeirmaid fos cum an
 adhbuir cedna co foillsigenn an grian ar gach sibal da
 ndenann a timcill na talman an leath bis ar a comhair
 don talmain co direach 7 gorab e an solus sin bis idir
 an grein 7²¹ talmain as la ann co brach 7 co mbi an
 leth ele don talmain dorca da sir o sgaili na talman 7
 is e an scaifi dorcha sin as aithci²² ann co brac 7
 is mar sin gibe siubhal do ni an grian²³ a timcill na
 talman leanaidh an la hi 7 teitidh an aithi²⁴ roimpe don
 taib ele don talmain.

Et mar sin na daine as cinn a nimtigheann grian
 dacid sin grian 7 la 7 an buidin bis don leth ele don

7-7 Z comnuide fairgeamail. 8 Z rithes. 9 Z arrdomainte
 10 Z nethe. 11 B ngluaister. 12 Z redla. 13 B foill—. 14 Z ndernta.
 15 Z om. 16 B foill—i. 17 Z heis. 18 Z cilis. 19 Z ar a mbi.
 20 Z om. 21 Z add in. 22 Z aidchi. 23 B om. 24 Z oidhti.

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one large permanent expanse of sea on the surface of the earth, and would not flow from place to place as it does now. Therefore, since it flows and does not remain in one place, let it be understood for certain that the earth is round and convex.

Another argument to prove the same thing:—If you journeyed from the centre of the world to the North Sea, there would there be discovered to you stars that you never saw in the centre of the world, and some of the Southern stars that you saw in the centre of the world would be concealed from you. So if you made the same journey to the South, there would be discovered to you stars which you did not see in the North or centre of the world, and the stars that you saw in these places would be concealed from you. Thus it is certain that it is the convexity of the earth, rising behind you on your journey, that discovers to you the stars before you, and conceals from you the stars behind you.

More on the same subject:—In every place you are throughout the earth, you see some portion of the firmament you did not see anywhere else, and it is proved from that, that the curve around the earth is spherical, and therefore the earth is in the middle of it. Of the same subject still, I add that, on every course which the sun makes around the earth, it illumines the half of the earth that is exactly opposite it, and it is that light between the sun and the earth which is always day; and [I say] that the other half of the earth is always dark, owing to the shadow of the earth, and it is that dark shadow which is always night. Thus whatever course the sun makes around the earth, day follows it and night flees before it to the other side of the earth. Hence the people over whom the sun passes see sun and day, and they who are at the

talmain dacid siat retlanna 7 aithci 7 mar sin ni fedtar
 na neithi sin dfaicsin ar en slighi co brach .i. ²⁵grian
 7 retlanna aithci 7 la²⁵, oir an trath bis la againne ar
 uachtar²⁶ talman bigh aitci²⁷ fo talmain 7 is mar sin re
 na impodh. Grinnigh²⁸ co maith an focal so adubart
 .i. ²⁹fo talmain. Oir gach uili ni ata tis³⁰ fo talmain
 as e an talam e no rann da rannaibh. Et gach uili ni
 ata gac aen taeb don talmain ³¹on talmain³¹ amach
 as tuas ata. Et as mar sin ata an talam na ³²enur
 guna rannaib this 7 gac en ni ele³³ doibrighthib De
 gibe taeb don talmain a mbid is tuas atait. Et as
 mar sin ³⁴gibe inad don talmain³⁴ ar a mbid daine na
 seasamh as [s]uas bid a cinn 7 sis bid a cossa. Et
 gibe neach aderadh an talam da beith na clar comtrom
 gan atmairecht 7 an grian deirgi da taib de 7 a dul
 fai don taib eli adeirmidni nach fedtar sin da beit na
 firinne 7 nac hedir³⁵ resun na arrdomaint³⁶ dfagbail da
 derbad sin. Oir da madh fir an baramail so³⁷ da cithfi³⁸
 co mbedh an³⁹ grian bec ag erghi 7 gach dul suas da
 denadh⁴⁰ 7 gach foicsi duinn da tuicfadh dacitfi⁴¹
 duinn co mad moidi hi 7 as follus da ga[c] eolac ar
 doman nach fuil sin na firinne⁴² oir daciamaid corub
 comtrom a meid a noircrer 7 a niartar 7 a mullach an
 domuin. Et as sin derbtar an talam 7 cursa na
 greine a timceall⁴³ na talman da bet comcruinn 7 da cur
 sin a ceill ni bhus follse⁴⁴ dagen fidhair iomitrici⁴⁵
 annso tis 7 dagen ar dus⁴⁶ cuma cruinn cercaille na
 talman 7 scribhfad⁴⁷ a medhon an a sentrom⁴⁸ E 7
 scribfaid⁴⁹ me na timcill sin cercall as mo na sin amail
 cercall na greine 7 cuirfead na hiartar⁵⁰ A 7 na mullach

25-25 Z grian 7 oidhte redlanna 7 la. 26 Z in *add.* 27 Z bi
 oighti. 28 B Grinnighmit, F grinnig, Z grinnig an focal so co
 maith .i. adubart. 29 .i. *not in BF.* 30 Z do thsir *add.* 31-31 B *om.*
 32 Z na haenur. 33 Z do rinne *add.* 34-34 B gibe don talmain taeb,
 F gibe don talmain ar a mbid. 35 Z fedtar. 36 Z arrdomainti. 37
 Z sin. 38 Z docifidh, F docifithi. 39 Z *om.* 40 Z denum. 41 Z
 docifi, B dacifidh. 42 Z frinec. 43 Z timeill. 44 Z folluisi, B folluse,
 F follusi. 45 Z gheomitrice. 46 Z tus. 47 ZF sgribhochad. 48 ZF an
 tsheantruim, 49 Z cuirfed. 50 ZF na hoircrer.

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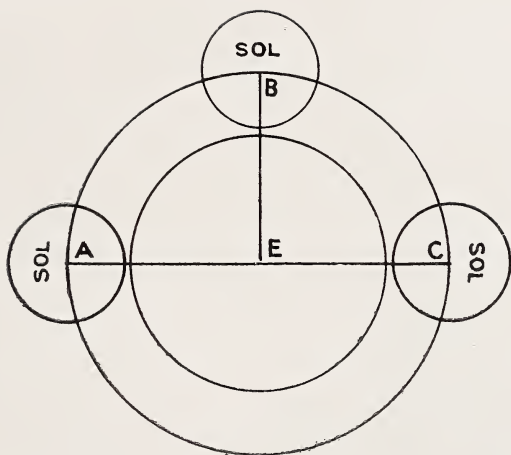
other side of the earth see stars and night, therefore those things can never be seen during the same course, *i.e.*, sun and stars, night and day, because when we have day on the upper part of the globe there is night in the part beneath, and *vice versa*. Consider (?) carefully the expression which I used—beneath the earth. For everything that is down underneath the earth, is the earth or one of its parts, and everything that is on every side of the earth, out from the earth, is above. Therefore the earth alone with its parts is below and all the rest of the works of God, on whatever side of the earth they are, are above. Thus on whatever point of the globe people stand, their heads are up and their feet down. Whoever may declare that the earth is a level plane without convexity, whilst the sun rises on one side of it and goes down on the other, I say that that cannot possibly be true, and that no reason or argument can be found to prove it; because if this theory were true, the sun would appear small when rising, and according as it mounted higher and approached nearer to us, it would appear larger to us. It is clear to every intelligent person in the world that this is untrue, since we see that it [the sun] is of equal size in the east and west and north of the world.

From this it is proved that the earth, and the course of the sun around the earth, are spherical, and to make this more clearly understood, I shall make a geometrical figure here below, and first I shall make the round figure of the circle of the globe, and write E in the middle of it—in the centre of it, and around that I shall describe a larger circle than that representing the orbit of the sun and place A in the west and B in the top and C

B 7 na oirrcer⁵¹ C 7 scribfad⁵² cercall bec a cosmulus⁵³ cercailli, cuirp na greine fare gac litir aca sin 7 tarrongad tar eisi sin tri line o tsentrom na talman co cercaill timcill na greine. Line acu sin co hA, an dara line co B, an treas line co C. Et as follus da gach neach smuaintecas⁵⁴ iat co fuilit na tri line sin comtrom comfada re ceili.

Ma sedh as comfada comtrom o gach aen an talamh gibe inad a mbia⁵⁵ an grian ag eirgi 7 a dul fai 7 a mullach a cercaille 7 is mar sin as follus co fuil an talamh 7 cercall na greine a dimcéall na talman comtrom leth ar leth. Et gibe neach aderad mar arrdamhaint a na agaid so co faicter⁵⁶ an grian ag erghi 7 ac dul fai co follus nis romho na mar docí a mullach a medhon lai 7 gurub as sin tuicter gorab faidi uainn⁵⁷ i a medhon lae na is na hairdib ele sin 7 gorab e⁵⁸ sin derbas co fuil an talam na clar comtrom gan atmeracht⁵⁹ da bet ann,⁵⁹ adermid co himcubaid da tabairt solaidi don arrdamaint⁶⁰ sin co tecmann sin co minic 7 nach tecmann da sir 7 an trath teagmas as i so an cuis fo tegmann. An grian ag ergi 7 a dul fai, togaid si⁶¹ suas na fliucadain 7 an fertain 7 eirgid dethaighi⁶¹ dorca fliuca co himard adrin 7 hi fein, 7 annsin an trath fecamaid ar in ngrein⁶² lethnaigid 7 remhrigi[d] an smuit sin daciter speir⁶² an radaire intu fein 7 mar sin da rer corpurdachta 7 talmanachta na smuiti sin, daciter an grian trit an smuit sin nis mo na mar dachitfid⁶³ i⁶⁴ muna beit an smuit sin⁶⁵ ann. Et an trath gluais an la 7, bis an grian a mullach na firmaminti gan smuit⁶⁷ adrainn 7 hi as annsin da citer⁶⁸ hi na med coir fein.

51 B iarthar. [*Text made to correspond with lettering of diagram BZ; F unlettered.*] 52 ZF cuirfed. 53 Z a comfogus. 54 ZF fechfus. 55 Z a mbiadh. 56 Z co faicear. 57 ZF uainne 58 ZF de, 59-59 ZF om. Z. 60 arrdomainte. 61-61 B on talmain suas ar na flaithesaib (?) no an feartain dethaidi. 62-62 B lethnaigh 7 ramraigh an smuit sin daciter spioraid. 63 Z docifi. 64 B in a med coir fein add. 65 B 7 add. 66 Z om. 67 Z smal. 68 Z fein add.



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in the east of it, and I shall describe a small circle representing the circular body of the sun, beside each of those letters, and then I shall draw three lines from the centre of the earth to the surrounding circle of the sun, one of those lines to A, the second to B, and the third to C. And it is evident to everyone who considers them that those three lines are even—equal each to each. Therefore the earth is equidistant from each, wherever the sun is, at its rising or setting, or when it is at the highest point of its course, and thus it is evident that the earth, and the circuit of the sun around the earth, are equidistant.

Whoever should declare as an argument against this that the sun appears distinctly larger when rising or setting than it does at the highest point at mid-day, and that it is understood from this that it is further away at mid-day than when it is in those other quarters, and that this proves that the earth is a level plane without convexity, I reply [to him] appropriately, in giving a solution for that argument, that that often happens, but not always, and when it does happen the reason is—when the sun is rising or setting, it draws up the moisture and the rain and black wet vapours rise to a great height between us and it, and then, when we look at the sun, that mist which is seen broadens and amplifies the sphere of vision within it, therefore, according to the denseness and materiality of that mist, does the sun appear larger through it, than it would appear without that mist being present. As the day advances, and the sun is at the highest point of the firmament with no mist between us and it, then we see it with its own proper size.

Et as follus a eisimlair sin is in duine lomnocht⁶⁹ fo uisci, oir dar leis an radarc as mo fa uisci e na don taib amuith duisci. Gidheadh ni fuil da derbad annsin acht an tuisci *fliuch* tiugh ac lethnugadh⁷⁰ 7 ac ramrugadh an radairc ann 7 a bacail de dul co seim na naduir fein dinnsaidhi an duine. Et as i an cuis cedna dabeir corob mo 7 gurab roime⁷¹ daciter ni tri gloine na don taeb amuit di. Et as uime sin na seandaine o mbi a radarc a dul nac fetaid litreacha caela da legad gabaid spechlai glaine cucu da reamrugad⁷² na litrech 'ledhaid 7 as i an cuis cedna dabeir ar in grein a faicsin mocrac⁷³ 7 um tratnona nis mo na a⁷⁴ medon lae mar adubrumar.

Et gibe aineolach aderad ani cedna .i. an talam da beth na *clar* comtrom 7 an *grian* a na cercaill cruinn a timcill na talman 7 co faicfidis daine an domhain co coitceann hi isin en uair fa nereochadh a nen inadh amhain aderamaisne go mad breg sin da nabartaigh.⁷⁵ Agus da cur so a ceill smuaintidh da cathair at inntinn fein .i. catair acu a noircerc an domhain 7 cathair ele a niartar an domain 7 smuaintidh da mbeith an talam na *clar* comtrom co nematmar mar adeir an baramhail so costrasta co faicfidis lucht catrac oircir an domain an *grian* a fogus doib fein ag erghi a meid moir 7 tar eis a cercaille da sibal co faicid i a dul fai tiar a med o⁷⁶ rolugha⁷⁷ na sin. Et as mar sin re himpodh:—lucht catrach iartair an domhain dacitfidis an *grian* ag ergi dhi a meid big ar son a fad⁷⁸ uata 7 ac dul fai dhi laim riu fein ar son a foicsi doib a meid bud romho na sin. Et as mar sin dacitfidhi⁷⁹ da lucht na catrach oirceraighi co madh girra leat tosaid an lae na a leth deighinach. Et ar an innus cedna dacitfidhi⁸⁰ da lucht na catrac iartaraighe co madh girri leth deirigh

69 Z noch bis *add.* 70 F letnocon. 71 Z rime, F reime. 72 ZF an raduire no *add.* 73 F moctrath. 74 B *om.* 75 F he *add.* 76 F bud. 77 B rolugh. 78 B a afhad. 79 Z docifidh. 80 Z docifi.

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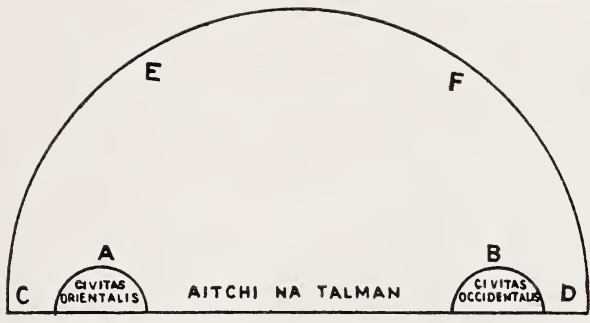
The example is clearly illustrated in the case of the naked person under water, because he appears larger to the sight under water than out of water; although there is no proof in that, except the fact of the wet dense water spreading and amplifying the sight, and preventing it from passing directly and naturally towards the person. The same reason is the cause of an object appearing larger and thicker through glass than otherwise. Consequently old people; who are losing their sight so that they cannot read small letters, use glass spectacles to magnify the letters they read, and for the same reason the sun appears larger in the early morning and in the evening than at mid-day, as I have mentioned.

If any ignorant person should make the same statement, *i.e.*, that the earth is a level plane and the sun a round orb [moving] around the earth, and that the people of the world in general can see it at the same time as it would rise in one place, I should say that that was false, if it were stated. To understand it, imagine two cities in your own mind, one in the east and the other in the west of the world, and imagine if the earth were a level plane without convexity (as this opinion has hitherto maintained), that the people of the city in the east of the world would see the sun rise in their own proximity as a large mass, and, having traversed its circuit, they would see it setting in the west in a smaller mass. *Vice versa* the people of the city in the west of the world would see the sun rise as a small mass, on account of its being distant from them, and set close to them, a much larger mass on account of its proximity to them. Similarly the first half of the day would seem shorter to the people of the eastern city than the latter half. In the same manner the latter half of the day would seem shorter to the people of the western city than the first half. We, and the

an lae na leth tosaigh. Et ata a⁸¹ deimhin againne 7 ac na heolcaibh co neamcunntabartach gorab comfada an la gaca leiti don ponc⁸² inmedonac⁸³ an lae ag an⁸⁴ da catair sin 7 in gach inadh ele is in domhuin 7 gorab e secran 7 easbaigh eagna tuc an baramail sin da tobairt. Et as an⁸⁵ comtromacht sin rainn tosaig 7 rainn derigh⁸⁶ an lae derbtar co follus an grian da beit ac sibal a cercaill cruinn a timcill na talman cruinne.

Et dfoillsiugad an adhbhair so nis mho⁸⁷ 7 da scris na baramhla sin dagen fidhair iomitre⁸⁸ annso this. Et tarrongad ar dus line direc re nabartar aigid na talman 7 tarrongad os a cinn sin⁸⁹ cercall re naibeoir⁹⁰ sligthi cursa⁹¹ na greine 7 dagen fidhair cathrach a cinn oirrcerach an line 7 scribfad⁹² A litir⁹³ as a cinn 7 da den⁹⁴ sa cinn iartarach don line cedna⁹⁵ fidair catrac ele⁹⁶ 7 scribohad⁹⁷ B os a cinn 7 scribocad C a ponc eirgi na greine 7 D a ponc a dula fai 7 E a medon lae na catrach oirrceraidhi 7 F a medhon lae na catrach iartaraighi di. Ma sedh an trath eirges grian a ponc C 7 teit si co hE 7 teit ced leth lae na catrach oirrceraighi tort⁹⁸ 7 bid⁹⁹ an da[ra] leth o E co D gan tiacht 7 aris an trath eirghes grian a ponc C 7 teit si co F teit ced leth lae na catrac iartaraighe torrsa¹⁰⁰ 7 bid an dara¹⁰¹ leath o F co D gan tiacht; da rer sin beith leth bus rofuidi na ceili ag la gac catrach aca sin oir is faidi co mor o E co D, noch is cuit deiginach da lo na catrach oirrceraidhi, na o C co E, noch is cuit tosanach da lo na catrac cedna. Et aris as faidi da mhoran o C co F, noc as cuit tosanach da la na catrach iartaraidh na o F co D, noch as cuit deiginach don la¹⁰² cedna 7 is follus do

81 Z om. 82 ZF do gac leth do ponc. 83 Z medonach. 84 Z annsa. 85 Z is as in. 86 Z dire. 87 Z nisa mo. 88 Z geometrice. 89 Z os cind an line sin. 90 Z aiber. 91 Z slighi cursaig. 92 F scribocad. 93 Z om. 94 Z fidhair add. 95 Z om. 96 Z om. 97 Z cuirfed, F cuirfid. 98 Z hort. 99 Z bi. 100 Z tarrsa. 101 B da. 102 Z lo.



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learned, have an unquestionable proof that the day is of equal length at equal distances from the middle point of the day at those two cities, and in every place in the world, and that it is error and lack of knowledge which caused the other opinion to be upheld. It is clearly proved from that equality of the first and last half of the day that the sun moves in a round orbit about the round earth.

To further illustrate this subject, and to confute that theory, I will make a geometrical figure here below. First I will draw a straight line called the surface of the earth, and above it a circle, which I will call the path of the course of the sun, and I will make a diagram of a city on the eastern end of the line and write the letter A above it, and in the western end of the same line I will make a diagram of another city and write B above it, and C at the point of the rising of the sun, and D at the point of its setting, and E at mid-day of the eastern city, and F at mid-day of the western. Consequently when the sun rises at a point C, and advances to E, the first half of the day in the eastern city is spent, and the second stage, from E to D has not arrived, and again when the sun rises at a point C and advances to F, the first half of the day in the western city is spent and the second stage from F to D has not arrived, accordingly day at each of those cities would have one part longer than the other, because it is much longer from E to D, the last part of the day in the eastern city, than from C to E, the first part of the day in the same city. Again, it is much longer from C to F, the first part of the day in the western city, than from F to D, the last part of the same day. And it is evident to everyone on earth who

gach neach is in doman lenab ail¹⁰³ a fecain co grinn nach fuil si na firinne. Ma sedh as seacranach na raiti sin as a tic sin .i. co fuil an talam na clar comtrom, gan atmaireacht ann, ⁊ is uime sin adearar¹⁰⁴ ar lorg na firinne co fuil an talam atmar comcruinn.¹⁰⁵

Et da derbadh gorab¹⁰⁶ fir sin, ni hinnann inad a teit an¹⁰⁷ grian fai da dha cathraigh san doman, oir mar *claechlighes* tu inad, *claechligidh* tu dul fai na greine duit. Da derbadh sin da mbeitea a cathair Iaruscalem,¹⁰⁸ da racad an grian fai duit ac an¹⁰⁹ Roimh ⁊ da mbethea annsin da rachadh si¹¹⁰ fai duit a niarthar na Fraince ⁊ ar mbeth annsin duit da racad si¹¹¹ fai a niarthar na Spainne. Et tar eisi sin dfaileochadh inad egin don fairrgi thiar ort ⁊ da coinneomhadh¹¹² an fairrgi tu ⁊ an grian da leanmhain, da *claechleofad* si dul fai gach nen la da mbeththea ca leanmain no co neachad si fa deridh duit fai is in inadh a facaid tu¹¹³ ag erghi hi an trat do bi tu a cathair Iarusalem.

Et as dearb nac fuil dexamlacht¹¹⁴ sa dul¹¹⁵ fai na greine acht atmaracht na talman a sirteacht adrainn ⁊ i, oir da mbeth¹¹⁶ an talam na *clar* comhtrom amail adubairt an baramail o cianaib, ni beth acht en inad a nereochadh¹¹⁷ grian da dhainib an domain ⁊ en inad ele a racadh fai. Ma sedh o ta imad na ninad ann a nerginn si ⁊ a teit si fai, as egin co fuil an talam comcruinn ⁊ na fuil se na clar comtrom.

Ma sedh an siraidhi bunaid dorduig¹¹⁸ mar sin e,¹¹⁸ go roib se bennaithi¹¹⁹ tre bithu.¹¹⁹

103 F leis ab ail. 104 Z adermid. 105 Z atmar *add.* 106 B gab. 107 Z *om.* 108 Z Iarusalem. 109 Z *om.* 110 Z an grian. 111 Z *om.* 112 Z do connmad. 113 Z a fecais. 114 Z examlacht. 115 F a ndul. 116 B mbeit. 117 Z an *add.* 118-118 Z sin. 119-119 Z *om.*, F *illeg.*

Chap. vii.]

wishes to examine it closely that that is untrue, therefore the statements out of which it arises are erroneous, *i.e.*, that the earth is a level plane without convexity, and therefore, in the interests of truth, it is declared that the earth is convex and spherical.

As a proof that it is true, the sun does not set in the same place in regard to any two cities in the world, and, if you change your position, you change the sunset in regard to you. As a proof of that:—If you were in the city of Jerusalem, in regard to you the sun would set in Rome, and if you were there, it would set in the west of France, in regard to you, and on your being there, it would set in the west of Spain in regard to you. After that some place in the Atlantic Ocean would conceal it from you, and if sea could support you, and if you could follow the sun, it would change its setting in regard to you every day that you would follow it, until at last it would set in the place in which you saw it rising, when you were in the city of Jerusalem.

It is certain there is no difference in the sunset, but the convexity of the earth constantly coming between us and it [causes it], because if the earth were a level plane according to that theory just mentioned, there would be only one place where the sun would rise in regard to the inhabitants of the world, and one place where it would set. Consequently since there are a number of places where it rises and sets, the earth must be round and not a level plane.

Therefore the Eternal First Cause who ordered it thus, blessed be He for ever.

8. MARIA ET FLUMINA DIUERSA LOCA MATANT ETCETERA. An fairr¹gi .i. *claechligid* an fairr¹gi ⁊ na srotanna i moran dinadaib ⁊ ni follus sin co tic tar eis morain da cedaib bliadan. Agus as amlaid so tic an *claechlod* sin .i. mar brisid na huisceadha na cnuic, tuitidh talam na cnoc a nictar na nuiscid ⁊ linaid inad an uisci, ⁊ o facaid a ninadh fein co hainneonach is egin doib dul a ninadh eli² a na fadaid slige.³ Et trit an cuis sin na catracha ⁊ na bailti ⁊ na crica a mbi⁴ aitrebh na ndainedh a ngleanntaib ⁊ a ninedaib isle a fogas na fairr¹gi, tic an fairr¹gi torrsa⁵ ⁊ baidhidh si iat.⁶ Et as i an fairr¹gi tic as na nelaib as adhbur do so, oir an trat tites, bigh a sir rith⁷ ar fud na talman ac tocailt na talman ⁊ gach ni as sooscailte⁸ ⁊ is laigi dageibh is in talmain, berid se⁹ o inad co hinadh isna srotaib ⁊ fuadaigidh¹⁰ nert na srotann na nethi cedna sa¹¹ fairr¹gi ⁊ lintar dib sin ichtar na fairr¹gi ⁊ is uime¹² as egin dan fairr¹gi an tinad sin dfagbail ⁊ dul a ninadh eli. Agus brisid cnuic an inadh cum a teid¹³ ⁊ linaid na gleannta ⁊ mar sin *claechligter* inad aitreabtha ⁊ sealbta¹⁴ na ndainedh .i. na catracha ⁊ na crica ⁊ na cnuic ⁊ na gleannta.

Oir as ni nadurtha don uisci, o ta se siltec, gan beth da sir a nen inadh ach a dul o inadh co hinadh. Agus na dedhaig sin, an talam as laigi, berid¹⁵ na srotha leo san fairr¹gi e¹⁶ ⁊ tre beth co rofada do ann, calcaidid se ann ⁊ cruadhaigid ⁊ dani cloch de¹⁷ ⁊ le sirbualadh na tonn fai ⁊ tairis da sir, snoighter¹⁸ ⁊ minaiter¹⁹ na clocha ⁊ curter fdracha egsamla orra, oir daniter blodha²⁰ acu crinn ⁊ blodha letan ⁊ blodha fada ⁊ blodha ger.

1 ZF *om.* 2 F inadaib. 3 B inadh sligedh. 4 Z an a mbidh. 5 Z tarsa, F tarrsa. 6 F baighigh si iat uile, Z baidhi si iat. 7 Z bid ag raeth. 8 F oslaicti. 9 ZF berid leo. 10 Z fuadidhe. 11 Z san. 12 ZF sin *add.* 13 Z techaid. 14 ZF *om.* 15 Z birid. 16 Z *om.* 17 Z clocha de ann, F clocha de. 18 Z sirshnagter. 19 F minighter. 20 Z blogh, F blogha.

[Chap. viii.]

8. MARIA ET FLUMINA DIVERSA LOCA MUTANT, ETCETERA. *i.e.*, the sea and the rivers change in many places, but it is not evident that it happens until after many centuries. In this manner does that change come about: as the waters break the hills, the earth of the hills falls to the bottom of the waters, and fills up the place of the water, and since the waters are forced out of their own position, they must occupy some other place where they can get room. By reason of that the sea washes over and submerges cities, towns and districts in which are the abodes of men in valleys and low places near the sea. The moisture¹ that comes from the clouds is the cause of this, because when it falls, it flows constantly about the earth rooting up the soil, and everything dissoluble and non-resistant that it finds in the earth it carries from place to place in the rivers, and the force of the rivers carries off the same things to the sea, and the bottom of the sea is filled with them. On that account must the sea vacate that spot and seek some other. The hills break the place whither they go, and fill the valleys, therefore the dwelling places and domains of men change, *i.e.*, cities, lands, hills and valleys.

For it is a natural thing for water, since it is fluid, not to be always in one place, but to travel from place to place. Consequently the rivers carry the weakest soil with them to the sea, and from being a very long time there it becomes firm and hardens and becomes petrified, and from the constant beating of the waves beneath it and above it, the stones are carved and polished and assume different shapes. Some of them become round, some broad, some long and some short. Likewise the rivers

¹ lit. sea.

Et as mar sin, an gaineamh 7 na clocha etroma, berid na srotha leo sa fairrgi 7 crinnigid²¹ cum a ceile o imbualadh na tonn amuith²¹ 7 tar eis morain da cedaib bliadan, fasaídh se 7 eirgidh se suas os a[n] fairrgi²² 7 doni cnuic de 7 sleibti 7 cuiridh an fairrgi ni²³ de dinnsaidhi na crích ele 7 as e as adbur as a mbainter²⁴ na catraca 7 na crica. Et da derbad sin gurab fir e,²⁵ daciter a²⁶ moran dinadaib dachuaidh fon fairgi²⁷ tigi cloch 7 caislein 7 tempaill 7 cloca snaighthi 7 clair 7 a lan da comartaib nemicunntabartacha ar i ndeimniter aitreb daine da beit²⁸ uair egin²⁸ is na hinadaib sin.

Ni ele da derbadh an raeda cedna, dagebtar co follus²⁹ a mullach na cnoc 7 na sleibtead cassain 7 sligteca na fairrgi²⁹ noch is cosmail risna himaraib 7 risna eitrib³⁰ beca cama daciter a³¹ ladh na mara deis na fairrgi da dul amach 7 leis sin dagabtar a lan da sligeanai³² 7 da miniasgaib mara³³ ar calcadadh 7 ar cruadhugad 7 ar ndenum cloch dib isna hinadaib cedna. Et ar an nos cedna doni an fertain slebti 7 gleannta an domain, oir an trat rithes³⁴ an fertain a ninad a fadhann an talam lag, toclaidh e 7 doni eitrighi ann 7 tuitid bruach an eitrighe gaca leiti, idir gaineam 7 talmain is in eitridhi³⁴ leis i[n] uisci 7 berid³⁵ an tuisci sin leis dinnsaighe na srothann 7 berid na srotha sa fairrgi 7 le himad fertana na haimsiri rofada ac sirtuitem is na heitrib sin 7³⁶ ac sirbreith na talman 7 an gainim³⁶ leo doni gleannta mara do na heitrib sin 7 fa deoid factar an talam na cnocai³⁶ 7 na sleibtib mora atarra 7 is mar sin dordaigh tuismiteoir beannaiti an domain ani sin.

21-21 B ambualadh na tonn amuit cum a ceile iat : ZF as text, 7 amach add. 22 Z asin add. 23 Z ele. 24 B ass adbur sin as a mbaiter, F as e as adbur as a mboighter. 25 ZF so add. 26 Z om. 27 B foairrgi. 28-28 Z om. 29 Z co follus foll. fairrgi. 30 Z itrib, F eitrigib. 31 Z ar. 32 B sligheanaib. 33 ZF beca. 34-34 Z an fertain an tan raethas an tinadh a fadhand talam tochlaid e 7 doni eitrighi gaca leithe idir ghainim 7 talmain is in eitrigh, F illeg. 35 Z brid. 36-36 Z o thsir brith . . . 7 na ngainimh.

Chap. viii.]

bring the sand and light stones to the sea, and they are gathered together by the beating to and fro of the waves outside, and after many hundreds of years it [*i.e.*, the new earth, formed as described] mounts and rises up over the sea, and hills and mountains are formed from it, and the sea sends some of it towards other lands, and that is the material from which cities and lands are formed.

As a proof that it is true, there are to be seen in many places that have been submerged, stone houses, castles, churches and carved stones and planks, and many unquestionable signs from which it is proved that human habitations were some time in those places.

Another fact to prove the same thing; there will be found plainly in the summits of the hills and mountains, the paths and roads of the sea, which resembles the ridges and the small irregular furrows that are seen in the mud (?) of the sea when the tide has ebbed, also there are found many shells and small sea-fish in the same places which have become hard, firm and petrified. In the same manner the rain forms the mountains and valleys of the world, because, when the rain flows into a place where it finds the soil weak, it turns it up and forms a furrow in it, and the edge of the furrow on either side falls, both sand and soil, into the channel by the strength of the water and the water brings that with it to the rivers, and the rivers carry it to the sea, and from the excess of rain of a very long period ever falling into those furrows and constantly carrying away the soil and sand, those furrows become valleys of the sea, and at last the earth is left in hills and large mountains between them; and thus did the blessed Creator of the world order that.

9. ¹CALOR ET FRIGIDUS OPUS UETIMENS² IN TERRUM, Etc. As dasachtac mear na gnimharta dani fuacht 7 teas a talmain, oir isin t[s]amrad, an trat teighes² teas na greine agaid na talman, o nach fuilingid³ da ni contrardha beit a nen inadh, tethidh an fuacht roimh an teas a ndoimne⁴ na talman 7 fuarid sin an tuisci dageib fo talmain 7 as uime sin bis uisci na tobar fuar is in tsamrad, 7 ar an adbar cedna, le fad na greine uainn is in geimridh gabaid⁵ an fuacht⁶ nert annsin ar uachtar na talman so uile 7 cuiridh an teas a teitead a ninne na talman astech 7 is uime sin bid uiscedha⁷ na tobar te sa gemrid. Agus an trath bis an fuacht sin a ninne na talman isin tsamradh co nertmar, calcaidh se 7 cubaid se e fein annsin o nac leiginn⁸ daingne 7 dluithi na talman do dul amach, 7 gac fad da mbia ann as moidi a nert 7 a brig. Et annsa geimred,⁹ an trat cuire fuacht aitchi¹⁰ na talman an teas asteach a ninne na talman 7 dageib ar a cinn astigh an prisunach .i. fuacht inne na talman, gnimaidhid ar a ceili 7 dab ail¹¹ le gac neac acu a celi da scris 7 crotaidh an talam 7 is risin crothad sin aderar terra motus .i. crit na talman¹² 7 tic as in crotadh sin co ngerrtar 7 co mbrister an talam 7 teit gaeth mhor maille re toirnigh 7 re foghar as¹³ in brisid sin 7 teit crefoc 7 cloca leis 7 gibe duine no ainmigi¹⁴ no caislen no raed ele daingin da mbeanfad¹⁴ cloc aca sin, ni gebhad uatha gan dul trit.

Et as minic tegmas a nuair terra motus co ndorcaigter an grian 7 is e ni o tic an dorchadus sin .i. an gaeth tren tic as an¹⁵ brisid sin na talman, seidid¹⁶ si co

1-1. B *completely faded*. 2 B seides. 3 Z fuilnginn. 4 B a noinni. 5 F beirigh, Z berid. 6 Z fuardhacht. 7 Z is mar sin bid uisci.

8 Z ligind. 9 B .g. 10 Z F aidhei. 11 Z dob fail. 12 Z gluasacht na crich. 13 B is. 14-14 Z caislen re mbainind no raed daingin cloc aca sin, F caislen no raed ele daingin re mboinn. 15 B as sin. 16 Z seidi.

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9. CALOR ET FRIGUS OPUS VEHEMENS IN TERRAM, ETCETERA. Intense and swift are the actions that cold and heat perform in the earth. For in summer the heat of the sun warms the surface of the earth, and since two contrary things do not endure to remain in the same place, the cold flies before the heat to the bowels of the earth and that makes the water which it finds under the earth cold, and on that account the water of the wells is cold in summer. For the same reason, on account of the distance of the sun from us in winter, the cold gains strength then on the surface of this whole earth, and sends the heat flying in before it to the interior of the earth—therefore the water of the wells is warm in winter; and when, in the summer, that cold is in the middle of the earth in all its strength, it concentrates and compresses itself there, since the solidity and firmness of the earth does not allow it to escape, and the further in it is, the greater is its power and strength. In the winter when the cold of the earth's surface sends the heat into the centre of the earth, and finds the prisoner inside before it, *i.e.*, the cold of the centre of the earth, they act upon each other, and each of them seeks to destroy the other, and the earth shakes; and it is to that shaking that “*terræ motus*,” *i.e.*, earthquake, is applied. It results from that shock that the earth is cut and broken and great wind accompanied by thunder and noise comes forth from that breach, and the wind carries with it sods of earth and stones, and no person, animal, building, or any other solid thing that one of those stones would strike, could escape its passing through them.

It often happens at a time of “*terræ motus*” that the sun is darkened; and the cause of that darkness is that the strong wind, that comes from that rupture of the

nertmar comachtach moran cannuir¹⁷ 7 crefoigi uaiti suas is in aer 7 bigh an cainniur¹⁸ sin mar nel idir an talam 7 an grian 7 boinid solus na greine do na cineadhachaibh na timcill.

Agus uair eli brisid an terra motus an talam fon fairrgi 7 seidigh an gaeth tic as an uisci¹⁹ suas fon aer²⁰ 7 cuiridh sin an fairrgi a fiuchadh adbul²¹ mhor. Et rebaigh an crit cedna na cnuic 7 na sleibhti an trat bis adbhur futa²² innus co fagann fuachaisi doimne duba²³ innus nac faicter²⁴ grinneall tar eis.

Et na dedaid sin tic la²⁵ egsamlacht an inaid a mbid na huiscedha examlacht an blassa da beth orra, or gid en tustaint ata ag na huiscedaibh uili, gabaidh ²⁶examlacht aicidec cugi da rer blassa an talman a mbi.²⁶ Et as uime sin an tuisci bis a ninadh clocach gainmech, blas milis bis air 7 ²⁷an tuisci bis a talmain goirt, blas saillti bis air²⁷ 7 an tuisci bis a talmain labain blas tragain(?)²⁸ bis air 7 an tuisci bis a talmain serb an a mbi clocha sulfuir no ailimi,²⁹ no an tinadh a mbi mianach prais no umha no neici serba eli, blas serb bis ar in uisci sin. Agus mar sin da rer examlacht aicidi³⁰ blassa na talman a mbid na huiscedha, *claechligid* an tuisci aicid blassa.

Et na diaidh sin na srotha bis ac sibal³¹ ar uachtar talman, an trat tegmas³² talam lac soscailti orra, tollaidh siat³³ e 7 doni sligteca³⁴ diamra doib fein ann fo talmain no co tecmann talam doscailti orra nac liginn tairis iat don taeb so na don taib eli. Et o gabtar mar sin riu tis³⁵ brisidh an talam os a cinn suas 7 doni toibreaca dib da rer meidi no laiged na srotann fo talmain o tigid, no da rer imaid na fertana

17 Z caindiuir. 18 F cannur. 19 F sin *add.* 20 B isin fan aer. 21 ZF *om.* 22 Z fuachta and. 23 Z duimne duibe. 24 Z faicer. 25 Z o, F a. 26-26 Z gabuid blasa examla aicida cucu . . . na . . . an a mbid. 27-27 B *om.* 28 Z tremar, F train. 29 Z in a mbid clocha no sulfur no ailim. 30 Z aiginta 7 blasa, F aicida 7 blassa. 31 Z siughal. 32 Z bis. 33 B si. 34 ZF donit slighthi. 35 Betroitis ris.

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earth, blows much dust (?) and sods with strength and force from it up into the air, and that dust (?) is like a cloud between the earth and the sun, and cuts off the light of the sun from the surrounding nations.

At another time the "terræ motus" breaks the earth under the sea, and the wind that comes out of the water blows up into the air and makes the sea rage in a terrible manner. The same shock tears hills and mountains when there is substance under them (?), so that it leaves deep dark crevices which appear bottomless.

Moreover, waters taste differently according as they are situated in different places. Although all waters have the same substance, they adopt an accidental peculiarity according to the taste of the earth in which they are situate. Consequently the water that is in a stony, sandy place has a sweet taste, and the water that is in salt earth has a salt taste, and the water that is in muddy soil has a . . . taste, and the water that is in acid earth, where there are stones of sulphur or alum, or a place where there is a brass or copper mine or other acids, that water has a bitter taste; therefore, in accordance with the accidental peculiarity of the taste of the soil in which the waters are, does the water change the accident of taste.

Also, when the rivers that flow on the surface of the earth encounter weak, movable soil they pierce through it and make secret paths for themselves in it beneath the earth, until they meet immovable earth that does not let them pass to this side or to that. Since, when, they thus come in conflict below, the earth breaks overhead, and they are converted into wells, according to the greatness or smallness of the underground streams whence they come, or according to the

a tigid na srotanna,³⁶ oir is da rer sin linaid 7 traigid na tobraca.³⁷

Et as e ni o tic sailltecht usci na fairrgi .i. on a [a]rrsaigecht fen 7 o sirbualadh na tonn fo na clocaib 7 o sibal na greine riam os a cinn 7 o innarbad na codac as millsi don uisci aisti o teasbac na greine. Oir tairrngid teasbac na greine an cuid as [s]eime 7 as millsi duisci na *fairrgi* suas a nelaib an aeir³⁸ 7 is de sin dani³⁹ an drucht 7 in fertain 7 in sneachta 7 an cloitshneachta 7 gac ni eli da tic anuas. Et facaid tis an rann is truime⁴⁰ 7 is reime⁴⁰ 7 is *talmanda* 7 is⁴¹ serbhi 7 is on naduir cedna bis fual an duine serb, oir an toibriugad dani grian os cinn na fairrgi⁴² as e sin doni⁴² *lionn ruad* os cinn an fuail ga sithlod 7 ac tarraing na rann seimh uadha.

Et as si an cuis cedna dabeir ar an usci dageib moran da *ber*[b]ud beit serb, *teasigacht*⁴³ na tened ic tarraing na rann seimh uadha. Et an trat dageib an tuisici saillti sin na fairrgi moran da *berbad* ar teni no o grein a tirtaib *te*⁴⁴ calcaidh se 7 cruagaid 7 impoidid se a naduir⁴⁴ na talman 7 is e sin an salann tig cugainn. Et as e doni an toibriugad sin .i. ro *berbad* na tineadh no na greine a tarraing na rann seimh uadha uili 7 ar na sitlodh mar sin 7 ar na cruthugad* fein 7 ar na inntod a naduir na talman da rer corpordachta. Agus duair⁴⁵ ann ceangailter na huisceadha millsi 7 co sunnradach uisci na srotann o dasacht na *fuardhachta*⁴⁶ 7 doni eigríd dib 7 ni leiginn an teas nadurtha ata sa fairgi, 7 beit na comnaige di, an ceangal sin da gabail cuci on *fuacht*⁴⁷ oir is i naduir na *fuardhachta*,⁴⁸ gach ni roites da cheangal 7 naduir an⁴⁹ *teasa* gac ni ceangailti da scailid, mar aderaid na *feallsamain*.⁵⁰

36 Z o ticeid srotha. 37 Z tobair. 38 ZF na firmaminti. 39 Z om. 40-40 ZF om. 41 ZF om. 42-42 Z is mar sin oibriges. 43 ZF tes. 44 Z calcaidhe se 7 impaighi se an naduir. 45 F uair ann. 46 ZF fuachta. 47 Z fuardhacht. 48 F f—. 49 ZF na. 50 Z is in thsuim so do rer a resuin fein add.

* Sic MSS. leg. cruadugad.

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quantity of the rain, from whence the streams come, since it is in accordance with that that the wells fill and grow dry.

The cause of the saltness of the sea is its own antiquity and the constant beating of the waves around its shores, and the course of the sun being always above it, and because the sweetest parts of the water are driven from it by the heat of the sun. For the heat of the sun draws the most volatile (?) and sweetest part of the water of the sea up into the clouds of the air, and from that are made the dew and the rain and the snow and the hailstones and every other phenomenon from above. It leaves below the heaviest, most solid, most material, and sourest portion. From its similar nature, human urine is sour, for the same action as is performed by the sun upon the sea, is performed by the bile upon the urine, as it strains it and extracts the volatile (?) parts from it.

From the same cause water that receives much boiling becomes bitter, as the heat of the fire vapourises (?) it. When that salt sea water receives much boiling on the fire, or from the sun in warm countries, it becomes condensed and solidified, and adopts the nature of the earth, and that is the salt we use. That effect is produced by the excessive boiling, caused by fire or by the sun vapourising them (?) [*i.e.*, the waters]. They are thus strained, and become solid and converted into the nature of the earth in accordance with (their) solidity. And sometimes fresh water, and particularly the water of rivers, is bound by the intensity of the cold and converted into ice. The natural heat that is in the sea, and the fact that it is still, does not permit it to take that binding upon itself from the cold, because it is the nature of cold to bind everything that flows and the nature of heat to dissolve every bound thing, as the philosophers say.

10. ¹Don da cnoc ar lasadh atara(?) .i. Etna an Sisaile ⁊ Ueranes is in Apaile a inad(?) na sulfure.¹

DICO QUOD ²OCCACIO HUIUS IGNIS EST ETCETERA. Aderim gorab e med³ na sulfure as adbur don teine bis ar lassadh da sir ⁊ is mar so as e .i. an trath tinnscnas an teine⁴ gnimh da deanam a cuislennaib⁵ na sulfaire fo talmain, ni fanann ac sir lasadh na sulfairi ⁊ talman roimhe⁶ co domuctha.

Agus is mar sin doni puill ⁊ cabain roimhe sa talmain ⁊ in trat tair le an tsulfur⁷ ata do naduir ann co fasann aris. Et an tan fases impoid⁸ aris ⁊ loisgidh aris⁹ e ⁊ bith an fas sin na sulfuri ⁊ losgad na teinedh ar fas tri bithu sir ⁊ teilgidh¹⁰ an lasair, mar eirges¹¹ aisti, a lan da caeraib ⁊ da caebaib teined¹² ¹³tic o folad na sulfuri aisti amach ⁊ cruinnigid sin ar en slighi ⁊ doni sleibti dib. Et as minic cluinter fogar¹⁴ mor aduatmar on gaith ac dul asteach is na fedanaib sin ⁊ a seidedh¹⁵ leis in lasair ac dul amac. Et atait na huiscedha¹⁶ tusmigter o na hinadaib teinntighi sin te, oir mar adubramar gabaid na huisceadha aicid on inadh a ticid.¹⁷

II. LUNA UISBILITER IN MARE ET-CETERA. .i. Gnimhaidhi an re co follus is in fairrgi ⁊ is na neicibh *fliucha* ele, oir aderaid na feallsamain nach anann an fairrgi ac sirlinadh on trat bis an re a ponc oircher a cercaille conic¹ an trat fa mbinn se a mullach a cercailli ²⁊ nach anann aris as sin a sir trágadh no co mbi ac dul fai a ponc iarthair a cercailli.² Et nac anann as sin aris ac sirlinadh no

1-1 ZF *om.* 2-2 Z locacio iudis ignis *etc.* 3 B inad. 4 Z *om.* 5 ZF a ninad. 6 Z roimpe. 7 Z in thsulfaire. 8 ZF impaigi. 9 Z *om.* 10 ZF tilgid. 11 ZF lasair mor *add.* 12 Z cadhbaib tesigachta. 13 B ⁊ *add.* 14 Z fobar. 15 Z seidi, F ac seided. 16 Z na huisci. 17 B Mas gluasacht siraidhi ingantac (MS. donningantac) dani na nethi ingantacha sin *add.* 1 F co nuige. 2-2 F nach anann as sin aris a inadh co mbi an re a ponge medonac a dul fai a ponge iartarach a cercailli.

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Concerning the two volcanoes, Etna in Sicily and Vesuvius in Apulia, in the sulphurous region.

10. DICO QUOD OCCASIO HUIUS IGNIS EST, ETC. I declare that it is the amount of the sulphur which is the cause of the fire that is constantly burning, and this is how it is: When the fire begins to perform an action in the veins of sulphur beneath the earth it continues always to burn the sulphur and the earth before it, so that it cannot be extinguished.

Consequently it makes holes and crevices before it in the earth, and when the sulphur that is naturally in it comes to the end, it grows again. When it grows, it turns again and burns it again, and that growth of the sulphur and the burning of the fire are ever increasing, and the flame as it rises from it, throws up many balls and masses of fire which come forth from the substance of the sulphur, and they collect in one direction and mountains are formed from them.

There is often heard a great, terrible sound from the wind going into those hollows and blowing with the flame as it comes out. The waters that are generated from these fiery places are hot, for as I have mentioned, the waters receive [their] accident from the place whence they come.

11. LUNA VISIBILITER IN MARE, ETCETERA. The moon acts visibly on the sea and on the other moist things, for the philosophers say that the sea never ceases flowing from the time the moon is in the east of its circuit, until the time it is at the topmost part of the circuit, and that it does not cease then constantly ebbing until it is setting in the westerly point of its circuit, and that it does not cease then constantly flowing until the moon is in the middle point of its circuit beneath the earth; and from

co mbi an re a ponc medhonac a cercailli fo talmain. Et as sin aris nach anann ac sir tragadh³ no co mbi a ponc oirrcerac⁴ a cercailli 7 tinnsnaidh annsin aris linad mar darinne roimhe.

Et mar sin da rer eirghi 7 dul fai an esga, ni anann an fhairgi co brac ac linadh 7 ac tragad 7 an trat bis an re a nenceime⁵ ris in ngrein is annsin as mo 7 as tinne a solus .i. a tosac gacha⁶ mis 7 is annsin as ro mho tragad⁷ 7 linadh na fairrgi. An dara cuairt as mo tragad 7 linadh⁸ na fairgi .i. a medhon gacha mis an trat bis solus lan ac an re laca rinne,⁹ oir as annsin frithbualter solus na greine anuas on re dinnsaighi na fairrgi 7 oibrigi sin tragadh 7 linadh¹⁰ na fairrgi.

Agus as mar sin foillsiges an re na gnimharta cedna a smir 7 a nincinn 7 a fuil na ndaine¹¹ oir medaigter 7 laidigtar na tri neici sin a tosac 7 a medon gacha mis ¹²da rer cursa an re.¹² Et da rer sin ni tigid eslaini na droca¹³ fola mar atait neascoidi (?)¹⁴ 7 neici iomda eli ach a tosach 7 a medon gaca mis.

Et as follus aris gnimarta an re da rer bisidh 7 dombisidh is na cucumeraib¹⁵ 7 is na cucurbitaibh¹⁶ 7 is gac en ni a tigernaiginn an flice da rer cursa an re. Et is si so a cuis nadurtha sin, oir ata tigernas ag an re ar na neicibh fliucha, 7 ar usci na fairgi co sunnrach, mar ata ag adhamas ar in iarann, oir mar tairrnges¹⁷ adhamas¹⁸ an tiarann cuici as mar sin tairrnges an re uisci na fairrgi 7 is ris sin aderar linad¹⁹ na fairrgi. Et an trat scuires se don tarraing sin impaid an fairgi dinnsaighe a hinaid fein aniar 7 is ris sin aderar tragad.

Et as folluse an tragad so 7 an linad a noircer²⁰ an domain 7 na iartar na sa Muir Ruaidh no a Muir na

3 Z tratha. 4 Z iartarac. 5 Z comarta. 6 Z gac. 7 Z traig. 8 ZF linadh 7 tragma. 9 Z laimh rinde, F lam rinne. 10 ZF linadh 7 tragma. 11

^e
F an duine. 12-12 F om. 13 Z dortagh. 14 B ne—i. Z n. F whole sentence om. 15 B cuigcumeraib, F cucumeraib. 16 B cuigcurbustaib, F cucurbustaib. 17 Z om. 18 Z an tadhmas. 19 Z lina. 20 Z orrter.

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that again that it does not cease constantly ebbing until it is in the easterly point of its circuit, and then it begins again flowing as it did before.

Thus, according to the rising and setting of the moon, the sea never ceases flowing and ebbing, and when the moon is in the same degree as the sun, then its light is greatest and strongest, *i.e.*, at the beginning of each month, and it is then the ebb and flow of the tide are greatest. In the second course [of the moon] the ebb and flow of the tide are greatest in the middle of every month, when the moon has its full light, facing us, for it is then the light of the sun is reflected down from the moon towards the sea and brings about the ebb and flow of the tide.

Thus, too, the moon reveals the same acts in the marrow, brain, and blood of men, because those three things are increased and decreased in the beginning and middle of every month according to the course of the moon. And, accordingly, diseases caused by bad blood, such as boils and many other things, do not occur except at the beginning and middle of every month.

The actions of the moon are evident again in accordance with increase and decrease, in the cucumbers and gourds and in every thing in which moisture preponderates, according to the course of the moon. The natural cause of that is that the moon controls moist things and particularly the water of the sea, as lodestone does iron, for as lodestone attracts the iron to itself, in the same way the moon attracts the water of the sea, and that is termed the flow of the tide. When that attraction ceases, the tide turns back to its own position, and that is termed ebb.

This ebb and flow are more visible in the east and west of the world than in the Red Sea or in the African

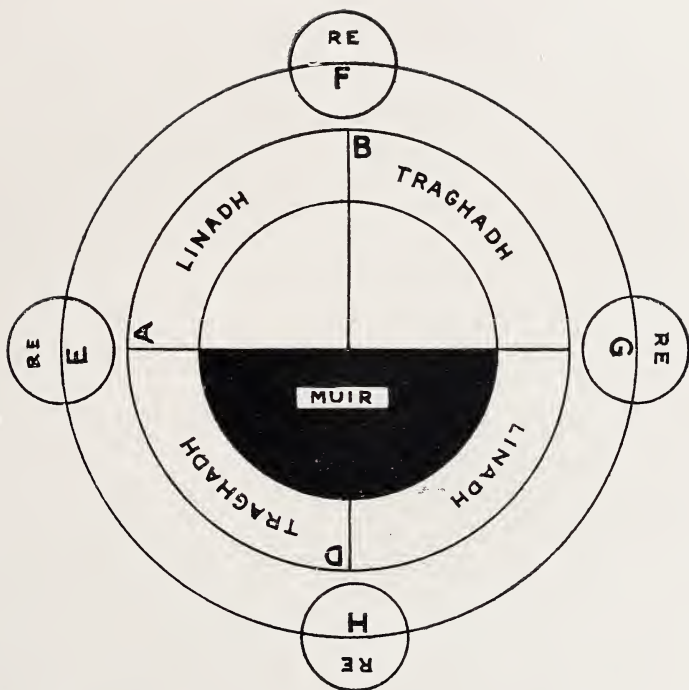
hAfrici no isna maraib eli tic on fairgi moir, oir i[s] sibal direach²¹ ata ac blodh acu sin siar gaca dirga, 7 soir gaca dirgha linas blod eli acu tre brig oibrighi²² an re ass a cinn. Et as uime sin nac follus an linad sin nan tragad ar cladacaib na mara annsin.

Agus dfoillsiugad na noibrighi sin an re a timcill traigti²³ 7 linta an²⁴ mara, dagen fidair iomitre²⁵ annso tis 7 dagen ar dus fidair comcruinn na talman ar na roinn a ceithre rannaib comtroma 7 scribocad na ceithre litreaca so na ninadaib²⁶ fein a timcill na ceithre rann sin .i. A, B, C, D, litre²⁷ 7 scribochad a timcill na talman samail cercaille an re 7 cuirfed E na hoirrcer 7 F na medon mullaid²⁸ 7 G na hiartar 7 H na medon ictar 7 dubochad²⁹ leth na fairrgi don talmain 7 faicfead an leth ele *tirim*, *geal*. Ma sed an trat bis an re a noircer a cercailli fein a ponc E co direc ar comar A, as annsin tinnsenas an fairgi linadh 7 ni anann ac sir linadh co soitinn an re a ponc F, ata ar comair B. Agus is annsin tinnsenus an muir tragadh³⁰ 7 ni scuirinn ac sir tragadh³¹ no co roitinn an re ponc G ata ar comair C. Et bidh sin ac sir linad no co roitinn an re *ponc* H ar comair D 7 bidh aris ac sir tragad no co roitinn an re ar comair A.

12. SOLENT QUIDAM IMPERITI ASERERE ETCETERA .i. Aderaid blodh do na eolcaib* tuile tsrotha Nil¹ do techt a fertapaib mora noch feras a cricaib ciana 7 mar linas² an sroth, sceighidh³ amach ar fud ferainn na hEigifti⁴ 7 ani dani an fertain do na cineadacaib⁵ eli, is e sin doni uisci srota Nil do na hEgeftecaib. Et adermuidne nach fuil ardhamaint⁶ na resun acu san da derbad na nethi sin ach baramail

21 B doreha. 22 Z co noibriind. 23 Z tragma. 24 Z na. 25 ZF geomitricce. 26 Z na ninad. 27 ZF om. 28 Z mullac. 29 Z dubfad. 30 Z traigh. 31 Z tragma. 1 ZF annsan Egipt add. 2 ZF linaid. 3 Z seidid. 4 ZF Egipti et pass. 5 ZF is na cricaib. 6 Z ardomuinti.

* Sic MSS. leg. haineolchaib.



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Sea or in the other seas that come from the Great Ocean, for some of these have a straight course directly west, in others the tide flows directly east through the power of the operation of the moon above them, consequently that flow or ebb is not evident on the shores of the sea in those places.

To explain those operations of the moon as regards the ebb and flow of the tide, I will make a geometrical figure here below, and first I will make the round figure of the earth and divide it into four equal parts, and write these four letters in their respective places around these four divisions, *i.e.*, A, B, C, D, and around the earth I will describe the figure of the sphere of the moon, and place E in the east of it and F in the centre of the top and G in the west and H in the centre of the lower part, and I will darken half of the globe to represent the sea and leave the other half dry and white. Thus when the moon is in the east of its own circle at a point E exactly opposite A the tide then begins to fill and does not cease constantly filling until the moon reaches point F that is opposite D, and then the tide begins to ebb and does not cease constantly ebbing until the moon reaches point G which is opposite C. It is ever filling until the moon reaches point H opposite D, and it is ever again ebbing until the moon arrives opposite A.

12. SOLENT QUIDAM IMPERITI ASSERERE, ETCETERA. *i.e.*, Some of the ignorant declare that the flood of the river Nile is caused by the great rains that fall in distant lands, and as the river fills, it bursts forth throughout the land of Egypt, and what rain does for the other races, the water of the river Nile does for the Egyptians. I declare that they have no argument or reason to prove that statement, except one single theory,

amhain, oir mar dacit siat srotha eli an domain da linadh o fertanaibh,⁷ sailid gorab mar sin linas srut Nil.

Derbocamaidni⁸ anois gora[b] breg⁹ an baramail sin, oir da madh iat na fertana, ¹⁰mar adubradar san,¹⁰ cuis tuili srota Nil, da linfaide gan aimsir airithe¹¹ cum a linta gac uair dferfad ann co hacmainnech trit an mbliadain amach, mar lantar na srota eli. Et as follus da gac aen daci e nac lantar an srot sin acht a naimsir airithi sa bliadhain .i. a mi Adhuist; ach an trat¹² feras co himarcac a crich egin laim ris an Eghift, gabaidh an srot sin becan linta on fertain sin, oir an fertain feras a cricaib ciana on Eghift ni¹³ medaiginn si¹⁴ srot Nil caiti¹⁵ ar son rofad tobair an thsrota on Egift 7 ar rotirma na talman 7 is ime sin, gibe trat dearrach no da thsamradh no daimsir eli feras ann, suidhid an ferann gainmec rotirim 7 britin na greine uisci na fertana 7 ni liginn e dinnsaidi an tsrota. No an trat lantar tri imarcaidh fertana, maille le fuarlochaib mora, an srot, ata da teas ¹⁶an talman¹⁶ a timcill an tsrota, nach tusca lantar na fuarlaidhi na suighes an talam iad. Ni minic bis an tuisici aicideach sa tsrot sin 7 bidh caithi linta port re port¹⁷ da uisci fein.

Da derbad sin, da ndernta claidhi¹⁸ a mbedh da ced no tri ced mili ar fad an¹⁹ talman tirim ge madh²⁰ mor duisci da doirtfea a ceann de²¹ da tsuidfedh an talam uili e sul²² da roised en deoir²³ an ceann eli de: 7 is mar sin tshuiges talamh brithnech te²⁴ srota Nil na huiscada feras na timcill sul shoitid²⁵ an Eghift, ma sedh ni hi an fertain cuis tuili srota Nil.

Ni ele da derbad an raeda cedna mar dacualasa²⁶ om arsantaib fein .i. da sailedar Egiftidh uair egin nach linfad srot Nil no co curtaighi²⁷ an maighdin

7 Z o ferthain. 8 Z derbomaidne. 9 ZF corob bregac. 10-10 ZF om. 11 Z dairidhti. 12 Z an sroth. 13 BF om. 14 B an add. 15 ZF om 16-16 Z isin talmain ata. 17 Z o port co port. 18 Z cladh. 19 Z na. 20 Z ge nidh. 21 B da doirtfstea a cinn de. 22 B suil. 23 Z do roithfed en deor. 24 Z om. 25 Z roithid. 26 Z docualas. 27 Z curtai.

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because, as they see the other rivers of the world becoming swollen by rains, they think that the river Nile is thus swollen.

I will now prove that that theory is false, because if the rains were the cause of the flooding of the river Nile, as they declared, it would become swollen, with no special period for its filling, every time it should rain heavily throughout the year as the other rivers become swollen. It is clear to everyone who sees it that that river does not become swollen except at a particular time of the year, *i.e.*, in the month of August; but when there is a plentiful fall of rain in some district near Egypt that river becomes slightly swollen on account of that rain, because rain that falls in districts distant from Egypt never increases the river Nile, on account of the great distance of the source of the river from Egypt, and of the exceeding dryness of the soil; consequently at whatever period of spring or summer or any other season rain falls, the sandy, very dry soil and the parching of the sun absorbs the rain water, and does not allow it advance to the river; or, when the river is swollen from excessive rain together with the great sudden floods, the heat of the earth around the river is so great, that no sooner are the floods at their full, than the earth absorbs them. The water in that river is seldom accidental, and it is always filled bank to bank with its own water.

As a proof of that: if you made a trench two or three hundred miles long through the dry earth, although you might pour a great amount of water into one end of it, the earth would absorb it all before one drop would reach the other end of it; thus does the parched, hot soil of the river Nile absorb the waters that fall around it before they reach Egypt; consequently rain is not the cause of the flooding of the river Nile.

Another fact to prove the same thing as I heard from my own elders: the Egyptians thought at one period that the river Nile would not rise until the fairest

budh ailli 7 bud ferr deissi²⁸ isin Eighift ann, 7 is uime sin da ba egin doib²⁹ fuarlaidhi an tsrota dfaghail da fliuchad an ferainn,²⁹ oir as e sin bis acu a ninadh na fertana; 7 da curdis an maidhin as ailli dageibthi³⁰ ansa cric uili a tosac mi Auust annsa srot, 7 da linad an srot an uair da eissi sin³¹ 7 ni har son na mna do cur annsin acht ar son a aimsiri fein da techt.³² Agus da linadh an Eghift na timeill fein uile 7 da bi an monadh so a ngnathochann(?)³³ isin Eigift no co tainic aimser Thomarus³⁴ .i. ri na hEigifti. Et mar daonnaic an ec³⁵ isin angnathadh(?) borbpecac sin³⁶ a tosach mis Adhuist, do rinne litir bec³⁶ 7 adubairt inti A nainm an tigerna trocairidh Thomarus³⁷ righ na hEighifti, betha 7 slainti da srot Nil, 7³⁸ madh ail let,³⁹ a srot Nil,³⁹ tri cumachtaib De tuisci da dortad ar ferann na hEigifti, guidmid⁴⁰ thu ma⁴¹ denum anois 7 munab ail let, ni fuil brig acainn innut. Agus da chuir an litir annsa srot annsin, 7 ni trit an litir, na⁴² trit an mnai, ac mar tainic a aimser fein da cuir⁴³ dar a bordaib co hacmuinnech 7 do lin an Egift. Et as uime sin, da mad o na fertanaib sin da ticfedh an tuili sin,⁴⁴ as a minic sa bliadain feras ann, as minic do linfad⁴⁵ an srot. Ma sed os a breg an baramail so, oisceolsa⁴⁶ cuis firinnech tuili⁴⁷ srota⁴⁸ Nil.

Agus aderim gorab idir oirrcer an domain 7 an ard teas ata bun an tsrota 7 idir iartar an domain 7 an aird tuaig teit se a⁴⁹ fairgi 7 is amlaid ata aer na hEigifti te, tirim 7 ni licinn gaeth na neil⁵⁰ na fertain inti co brac ac co hannam. Oir, ge tait na crica

28 Z 7 u disi. 29-29 Z fuarfici (?) an tsrota dfaghail do fliuchad 7 dfertain na hEgheiptig; F *illeg.* 30 Z dogheibdis. 31 Z da eis sin. 32 Z tiacht. 33 B ingnatochann, Z angnaththach (*sic*), F angnathochann. 34, 37 ZF Tomais, B Thomarus *to represent Homarus, the latinized form of Omar.* 35 Z in ec hi. 36-36 ZF do scrib a tosac mi Aguist litir bec. 38 F masa maith. 39-39 ZF *om.* 40 B gu ibmaid. 41 Z fa. 42 Z ni. 43 ZF docuaid. B da cuir *over line.* 44 ZF do tuicfad tuile srota Nil. 45 Z do linfai, F do linfaithi. 46 ZF oisgeoladsa. 47 F *om.* 48 F srot. 49 ZF sa. 50 Z nell, F nel.

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maiden of greatest beauty in Egypt should be cast into it; and because they were obliged to get the overflow of the river to moisten the earth, since that is what they have instead of rain, they used to cast the most beautiful maiden that could be found in the whole land into the river in the beginning of the month of August, and the hour after that the river used to be filled, not on account of the woman being cast into it but because its own time had come, and it used to fill all Egypt around it, and this kind (?) [of evil practice (?)] was in vogue in Egypt until the time of Omar, King of Egypt. As he saw her die (?) by that rude, sinful, evil custom (?) in the beginning of the month of August, he composed a short letter, and said in it, "In the name of the merciful Lord, Omar King of Egypt. Life and health to the river Nile, and if it be thy will, O river Nile, through the powers of God to pour thy water on the land of Egypt, we pray thee do so now; and if it be not thy will, we have no reliance (?) in thee." He put the letter then into the river, yet not on account of the letter nor on account of the woman, but because its own time had come, it overflowed its banks mightily and filled Egypt. Consequently, if that flood resulted from those rains, since rain falls frequently during the year, the river would become swollen frequently. Thus as that theory is false, I shall disclose the true cause of the flood of the river Nile.

I declare that the source of the river is between the east of the world and the southern quarter; between the west of the world and the northern quarter, it enters the sea. The atmosphere of Egypt is warm and dry, so that it but seldom admits wind or clouds or rain to exist in it. For

eli ac seidid na timcill, dluthaid 7 daingnidh⁵¹ an taer sin, innas corab maille *re* hanfad romhor teit neil no fertain tar coicrich an aeir sin astec. Agus an uair ainminic theit, bid toirrnec adhuathmar ann 7 gaeth romor⁵² 7 teinntec mhor noch marbas eallach na hEgifti. Et as i naduir an aeir coitcinn, an trat teidhes, dul⁵³ a scailedh 7 a letni; 7 an tan fuaras, timsaighi dinnsaigi a celi, 7 dluthaid⁵⁴ 7 tairrngidh gach ni is cosmail ris da innsaighi. Aer na mara, as fuare e san aithi⁵⁵ na sa lo 7 is ime sin an trat ardaighes an⁵⁶ grian co hinadh medon lae, tri teas na greine, scailid an taer 7 lethnaidh 7 seididh an gaet aniar on uair sin co taca medon aichi⁵⁷ a ndoirsib na srotann tsilis is in fairrgi siar, 7 buailidh a nagaid na srotana 7 teilgid iat da nainneoin tar a nais 7 ni liginn doib siled sa fairgi no co mboinn⁵⁸ fuacht na haithi⁵⁹ a brig as⁶⁰ teas na greini; 7 is mar sin as o teas an aeir tic gabhail risna srotaib 7 is o fuacht an aeir tic an siledh. Et mar is teo aer na mara sa lo na san aithi⁶¹ 7 gorab o neasacht na greine duinn 7 o na fad uainn tig an claechlod sin⁶² ar an aer, ma sedh an aimser ana ro foicsi duinn sa bliadain hi .i. an samradh, as ann as roteo an taer sin na fairgi. Et as ime sin on* ced la da mhi Mai conuic an taca a⁶³ tet an grian a neccinocium⁶⁴ Septimpir, seididh gaet na fairgi soir dinnsaighi na hEgifti as cinn srota Nil 7 cuiridh re haer na hEgifti da gluasacht 7 da chur as a inadh fein.

Et o ta⁶⁵ an taer sin tirim, trom, dogluasta⁶⁶ gabaidh risin ngaith 7 ni fagann a inadh fein, 7 an gaet bis oc sir seididh, o nac fadann slidhi eli, cuiridh srot Nil da aineoin tar a ais 7 ni leiginn en deor de sa fairgi, 7 scubaid an gaeth cedna moran da

51 Z dluthaigi 7 daingine, F dluthaidh 7 daingnighi. 52 ZF *om.*
53 F a seime 7 *add.* 54 Z 7 dangini *add.* 55, 61 Z aighti, F aidhchi.
56, 62 Z *om.* 57 Z aidhti, F aidhchi. 58 Z beanann. 59 Z oighti,
F aidhchi. 60 F a. 63 B fa. 64 Z ecuinnocium, F eccinosium.
65 F ata. 66 Z 7 *add.*

*MSS. an.

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although the surrounding countries experience wind, that air condenses and contracts, so that it is accompanied by a very great storm that clouds or rain enter the boundary of that air, and when it enters—which is seldom—there is terrible thunder and very great wind and lightning, which kills the flocks of Egypt. It is the nature of air in general to spread and dilate, when it becomes warm; and when it grows cold to press together, and it contracts and draws towards it everything like unto it. The sea air is colder in the night than in the day, consequently, when the sun reaches its mid-day position, through the heat of the sun the air spreads and dilates and the wind blows from that time until midnight into the mouths of the rivers which flow westwards into the sea, and (the wind) opposes the rivers, and drives them forcibly back, and does not permit them to flow into the sea until the cold of the night lessens the strength of the heat of the sun; and, consequently, the conflict with the streams results from the heat of the atmosphere and the flowing into the sea from the coldness of the atmosphere. As the sea air is warmer in the day than in the night, and it is owing to the proximity of the sun to us and its distance from us that that change comes over the atmosphere; thus, at the time of the year the sun is nearest to us, *i.e.*, the summer, the sea air is hottest. Consequently on the first day of the month of May until the sun enters the September equinox the sea-breeze blows eastwards towards Egypt over the river Nile, and joins with the air of Egypt to set it in motion and expel it from its own place. Since that air is dry, heavy, and difficult to move, it opposes the wind and does not abandon its own place, and since the wind that is always blowing finds no other course, it turns the river Nile forcibly back, and does not allow a drop of it to enter the sea, and the same wind

gaineamh na fairgi a ndorus srota Nil da ainneoin.⁶⁷ Et as uime sin, o nac leigter sibal dan tsrot sa fairgi, linaidh se ar fud na hEighifti suas 7 bid an tuili sin ar bun an comfad bis a brig fein sa gaith .i. feadh⁶⁸ na haimsire adubramar o cianaibh, on ced la da mhi Mai co heccinocium Septimpir 7 as annsin tinnscenus a brig dul as an ngaith 7 facus an grian a mullach na fairgi 7 islides⁶⁹ si deis a celi san aird teas don doman. Et o nac fedann uisci an tsrota gabail ris an gaith mar fuair conuice sin, brisidh se an sliab gainimh 7 teit roimhe sa fairrgi 7 fagaidh in Egift 7 is annsin donit na hEgiftidh treabad 7 cur,⁷⁰ o bis a deimhin acu nac toirmeoscadh an srot iat co di an aimsir cedna aris. Et mar sin is follus co toirmeoscaithi⁷¹ iat co minic ni bud tusca nan aimsir sin da madh o na fertanaib da ticfad tuili srota Nil.

Et tecmaid⁷² an linadh cedna⁷³ da srotaib na cric eli⁷⁴ siles is in fairgi siar gin co tecmann co mor re srot Nil, oir ni fuil acht aer lag sogl[u]asta, nac gabann risin ngaith 7 gluais⁷⁵ le gac slighe da mberinn e is na cricaib ele. Et as ime sin nac bi⁷⁶ lethad tuili srota Nil a nen tsroth eli is na cricaibh 7 co raib in ti⁷⁷ da crutaid srot Nil bennaithi tre bithu sir⁷⁸ 79in secla cecloram.⁷⁹

13. DICO SICUT SUPERIUS UERACITER ETCETERA. Aderim co firinneach mar¹ adubart ar dus gurub iat as cirp* edroma ann, na cuirp gluais² o medon co nuic an cercaill² timcill 7 gurub iat as cirp troma ann, na cirp gluais³ as sin co medon 7 gurub ac na ceithre duilib 7 ac³ gac ni cumusctar astu atait an da gluasacht direca sin.⁴ Ma sedh o nac gluaisinn an firmamint o medon no co medon, tuicter nach trom 7

67 ZF om. 68 Z fegh. 69 Z islighi. 70 ZF cur 7 treabad.
71 ZF toirmisgfithe. 72 F tecl.madh. 73 B om. 74 ZF noc add.
75 Z gluaisid. 76 F om. Z fuil. 77 F om. 78 Z gorob beannaighiti in
ti do chrutaig Sroth Nil beannaighiti tre bithi sir. 79-79 F om.
1 Z agus. 2 Z an cercailli. 3 Z a. 4 Z sin co direc, F om. sin.

* Sic. MSS.

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sweeps much of the sea sand forcibly into the mouth of the river Nile.

Consequently, since the river is prevented from flowing into the sea, it becomes flooded throughout Egypt, and that flood continues as long as the wind has its own force, *i.e.*, during the time I have just mentioned, from the first day of May until the September equinox. Then the wind begins to lose its strength, and the sun leaves its position directly over the sea, and sinks by degrees in the southern quarter of the world. When the water of the river finds no opposition from the wind as it did up to this it breaks the mountain of sand and proceeds on to the sea and departs from Egypt; and then the Egyptians plough and sow, since they are certain that the river will not hinder them until that season again. Consequently it is evident that they would be often hindered earlier than that season if the flood of the river Nile resulted from rains.

The rivers of the other lands which flow into the Western sea experience the same flooding although it does not happen to them so much as it does to the river Nile, for there is only weak movable air, that does not contend with the wind, and moves in every direction in which it is carried into the other lands. On that account no other river in (other) countries is as wide as the river Nile at its flood; and may He who created the river Nile be blessed for ever in *saecula saeculorum*.

13. DICO SICUT SUPERIUS UERACITER, ETCETERA. I declare truly, as I declared in the beginning, that light bodies are the bodies that move from the centre to the surrounding circle, and that heavy bodies are the bodies that move from that to the centre, and that the four elements and everything that is composed of them have these two direct motions. Consequently, since the firmament does not move from the centre, or to the centre,

nac edrom hi, oir da mad trom hi da gluaisfedh co medon 7 da madh etrom da gluaisfedh o medhon 7 o nac neachtar acu sin tuicter hi, tuicter na deagaid⁵ sin nac te hi 7 nac fuar, oir as annsna corpaib te mar ata an tene bis an edromacht 7 o nac fuil sisi edrom mar da derbamar, as egin nac fuil *teas* innti, 7 os is na corpaib troma, mar ata an talam, bis an *fuardhacht*, a nach fuil an firmamint trom is egin nach fuil *fuacht* innti.⁶ Tuicter aris as sin nac fuil an firmamint *fliuch* na *tirim*,⁷ oir oibridh an *flichi*⁸ amluas annsa corp a mbi, mar dani san aer gluaisis o medon 7 annsan uisci gluaisis co medon. Agus mar sin oibriges tirmigacht⁹ luas is na corpaibh a mbi, mar oibriges isin tene gluaisis a medon 7 isin talmain gluaisis co medon. Et o nac fuil luas na amluas isin firmamint, ni bi uair is luathi ina ceili na uair is amluaiti na celi on trat da crutaigh Dia e¹⁰ acht en gluasacht inann cobsaidh siraidhi¹¹ da bi 7 ata 7 bias aigi co deredh an domain. Et as ime sin nac fuil *fliche* na *tirme* as a ticfadh luas na mailli ann. Et mar sin is e an gluasacht cedna ata ac speir na nairdrinnach 7 ac secht speirib na secht plained da bhi 7 bias co deiredh an domain.

Et atait blodh do na haineolcaib¹² ata co hainfeasac¹³ a gnimartaib De, ga rad gurab is na ceithre duilib da cumuscadh¹⁴ an firmamint, 7 ata co follus a nagaid na firinni, oir ni fuilnginn resun, o ta an naduir examail ag an cetharduil an gac uili ni on naduir na firmaminti, co cumusceotaid¹⁵ an firmamint astu san. Oir is i naduir na cethardula, mar adubrumar, blod acu da gluasacht co medon 7 blod ele o medon amach 7 an gluasacht sin da beth co haimserda 7 a beth nis luaite na deredh na natosach 7 comnaidhi sir da beit acu na ninadh fein 7 gan na hinaidh sin dfhagail caithi¹⁶ acht da nainneoin,

5 Z na naighid. 6 B *fuardhacht* e., F *fuacht* e. 7 ZF nac fuil *fliche* na tirmighacht innti. 8 B acht *add.* 9 Z t—. 10 Z hi. 11 Z siraighiti. inand cobsaidh, F gluasacht inann cobsaidh. 12 F eolcaib. 13 Z co hainmisach. 14 Z cumusetar. 15 Z coimeosgaidh, F cumeosgaighi. 16 Z coidhti.

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let it be understood that it is neither heavy nor light; because if it were heavy, it would move to the centre; and if it were light, it would move from the centre, and since we understand it to be neither one or the other, we must assume it to be neither hot nor cold, because it is in hot bodies like fire that lightness is, and since that is not light, as we proved, there cannot be heat in it; and since it is in heavy bodies like the earth cold is, since the firmament is not heavy, there cannot be cold in it. Let it be understood again from that that the firmament is neither wet nor dry, because wetness causes tardiness in the body in which it is, as it does in air, which moves from the centre, and in water, which moves to the centre. Thus dryness effects velocity in the bodies in which it is, as it does in fire which moves from the centre, and in earth which moves to the centre. Since there is neither swiftness nor slowness in the firmament, it is at no time swifter or slower than at another, since God created it, but it had, has, and will have one identical, steady, constant motion until the end of the world. Consequently there is no wetness nor dryness in it from which swiftness or slowness could result. Similarly it is the same motion that the sphere of the constellations and the seven spheres of the seven planets have, had, and will have until the end of the world.

There are some ignorant men who are uninformed as regards the works of God, who say that the firmament was composed from the four elements, which is clearly contrary to truth, for since the four elements possess a nature different in everything from the nature of the firmament, reason can not admit that the firmament could be composed of these. Because, as I said before, it is the nature of the four elements, that some of them move towards the centre and others out from the centre, and that that motion occurs at regular intervals, and is slower at the end than at the beginning, and that they (the elements) are permanent in their own places, and that they never leave

oir is comhaisi gac duil don cetharduil¹⁷ re cele 7 a comnaighi nadurtha.

Agus leis sin atait caili iomdha isin cetharduil .i. *tes*¹⁸ 7 *fuacht*, *fliche* 7 *tirime*, *etruma* 7 *troma*, *luas* 7 *mailli*, 7 is amlaid ata naduir na *firmaminti* a cert *agaid*¹⁹ na naduir sin, oir a *nagaid*²⁰ gluasachta dirid na cethardula ata gluasacht timcill na *firmaminti* 7²¹ a *nagaid* aimserachta an gluasachta sin ata siraigecht a ngluasacht na *firmaminti*²¹ 7 i *nagaid* *luais* 7 *maille* an gluasachta sin²² ata siraidacht *maille*²² ²³a ngluasacht na *firmaminti*.²³ Et a *nagaid* *comnaidi* sir na cethardula na *ninadaib*²⁴ fein ata sibal sirnadurtha na *hinadh* fein ac an *firmamint*. Et mar as comaisi²⁵ an cetharduil 7 a comnaidhi re celi as mar sin as comaisi an *firmamint* 7 a gluasacht re celi²⁶ 7 ata a *negmuis* gach uili cail²⁷ da cailib na cethardula²⁸; oir ni fuil²⁹ *teas* na *fuacht*, na *fliche* na *tirme*³⁰ innte na *etromacht* na *troma*³⁰ na *luas* na *mailli*.

Et mar daniter ranna na cethardula ni truailidter³¹ 7 ni *claechligter* hi co *brac* ach mar da bi o tus an domhuin co daingin duinti dotruailidthe doscailti, 7 is mar sin bias co nic³² an *cric* dordaidh an *tusmiteoir* di. Ma sedh o ta naduir na cethardula 7 naduir na *firmaminti* co *direch* a *nagaid* a celi, as a *nagaid* *resuin* 7 naduir *aderar* gorab is in cetharduil da comasced an *firmamint*.

Resun eli a *nagaid* na *baramla* cedna .i. gach uile ni cumuscter³³ a netib *contrardha* bis ac *oibriugad* a *nagaid* a ceili³³ 7 bis a truailled a ceili truailigter uili fa *deredh* e, mar atait na *daine* 7 na *hainminnti* 7 gach uili ni ele cumuscter sa cetharduil a mbid caili *contrardha* na *ndul* a *scris* a ceili 7 an *trat* gabhas cail acu *tigernas* ar in cail ele truailidter³⁴ co huili an raed cumuscter

17 Z gac duil do na ceithre duilib. 18 Z *tesigacht*. 19 ZF a *cutugad*. 20 Z is in aigid, F is a aigid. 21-21 B *om.* 22-22 ZF ata gan *luas* gan *moille*. 23-23 Z na ngluasacht sin. 24 Z na *nuaid*. 25 Z *comaeis*, F *comais*. 26 Z *om.* 27 ZF *caile*. 28 Z *dul*. 29-29 ZF *fuacht* na *fliche* *tes* na *tirme*. 30 Z na *troma* na *etroma*. 31 ZF truailter. 32 Z *conuigi*, F *conuice*. 33-33 ZF a *neithib* bis in aigid a ceile ag *oibriugad*. 34 ZF truailter.

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those places except by force, for each of the four elements is equal to the other as regards length of existence and natural permanence.

Besides, the four elements possess various properties : heat and cold, wetness and dryness, lightness and heaviness, swiftness and slowness, and the nature of the firmament is directly opposed to those natures ; because in opposition to the vertical motion of the four elements there is the circular motion of the firmament, and in opposition to the periodical occurrence of that motion, is the perpetuity in the motion of the firmament, and in opposition to the swiftness and tardiness of that motion, is the perpetual slowness in the motion of the firmament. In opposition to that lasting permanency of the four elements in their own positions, is the permanent natural motion of the firmament in its own position. And as the four elements and their state of permanency are of equal antiquity, in the same way the firmament and its motion are of equal antiquity, and is without any of these properties of the four elements, for there is neither heat nor cold, wetness or dryness in it, nor lightness or heaviness, nor swiftness nor slowness.

As the parts of the four elements are made, they never become corrupted nor changed but (are) as they were from the beginning of the world, firm, compact, indestructible, indissoluble, and thus they will be until the end which the Creator ordered for them. Consequently, since the nature of the four elements and the nature of the firmament are directly opposed to each other, it is against reason and nature to say that the firmament was composed of the four elements.

Another reason against the same theory : Every object that is composed of contrary elements that work against each other and destroy each other, the whole perishes in the end ; for instance, men and animals, and everything else that is composed of the four elements, in which the opposite properties of the four elements destroy each other, and when one property prevails over the other,

asta. ³⁵Mar sin da cumusctaidh³⁵ an *firmamint* is na ceithre duilib o na cailib contrara sin da beit ac truailled a celi da scailfithe 7 da truaillfithi³⁷ an *firmamint* fo dereadh.

Ma sedh o nach faicter 7 o nac facas 7 o nac ficfiter³⁸ comarta an scailti uair,³⁹ tuicter corab cian uaithi beth ar na cumosc isin cetharduil. ⁴⁰Ma sedh in te dordaigh mar sin i co roib bennaithi o gac aen dacitf⁴¹ [edh hi.]⁴⁰

14. QUANDO DEUS FIRMAMENTUM CREAUIT ETCETERA. .i. An trat¹ da tuismidh Dia an *firmamint*² da ordaid se gluasacht coimlinta foirfi nac fasann 7 nac teit ar cul caithe,³ oir as re⁴ ceithre huairib *fichet* coimhlinas an *firmamint* a timcill co neamhfailleach nemmheallta 7 is iat na ceithre huaire *fichet* sin as aitchi⁵ 7 is la ann.

Da rinne fos Dia speir na greine dfoillsiugad lae 7 aitchi⁶ 7 a cailidechta⁷ 7 a fad 7 a ngirri 7 dfoillsiugad mesardachta⁸ neamdha 7 examlachta⁸ fasta⁹ 7 traighti¹⁰ teasa 7 fuachta¹¹ a ninadaib¹² examla cum na creatuir da silad o ceili 7 cum ordaithi an domain da coimlinadh; oir da ngluaisidh an *firmamint* 7 an grian ni bud¹³ luaithi na mar danit, da gerrfaidi na laeithe 7 na haiteda 7 ni beit aimser coimlinta a gnimhartad¹⁴ ac an grein 7 da locfadais na creatuir *talamanda* fas; 7 da ngluaisdis nis maille na mar danit da faideochaidh¹⁵ la 7 aithi 7 mar sin da beth grian co rofad¹⁶ os cinn na talman 7 da bruitfedh¹⁷ 7 da tirmochad *agaid* na talman 7 ni leigfeadh en red dfas tri talmain. Et mar sin ni fedfaidis daine aitreabocan da denamh isin aird bu dheas don doman mar donit anois leted¹⁸ se ceiminna

35 F is mar sin. 36 Z cumuscidh, F cumuscaithi. 37 Z do scailfi 7 do truaillfi. 38 Z faicfiter, F faicfighter. 39 F om. 40-40 ZF om. 41 B dacithfi. 1 F om. 2 F 7 add. 3 Z caidhti. 4 F om. 5 Z oidhti. 6 Z oidhei. 7 B cailidecht. 8 BF mesardacht . . examlacht. 9 B fhasa. 10 B tratighthe, Z trethaith. 11 B teas 7 fuacht. 12 Z a nithibh. 13 Z nis. 14 Z om. 15 Z faideochai. 16 ZF co rofada. 17 B bruitfidh, Z da tirmochad 7 da bruitfedh.

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the thing that is composed of them is completely destroyed. Consequently if the firmament were composed of the four elements, owing to those opposite qualities being mutually destructive, in the end the firmament would be dissolved and would perish.

Thus since no sign of the dissolution is, has been, or will be, observed, let it be understood that it (the firmament) is far from being composed of the four elements. Thus may He who ordered it in such wise be blessed by everyone who should behold it (?).

14. QUANDO DEUS FIRMAMENTUM CREAUIT, ETCETERA. When God created the firmament He ordained a full perfect motion that never increases or decreases; since in twenty-four hours the firmament completes its course without fail and without deception, and those twenty-four hours are day and night.

God also made the sphere of the sun to manifest day and night and their nature, their length, and shortness, and to manifest the regularity of the heavens, and the difference of increase and decrease of heat and cold in different places, in order to propagate creatures from each other, and to fulfil the order of the world, because if the firmament and the sun moved more quickly than they do, the days and nights would be shortened, the sun would not have time to fulfil its functions, and terrestrial creatures would refuse to grow; and if they moved more slowly than they do, night and day would be lengthened, and, consequently, as the sun would be too long over the earth, it would parch and dry up the surface of the earth, and would permit nothing to grow in the soil. Thus men could not dwell in the southern part of the world, as they do now, at a distance of sixteen degrees

deg¹⁸ don taib astigh don line medonac an domain, oir daghenadh¹⁹ rocomnaidhi na greini an tinad sin co doaitrebta. Agus mar sin timcill deiridh se ceiminna²⁰ 7 tri *fichit* ceim na firmaminti on line cedna bud thuaidh, da beth²¹ an tinadh futa co²² doaitrebtha tri *fuacht* na haithi rofaidi. Et ata an tinadh o deredh na se ceiminna 7 tri *fichit* sin doaitrebtha tre *fuardhacht*²³ anmesardha conuic an inadh ata co direach fa cuairt²⁴ na greine. Oir an trat claenas an grian dan taib u²⁵ deas don doman, fasaid an *fuardhacht* an medi sin isin taeb budhtuaidh innus nach fedaid ainminnti aitrebachan²⁷ ann 7 nach fasait a crainn. Et mar sin don taib amuith²⁸ don line adubrumar u dheas²⁸ ni aitrebhaid daine na²⁹ ainminnti ann tre imarcridh teasa, 7 is in crit³⁰ as foicsi don line sin don taib astidh atait na fir gorma noc dubus o *teas* ainmesarda na greine.

Adobrumar thuas³¹ nac fuil en cail do na cailib contrara o tic gac *truailled* 7 gac *scailed* isin firmamint, 7 mar sin ni fuil contraracht na gluasacht acu oir is egin da gluasacht cac uili cuirp isin doman beth cruinn no direc no cumusca asta ar aen amail ata gluasacht na cartach. An gluasacht cruinn 7 direc co nemhcumusca atait siat. As ime sin, gac corp cumasca 7 nemcumasca as cruinn no direach gluaisis se. Acht is e is gluasacht cruinn ann an gluasacht teit mar samail *cercaill*³³ a dimcill medoin. Acht is e³² is gluasacht direach ann an gluasacht teit o medon³⁴ tuas co medon tis³⁴ 7 atait na tri gluasachta na ngluasachtaib nemcomusca 7 is nemcomusca an gluasacht cruinn nan da gluasacht eli oir is neamcumusca an corp gluaisis mar sin na gach uili corp.

Et an da³⁵ gluasacht sin teit co medon³⁶ 7 o medon³⁶ as cumusca iat ac fecain an gluasachta

18-18 Z secht ceim. F *illeg.* 19 Z do deinum. 20 Z ceimind. 21 Z doberadh. 22 Z *om.* 23 Z *fuacht.* 24 Z fa guairt. 25 Z bu. 27 Z aitrebh. 28-28 Z *om.* 29 Z naid. 30 Z erich. 31 Z huas. 32, 36-36, 38 B *om.* 33 F *cercailli.* 34-34 F *thuas . . . sis.* 35 B corp *add.*

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from the equator, because if the sun stayed too long, it would make that place uninhabitable. Similarly at about the end of sixty-six degrees of the firmament northwards from the same line, the region beneath them would be uninhabitable on account of the cold of the very long night. The region from the end of those sixty-six degrees is uninhabitable on account of excessive cold as far as the region that is exactly under the sun's course.* For when the sun inclines towards the south side of the world, the cold increases so much on the north side, that animals cannot dwell in it and the trees do not grow. And so men or animals cannot dwell south of the aforementioned line on account of excessive heat, and in the land that is nearest that line on the inside are the negroes, who are darkened by the excessive heat of the sun.

I mentioned above that there are none of the opposite qualities in the firmament from which every corruption and dissolution results, and consequently they have no opposite motion, since the motion of every body in the universe must be circular or vertical or a compound of both as is the motion of a cart (wheel?). The circular and vertical motions are simple, consequently every body, simple or compound, moves in a circle or vertically. But circular motion is the motion that moves like a circle around a centre, and vertical motion is the motion that moves from a centre upwards (?) [or] to a centre downwards, and the three motions are simple motions, and the circular motion is simpler than the other two motions, because the body that moves thus is simpler than any other body.

Those two motions that move to and from the centre are compound compared to the circular motion, and they

* (*Sic.*)

timcill cumascter sa cetharduil, oir ni fuil gluasacht cumusca ann co firinneach ach an gluasacht sin 7 ge ta gac en³⁷ corp do na ceithre corpaibh duilita cumusca as da cail, nemcumusca iat ac fecain na corp cumuscter asta. Et as amlaid ata an gluasacht timcill, ar son a³⁸ beth nadurtha dho na gluasacht fhoirfi, gan tosac gan deridh aigi, gan a sibal da beith cum combhnaighi na cum impoidh tar ais; 7 ni mar sin dan gluasacht direc noch gluaises duairib ann co hainneonac na cirp,³⁹ oir in trat bis duil egin dan taibh amuith da hinadh nadurtha fein gluaisidh co hobann tar a hais dinnsaidhi a hinaidh fein aris 7 anaidh co nadurtha annsin 7 is ime sin bis tosac 7 deiridh⁴⁰ ag an gluasacht sin. Agus is red nemfoirfi in⁴¹ raed ag a mbi tosac 7 deridh⁴² 7 is mar sin as gluasacht neamhfoirfi an gluasacht direc. Et mar as tusca 7 as mo 7 is buaine 7 is uaisli⁴³ gach ni foirfi na gac ni nemhfoirfi 7 is mar sin teit an gluasacht timcill isna ceiminnai cedna tar in ngluasacht ndirec.

Tuilledh da derbadh an raeda cedna. Aderaid na feallsamain an gluasacht bhis co hainneonac do ni, bid se co nadurtha dan ni eli, mar ata dul suas na teinedh 7 na talman no⁴⁴ dul sis na deise cedna. Et mar as aicideach gac ni aindeonac 7 mar as [s]ustaint gac ni deonac nadurtha⁴⁵ 7 mar as contrardha in taicid⁴⁶ 7 in tsustaint da celi, is mar sin is contrardha an gluasacht ainneonac 7 in gluasacht nadurtha da ceili. Et ni hed amhain ach in ni ata⁴⁷ tis 7 tuas, deas 7 cle,⁴⁸ roimhe 7 na dedaidh,⁴⁹ atait contrardha da ceili. Et mar as uaisli gach ni ac na bi contrardacht na an i ag a mbi as mar sin as uaisli an gluasacht timcill ac nac fuil contrardacht na gac gluasacht eli da ndobart.

Tuilledh eli da derbadh a[n] neic⁵⁰ cedna; gach uili ni gluaises co nadurtha da gluasacht direc,⁵¹ fedtar a

37, 38 Z om. 39 Sic MSS. 40, 42 F derigh 7 tosac. 41 ZF gac. 43 F om. 44 Z 7. 45 Z do ier naduir. 46 ZF in aicid. 47 B om. 48 Z don taeibh dheis 7 don taeibh cle. 49 F na diaigh. 50 F neti. 51 F nadurtha.

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are simple compared to the motion of things that are composed of the four elements, because, in reality, there is no compound motion but that one, and though each of the four elemental bodies is composed of two qualities, they are simple compared to the bodies that are composed of them (the elements). Thus the circular motion, on account of its being naturally a perfect motion without beginning or end, its course does not permit of being stationary or of turning back. Not so is the vertical motion, which sometimes moves independently of the bodies, for when some element is outside of its own natural position, it moves suddenly back towards its own place and remains naturally there; thus that motion has beginning and end, and the thing that has a beginning and an end is imperfect; consequently the vertical motion is an imperfect motion. As every perfect thing is superior to, and greater, more permanent, and more noble than every imperfect thing, in the same way circular motion in the same degrees surpasses vertical motion.

Additional proof of the same thing: the philosophers declare that the motion that is foreign to one thing is natural to another, for instance the upward motion of fire and of earth, or the downward motion of both. As every non-essential thing is accidental, and every essential natural thing is a substance, and as the accident and the substance are opposite to each other, in the same way the non-essential motion and the natural motion are opposite to each other. Not only (that), but things that are below and above, right and left, before and behind, are contrary to one another. And as everything which has not contrariety is nobler than that which has, in the same way the circular motion which has no contrariety is superior to every other motion I have mentioned.

Additional proof of the same thing: everything that moves naturally with a vertical motion can be moved

gluasacht co hainneonac ⁊ a nagaid naduir ⁊ ni mar sin ⁵²don gluasacht timcill, oir an cursa cruinn timcill da hordaidedh dho a tus⁵² an domuin da bi ⁊ ata ⁊ bias co nemmelta, gan cor da taib da na taebaib, ga congmail sin tri bithu sir. Ma sedh is ⁵³follus gorab⁵³ tusca buaine an gluasacht timcill nan gluasacht eli.

Et ce ta an gluasacht air leth⁵⁴ a gac rotha do rothaib⁵⁵ na firmaminti, is le celi gluaisid uili gan contraracht, oir da mbeth contraracht is in firmamint mar ata is na corpaib duilita, gac ni oibriges si innta sin daghenadh a macasamhla isin firmamint ⁊ mar sin an corp u treisi sin⁵⁶ firmamint, da *claechlochad* se a na naduir fein an corp budh anmaine ⁊⁵⁷ mar sin dacitfimis⁵⁸ na plaineid ⁊ na hairdrinnaidh ⁊ na retlanna eli uair budh mho ⁊ budh ludha iat na ceili. Ni faicter so anois ⁊ ni facas⁵⁹ ⁊ ni faicfer⁶⁰ caithi. Ma sedh is follus a ni as a tuicfid⁶¹ na *claechligti* sin .i. an contraracht is in firmamint.

Et as amlaid ata an corp mor seimh daingin⁶² is in firmamint na cercaill cruinn mar samail liatroidi a timcill a seantruim fein ⁊ a ponc a puinc medonaidh⁶³ ag anmain a nen inadh co brac ⁊ a cumscugad da sir ⁊ is derb gorab comtrom an gluasacht sin o nac derna en⁶⁴ comnide da laided riamh ⁊ nac gluaisinn uair is luaithi nas maille na celi. Agus is mar sin atait secht *cercaill*⁶⁵ na secht plained .i. Luna, Mercur, Venir, Sol, Mars, Ioip, Saturnus ⁊ *cercall* na nairdrinnach ndogluasti⁶⁶ ⁊ cercall an da comarta deg mar ata⁶⁷ cercall re ndubrumar⁶⁸ an firmamint. Et as mar sin da badar na deich *cercaill* so on uair da crutaig Dia iat ⁊ is amlaid beit co brac an comfad as ail leisín a mbeth amlaid.

52-52 Z do gluasacht an chursa cruinn oir timcill do horduighedh e do beth a tus. 53-53 ZF om. 54 Z leth ar leth. 55 Z rothaidhibh. 56 Z sa. 57 Z is add. 58 Z docimais. 59 Z om. 60 B fitir. 61 Z tuicfid. 62 Z is amlaid na corp daingin seim dotruailligti; F illeg. 63 Z i ponc medonac ann. 64 ZF om. 65 Z cercailli, F cercalla. 66 Z ndogluasta. 67 ZF an add. 68 ZF re nabartar.

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by force and contrary to nature, but such is not the case with the circular motion, for the spherical circular course which was ordered for it at the beginning of the world, it was, is, and for ever will be preserving this without fail, and without moving to any one side of it. Consequently it is clear that the circular motion is superior to any other motion, and more constant.

Although each of the spheres of the firmament has a separate motion, they all move together without opposition; for, if there were contrariety in the firmament as there is in the elemental bodies, everything it effects in them would cause a similar effect in the firmament, and thus the strongest body in the firmament would change the weakest body into its own nature, and similarly we should see the planets, and constellations, and the other stars at one time larger, at another smaller than one another. This is not seen now, and was not, and never will be seen. Thus it is clear whence those changes, *i.e.*, the contrariety in the firmament can be understood.

Thus is the great smooth, firm body in the firmament—a round sphere like a ball, around its own centre, with its centre in a middle point, which remains for ever in one point, and ever moving; and it is certain that the motion is uniform since it has never made the least halt, and does not move swifter or slower at one time more than another, and thus are the seven spheres of the seven planets:—Luna, Mercury, Venus, Sol, Mars, Jupiter, Saturn, and the sphere of the fixed stars and the sphere of the twelve signs, *i.e.*, the sphere which we call the firmament. Thus were those ten spheres since the time God created them, and thus will they be for ever, as long as He wishes them to be thus.

Et aderaid na haineolaidh co fuilit primcaili na ndul 7 caili na nethidh cumasca⁶⁹ astu isin da comartha deg 7 is na plainedaib 7 ader[aid] co fuil Airges, 7 Leo 7 Saigitairius te *tirim* da rer naduir na teinead 7 Taurus, Uirgo, ⁷⁰Capricornus *fuar* *tirim* do rer naduir na talman; Gemin, Libra, Acarius te, *fliuch*⁷⁰ do rer naduir an aeir; Cannsir, Scoirpio, Pisis *fuar* *fliuch* da rer naduir an uisci. Et aderaid co fuil cuit do na comartaib sin sogluaisti 7 cuid daingin⁷¹ dogluaisti 7 cuid nemneachtardha. Et aderaid co fuil cuid aca feramail 7 cuid mnaamail⁷² 7 cuid solus 7 cuit dorcha. Agus adeiraid co fuil cuit maith do na plainedaib 7 cuit olc 7 go fuil blodh⁷³ dib co⁷⁴ soirb imcubaid da dainib maithi 7 blodh co⁷⁵ doirb cle donaidhi da drochdainib. Et aderaid aris muna bedh an grian na sustaint fein te ni dingnad si na gnimarta teasbaid⁷⁶ dacimid is na neicibh talmanda, oir is cert inann gnimhartha⁷⁷ dani isna neithibh talmanda 7 dani an tene, noc ata te na sustaint fein .i. losgadh 7 tirmud 7 dubadh.

Et ader[aid] aris muna beth an re *fliuch* ann fein nac oibreocad⁷⁸ *fliche* is na neicib talmanda. Et adermidni na *agaid* sin gorab secranach ealadhan an baramail sin 7 gorab breg hi 7 aderim nac fuilit comartada na firmaminti⁷⁹ *fluich* na te na *fuar* na *tirim*⁸⁰ na maith na saith, gidhedh as as a ceangal⁸¹ fein re celi 7 as a sibal oibrigid siat na caili sin ⁸²gin co fuilid innta fein⁸² isna netib talmanda, oir is a hen tsustaint 7 a hen adhbhur⁸³ da rinneadh iat uili 7 foillseochamaid so nis grinne na mar⁸⁴ so na deadhaidh so.

69 F cumuseta. 70-70 B. om. 71 ZF om. 72 Z banamail. 73 ZF cuid. 74, 75 Z om. 76 Z tesigachta. 77 Z gnim. 78 Z oibreocha. 79 Z fein add, F innti fein add. 80 BF om. 82-82 Z om. 83 ZF bun. 84 ZF om.

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The uninformed say that the primary properties of the elements, and the properties of the things that are compounded of them, are contained in the twelve signs and in the planets, and they declare that Aries, Leo, and Sagittarius are warm and dry in accordance with the nature of fire; and Taurus, Virgo, and Capricornus cold and dry of the nature of earth; Gemini, Libra, and Aquarius warm and wet of the nature of air; Cancer, Scorpio, Pisces cold and wet according to the nature of water. And they say that some of those signs are movable, and some firm and immovable, and some neutral. They say also that some of them are male and some female, some light and some dark, and they say that some of the planets are good and some bad, and that some of them are favourable and auspicious for good people, and others unfavourable, adverse, and inauspicious for bad people. They say again, if the sun were not hot in its own substance, it would not perform the functions of heat which we see in terrestrial things, for it performs the very same functions in terrestrial things as does fire (which is hot in its own substance), namely, burning, parching and charring.

They say again, that if the moon were not wet in itself it would not produce wetness in terrestrial things. Against this I declare that that theory is scientifically incorrect and false; and I declare that the signs of the firmament are neither wet, nor hot, nor cold, nor good, nor bad; although it is from their union (together) and from their motion that they produce those properties; although (in themselves) they are not present in terrestrial things, because they were all made from one substance and one material; and I will explain this in more detail afterwards.

15. SCIENDUM EST ETCETERA. .i. As follus nach as a blasannaib¹ na as a mblathaib athainter naduiri² na corp nadurtha, oir da madh as a ndathannaib³ da hathontaidh⁴ iat da bedh en naduir ag na corpaibh *geala* uile ⁊ gach uili ni da madh inann dath no blas⁵ as den naduir da beidis, oir dachiamaid gorab en dath ata ag an tsnechta ⁊ ac puisdian⁶ ⁊ ac an caisi ur gidedh as naduir ar leith ata a gac ni dibh. Et dacimit aris, ge tic apium ⁊ alues⁷ le cele da rer a serui, ni hinann naduir doib oir ata ni acu te ⁊ ni ele *fuair* ⁊ is mar sin adermid don bolad. Ma sedh ni as a n[d]athannaib⁸ na as a mblasanaibh⁹ na as a mbolladaib¹⁰ na as a nglaccad atainter naduir na corp nadurtha ach as a ninadaib ⁊ as a ngluasachtaib.¹¹ Et aderaid na haineolaidh go *claechligher* an firmamint na rannaib no innti fein uili re haimsir fada, gin co fúil an *claechlod* sin co follus duinne mar dacimid an tor ⁊ an tiarann ⁊ an corp ⁊ iacingctis ⁊ moran do¹² clocaib uaisli ele, da dergadh re narsud ⁊ re faidi a naimsiri, a¹³ meid ⁊ a ndatanna¹⁴ ⁊ a mblas ⁊ a mbalad¹⁵ da claechlod doib le fad a naimsiri¹⁶ gin co follus duinni an claechlod sin ca denamh tri rofad na haimsiri ana ndentar e.

Adeirmidne⁸ riusan ac fregra doib co ngabann¹⁷ cac uili ni ata ¹⁸fan escu a speir¹⁸ na ceithre dula claechlod cuige; ⁊ atait da gne ac an claechlod sin .i. claechlod uili ⁊ claechlod rann¹⁹ ⁊ is a timcill fasta ⁊ truailligti atait an da claechlodh sin ⁊ is folluse²⁰ an claechlod uili nan claechlod rann. Et gach uili corp

1 F blasaib. 2 Z do naduir, F naduir. 3 F dataib. 4 Z do aitheonta, F do haitheontaigi. 5 Z doib *add.* 6 ZF Puisdian. 7 Z opium ⁊ alce, F opium ⁊ aloes. 8 F dataib. 9 F blasaib. 10 B mboltanadh. 11 ZF as a ngluasachtaib ⁊ as a ninadaib. 12 B a *add.* 13 F in. 14 F dataib. 15 Z a blasaib ⁊ a mboltonugad, F a mblas ⁊ a mblath. 16 F an aimsir; B aderid co claechligher an firmamint tar eis a ceili ach *add.* 17 Z co ngabaid. 18-18 B fa speir an escu a speir. 19 Z rannuidi. 20 Z follusidh.

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15. SCIENDUM EST, ETCETERA. *i.e.*, It is evident that it is not by their taste or by their odour that the natures of natural bodies are known, for if they were recognised by their colours, all white bodies would have the same nature, and everything of the same colour or taste would be of the same nature; for we see that snow and dough (?) and fresh cheese have the same colour although each of them has a different nature. We see again that, although parsley and aloes agree in pungency, they are not of the same nature since one is sharp and the other mild; and in the same way we speak of smell. Consequently, not by their taste or smell or touch, is the nature of the natural bodies known, but by their positions and motions. The ill-informed declare that the firmament changes in parts, or in its own entirety, with length of time, although that change is not apparent to us, as we see gold, iron, the body, jacinth and many other precious stones becoming discoloured (?) with age and length of time, and changing in size, colour, taste and smell with length of time, although we are not aware of that change when it is in progress, on account of the great extent of time during which it is carried on.

I say to them in answer, that everything that is beneath the moon in the sphere of the four elements undergoes change, and that change is of two kinds—complete and partial—and those two changes concern growth and decay, and the complete change is more evident than the partial. Every body

claechligter ann²¹ is na cainndigecht no na cailidecht bis an claechlodh sín²¹ 7 as iat gnimharta an cuirp foillsiges an claechlodh sin duinne; oir an tan daniter slán don corp easlan 7 easlan²² don corp slán as iat gnimhartha an cuirp sin foillsiges an claechlodh²³ sin duinne. ²⁴Et mar sin an trat doni²⁵ edrom don corp trom, as iat gnimhartha an cuirp cedna foillsiges an claechlodh²³ sin duine.²⁴ Et mar sin an trat doniter luath don corp amhluath no amluath don corp luath, as e luas no amluas an cuirp sin foillsiges an gluasacht sin duinne.²⁵

As mar sin, da medaithi no da laigdithi an firmamint, dfoillseochadh a gnimharta an claechlodh sin duinn. Oir in trat do medocaidh 7 da fairsingeochtai²⁷ hi 7 do cuirfithi²³ na hairdrinnaidh ní budh faidi²⁹ uainn na mar atait siat, as lugha an cainndigecht dacithfimis acu sin³⁰ annsin ³¹na mar dacimit anois.³¹ Agus ata moran acu dacimid anois nach foicfimis³² fon taca sin, 7 mar sin an trat da cumhgochaidhi³³ a timceall na talman, da badh aibsidhi linn³⁴ cainndigecht na nairdrinnach fon taca sin na anois 7 dacithfimis annsin moran da retlannaib nach facamar roimhe. Ma sedh o nach facaid neach riamh na *claechligthe* sin isin firmamint, oir³⁵ da faicedh dagebtai³⁶ scribtha e, as dearb 7 as deimin nach medaigter 7 nac laidhditer 7 nach cumgaigter³⁷ 7 nac fairsingigter³⁸ an firmamint.

Et mar sin da claenadh an firmamint da leth deis no da leth³⁹ cle no roime no na diaid no da necadh sis no suas as in inad ana fuil da badh egin co natrocadh an⁴⁰ seantrom le .i, an talam, gidedh ní fedann an talam a inadh fein dfacbail oir ní fuil aici⁴¹ inadh a racadh,

21-21 Z an a cainndiacht bis a claechlodh sin. 22 B *om.* 23 Z gluasacht. 24-24 Z *om.* 25 F *om.* 26-26 ZF *om.* 27 B fairseongeoc-aigaidi. 28 Z cuirfidh. 29 ZF airidi. 30 F *om.* 31-31 ZF *om.* 32 F faicemais. 33 Z cumgochtai. 34 B aibsidhidi linne. 35 Z 7. 36 B doziabhthaid, F dogebtaighi. 37 B cumscagter. 38 B fairsingiter, Z fairsingidhter, F *as text.* 39 Z *om.* 40 F a. 41 F aigi.

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that is changed, undergoes that change in quantity or quality, and the actions of the body make that change evident to us; for when an unsound body becomes sound, and a sound unsound, it is the actions of that body that make that change evident to us. So, when a heavy body becomes light, the actions of the same body make that change evident to us. Thus, when a slow body becomes swift or a swift slow, it is the swiftness or slowness of that body that makes that motion evident to us.

Thus if the firmament were increased or decreased, its actions would manifest that change to us. For were it augmented and extended, and the constellations placed further from us than they are, we should see then a smaller quantity of them than we do now observe, and there are many of them which we see now, that we should not see then. Consequently, when it would have closed in around the earth, the quantity of the stars would seem to us more prodigious than than now, and then we would see many stars that we did not see before. Now, since no one ever has seen these changes in the firmament (for if he had, it would be found written) it is sure and certain, that the firmament suffers neither increase or decrease, and is neither narrowed nor widened.

Similarly if the firmament inclined to its right or to its left, or forwards or backwards, or if it moved up or down from the position in which it is, the centre, *i.e.*, the earth, must necessarily change with it but the earth cannot leave its own position, since it has no place to go; for

oir gach inadh an a timceall, ata⁴² lan do corpaib eli
 7 o nac fedann da corp beit ar aen tsliidhi a nen inadh,
 ni fedann an talam a hinad fein dfagail da dul fare
 corp eli 7 is mar sin is egin don firmamint beith na sir
 comhnaidhe co dogluaisti do**claechligh**ti a timcill na
 talman tri bithu sir. Et da nabartaiddh⁴³ gorab o
 anmainne no o dombisec⁴⁴ a⁴⁵ cuirp da tigemad⁴⁶
claechlod na firmaminti, mar anmainnigter corp an
 duine on eslaini, as mar sin da hanmainneoctaig
 gluasacht na firmaminti mar daniter sibal⁴⁷ an
 duine eslain 7 is mar sin da **claechlodfaidis**⁴⁸ na huaire
 7 na haimsera, ni nach tarra ann riamh, oir is en cursa
 da bi acu riamh 7 aniudh⁴⁹ 7 bias co brach. Ma sedh
 o nac claechlighter sustaint na cainndighecht na
 cailidheacht na inadh na gluasacht na⁵⁰ aimser na
 firmaminti, na eirghi na dul fai⁵⁰ na folach⁵¹ na
 foillsiugad airdrinnac 7 nac dernadh riam 7 nac
 dinnginter⁵² co brach, is egin gurub en modh daingin
 doscailti da bhi aice 7 ata 7 bias an comfad bus ail les
 in te da crutaigh hi⁵³ 7 gorab naduir ele ata aici⁵⁴ a
 naduir na ceithre dula.

16. QUI PERFECTE CIRCULOS LINIASQUE
 ETCETERA. Gibe neach da ticfad co foirfi cercalla
 7 linedha 7 puinc¹ na firmaminti da thicfad² gan
 cunntabart naduir na firmaminti co huili, 7 is amlaid
 is coir a ticsin, a himaidh 7 cruth³ mar⁴ ata si innte fein da
 smuaintiugad 7 da cuma ad resun 7 at intinn co grinn
 dan taib astigh. Et as amlaid ata suigiugad⁵ ced cercaille
 na firmaminti, on⁶ pone oircercach conuic an pone
 medonac uachtarach as cinn⁷ talman 7 as sin co roith⁸
 an pone iartharach 7 as sin co nuic an pone medonac
 ichtarach fo talamh 7 as sin aris conuic an pone

42 Z *precedes* gach inad. 43 F abartaighi. 44 F dombisec. 45 ZF an.
 46 Z teigmeadh. 47 B si sibal. 48 B cl. l.—. Z cl. l. fad., F cl. l.
 faidis. 49 Z ata aniugh. 50 B om. 51 B follus. 52 Z dintar, F
 dingentar. 53 ZF iad. 54 Z aigi. 1 F puinge *et pass.* 2 Z do tuigfed.
 3 Z 7 a hinadh *add.*: F 7 a himaigh *add.* 4 B ma. 5 B na *add.*
 6 B ona. 7 Z na *add.* 8 ZF co nuigi.

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every place around it is full of other bodies; and since two bodies cannot on any account occupy the same place, the earth cannot leave its own position to join (*lit.* along with) other bodies, and consequently the firmament must be in a permanent, immovable, immutable position around the earth for ever. If it were said that the change of the firmament resulted from the failure or decrease of its substance, as the human body becomes weakened by ill-health, in the same way the motion of the firmament would be weakened, as is the walk of a sick man. In the same way the hours and seasons would be changed—a thing that never happened, for they always had the same course and have to-day, and will have it for ever.

Thus, since the substance, or quality, or quantity, or position, or motion, or time of the firmament, or of the rising, or setting, or concealment, or revealing of the stars are not changed, and since that has never happened, and never will happen, it must necessarily be one firm immovable system that it had, has, and will have, as long as He who created it desires, and it must have a nature other than the nature of the four elements.

16. QUI PERFECTE CIRCULOS LINEASQUE ETCETERA. Whoever could perfectly understand the orbits, lines and points of the firmament, would understand without doubt the nature of the whole firmament, and the proper way to understand it is to consider its form and shape as it is in itself, and ponder it carefully from the inside in your reason and mind. The position of the first orbit of the firmament is as follows:—From the eastern point to the central upper point above the earth, and from that to the western point, and from that to the central lower point beneath the earth, and from that again to the eastern point whence it began at first. That circle is called “orientalis” and “occidentalis,”

oircearrach⁹ or tinnscain si ar tus 7 as e ainm na cercailli¹⁰ sin .i. orientalis 7 occidentalis .i. an cercaill oirccerac no an cercall iartarach 7 ainm eli *daberar* uirre .i. cercall an line diridh, oir in trat teit an grian sa line ndirec sin, bith la 7 aithi comtrom a cricaibh an domain uili. Agus is ann suigiter an dara cercall, o ponc poil Airtic co ponc uachtairaid¹¹ na firmaminti 7 as sin co¹² ponc poil Antartic 7 as sin co ponc¹² medon ichtair na firmaminti fa thalmain 7 as sin co ponc poil Artic as ar tinnscainn roimhe. Et ataid tri hanmanna ele *daberid* na feallsamain ar in cercall so .i. *Septentrionalis*,¹³ *Australis* 7 *Meridionalis* .i. an cercall tuaiscertac non cercall deiscertac¹⁴ no cercall an¹⁵ medon lae. Et as e *suidiugadh* an tres cercaill, o ponc oirccerach na firmaminti co ponc poil Antairtic 7 as sin co ponc iartair na firmaminti 7 as sin co ponc poil Artic 7 as sin¹⁶ co ponc oirrcir na firmaminti. Et is e as ainm don cercall so, *circulus termenorum*¹⁷ no *circulus signorum* .i. cercall na termine no *cercall* na comartadh.¹⁸

Et is e so *suidiugad* an ced line da tri linadhaib¹⁹ na firmaminti o ponc oirccerach na firmaminte tri ponc medhonach na talman co ponc iartarach²⁰ na firmaminti. An dara line o ponc mhedon uachtair na firmaminti as cinn na talman tri ponc mhedonac na talman co ponc²¹ medon ichtair na firmaminti fo talmain.²¹ An treas line o pol Airtic tri ponc medonac na talman co ponc poil Intartic.

Et is iat so secht *puinc* na firmaminti, a se dib isna se hinadhaibh a tiagait na tri cercalla²² adubrumar²³ tar a ceili 7 a na fuilit se cinn na tri linadh²⁴ adubrumar. Et an seachtmad ponc .i.²⁵ seantrum na talman noch ata na sentrom ag an doman uili.

Ee is e inadh a na fuil an ced ponc dib sin, a noirrcer

9 Z oirchirach. 10 B an cercailli, F an cercaill, Z na crecailli 11 F uachtair. 12-12, 15, 23, Z om. 13 F septentrionalis. 14 Z deisgirtach. 16 ZF aris add. 17 Z terminae. 18 Z comartada. 19 Z line, F linib. 20 ZF iartair. 21-21 ZF poil Intartic. 22 Z cercaill. 24 ZF line. 25 ZF a medon add.

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i.e., the eastern orbit or the western orbit, and is also called the orbit of the straight line, because when the sun is in that straight line, day and night are equal in the countries of the whole world. The situation of the second orbit is from the point of the Arctic Pole to the upper point of the firmament, and from that to the point of the Antarctic Pole and from that to the central lower point of the firmament beneath the earth, and from that to the point of the Arctic Pole whence it previously began. There are three other names which philosophers apply to that orbit—septentrionalis, australis and meridionalis—the northern orbit, or the southern orbit, or the orbit of the middle of the day. The situation of the third orbit is from the eastern point of the firmament to the point of the Antarctic Pole, and from that to the western point of the firmament, and from that to the point of the Arctic Pole, and from that to the eastern point of the firmament. This orbit is called “*circulus terminorum*” or “*circulus signorum*”—the orbit of the termini, or the orbit of the signs.

This is the position of the first of the three lines of the firmament, from the eastern point of the firmament through the middle point of the earth, to the western point of the firmament. The second line from the central upper point of the firmament above the earth through the middle point of the earth, to the central lower point of the firmament beneath the earth. The third line from the Arctic Pole through the middle point of the earth to the point of the Antarctic Pole.

Here below are the seven points of the firmament—six of them in the six places where the three orbits I mentioned cross each other, and where the six ends of the three lines I mentioned are. The seventh point is the centre of the earth, which is the centre of the whole universe. The first of these points is situated

na firmaminti isin inadh a teit circalus terminorum ⁊ circalus orientalis no occidentalis tar a ceili. An dara ponc a medon uachtair na firmaminti as cinn talman insan inad a tet circalus orientalis no occidentalis ⁊ circalus Septrimtrionalis no Australis tar a ceili. An treas ponc a niartar na firmaminti isin inadh a teit circalus orientalis no occidentalis ⁊ circalus terminorum tar a ceili. An ceathramad ponc a medon ichtar na firmaminti fai talmain as in inadh a teit circalus Septremtrionalis²⁶ no Au[s]tralis²⁷ no circulus orientalis no occidentalis tar a ceili. An cuigmed ponc a tuaiscert na firmaminti is in inadh a teit circalus septremtrionalis no Au[s]tralis ⁊ circalus terminorum tar a celi. An seiseadh ponc, a ndeiscert na firmaminti isin inadh a teit circalus terminorum ⁊ circalus septremtrionalis no Australis tar a celi. An sechtmad ponc mar adubrumar seantrom na talman noch ata na seantrom ag an doman uili a na tiagait na tri linadha adubrumar²⁸ trit a ceili ⁊ is e sin suighiugad ⁊ tuarasbail na tri *cercall* ⁊ na tri linadh ⁊ na secht ponc, noc adubrumar tuas. Gibe neach da ticfad iat co forfi co tuicfead se naduir na firmaminti uili.

¹Dexamlacht ergi ⁊ dul fai na greine a moran da cricaib.¹

17. SOL PRIUS BABILONE QUAM EGIFTO ET-CETERA. As tusca eirghes an grian don Uaibileoin na don Eghift ⁊ don Egift na don vFrainc. Et mar sin as tusca teit si fai don Babileoin na don Eigift ⁊ is tusca don Eighift na do[n] vFrainc. Et da cur so a ceill co follus, cuirfad na tri cricha so mar eisimplair ar eirgi ⁊ dul fai na greine da cricaib ele an domain a fidair iomitrice, acht as ed is ail lium *beth* sbas se nuaire daimsir idir an mBaibileoin ⁊ in Eigift ⁊ atorra sin aris ⁊ in Frainc ⁊ mar sin idir na cricaib eli ⁊ da

²⁶ Z septrionalis. ²⁷ Z a *add.* ²⁸ B an a ngroi (*sic*) dingan *add.*, 1-1 ZF *om.*

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in the east of the firmament in the place where “circulus terminorum” and “circulus orientalis” or “occidentalis” cross each other. The second point in the centre top zenith of the firmament, over the earth, in the place where “circulus orientalis” or “occidentalis” and “circulus septentrionalis” or “australis” cross each other. The third point, in the west of the firmament, in the place where “circulus orientalis” or “occidentalis” and “circulus terminorum” cross each other. The fourth point, in the centre bottom of the firmament, below the earth in the place where the “circulus septentrionalis” or “australis” and “circulus orientalis” or “occidentalis” cross each other. The fifth point, in the north of the firmament, in the place where the “circulus septentrionalis” or “australis” and the “circulus terminorum” cross each other. The sixth point, in the south of the firmament, in the place where “circulus terminorum” or “circulus septentrionalis” or “australis” cross each other. The seventh point, as I remarked, is the centre of the earth which is the centre of the whole universe, where the three lines I mentioned cross each other; and that is the situation and description of the three orbits and the three lines of the seven points which I mentioned above. Whoever could understand them perfectly would understand the nature of the whole firmament.

Concerning the different sunrise and sunset in many countries.

17. SOL PRIUS BABYLONI QUAM EGYPTO, ETCETERA. The sun rises earlier in Babylon than in Egypt and (earlier) in Egypt than in France, and, consequently, it sets earlier in Babylon than in Egypt, and earlier in Egypt than in France. To explain this clearly, I will place these three countries in a geometrical figure as an example of the rising and setting of the sun in the

gen da eisi sin cercall cruinn a nimdenam na talman
 7 cercall as mo na sin dan taib amuith de² amail
 cercall na greine 7 cuirfed a ninadh na Bauileoine A
 litir³ 7 a ninadh na hEighifti B 7 a ninad na
 hAfraici⁴ C 7 scribocad a neirghi greine na Baibileoine
 D 7 na medon lae E 7 a ndul fai na greine F 7 mar sin
 a neirghi greini na hEighifti B 7 na medon lae F 7 a
 ndul fai na greine G 7 mar sin aris a neirghe greine
 na hAfraice F 7 na medon lae G 7 a ndul fai na greine
 D.

Et mar sin aderim an trat eirghes grian a ponc
 D⁵ foillsigter da lucht na Baibileoine i 7 folaiter ar lucht
 na hEighifti no co tic si⁶ co ponc E noc ata na medon
 lae sa Baibileoin 7 na eirgi greine ac an Eighift 7 na
 medon aithi ac an Afric,⁷ oir as annsin eirges an grian
 do na hEgiftecaib 7 gidedh ni follus da lucht na
 hAfrici i no co soitinn si ponc F noc ata na deredh
 lae annsa⁸ Baibileoin 7 na medon lae ag an Eigift 7
 na eirgi greine ac an Afric, oir is annsin tinnsenus la
 do hAfriceacaib 7 na deredh lae ac na hEigifticaibh 7
 na medon aithi ac an Baibileoncaib. Dacit na
 hAfricid hi no co soitinn si ponc D noc ata na
 deredh lae acu 7 na medon aiti⁹ ag an Eighift 7 na
 tosac lae ac an Baibileoin, 7 is mar sin is a nen ponc
 ata tosac lae na Baibileoine 7 medon aithi¹⁰ na hEighifti
 7 dered lae na hAfrice. Et a nen ponc eli ata tosac lae
 na hEighifti 7 medon lae na Baibileoine 7 medon aiti¹¹
 na hAfrici. Et mar sin as a nen ponc ata tosach lae
 na hAfraici 7 medon lae na hEighifti 7 deredh lae na
 Baibileoine. Et mar sin aris as a nen ponc ata medon
 lae na hAfraici 7 deredh lae na Eighifti 7 medon aithi
 na Baibileoine.

Et mar sin da rer ordaithe¹² De, an trat eirgis grian
 da cric egin isin doman, teit fa da cric eli 7 is e

2 B amail cercall is mo na sin *add.* 3, 5 Z *om.* 4 B na Francee.
 6 ZF *om.* 7 B Afrinc. 8 Z sa. 9, 10, 11, F aidhchi. 12 F ordaigti.

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other countries of the world, but I suppose a space of six hours to be between Babylon and Egypt, and between it again and France, and in the same way again between the other countries. Then I will describe a perfect circle in the form of the earth, and a circle larger than that outside it representing the orbit of the sun, and will place the letter A for Babylon and B for Egypt and C for Africa, and I will write D for the sunrise of Babylon and E for its noon and F for the sunset, and in the same way, B for the sunrise in Egypt and F for its noon, and G for its sunset, and in the same way again, F for the sunrise of Africa and G for its noon and D for its sunset.

Thus, I declare when the sun rises at point D, it is visible to the inhabitants of Babylon, and is concealed from the inhabitants of Egypt until it reaches point E which is noon in Babylon, and sunrise in Egypt, and midnight in Africa, for then the sun rises with reference to the Egyptians, yet it is invisible to the inhabitants of Africa until it reaches point F, which is the end of the day in Babylon, and noon in Egypt, and sunrise in Africa, because day begins then with reference to the people of Africa, and [it is] evening with the Egyptians and midnight with the people of Babylon. The Africans behold it until it reaches point D which with them is the end of the day and is midnight in Egypt and the beginning of the day in Babylon. And midnight in Egypt and the end of the day in Africa are at one point. At another point is the beginning of the day in Egypt and midday in Babylon and midnight in Africa. In the same way, at one point is the beginning of the day in Africa, and midday in Egypt, and the end of the day in Babylon. In the same way again, at one point is midday in Africa, and the end of the day in Egypt, and midnight at Babylon.

Thus, according to the order of God, when the sun rises in some country in the world, it sets in another,

cruinne na talman doni an examlacht sin da dhul fai
 7 deirghi na greine annsa doman.

Et as i so this¹³ an fidair ¹⁴da geallamar thuas da
 denamh.¹⁴

¹Do med na greini.¹

18. RACIONES² GEOMETRICE ETCETERA. .i.
 Derbaid resuin iomitrici Tolimeus astrolaic³ med na
 greine. Et adeir gorab egin cainndigacht⁴ na greine da
 beth comtrom no nis luda no nis mo⁵ re cainndigacht na
 talman; 7 da madh comtrom da beit grian 7 talam, da
 rachadh scail na talman .i. an aitchi,⁶ coimhletan risin
 talmain fein amac co speir na nairdrinnach ndaingin 7 da
 mucfad si iat. Et da tigemad⁷ eclipsis .i. easbaidh soluis
 don⁸ re, gac en mi trit an mbl⁹adain amach, oir da
 boinfedh cainndigeacht na talman noc de beth co mor re
 cainndigeacht cuirp na greine⁹ solus na greine don re 7
 do na hairdrinnacaib 7¹⁰ mar sin ni beit gealach co
 brac ann ac dorcadus siraidhi o tosach na haiti¹¹ conuic
 a deredh. Ma sedh o bis an gealach ann 7 daciter na
 hairdrinnaich co solus is in aithi, tuicter as so nac
 comtrom an grian 7 in talam re ceili.

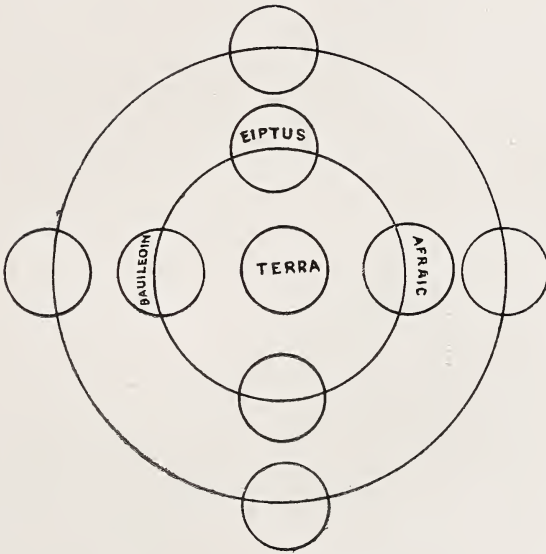
Agus da chur¹² a cell co follus daghen fidhair
 tri cercaill¹³ a timcill a celi .i. an cercall leitimillech¹⁴
 amail cercall na nairdrinna[c] ndaingin, 7 an cercall
 medonac mar cercall na greine, 7 an cercall as
 lugha mar cercall an re 7 an talam ar a lar
 7 in grian fon talmain this na speir fein, coimlethan ris
 an talmain 7 scaile na talmain ar comair na greine don
 taeb eli don talman,¹⁵ coimlethan ris an talmain, ac dul
 amach co speir na nairdrinnach co direach.

13 Z om. 14-14 Z om., F om. da denamh. 1-1, 3, ZF om. 2 Z
 Feciones, F Raciones. 4 Z med. 5 ZF no nis lugha add. 6 F aitchi.
 7 Z thigmeoadh. 8 F an. 9 B da bainfedh repeated. 10 F is add. 11 Z
 oidhehe, F aidhechi. 12 F so add. 13 ZF doden tri cercalla. 14 F
 imillech. 15 F co add.

NOTE.—Chaps. 18, 19, 20 correspond to Chap. 8, Stabius, which the
 Irish translator divides into three.

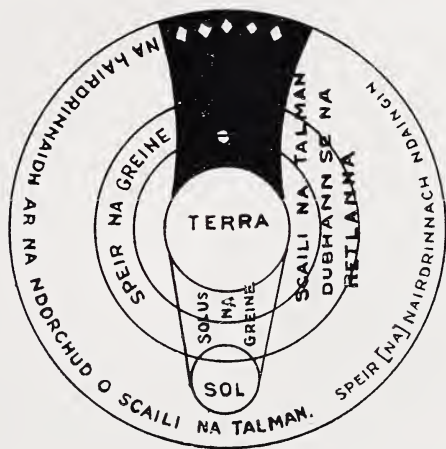
MEDON LAE NA BAIBILEOINE
 TOSAC LAE SIN AGIPT
 MEDON AITI NA hAFRAICE

MEDON AITHI NA hEGIFTI
 DERID LAE NA hAFRICE
 TOSAC LAE NA BAIBILEOINE



MEDON LAE NA hEGIFTE
 TOSAC LAE NA hAFRAICE
 DERID LAE NA BAIBILEOINE

DERID LAE NA hEGIFTI
 MEDON LAE NA hAFRAICI
 MEDON AITHI NA BAIBILEOINE



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and it is the roundness of the earth that causes that difference of sunset and sunrise in the world.

Here follows the figure I promised to make.

Concerning the size of the sun.

18. RATIONES GEOMETRICAÆ, ETCETERA.

The geometrical calculations of Ptolemy, the astrologer, prove the size of the sun. He says: The size of the sun must be equal to, lesser, or greater than the size of the earth; and if the sun and the earth were equal, the shadow of the earth, *i.e.*, the darkness co-extensive with the earth itself, would travel out to the sphere of the fixed stars and obscure them, and an eclipse, *i.e.*, deficiency of light in the moon, would occur every month throughout the year; for the earth's mass, which would be as large as the mass of the body of the sun, would deprive the moon and the stars of the sun's light, and there would then never be a moon, but constant darkness from the beginning of the night until the end. Therefore, since the moon is present and the stars are seen illuminated in the night, let it be understood from this that the sun and the earth are not equal to each other.

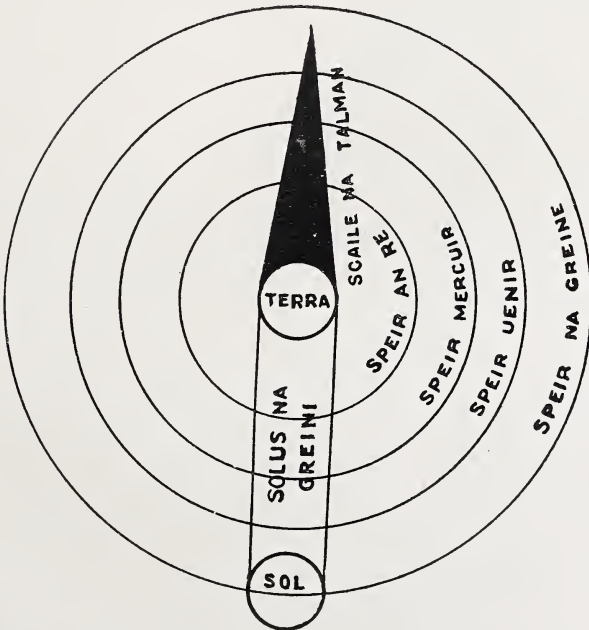
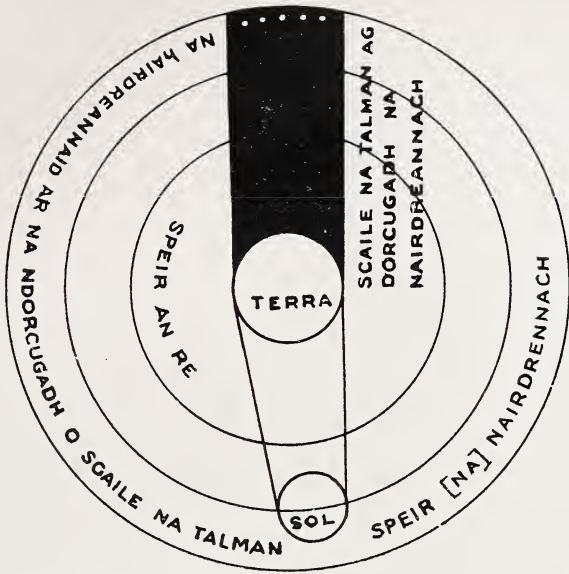
To make it clearly understood, I will make a figure of three circles around each other; the outer circle for the orbit of the fixed stars, the middle circle for the orbit of the sun, and the smallest circle for the orbit of the moon; and the earth in the middle, and the sun down beneath the earth in its own sphere co-extensive with the earth, and the shadow of the earth opposite the sun on the other side of the earth, and co-extensive with the earth passing out straight to the sphere of the stars.

19. SI AUTEM SOL MINORIS ESSET CAINNDITATIS¹ ETCETERA. .i. Da madh lugha cainndigecht na greine na na talman, gac uili ni do ceadaithe dofolaing² ³adubrumar 7 tuilled leo, da tegemaddais⁴ ann, oir da bet scaile na talman ac sir fas ar meid 7 ar lethead⁵ on talmain amach co speir na nairdrinnach 7 da dhorcochadh se an cuid budh mhó acu 7 da tegemad⁶ eclipsis do na plainedaibh is gac en mi 7 da bedh eclipsis an re, mar adubrumar, ar bun re fedh na haithi⁷ co maidin.⁷ Ma sedh o nac facamar an í so riamh 7 o nac cualamar 7 o nac fuaramar scriobtha as egin nac lugha cainndigecht na greine na cainndigecht⁸ na talman. ⁹Et foillsigidh an fidair so tis an radh so adermid.⁹

20. NISSISARIO IDHITUR¹ FADENTUM EST. Is egin a admhail gorab mo cainndigecht na greine na na talman 7 nach ted sgali na talman tar speir Mercur suas chaithi² 7 is ar cuma speiri ata sgaili na talman .i. an chuid lethan risin talmain 7 se ag dul a ngiri tar es a chele no go taire³ becan don taibh thuas do speir an re. ⁴Et is e in sgaili cedna dorcaidhes an re⁴ do rer mar beris se air, oir an trath bis an re a ndesgeart no a tuaisgeart an sgaili, an chuid ar a mbi se don re dorcaigid⁵ se e 7 an trath beris se ar a leth dorcaigid⁵ se uile e. Et gidhed ata a fis againne 7 fuaramar sgribtha nac soitheann an sgaili sin na talman na hairdrennaidh na en plained do na plainedaibh ach an re amhain, noc ata na comursain ag an talmain 7 is ime sin bid na plaineid uili a negmuís an re 7 na hairdrennaidh⁶ tri bithu sir solus on grein 7 is as sin derbas gorab mo an grian na an talam da mhoran mar foillsighes an fidair so this⁷.

1 Z canditatis. 2 ZF dofolaing docedaiti. 3 Z mar adubramar. 4 B tegemethdais. 5 Z ar lethnocadh, F ar lethm (?). 6 Z tigemha. 7-7 Z om., F . . . maidin mar adubrumar. 8 Z om. 9-9 Z is follus an radh so adermid is in fidhair so his. F is follus is in fighair so this an rud só adermid.

1 Z Niscario igitur. 2 Z caidhti. 3 F tair. 4-4 Z om. 5 Z dorcaigi. 6 ZF uile add. 7 Z duind do rer mar ata si add.



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19. SI AUTEM SOL MINORIS ESSET QUANTITATIS, ETCETERA. If the size of the sun were less than that of the earth, every unpermissible insufferable thing I have mentioned, and more besides, would occur, because the shadow of the earth would be constantly increasing in size and width out from the earth to the sphere of the constellations, and it would darken the greater part of them, and an eclipse of the planets would occur every month, and an eclipse of the moon, as I mentioned, would be in progress during the night until morning. Since, then, we have never seen this, and never heard of it, and never found it written, the size of the sun cannot be less than that of the earth. This figure below explains this statement I make.

20. NECESSARIO IGITUR FATENDUM EST.

It must be admitted that the size of the sun is greater than that of the earth, and that the shadow of the earth never extends up beyond the sphere of Mercury. The shadow of the earth is conical in shape, with the broad side towards the earth, while it becomes narrower by degrees, until it comes to an end a little above the sphere of the moon. The same shadow obscures the moon according as it spreads over it; for when the moon is in the north or south of the shadow, it obscures the portion of the moon on which it is, and when it spreads over half of the moon, the shadow obscures it completely. However, we know, and we have found it written, that that shadow of the earth does not reach the stars nor any of the planets, but only the moon which is neighbour to the earth, and therefore all the planets, except the moon, and the stars borrow light from the sun always; and thus he* proves that the sun is much larger than the earth, as this figure below shows.

* Ptolemy.

21. LUNA NICEL LUMINIS ABET NISP ETCETERA. Ni fuil en red solus isin re acht mar ghabus on grein 7 as amlaid ataid ar aen comtrom mar samail liathroidi cruindi, oir da madh na claraibh lethna² do bedis,³ amail adobradar na haineolaigh, an trath do bedis³ a noirreer no a niarrtar na firmaminti ni faicfithi dibh acht a mbuird 7 gidhedh docithfithi iad uili a mullach na firmaminti. Ma sed o nach folluse⁴ dociter cruinn iat a mullach na firmaminti na an gach inadh eli acu sin tuicter gorab cruinn ataid fein 7 nach lethan. Et an cuid cruind ut dacimid⁵ a gac aen dib ni fuil ann acht⁶ emisperium .i. letspeir 7 an let eli gan fhaicsin. As mar sin is follus gorab corp cruinn ata ag an grein 7 ac an esca 7 ac na plainedaibh 7 ac na hairdrinnachaibh uile, oir gebe taeb da faicfer iat as cruinn daciter iat.

Et mar adubramar, ⁷ni fuil solus on a naduir fein ag an re⁷ 7 as amlaid ata⁸ dorcha slighaithe⁹ amail iarann iar na glanadh,⁹ 7 in med da solus bhis aigi as on grein gabus 7 as i a speir an speir is foicsi don talmain idir na corpaibh¹⁰ nemdha 7 speir na greine an ceathramad os a cinn. Agus gidh fada o ceili iat an trat bis an re fai an grein co direc an en ceim re,¹¹ is annsin soillsiges si an leth uachtarach don re 7 bigh an let laimh rinne dorca 7 as annsin as lan re dorca againne. Et as ime sin nach faicmid¹² isin aimsir sin en red don re.

Et an trath fagas an re an ceim direc sin a mbi se fon ngrein 7 snaidhes¹³ tar eis a ceile uaite sair snamaidh¹⁴ an solus¹⁵ mar sin deis a ceili siar.¹⁶

An solus ghabhus an cuid uachtarach de on grein soillsigid¹⁷ an bord ictarach de 7 is annsin bis an re ar a primh .i. ar a ced solus laimh rinne, oir as i sin¹⁸ ced cuairt dacimid e 7 gach faidi da cumscaidinn sair¹⁹ on

1 Z suscipet a sole *add.* 2, 3-3 Z *om.* 4 ZF follusi. 5 ZF an cuit ut docimid cruinn. 6 ZB *om.* 7-7 ZB ni fuilid solus on a naduir fein 8 Z atait. 9-9 ZF *om.* 10 ZF speirib. 11 Z ria. 12 Z faicfer. 13 Z snaidi. 14 B smnamaidh *miswritten.* 15 ZF *om.* 16 F on t (*illeg.*) *add.* 17 B foillsigid. 18 B as e sin, Z is i sin. 19 ZF sair *fol.* faidi.

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21. LUNA NIHIL LUMINIS HABET NISI, ETCETERA. There is nothing light-giving in the moon except what it borrows from the sun, and both are spherical like the figure of a round ball; for if they were level planes, as the ignorant have asserted, when they would be in the east or west of the firmament, only the edges of them would be visible, whereas they would be completely visible at the top of the firmament. Since they do not appear more clearly spherical in the highest point of the firmament than in any other of those places, let it be understood that they are spherical, and not flat. That spherical portion which we see in each of them is only a hemisphere, *i.e.*, half a sphere, and the other half is invisible. Thus, it is clear that the sun, moon, planets, and stars have all a spherical form, for from whatever side they are viewed, they appear round.

As I have said, the moon has no light of its own nature, and it is dark and polished (?) like iron which has been cleaned; and whatever light it has, it borrows from the sun; and its sphere is the sphere that is nearest the earth, between the heavenly bodies, and the sphere of the sun is the fourth above it. And, although they are far from each other, when the moon is beneath the sun in exactly the same degree as it, then it illumines the upper part of the moon and the side near us is dark, and it is full dark moon with us. Therefore we see nothing of the moon at that time.

When the moon leaves that exact degree in which it is beneath the sun, and moves by degrees away from it eastward, then the light moves by degrees westward.

The light which the upper part of it borrows from the sun, illumines the lower edge of it, and then the moon is in its prime, *i.e.*, with its first light turned to us, for that is the first course in which we see it; and the further eastwards it moves from

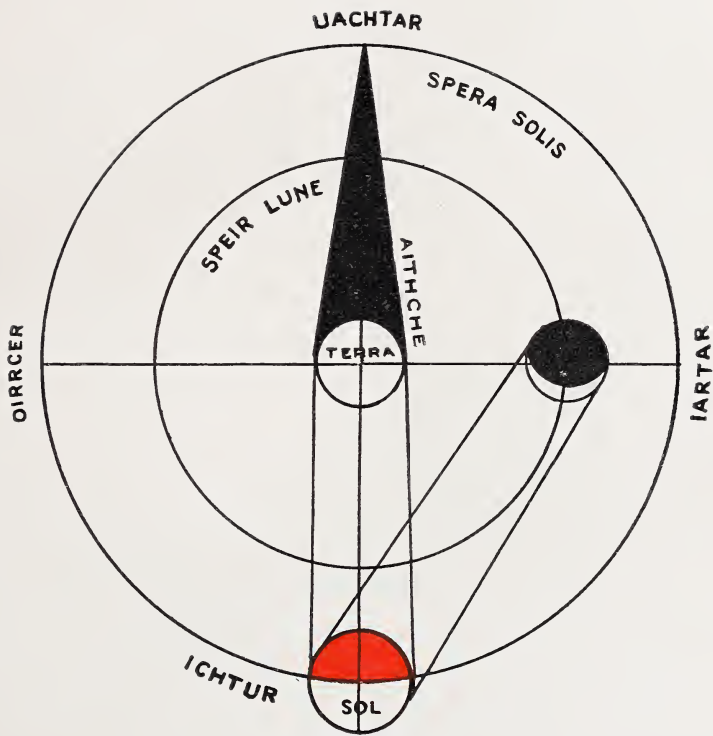
grein as moidi timceallas solus na codac thuas de anuas
 7 gac fad sair teit on grein as moidi biseac a soluis tiar
 7 doni biseac a dhorchadais toir co nuigh a ceithre deg,
 oir is annsin as rofaid²⁰ on grein e 7 bis co direc ar a
 comair don taib eli don talmain 7 is annsin²¹ bis an
 temisperium as foicsi dan talmain dhe solus uili 7 in
 temesperium uachtarach dorcha uili. Et mar sin ni bi²²
 chaithi gan a leth dorcha 7 a leth solas gibe *slige* a
 ngabann.

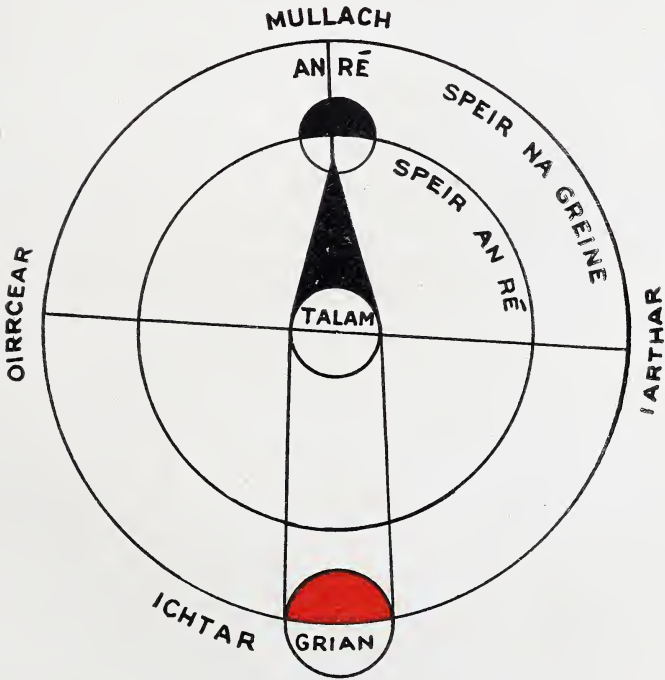
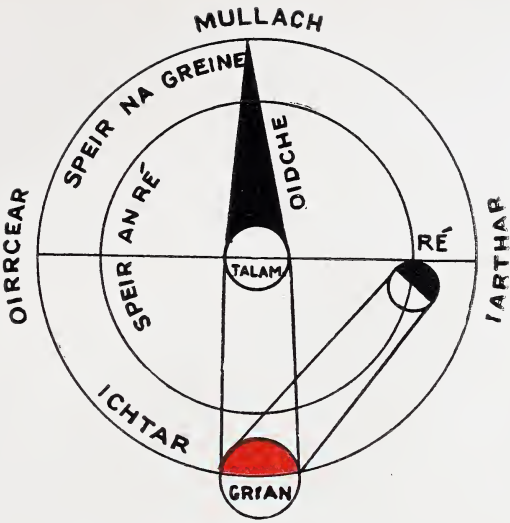
Et an trat claenas an re o diameiter na greine siar .i.
 on line direc a mbinn don taib ele don talmain ar comair
 na greine, impoid²³ solus an re²⁴ laimh rinne suas tar eis
 a ceili 7 in med soillsigter don bord ichtarach²⁵ ar a primh
 as i an med sin dorcaidter don cuid soir de ar a guin.
 Et mar sin an med soillsigter de gach nen aithi co ceann
 a ceithre deg as i in medi²⁶ sin dorcaidter dhe gach nen
 aithi co deredh a mis no co mbi co direach fon²⁷ grein
 a nen ceim ria,²⁸ aturra 7 in talam, 7 is annsin bis an let
 bis rinne don re dorcha 7 an leth suas solus 7 da cur so
 a ceill co follus dagen fidair annso this a cuireab an
 grian fo let taeb na talman²⁹ don taebh tiar 7 in re da
 ceim deg becan os cinn na talman uaithi sair 7 scribocad
 dorca uili e ac an bord iartarach is foicse don grein de,
 noch foillsiges e da beth³⁰ ar a prim.

Dagen aris fidhair eli a cuireabh an re a mullac a speiri
 fein a cinn an sèchtmad la don mhi 7 a leth solus 7 a let
 dorcha 7 cuirfed an grian fo leth taib na talman don taib
 tiar.

Dagen aris an treas fidair a cuireabh³¹ an re toir co
 direac 7 a let uachtarach dorcha 7 a leth ichtarach, ata ar
 comair na greine 7 na talman, solus. Et cuirfad an grian
 an uair sin tar eis dul fai di fo let taib³² na talman 7rl.
³³Et ac so thall an fidair fein.³³

20 F rofaid. 21 Z nuair. 22 Z binn. 23 F impaighi. 24 ZF
 na greine. 25 ZF uachtarach. 26 B mhethi. 27 B fo. 28 F .re.
 29 B tiar *add.* 30 ZF a beth. 31 Z a cuirim. *This passage in red
 ink in B; very faint. F quite obliterated.* 32 B leth mas (*sic*). 33-33
 ZF *om.*







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the sun, the more does the light of the upper parts come round it from above, and the further eastwards it goes from the sun, the greater the increase of its light in the west, and the increase of its darkness in the east, until it reaches the 14th day, because then it is furthest from the sun, and is exactly opposite it on the other side of the earth, and then the hemisphere which is nearest the earth is completely light, and the upper hemisphere completely dark. Thus, it is never without its dark half and its light half, whatever course it takes.

When the moon inclines westwards from the diameter of the sun, i.e., from the straight line in which it is, to the other side of the earth opposite the sun, the light of the moon beside us moves upwards by degrees, and the same area of it is darkened at its wane as has been illumined at its prime, and thus, as much of it as is illuminated every night for fourteen nights, is darkened every night from then until the end of the month, until it is exactly beneath the sun in the same degree as it [the sun], between it and the earth, and then the side towards us is dark and the side above light.

And to make this clearly understood, I will make a figure here below in which I will place the sun to one side of the earth—the western side—and the moon 14 degrees eastwards from it, a little over the earth, and I will make it all dark except the western edge of it which is nearest the sun, which shows it to be at its prime.

I will make again another figure in which I will place the moon at the top of its own sphere at the end of the seventh day of the month, with half of it light and half dark, and I will place the sun to one side of the earth—to the west side.

And I will make moreover a third figure, in which I will place the moon in the east exactly with its upper half dark and its lower half, which is opposite the sun and the earth, light. I will place the sun as having set at that time at one side of the earth, etc. Here yonder is the figure itself.

Daden aris an ceathramad fidair 7 scribochad an leth³⁴ is foiesi don talmain don re solus 7 an leth eli dorca amail bis an re annsa *deichmad*³⁵ (?) la don mhi 7 cuirfed e mar sin thoir co direc 7 an grian a medon ichtair na talman co direac.

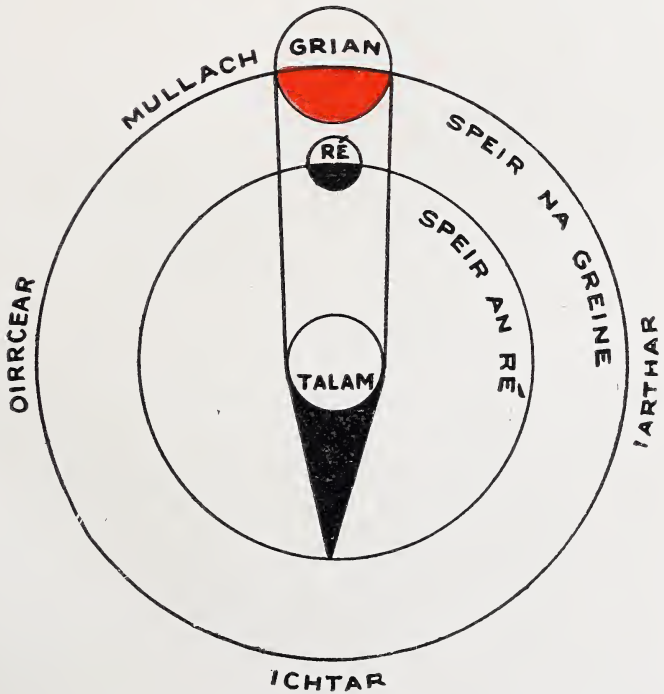
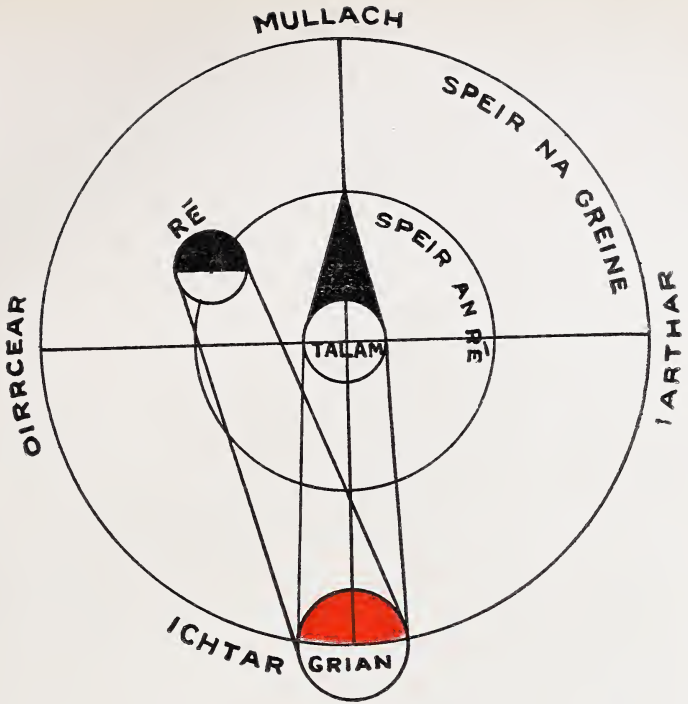
Daden da eise sin an cuigeadh fidair a cuireab³⁶ an re a mullach a cercaille fein a nen ceim risin ngrein 7 scribocad an leath suas solus de 7 an leth anuas dorcha. ³⁷Et ac so an fidhair don taib amuith don leth ele.³⁷

¹Da cuis eclipsis an re.¹

22. POSTQUAM ARGUMENTIS ETCETERA. .i. Tar eis a derbtha duinn darrmainntibh² egintaca 7 d fidracaib geomitreachta³ gorab on grein soillsigter an re 7 na hairdrinnacidh uili, foillseocamaid anois cad o tic dorcadus nadurtha ar in re re nabarthar eclipsis. Agus adermaid dinnsaidhi an adbhur sin, os on ngrein gabus an re a solus 7 nac fuil ni ele ann da boinfed an solus sin de ac an talman, gorab e scaili na talman, bis co direc idir an grein 7 in re, tet a dimcill an re 7 benas solus na greine dhe 7 is e an dorcugad sin an re o scaile na talman is eclipsis ann. Agus teagmaidh se co nemeallta⁴ an gach en mi caithi oir gac uair tecmas an re do ceann no derball na Dreaguine, curtar annsa line ndirec e ar cert comair⁵ na greine 7 na talman 7 tollaidh se co cert scaili na talman 7 dorchaidter uili e. Et an trath gluaisis an re da deiscert no do tuaiscert an scaili sin, seachnaidh se an teclipsis uile 7 gibe taeb dib sin a mbaininn se ris an scaili sin, an med⁶ bis fai an scaili de, as i an meidi sin bhis declipsis eir sin.

Agus is ime sin ata da gne declipsis ann .i. eclipsis unuersalis .i. eclipsis coitcinn 7 eclipsis particularis .i. eclipsis rannaighi. Agus is uime sin nach inann aimser

34 MSS. leth na lethi is foisce. . . . 35 (*sic*) B. Z. 2e. u lá (*sic*); F xx. la. *leg.* xxi. la. 36 Z a cuirim. 37-37 Z *om.* 1-1 ZF *om.* 2 Z dargomintib. 3 ZF *geometrice.* 4 Z *nimmeallta.* 5 Z ar comuir. 6 F an medi.



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I will make moreover a fourth figure, and will represent the half of the moon which is nearest the earth light, and the other half dark, as the moon is on the tenth¹ day of the month, and I will place it exactly in the east, and the sun exactly in the middle beneath the earth.

After that I will make a fifth figure in which I will place the moon at the top of its own orbit in the same degree as the sun, and represent the upper half of it light and the lower dark. Here is the figure on the other page.

Concerning the cause of the eclipse of the moon.

22. POSTQUAM ARGUMENTIS, ETCETERA.

Having proved by forcible arguments and geometrical figures that it is from the sun that the moon and all the stars receive light, we shall now show whence comes the natural darkness upon the moon which is called an eclipse; and I declare, approaching that subject, since the moon receives its light from the sun, and there is nothing else to deprive it of that light except the earth, it is the shadow of the earth, which is exactly between the sun and the moon, which envelopes the moon and deprives it of the sun's light; and that obscuration of the moon by the shadow of the earth is an eclipse. It happens always, without fail, every single month, because every time the moon arrives at the head or tail of the Dragon, it lies in the straight line exactly opposite the sun and the earth, and exactly penetrates the shadow of the earth, and is totally obscured. When the moon advances to the south or north of that shadow, it avoids the total eclipse, and on whatever side it meets that shadow, the portion of it which is beneath that shadow is eclipsed.

Therefore, there are two kinds of eclipse, *i.e.*, "eclipsis universalis," *i.e.*, a general eclipse, and "eclipsis

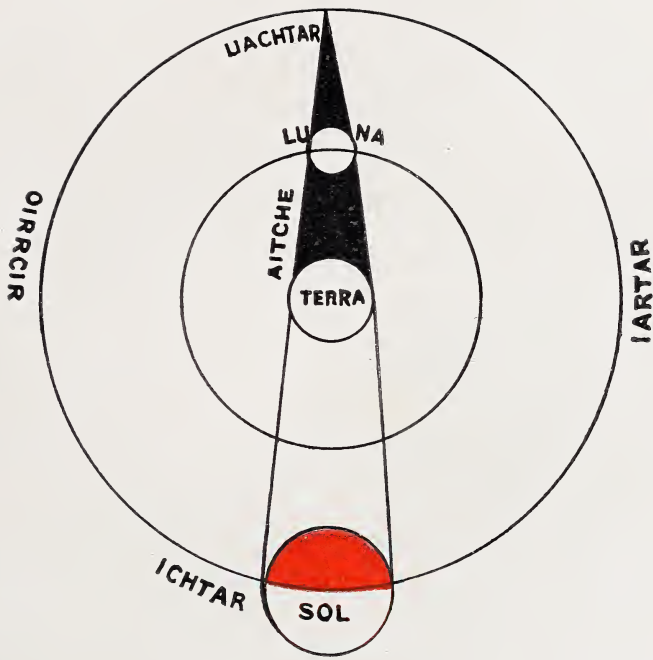
¹ *recte* 21st day.

a tinnscann se a ngach en inadh 7 nach inann cainndighacht do an gac inadh oir ni hinann med do toir 7 tiar⁸ 7 ni mo 'is inand⁹ a ndeiscert¹⁰ an domain¹⁰ na na tuaiscert. As uime sin, ni¹¹ hinann dacit na daine e a cricaib an domuin. Agus an buidhin ar a neirginn la, ni facid siat e ge dobedh¹² se san uair sin ann do rer naduir. Et na diaigh so aderam declipsis na greine na inadh fein.

Eclipsis na plained ele. As plained acu fein as cuis declipsis na plained ele, oir is e an plained as isli dorchaides an plained is airdi. Et ar i[n] nos cedna, as e an re dorcaidhes¹³ iat uili uair ele fa sec.¹³ Da cur a ndobart¹⁴ a cell ar eclipsis nis mo¹⁴ dogen fidair gheomitric annso tis as a ticfither an teclipsis co' follus.

23. MANIFESTUM EST ETCETERA. .i. As follus mar adubramar solus na nairdrinnach uili da teacht¹ on grein 7 a mbeit comcruinn mar² liatroid amail ata grian 7 esca 7 is i cuis um nac follus a cruinne mar as follus cruinne na deise ele sin .i. a mbeit uili don taib thuas don grein a fad uainn a negmus Uenir 7 Mercurir. Agus soillsigter leath gach en³ retlaine ata don taib thuas don grein uaithi fein, gibe inadh a mbid na retlanna sin na cercaill fein .i. mas⁴ a nen ceim re grein na mas a fad uaithe no mas a fogus di no roimpi no na diaigh, as uaithe sin gabaid uili solus. Et gach uair bis ceachtar do na tri plainedaib⁵ ata os cinn na greine ar a comair co direac as ann as aibsidhi a solus ar comair na talman ar da cuisib. An ced cuis acu⁶ an duine bis a ndorcadus, as aibsidhidi⁷ leis an solus daci se don taib amuit don dorcadus na leisín duine bis annsa solus fein 7 is uime sin, an duine bis a scaili tiudh⁸ dorcha na talman annsan aithi, ag fecain uadha⁹ na plained

8 Z hiar 7 toir. 9-9 B om. 10-10 ZF om. 11 Z nach. 12 B bedh. 13-13 Z fa seach iad uili. 14-14 ZF ar eclipsis a cell nisa mo. 1 Z tiacht. 2 Z amail. 3 Z om. 4 B masa ceangailte. 5 F plainedacaib. 6 ZF foll. dorcadus. 7 F aibsigi. 8 Z tiugh. 9 Z om.



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particularis," *i.e.*, a partial eclipse. Wherefore it does not begin at the same time in every place, and is not of equal size in every place, since it is not of the same size in the east as in the west, and neither is it the same in the south of the world as in the north. On that account it [the eclipse] does not appear the same to people in the countries of the world, and they on whom day rises do not behold it, though it is present naturally at that time. Afterwards I will speak of the eclipse of the sun in its own place.

The eclipse of the other planets:—One of the planets themselves is the cause of the eclipse of the others, for the lower planet obscures the higher. In the same way, the moon obscures them all, each at its own time. To explain better what I have said of eclipses, I will make a geometrical figure here below, from which the eclipse will be clearly understood.

23. MANIFESTUM EST, ETCETERA. It is evident, as I have stated, that the light of all the stars comes from the sun, and that they are round like a ball, like the sun and moon, and the reason why their roundness is not evident as is the roundness of those other two, is because they are all above the sun, far from us, except Venus and Mercury; and half of each star which is above the sun is illumined by it [the sun] at whatever point of their own orbit these stars are; *i.e.*, whether they are in the same degree as the sun or whether they are far from it, or near to it, or in front of it, or behind it, from it they all receive light. Every time any of these planets, that are above the sun, are directly in front of it, then their light is most prodigious in front of the earth for two reasons. The first reason:—A person who is in darkness thinks the light he sees outside the darkness more brilliant than a person who is in the light itself, and accordingly the person who is in the thick dark shadow of the earth at night, as he beholds the planets that are directly in

bis ar comair na greine co direc, is aibseach leis an solus tre mhéid an dorcadais bis na thimceall fein. Cuis é, an tan curtar ceachtar do na plainedaib co direc ar comair na greine is égin di impod na cercaill fein tar a hais 7 is aibhsididí a solus¹⁰ an timpodh sin oir is foicsidí¹¹ da talmáin hi 7 ní teicmann so co brac is na plainedaibh bis don taibh tuas don grein.

Agus na plaineda¹² ata faí grein¹³ .i. Mercur 7 Uenir, ní roitit siat co brach ar comair na greine 7 ní roitit an en cuil do na ceithre cuilib¹⁴ 7 ní hedh bid ac laim ría co brat, roimpi no na diaigh 7 gach foicsí bid¹⁵ don grein as lugaide a solus, 7 gach fad uaithi bid as moidí a solus.

Solus *uero* na plained teit ar comair na greine, bit ac fas caithi¹⁶ tar eis a ceili conuic an inadh tar nac fedaid dul 7 inab égin doib impodh dinnsaighi na greine aris 7 as annsan impoidh¹⁷ sin bith¹⁸ a sholus san ar dombisec no co mbit siat ar en ceim risin grein fuithe 7 annsin bith an leth as foicsí don grein dibh solus 7 in leth éle dorcha, mar adubrumar don re, an trat bis a nen ceim re grein, oir ní faicter e co brac acht an tan bis da ceim deg a neach¹⁹ as luda da taib égin don grein .i. ar a prim no ar a fírdredh.

Agus is e an modh cedna ata ac na plainedaib sin oir²⁰ an trath bid siad toir da *ceim* deg roim in grein ag impod cum na greine no²⁰ an trat bid²¹ da ceim deg don taibh thiar don grein ar sibhal, dacitar adharcach iat ar cuma an re nua²²; 7 an trat tiaghait on grein mar nac fedaid dul nis faidí, bith a lan solus acu. Gidedh ní follus an *claechlod* sin duinne²³ mar as edh *claechlod*²³ sholus an re oir is faidí da moran uainn iad²¹ na an re 7 as uime sin an trat is mor a solus as bec a toirt ar a fad uainn. Et an tran is foicsí bid don talamh daciter an lasair

10 Z aibside a solus sin; F aibsighe da solus. 11 F foicsidí. 12 Z na plaineid. 13 F an ngrein. 14 ZF eulaib. 15 B beid. 16 Z caidhce. 17 ZF impodh. 18 ZF bis. 19 Z noe; F i let (?). 20-20 B om. 21 B bhét. 22 Z nuaigh. 23-23 Z ma sed eclipsis; F mar isin claechlodh. 24 B om.

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front of the sun, considers the light prodigious on account of the intense darkness which surrounds him. Another reason : when any one of the planets is placed directly in front of the sun, it must revolve in its own orbit, and its light is the more brilliant because of that revolution, for it is the nearest to the earth; and this never happens in the case of the planets above the sun.

The planets that are beneath the sun, *i.e.*, Mercury and Venus, never arrive opposite the sun, and are never in the quadrature aspect. Not thus are they, but near it always, before or behind it, and the nearer they are to the sun the less is their light, and the further they are from it the greater the light.

The light, however, of the planets that pass opposite the sun, is always increasing by degrees, until they reach the place beyond which they cannot go, and where they must turn towards the sun again, and during that backward motion, their light is on the decrease until they are in the same degree as the sun, beneath it, then the half of them nearest the sun is light and the other half dark, as I said in reference to the moon, when it is in the same degree as the sun; for it is never visible except when it is at least fourteen degrees to one side of the sun, *i.e.*, at its prime, or at its extreme wane.

Those planets are also after the same manner; for when they are to the east, twelve degrees in front of the sun turning towards the sun, or when they are in motion twelve degrees to the west of the sun they appear horned, after the manner of the new moon, and when they come away from the sun, as they cannot advance further, they have their full light, although that change is not evident to us as is the change of the light of the moon, as they are much further from us than the moon. Therefore, when their light is great, their bulk is small on account of their distance from us. When they are nearest the earth, the beam that comes from them appears

eirghes dib uair fada 7 uair gerr 7 uair ceithreuilinnach da rer chuma a cirp. Et an uair is faidi bid o talmain ni mar sin daciter an lasair cedna acht comcruinn, mar bis an tene a fad uait, gibe cuma ²⁵bis ar in lasair²⁵ innte fein, cael no fada no letan no gerr 7 ni mar sin daciter hi a fad uait ach comcruinn.

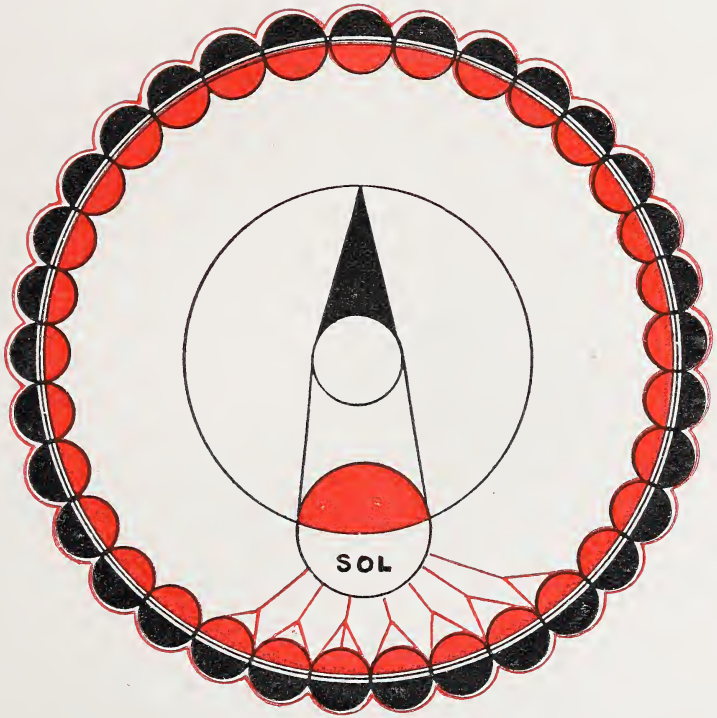
Et ac so this²⁶ an fidair inneosas co follus cinnus soillsiges an grian na hairdrinnaidh uili a negmus na plained, 7 foillsigid ciall na fidrach so nac fuil inadh is in doman gan beth deallraigteach²⁷ solus on grein.

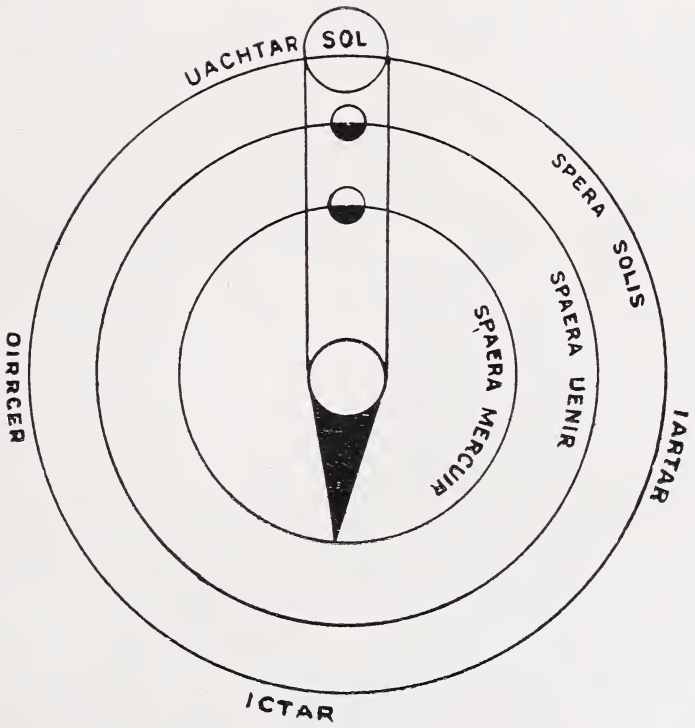
Daghen aris an dara fidhair da foillsiugad cinnus thsoillsighter Uenir 7 Mercurir noch ata fai grein uaithe 7 cinnus tiaghaid siat ar en ceim re grein mar as foicse fedaid dul di.²⁸

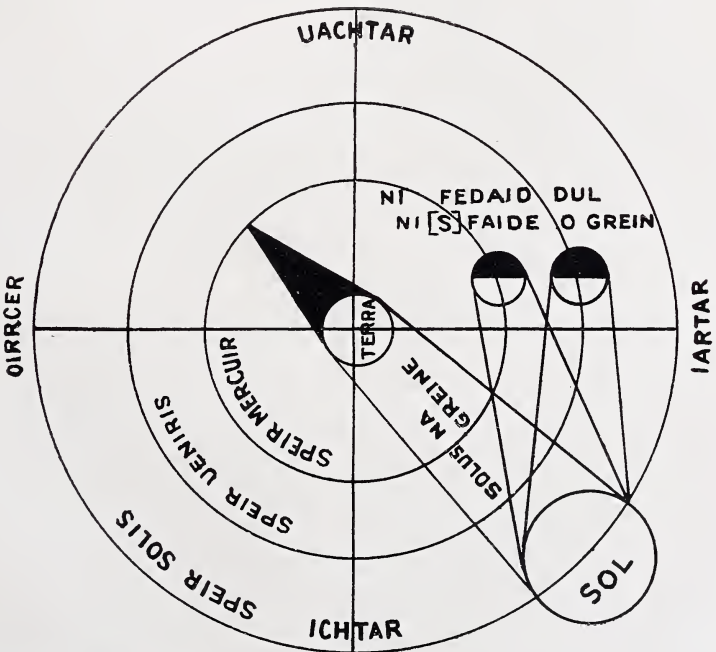
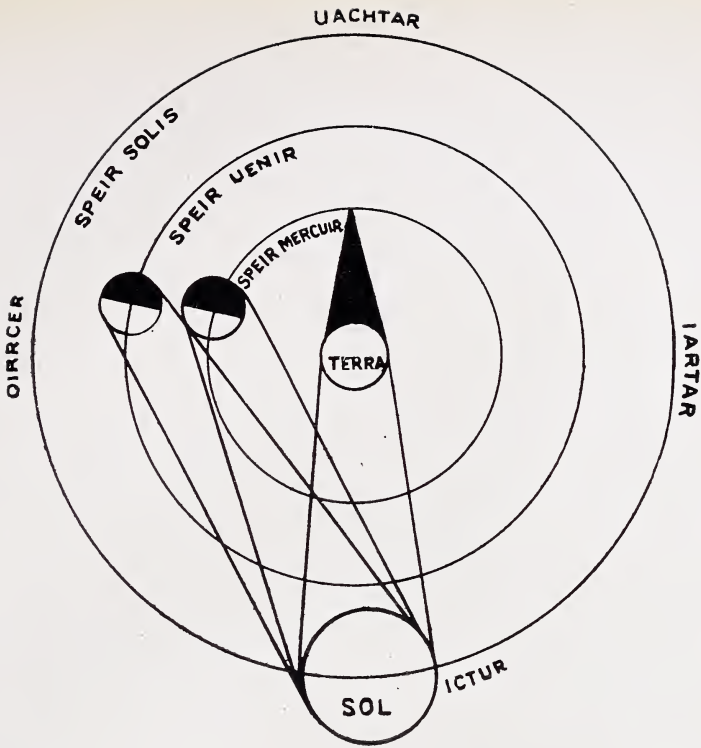
Daghen aris an treas fidhair andso da chur a ceill nis mho na mar so²⁹ mar shoillsithter³⁰ Uenir 7 Mercurir o grein 7 cuirfead iat an oirrcir a cercaille as cinn na talmhan innus nac fedaid dul nis faidi on³¹ grein ³²na mar bid mochrach roimpi.³²

Dagen anois an cethramad fidair da foillsiugad nis mho cinnus gabhaid a ³³solus 7 cuirfead iat dan leith thiar dan speir os cinn³⁴ na talmhan isin fhad as mo³⁵ fedaid dul on grein .i. isin inadh a mbid a leanmhain a nuair easparta.

25-25 B beris ar a lasair. 26 Z amuith. 27 B gabadh deallraigti. 28 B fedas siat dul. 29 B na add. 30 F foillsigter. 31 Z o. 32-32 Z acht mar bid a muchrach roimpe; F ach mar mbit roimpi. 33 ZF an. 34 Z os cosmalas. 35 F talman an add.







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now long, now short, and now quadrangular, according to the shape of their body. When they are furthest from the earth, not thus does the same beam appear but round, as is fire distant from you; whatever shape the flame naturally has, narrow or long or broad or short, not so does it appear when far from you, but round.

Here below is the figure that will clearly shew how the sun illumines all the stars, as well as the planets; and the meaning of this figure shows there is the furthest distance they can go from the sun, *i.e.*, in no place in the universe that is not brightened and illuminated by the sun.

I will make again another figure to show how Venus and Mercury, which are beneath the sun, are illumined by it, and how they come into the same degree as the sun, as near as they can go to it.

I will make again the third figure here to explain better than this, how Venus and Mercury are illumined by the sun, and I will place them in the east of its orbit above the earth, so that they cannot go a greater distance from the sun than they are in front of it at dawn.

Now I will make the fourth figure to demonstrate better how they obtain their light, and I will place them on the western side of the sphere above the earth at the place in which they are continually (?) at evening time.

24. DICO QUOD LUNA SOLI QUASAM¹ ECLIPSIS ETCETERA. .i. Aderim gorab e an re as cuis declipsis na greine² oir as i a speir speir³ as ichtaraighe⁴ sis do na speirib nemda 7 as si speir na greine an cethramad speir don taib tuas de sin 7 mar sin gach sibal dani as fai grein bhis. Et an uair tecmas se a cinn no a nearball na Dreaguine a nen ceim co direach ris in ngrein gan claenad da deiscert na da tuaiscert, boinid solus na greine dinne 7 is e an dorcadus sin as eclipsis ann. An trat cheana* claenas da let deis no cli 7 nac sibhlaiginn co direch a ceann no a nearball na Dreaguine fa grein a nen ceim re secnaidh annsin eclipsis da tuismeadh. Et as e corp an re an docardus so daciter sa grein an uair eclipsis do beith ann, ma sedh as follus nac tic eclipsis ⁵ann co brach⁵ acht an trat bis an re fon grein co direach a nen ceim re 7 is annsa leth tiar da grein tinnschas se co brac 7 thoir crichnaiges. Et an trat siblaighes an re dan taibh amuith dan ceim direach sin na greine dorcaidh, uair ann, cuid don grein orainn. Et as ime sin atait da ghne ag eclipsis na greine mar ata ac eclipsis an re .i. eclipsis uili 7 eclipsis rannaighi.

Et da rer examlacht na crich bit⁶ an teclipsis co hegsamail inntu,⁷ oir an trat bis eclipsis ann ni comtrom daciter e an gach⁹ cric⁸ oir ata cric a faicter e 7 cric nach faicter 7 crich a faicter nis mo 7 cric a faicter nis lugha amail ata so ; .i. da mbedh an grian is an line direach os ar cinn an airdi 7 an re is in line cedna fuithi da badh¹⁰ egin eclipsis ann duinne. Et da mbedh neach is an uair cedna a noircer an domuin 7 e ac fecain na greine, dacitfedh,¹¹ dar leis, hi an iartar an domain. Et da mbedh nec ele isin uair cedna a niartar an domain ac fecain na greine, dacithfedh se, dar leis, hi

1 Z causa ; F quausa. 2 ZF as cuis eclipsis don grein. 3 B om.
4 Z uachtaraige. 5-5 Z co brach ann. 6 Z examlachta na criche bi.
7 Z indtib. 8-8 Z om. 9 F en add. 10 F do leth. 11 Z do eifidh.
*MSS. .c. na.

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24. DICO QUOD LUNA SOLI CAUSAM ECLIPSIS, ETCETERA. I declare that the moon is the cause of the eclipse of the sun, because its sphere is the lowest of the heavenly spheres, and the sphere of the sun is the fourth sphere above that, and, accordingly, every course it makes is beneath the sun. When it arrives at the head or the tail of the Dragon, in exactly the same degree as the sun, without inclining to the south or to the north, it deprives us of the light of the sun, and that darkness is an eclipse. When, however, it [the moon] inclines to its right or left side, and does not move exactly in the head or in the tail of the Dragon beneath the sun in the same degree as it, it avoids producing an eclipse. That darkness which is seen on the sun, when there is an eclipse, is the body of the moon; therefore, it is evident that an eclipse never occurs, except when the moon is exactly beneath the sun in the same degree as it. It always begins to the west side of the sun and finishes in the east. When the moon moves outside that exact degree of the sun, it sometimes obscures a portion of the sun from us. Therefore, an eclipse of the sun is of two kinds as is an eclipse of the moon, *i.e.*, total and partial.

The eclipse varies in various lands, for when there is an eclipse it is not visible to the same extent in every land, for there is one land in which it is visible, and another in which it is not, and one land in which it is more visible, and another in which it is less visible; in this wise:—If the sun were in the straight line up over our heads and the moon in the same line beneath it, it would necessitate an eclipse for us. If a person were at the same time in the east of the world, looking at the sun, he would imagine he saw it in the west of the world, and if there was another person at the same time in the west of the world beholding the sun he would imagine he saw it in the east of the world, but neither of them see the eclipse of the sun

a noirrcear in domain; gihedh ni faicinn ceachtar acu *eclipsis* na greine, oir da rachadh radharc gac neac acu co direc idir an grein 7 in re 7 mar sin ni boinfedh an re, ge da bedh se isin line direc fa grein ar a fad san on line sin na en corp dorcha,¹² solus na greine dib. Et an pinnsi¹³ a ndorcaiter an grian mar sin daciter innti sa lo na hairdrinnaig le med an dorcadais.

Et as girra beris as *eclipsis* na greine na *eclipsis* an re le na luas ar aen ac dul tar a ceili 7 ni mar sin ata *eclipsis* an re noch¹⁴ thic on talmain, ni bhi ga chur as ach sibal an re na aenur 7 in talam na comhnaighe.

Et gibe neach da ticfadh in ar *nagaid* annso 7 *aderadh*¹⁵ na budh e an re bud cuis *declipsis* na greine 7 da mud e mar adubrumar, na budh chora do san *eclipsis* da dhenamh na da Uenir 7 da Mercur an trat bid sa line direc fai grein. Et as do sin freagramaid, oir an trat bis Uenir 7 Mercur fai grein a nen ceim re as ar fad bis, gidedh as annsin teit uaithe a meid 7 a letead¹⁶ 7 is minic theagmas an i cedna don re oir bi fai grein co minic a nen ceim ria ar fad 7 gidhed bith a fad uaithe ar lethed.

Amail¹⁷ nach tic *eclipsis* na greine o na retlannaib as ludha corp nan re 7 is foicsi dhi, oir an trat curtar corp bec fa corp mhor a fogus do, gach foicsi da mbi¹⁸ do as lughaidi fhoilghis¹⁹ de, 7 trat curtar a fad on corp mor e 7 a fogus don radharc ²⁰bis ac a fecain araen, gach fad doteit on corp mor 7 gach foicsi dateit don radharc,²⁰ is moidi foilghes²¹ an corp mor, innas gorab mar sin co foileocadh uball fiadain corp na greine ar in radarc.

Et da cur so a ceill dagen fidair annso tis a ndingean²²

12 B bainid *add.* 13 Z proindsi; F prinnsi. 14 B no. 15 B aderaid. 16 Z lethi. 17 B Agus is ann. 18 ZF mbia. 19 ZF fuilrgis 20-20 ZF *om.* 21 BF foill—. 22 Z an di—.

¹The Irish translator misunderstood original text. S. cum sunt cum sole in gradu uno in longitudine sunt longiores quam esse possint in latitudine.

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because the sight of each would pass exactly between the sun and the moon, and, consequently, the moon, or any dark body, even though it were in the straight line beneath the sun would not deprive them of the sun's light, because of their distance from that line. At the point (?) in which the sun is thus obscured, the stars are visible in the day-time, so great is the extent of the darkness.

An eclipse of the sun is of shorter duration than an eclipse of the moon on account of the rapidity with which each passes the other, but not so is an eclipse of the moon, which is caused by the earth. There is nothing interfering with it but the course of the moon above whilst the earth is stationary.

If anyone opposed me in this by saying that the moon is not the cause of the eclipse of the sun, and that if it were as I said, it would not be more fitting for it to cause an eclipse than for Venus and Mercury when they are in the straight line beneath the sun, I answer him thus: When Venus and Mercury are beneath the sun in the same degree as it, it is as regards longitude, but then there is a decrease in them in size and width¹ (sic). The same thing often happens the moon, for it is often beneath the sun in the same degree as it, as regards longitude, and yet it is far from it in latitude.

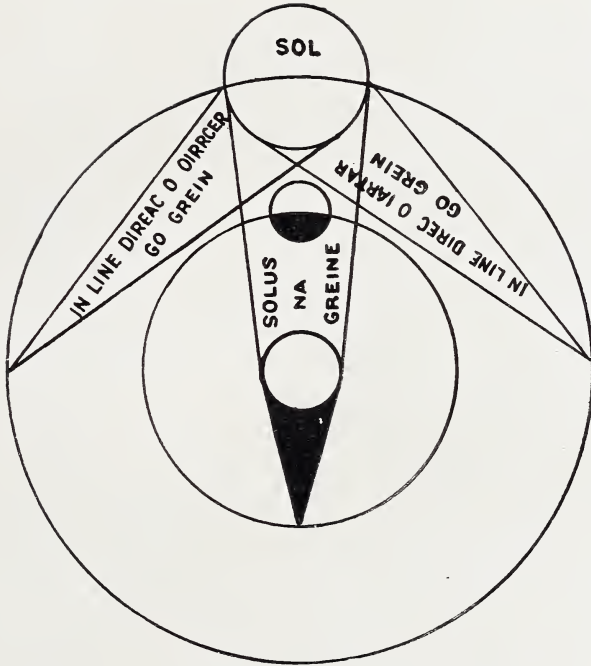
In the same way an eclipse of the sun is not caused by the stars of less magnitude than the moon, or (by stars) nearer to it, because, when a small body is placed under a large body near it, the nearer it is to it the less of it it conceals, and when it is placed far away from the large body, and near the sight which is looking at both, the further it recedes from the large body, and the nearer it approaches the sight, the more does it conceal the large body; so that in this manner a wild apple would conceal the body of the sun from the sight.

To explain this, I will make a figure here below

cercall mor amail cercall na greine 7 cuirfed an grian na mullach tuas 7 dagen cercall ele don leth istigh di sin amail cercall an re 7 cuirfed an re fein na mullach thuas annsa line direc fa grein 7 dagen an tres cercall don taibh astigh di sin ar cuma na talman 7 cuirfed²³ E litir²² na seantrom 7 saimeolad e risin inadh sa talmain as a faicid na daine an grian 7 cuir[fed] A a noircer 7 cuirfed B a niartar speiri na greine 7 cuirfed radarc na [n]daine is in line direch o E 7 o A 7 o B cum na greine. Ma sedh na daine ata a nE dacit siat *eclipsis* na greine co follus. Et an buiden cedna ata a nA 7 a mB, dacit co follus an grian gan *eclipsis*, oir ata²⁴ an re robec a fecain²⁵ na greine.²⁵ Ni folaidinn²⁶ an grian orta 7 is uime sin ar a fad san on grein teit a radarc co hurusa don taib thuas don re dinnsaighi na greine.

25. LUNA NON UIDETUR PRIUSQUAM¹ ETCETERA. .i. Ni faicter an re co brach no co mbinn² se da ceim deg on grein oir³ ni liginn³ treisi tsoillsi na greine duinn a faicsin 7⁴ binn se da ceim deg on grein an tan foillsiter e laca rinne⁴ ar tosac 7 is annsin bis ar a primh .i. ar a ced solus, 7 teit an grian fai da lucht oircir an domain ar mbeth don re ar aen ceim deg uaithi, sul daciter e, an trat bis si ac soillsiugad da lucht iartair an domain co follus ar mbeth dan re ar da ceim deg no nis mo⁵ on grein. Et mar sin as tusca da cit lucht iartair an domain an re na lucht oircir den la amhain. Et mar sin an trat bis an re da ceim deg no tri deg no becan nis mo on grein as bec an cainndighacht⁵

23 B cuirfedh ; F cuirfid. 24 ZF om. 25-25 B om. 26 Z foill- se. 1 Z erit duodecimum gradum a sole add. 2 F mbia. 3-3 Z om. 4-4 ZF an trath bis se is annsin . . laim rinne he. 5 Z lia.



Chap. xxv.]

in which I will make a large circle, like the orbit of the sun, and will place the sun up at the top of it, and will make another circle inside that like the orbit of the moon, and place the moon itself up at the top of it in the straight line under the sun, and I will make the third circle inside that in the form of the earth and place the letter E in the centre of it and assume it to be the point in the earth whence men behold the sun, and put A in the east and B in the west of the sphere of the sun, and place the human sight in the straight line from E and from A and from B towards the sun. Therefore the people in E see the eclipse of the sun clearly, and the same company that are in A and B see the sun clearly without an eclipse because the moon is too small compared to the sun. It does not conceal the sun from them, and consequently on account of their distance from the sun their sight passes easily above the moon towards the sun.

25. LUNA NON VIDETUR PRIUSQUAM, ETCETERA. The moon is never visible, until it is twelve degrees from the sun, because the brightness of the light of the sun prevents us seeing it. And it is twelve degrees from the sun when it appears facing us in the beginning and then it is at its prime, *i.e.*, at its first light. And the sun sets in regard to the inhabitants of the east of the world when the moon is eleven degrees from it before it is seen, while to the inhabitants of the west of the world it is shining clearly, when the moon is twelve degrees or more from the sun. Therefore the inhabitants of the west of the world see the moon sooner than the inhabitants of the east by one day. Consequently when the moon is twelve or thirteen degrees from the

a faicter e. Et an trat bis o ocht ceiminna deg co tri ceiminnaib *fichet* on grein as annsin as mo a cainndighacht.⁶

¹Degsamlacht soluis an re 7 na nairdrinnach. A negsamlacht.¹

26. DICO QUD LUNA AC SIDERA ETCETERA.
.i. Aderim co faicter an re 7 na hairdreannaigh a nen uair 7 a nen aimsir co solus a crit² 7 co dorca a crith ele. Lucht na crite dachi iat co solus, as e, dabeir orra a faicsin .i. an aitchi³ da leth dibh annsan aimsir cedna. An la baines⁴ da lucht na crite ele gan a faicsin 7 ni he cinta an lae dabeir sin acht anmainne radairc na ndainedh.⁵ Et mar ⁶sin an cric an a foillsigter an grian, folaidter an re⁶ 7 na hairdrinnaigh risin fad sin uirre, 7 an trat folaidter hi as i foillsiges iat san; 7 mar sin bis an tene⁷ 7 gach ni solus ele, ach ge fada uait iat san aite⁸ is aibsec a solus 7 ge mad fogus duit sa lo iat as anaibsec a solus. Ma sedh ma sailt[er] let⁹ na haird[r]innaigh dfaicsin sa lo, imid mocrach no tratnona a poll dorcha domain 7 fec os da cinn 7 dacitfir iat a mullach na firmaminti os da cinn co follus et dacithfir iat an uair *eclipsis* na g[r]eine co follus.

Dagen anois cercall amail cercall na nairdrinnach ndaingean ina cuireabh imdenamh morain do na hairdrinnacaibh mora. Daghen speir ele don taib astigh di sin amail speir na greine, an a cuireb an grian fein 7 dagen dan taib astidh di sin speir ele amail speir an re in¹⁰ a cuirib an re fein a cinn an deichmad la *fichet* o thosach an mi.¹¹ Et daghen in cethramad speir don taib istigh dib sin 7 scribocad hi¹² na sentrom 7 A na hoirrcer 7 B na huachtar 7 C na hiartar 7 D na hictar; 7 na ceithre cercalla beca ata ar cercall na talman ceatra

6 Z caindicht.

1-1 Z om. 2 Z crich. 3 Z inn aighti. 4 Z beanus. 5 Z daine. 6 Z foillsigter an re. 7 Z tire. 8 Z aidhti. 9, 10 Z om. 11 Z mis. 12 Z .i.

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sun, or a little more, the visible size of it is small, and when it is from eighteen to twenty-three degrees from the sun then its size is greatest.

The characteristic of the light of the moon and of the constellations. Their characteristic (sic.).

26. DICO QUOD LUNA AC SIDERA, ETCETERA.

I declare that the moon and the stars appear at the same time and season, bright in one country, and dark in another. The reason why the people of one country see them with their light, is because the night is on their side at the same time. The daylight prevents the people of the other country from seeing them, yet it is not the daylight that causes that, but the weakness of men's sight. Thus the moon and the stars are concealed from the country in which the sun is visible during that period, and when it [the sun] is concealed, it renders them visible. And thus is fire and every other light-giving object; though they are far from you at night their light is prodigious and though they were near you in the day their light is not great. Then if you mean to see the stars by day, go in the morning or evening into a dark deep pit, and look up, and you will see them clearly over your head at the top of the firmament; also you will see them clearly at the time of an eclipse of the sun.

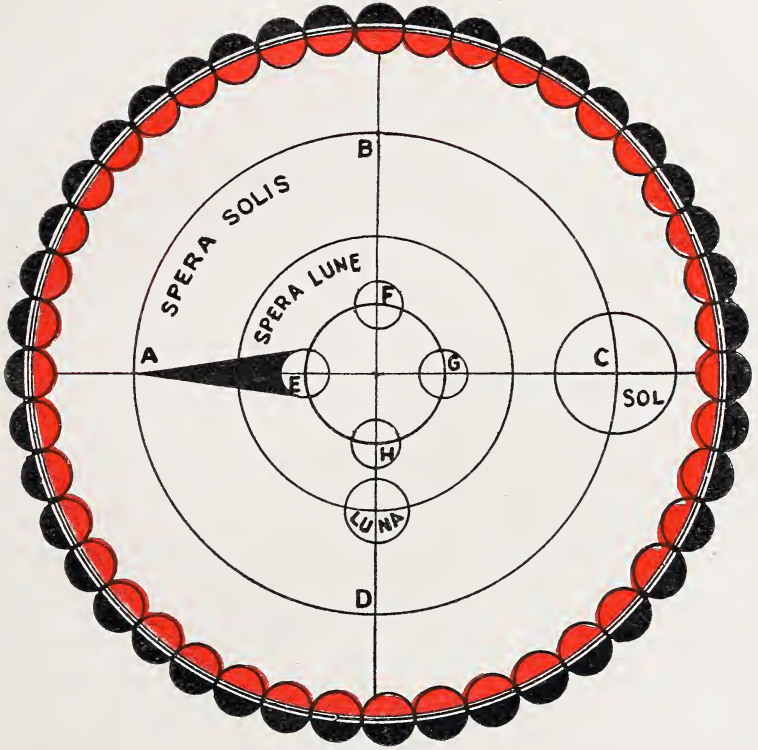
Now I will describe a circle for the orbit of the fixed stars in which I will place a diagram of many of the great stars. Inside of it I will make another sphere for the sphere of the sun, in which I will place the sun itself, and inside of that I will make another sphere for the sphere of the moon, in which I will place the moon itself at the end of the thirtieth day from the beginning of the month. I will make a fourth sphere within these, and write I in the centre of it, and A in the east of it, and B at the top of it, and C in the west of it, and D at the bottom of it, and let four cities be represented by

catracha *tuicter* asta 7 *ceatra* litreca foillsiges na ceithre catracha sin E an catair oirrcerach 7 F an catair uachtarach 7 B an catair iartarach 7 H an cathair ichtarach 7 mar sin an trat teit an grian fai, fagaidh¹³ a solus cathair F 7 tic tosach na haithi cuci 7 annsin as medon aiti a cathair E 7 dacit lucht na cathrac ele an uair sin na hairtrinnaidh lansolus 7 an re ag erghi thoir lethsolus;¹⁴ 7 an trat roites an re cathair H, bit a mullach na firmaminte an tan sin;¹⁴ 7 an trat eirghes an grian toir don cathair sin, ni fedaid lucht aitrebta na cathrac an re naid¹⁵ na hairdrinnaidh a faicsin. Et an trat roithes grian os cinn catrac G bith a mullach a *cercailli* 7 is annsin as medon lae ann 7 bith an re annsin sa let tiar don doman as cinn cathrac H 7 ni foillsigid na hairdrinnaid a solus fein¹⁶ da lucht catrac G.

27. CONSTAT QUOD QUATUOR SPERE LUNE ETCETERA. .i. *Cetra* cercailli¹ innsit na heolaid da beit ag an re; an ced cercall acu re nabur in speir mhor 7 le na roluas fein impoidh si le an² re en cuairt ris in la co naithe a timcill an domhain 7 dabeir air eirgi thoir 7 dul fai thiar annsa chuairt sin.

Et muna gluaisidh an speir mhor so an re en cuairt o oirrcir co hiartar an domain re³ la co naithi mar adobrumar dacitfi e gac nen la 7 gach nen aithi⁴ gan folach on taca⁵ da bedh se ar a prim thiar, ac dul sair tar eis a ceili no go mbedh se fo deredh a medhon na⁶ mis toir an oirrcir an domain. Et ar ndol fai annsin da bedh se ar na folach do lo 7 daithi⁷ no co neirgidh⁸ tiar ar a primh aris a tosac na mis ele. Ma sedh as e gluasacht na cercailli moiri

13 Z fagtar. 14-14 Z *om.* 15 Z na. 16 B *fol.* foillsigid. 1 Z cercalla. 2 Z leis in. 3 Z risin. 4 Z oidhti. 5 Z uair. 6 Z an. 7 Z doigehi. 8 Z eirghi.



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the four small circles on the orbit of the earth and four letters which mark these four cities; E the eastern city and F the upper one, and G the western city, and H the lower one; and thus when the sun sinks, its light leaves city F and the beginning of night approaches it, then it is midnight in the city E, and at that time the inhabitants of the other city behold the stars with their full light and the moon rising in the east half illuminated, and when the moon reaches city H it is then at the top of the firmament, and when the sun rises in the east of that city the inhabitants of the city cannot see the moon or the stars. When the sun arrives over city G, it is at the top of its orbit, and then it is mid-day and the moon is there in the western half of the world over city H, and the stars do not show their light to the inhabitants of city G.

27. CONSTAT QUOD QUATUOR SPHAERAE LUNAE, ETCETERA. The learned relate that the moon has four spheres. The first of them is called the "great sphere," and with its own excessive speed it carries the moon with it, making one revolution in a day and night around the world, and causes it to rise in the east and sink in the west in that course.

If this great sphere did not move the moon one course from the east of the world to the west in a day and a night, as I mentioned, the moon would be visible every day and every night without concealment from the time it would be at its prime in the west moving gradually eastward, until at last it would be in the middle of the month eastward, in the east of the world. At the setting then, it would be concealed by day and by night, until it would rise again in the west at its prime at the beginning of the next month. Thus the revolution of the great sphere I have mentioned, carries

noch adubrumar *beres* an re leis risan la co naithe⁹ o oirrcer co hiartar an domain; gidedh as o iartar co hoirrcer an domhain ata gluasacht direc an re fein 7 is follus¹⁰ gorab ed, oir¹⁰ an trat bis an re ar a primh tiar dacimid e gach nen aithe ag drut sair tar eis a celi no go mbi a noirrcer an domain 7 as e so gluasacht as nadurtha 7 is disli dho, oir as e so gluasacht na speiri a¹¹ fuil se¹² fein daingin, 7 in gluasact eli ut gluaises e¹³ o oirrcer co hiartar an domain risin la co naithi, ni fuil acht gluasacht ainneona^c minadurtha ann.

An dara speir ata ac an re darub comhainm speir cosmail re speir na comartad¹⁴ 7 an trat bis annsa speir so as follus e ac dul andsna comartaibh 7 astu, oir an trat teit dinnsaidhi na comartadh ndeiscertach as claeadh uata doni* 7 gidedh ni facan¹⁵ cursad speiri na comartad¹⁶ co brac.

An treas speir ata ac an re re nabur an speir sa sentrom ata let¹⁷ amuith da tsentrom na talman 7 is fogus¹³ cuid di son don talmain 7 as lan fada an cuid ele uaithe, 7 as ar in¹⁹ cuis sin bis in re annsa speir sin uair a fogus don talmain 7 uair ele a fad uadha²⁰ 7 is o iarthar co hoircer an domain ata gluasacht na speiri sin.†

Et is a corp na *speiri* sin ata speir bec eli darub ainm in speir impoides le anuas cum an re, 7 ata speir an re daingin dogluaisti annsa speir sin mar thairnge a clar. Et a[s] sair *gluaises*²¹ an speir beac so²¹ annsa speir so na fuil an re daingin 7 an trat roites an re mullach na speiri sin adobrumar, luathaigid se a cursa. Et an trat bis an a ichtar, mallaidh se an cursa cedna 7 in trat mallaides dani raed egin impoid²² tar a ais siar mar da nit na plaineid eli 7 gidedh ni follus an timpodh²³ sin

9 Z choidchi. 10-10 Z gorab e a oirrcer. 11 Z a na. 12, 13 Z om. 14 Z comaradha. 15 Z faghann. 16 Z comtari. 17 Z don taib. 18 Z follus. 19 Z om. 20 Z uaithe. 21-21 Z an speir sin. 22 Z impaighiti. 23 Z impo.

*The Irish translator skipped portion of the sentence, hence confusion in text. S. reads:—Cum ergo signa sunt septentrionalia declinat ad ea et quando signa sunt meridionalia descendit ad ea.

† About here F breaks off. This and preceding Chap. almost entirely illeg.

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the moon with it during the day and night, from the east of the world to the west, but the direct motion of the moon itself is from the west of the world to the east. It is clear that this is so, for when the moon is at its prime in the west, we see it every night moving gradually eastwards, until it arrives at the east of the world, and this is the motion that is most natural and appropriate to it, for this is the motion of the sphere in which it itself is fixed, while that other motion which moves it from the east to the west of the world in a day and a night is only a forced unnatural one.

The second sphere of the moon is called "the sphere like the sphere of the signs." When it is in this sphere it is visible going into the signs and out of them for when it advances towards the southern signs it swerves from them, yet it never leaves the course of the sphere of the signs.

The third sphere of the moon is called "the eccentric sphere," and portion of this is near the earth, and the other portion is very far distant from it, and on that account the moon in that sphere is at one time near the earth, and at another far from it; and the motion of that sphere is from the west to the east of the world.

In the body of that sphere is another small sphere, called "the sphere which revolves downwards to the moon,"¹ and the sphere of the moon is firm and immovable in that sphere like a nail in a board. This little sphere, which is within that sphere in which the moon is fixed, moves eastwards, and when the moon reaches the top of the aforementioned sphere, it accelerates its course; and when it is at the bottom of it, it relaxes the same course and when it relaxes, it performs something of a backward revolution westwards as the other planets do, although that revolution is not

¹ S. has simply—qui dicitur orbis revolutionis. Also the simile of the nail is not in S.

mar as follus impodh na *plained*. Oir an speir sa seantrum ata don taib amuith da tseantrom na talman, tri na roluathi fein ag impodh an re leis, ni liginn an timpod sin impodh an re tar a ais²⁴ dfaicsin.

Et dagen anois²⁵ fidair dfoillsiugad na ceithre speir sin.

¹Da *cercallaib* na greine.¹

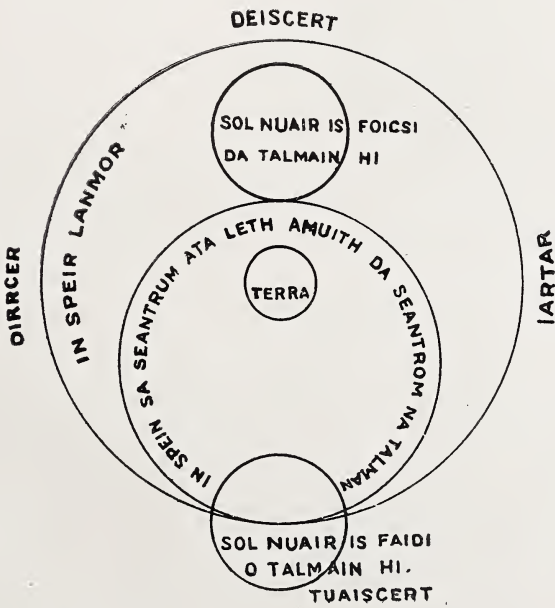
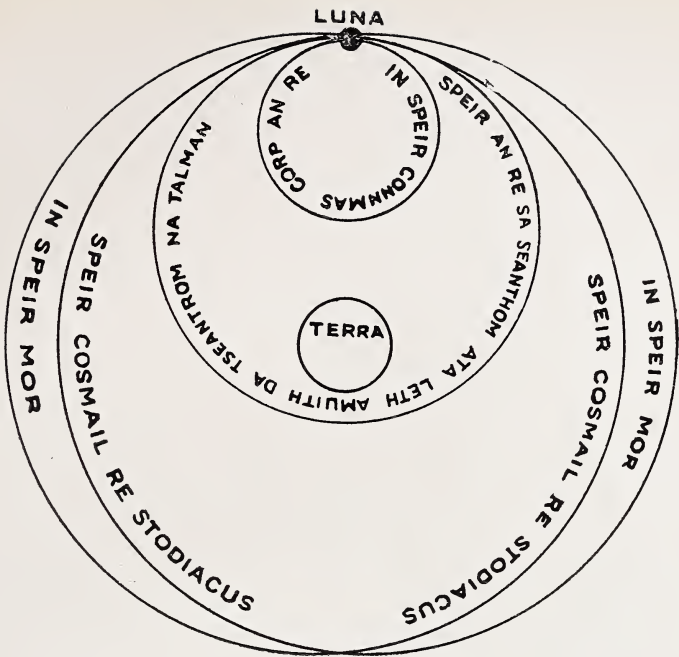
28. DICO QUOD SELI BINE SPERE ET-
CETERA. .i. Aderim gorab da speir ata ag an grein.

An ced speir acu da rer na speire lanmoiri gluaisies siar 7 fuadaiges le o² oirrcear co hiartar an domain. Et muna thoirmisceadh³ sibal na speiri sin an *grian* da beth si re se mhi ⁴diles fein⁴ ac dul o iartar co hoirclear an domain os cinn talman gan folach. Et da beith an comfad ele sin ac dul o oirclear an domain co hiartar gan faicsin 7 mar sin da beth leth na *bliadna* na hen⁵ la 7 in leth ele na⁶ aithe.

An dara speir ata ag an grein darub ainm an speir sa seantrum ata leth amuith da sheantrom na talman mar ata ag an re 7 o iartar co hoirclear an domain ata gluasacht na speiri sin 7 is fogus an speir so 7 in *grian* innte le celi ⁷da taib⁷ don talmain 7 is fada on⁸ taib ele. Et an trat bis an *grian* go focus don talmain annsa speir sin, loisgidh si⁹ deiscert na talman co mor co fuil an cric sin doaitribthe 7 in trat ¹⁰as faidi bhis¹⁰ o talmain annsa speir cedna¹¹ ni roithinn a tes cum an¹² talman 7 ata¹³ an mede sin da tuaiscert na talman doaitrebthi o imarcruidh fuachta.¹⁴

Dagen anois fidair da foillsiughadh mar atait an da cercall sin na greine na¹⁵ ceile.

24 Z tar ais. 25 Z om. 1-1, 2 Z om. 3 Z toirmisgi. 4-4 Z om. 5 B en. 6 Z hen add. 7-7 Z om. 8 Z don. 9 Z om. 10-10 Z bis an grein a fad o-. 11 Z ced speir. 12 Z na. 13 B om. 14 Z tre imad a fuardhachta. 15 Z ana.



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evident, as is the revolution of the planets. On account of the great swiftness of the eccentric sphere in turning the moon with it, that turning prevents the backward revolution of the moon being visible. Now I will make a figure showing those four spheres.

Concerning the spheres of the sun.

28. DICO QUOD SOLI BINAЕ SPHAERAE, ETCETERA. I declare that the sun has two spheres. The first in accordance with the very great sphere, which moves westwards, and advances from the east to the west of the world. If the motion of that sphere did not check the sun, it would be six full months journeying from the west to the east of the world above the earth without setting. It would be an equal length of time moving from the east to the west of the world invisible, and thus half of the year would be one day and the other half night.

The second sphere of the sun, called "the eccentric sphere," is like that of the moon. The motion of this sphere is from the west to the east of the world, and this sphere containing the sun within it is near the earth on one side, and distant from it on the other side. When the sun is near the earth in that sphere it parches the southern portion of the earth greatly, so that that land is uninhabitable; and when it is furthest from the earth in the same sphere, its heat does not reach the earth, and a corresponding portion of the northern part of the earth is uninhabitable from excessive cold.

Now I will make a figure to show how those two orbits of the sun are within each other.

¹Dordugad na deich speireadh.¹

29. SICUD DICIT PARTOLOMEUS.² .i. Mar³ adeir an feallsam sin⁴ da gne gluasachta dacimid is in firmamint .i. gluasacht acu o oirrcear co hiartar 7 in gluasacht eli o iartar co hoirrcear an domain. Et tic grian 7 esca 7 gach plained don cuiger⁵ ele le cainndigeacht⁶ leitne a speiri fein annsa gluasacht sair. An gluasacht siar, uero, fuadaid⁷ se na plaineid leis siar so contrardha a nagaid a ngluasachta nadurtha fein noch ata soir.

Et aderim aris gorab en gluasacht comtrom ata ac grein 7 ag esca 7 ag a cuigear eli 7 ac na hairdrinnacaibh daingne uile, oir ni fuil acu uili leth ar leath en relta as luaithi na [a]s mailli gluasacht⁸ na celi. Et is ime sin ni fuil deitfir⁹ is in doman idir gluasacht na greine no an re 7 gluasacht na retlann¹⁰ ele, oir is deimin gorab inann naduir 7 cruthugad¹¹ doib. Et ge daciter gorob¹² maille Saturnus nan re ar son na cuisinneasmaid aris,*¹³ as comtrom a ngluasacht.

Agus mar adeir¹³ Partholomeus 7 na feallsamain ele, deich speiri mora ata ann 7 is inann gluasacht don speir as mo dib sin re nabarthar an speir lanmor 7 do speir na comartad oir is¹⁴ siar gluaisid araen.

Gluasacht an ocht speire uero .i. speir na nairdrinnach ndaingin 7 na greine 7 an esca 7 cuigear ele¹⁵ o iartar co hoirrcear an domain ata, amail adubrumar co minic,¹⁵ 7 don taibh astigh da ceili ata suidiugad na speir sin 7 is i speir an re as faisci don talmain dib 7 speir Mercur annsein 7 Uenir 7 na greine don taibh amuith dib sin 7 speir Mars 7 speir Iubiter 7 Saduirn don taib amuit dib sin 7 speir na nairdrinnach ndaingin don taib amuith dib sin. Agus ni har son nach gluaisid siat aderur airdrinnaigh daingne¹⁶ riu, oir gluaisid o

1-1 Z om. 2 Z Dico ut dixit Tolomeus. 3 Z om. 4 B na add. 5 Z do na plainedaib. 6 Z caindicht. 7 Z fuaighi. 8 B gluaisis. 9 Z difir. 10 Z nairdrinnac. 11 Z cruth. 12 B gora. 13-13 Z gorob comtrom a ngluasacht amail adeir p—. 14 B a. 15-15 Z o iartar an domuin amail adubrumar. 16 Z daingin.

* Leg. anois? cf. chap. XXXIII., 13.

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Concerning the order of the ten spheres.

29. SICUT DICIT PTOLEMAEUS. As that philosopher says, we see two kinds of motion in the firmament—one motion from east to west and the other from west to east of the world. [The motion of] the sun, moon, and each of the other five planets corresponds to the extent of the amplitude of their own spheres in the eastward motion. The westward motion moreover carries the planets with it westwards in a contrary direction, in opposition to their natural motion which is eastward. I repeat that the sun, moon, and other five planets and all the fixed stars have the same equal motion, for of them all individually there is no star which moves more swiftly or more slowly than the other. Therefore, there is no difference in the world between the motion of the sun and moon, and the motion of the other stars, because it is certain that they have the same nature and form. Although Saturn appears to be slower than the moon in consequence of the reason I shall now relate, their motion is equal.

As Ptolemy and the other philosophers declare, there are ten large spheres, and the largest sphere of those, which is called the very great sphere, possesses the same motion as the sphere of the signs, since both move westward. The motion of the eight spheres moreover, *i.e.*, the sphere of the fixed stars and [that] of the sun and of the moon and of the other five planets, is from the west to the east of the world, as I have frequently remarked, and those spheres are situated within each other; and the sphere of the moon is the nearest to the earth, and then the spheres of Mercury and Venus respectively, and that of the sun outside those, and the spheres of Mars and Jupiter outside those, and the sphere of the fixed stars outside those. It is not because they do not move that they are called fixed stars, for

oirrcear co hiartar an domain mar danit na plaineid ele, ⁊ ni hedh, acht ar son nach claenaid siat o tuaiscert co deiscert na firmamintē mar danit siat sin. Speir na comartadh an naomad speir.¹⁷ Agus¹⁸ don taibh amuith dib sin leth ar leth ata an deichmad speir darub ainm an speir lanmor no¹⁹ an speir direch dainm ele. Agus as so amuit²⁰ fidair as a tuicter uile iad.²¹

Adubart²² tuas gorab luaithi an re da rer fechsana na Sadurn. Da mbeith an re a cercaill Saduirn da beth se deich mbliadna *fichet* ag sibal mar bis Sadurn. Et mar sin da siboladh Sadurn cercall an re, da mbeth ann²³ re ocht la *fichet* ⁊ re secht seachtmaine ach en la mar do ni fein. Et as mar sin as e cumhga an rotha bis acu sin ⁊ fairsinge an rotha ele dabeir co faicter na plaineid ata innta luath no amhluath ⁊ ni he co fuil siat mar sin, oir as cert inann curs[a] ⁊ naduir, luas ⁊ amluas doib. Et da ndearntaid²⁴ tri *fichit* ⁊ tri ced cuit comtrom co seantrum na talman da speir Saduirn ⁊ crut cruinn da cur ar gac en cuid acu sin do bo comhtrom gac cuit acu re speir an re. Et da mbeth speir an re lethan ⁊ nai nurdail *deg* ⁊ a da *fichet* ⁊ a tri *ced* urdail do chur na ceann fein ⁊ crut speiri da cur air sin uile, ni²⁵ mo na mar sin da beth comtrom re speir Saduirn. Et as mar sin derbtar gorab e cumgacht²⁶ ⁊ fairsinge cercall na planet dabeir sibal luath dfaicsin ac cuid acu ⁊ sibal amluath ac cuit ele gin co fuilit mar sin mar adubrumar co minic.

Et da scriob Tolomeus eisimplair follus dfoillsiugad an da gluasacht adubrumar tuas, o oirrcear co hiartar ⁊ o iartar co hoirrcear en domain. Da ritad²⁷ rotha o oirrcear co hiartar an domhain risin la co naiti²⁸ ⁊ co mbedh cercall bec a dimceall tseantro[i]m an rotha sin ⁊ cercall budh da comor ria²⁹ sin don taib amuith de ⁊ an

17, 18 Z om. 19 Z .i. 20 Z this. 21 B as a ticter an speir lanmor no an speir direac ⁊ na speiri uile. 22 B an dubert. 23 indtu. 24 Z ndeirntai. 25 Z bu add. 26 Z cumga. 27 Z raithed; B da rith add. 28 Z oidhti. 29 Z re.

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they move from the west of the world to the east, as do the other planets, but because they do not incline from the north of the firmament to the south, as do those others. The sphere of the signs is the ninth sphere, and outside those one and all is the tenth sphere called the "very great sphere," or by another name, "the straight (?) sphere," (*orbis rectus*). Here without is a figure which represents them all.

I said above that the moon appears swifter than Saturn. If the moon were in the orbit of Saturn, it would be thirty years travelling as Saturn travels. Similarly Saturn would traverse the orbit of the moon, if he were in it, in twenty-eight days,¹ and seven weeks less one day,¹ as it does itself. Thus it is the narrowness of the orbit they have, or the wideness of the other orbit (*sic*),² which causes the planets that are in them to appear swift or slow and not that they are really so, for they have exactly the same course and nature, swiftness and slowness. If the sphere of Saturn were divided into three hundred and sixty equal parts to the centre of the earth and if each of those parts were given a circular form, each part would be equal to the sphere of the moon. If the sphere of the moon was opened out so that three hundred and fifty-nine³ times as much were added to it, and the whole made into the shape of a sphere, none the less would it be equal to the sphere of Saturn. Thus it is proved that it is the narrowness and the wideness of the orbits of the planets that makes some of them appear to have a swift and some a slow movement, although as I have repeatedly stated, such is not the case.

Ptolemy gave a clear example to explain the two motions I mentioned above, from east to west and from west to east of the world. Imagine that a wheel revolved from the east of the world to the

¹⁻¹ Obviously an interpolation.

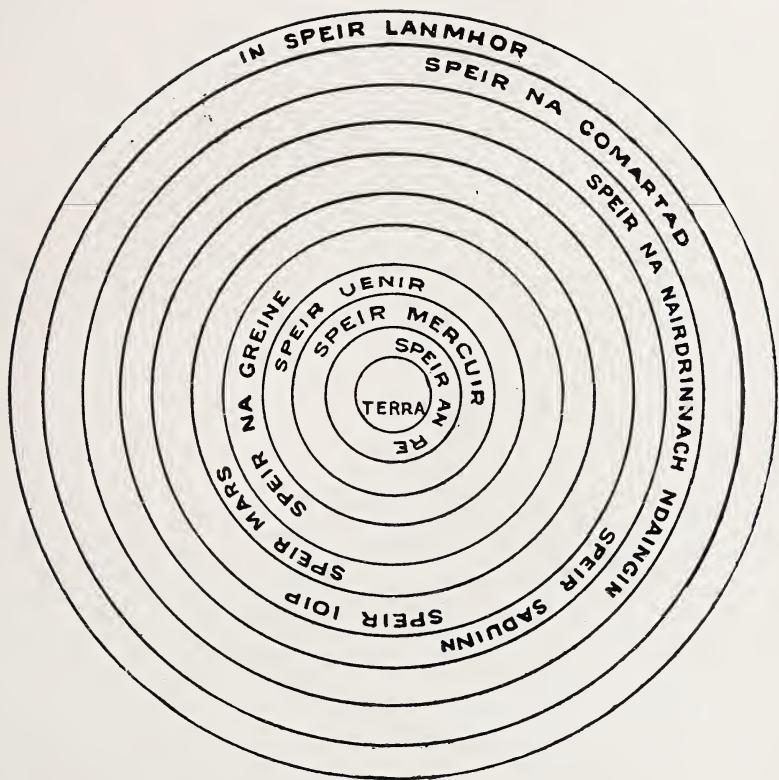
² *S. et illud quidem non est nisi per constrictionem orbis luno apud amplitudinem orbis Saturni.*

³ *S. tercentupla et sexagintupla.*

treas cercall leth amuith de sin u³⁰ tri mho nan ced cercall. An cethramad cercall don taib amuith de sin o cethri mo nan ced cercall 7 mar sin suas co nuic³¹ an ochtmad cercall 7 liatroid da bet in gac en cercall acu fa let ga gluasact o iartar co hoirrcear an domain, 7 is cosmail an rot so re³² speir lanmoir an domain 7 na cercalla beca sin adubrumar re cercallaib meadhonaca na speiri moire sin. Ma sedh an trat impoides an ced cercall a timceall ar tus, bith an dara cercall ar in dara cuit da timcill 7 in treas cercall ar in treas cuid 7 an cethramad cercall ar in cethramad 7 an cuigmad ar an cuigmad 7 in sesed ar in sesed 7 in sechtmad ar in sechtmad 7 in ochtmad ar in ochtmad. Et mar sin an trat darachadh an ochtmad cercall timcill uili, daracad an ced cercall re hocht cuartaib timcill. An fad da bedis na hocht cercalla so a coimhlinadh a cursa timcell as mor minic atarra sin dimpodh an roth³³ o oirrcear co hiartar an domain 7 da tinnscondais na hocht cercalla a sibal fein 7 da gerugad inntleachta an lectora do cuirimar an tsamail so sis.

30. SCIENDUM EST QUIA MACCIMA¹ SPERA ETCETERA. .i. Bith a fis agad gorab hi an speir romor a[s] speir direach ann 7 as mor da baramhlaib secranaca tugadar na haineolaid di,² oir adobradar ar son gorab i as airde 7 as oiredha 7 as luaith[i] do na speirib gorab hi tuismidhteoir an domain hi. Agus coimlinaidh si a cursa re la co naithi 7 atait tri *fichit* 7 tri ced cem Stodiacus³ innte fein 7 is na hagain so gluaisis speir na nairdrinnac ndaingin o iartar co oircer an domain 7 bit ag sibal en ceme deic ced bliadain. Et gach en speir da speirib na plained da rer a cumgachta⁴ 7 a fairsinga coimlinaid a cursa.

30 Z bud. 31 Z conuigi. 32 Z risin. 33 Z rota. 1 Z maxima. 2 B om. 3 Z Stodiaca. 4 Z cumuigi.



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west in a day and a night, and that there was a small circle around the centre of that wheel, and a circle twice as large outside it, and a third circle outside that three times as large as the first circle, the fourth circle outside of that four times larger than the first circle, and so on up to the eighth circle, each separate circle being a sphere, moving from the west of the world to the east. This wheel is like the very great sphere of the world and the small circles I mentioned are like the inner circles of that great sphere. Then, when the large first circle completes its first revolution the second circle is on the second part of its round, and the third circle on the third part, and the fourth circle on the fourth and the fifth on the fifth, and the sixth on the sixth, and the seventh on the seventh, and the eighth on the eighth. Thus when the eighth circle would have traversed its whole course the first circle would have made eight revolutions. Whilst those eight circles would be fulfilling their circular course, the wheel would revolve very frequently between those revolutions from the east to the west of the world and the eight circles would begin their own motion; and to enlighten the mind of the reader I have set down this diagram.

30. SCIENDUM EST QUIA MAXIMA SPHAERA, ETCETERA. Be it known unto you that the very great sphere is the straight sphere. Ill-informed persons have given many erroneous opinions concerning it, for they declared that, since it is the highest and loftiest and swiftest of the spheres, it is the origin of the universe. It completes its course in a day and a night, and contains in itself three hundred and sixty degrees of the Zodiac, and the sphere of the fixed stars moves in a contrary direction to this from the west of the world to the east, and it is a thousand years (sic)¹ moving over one degree. Each of the spheres of the planets completes its course according to its narrowness or wideness.

¹ S. in omnibus centum annis.

An speir lanmor cheana, ata gac aen taeba a timcill na speiredh eli, follamnaigid iat 7 dabeir orra impodh o oirrcer ho hiartar an domain 7 as i so cuis ag la 7 ag aithi,⁵ ac solus 7 ag dorcadus 7 ag examlacht na naimser⁶ ag earrac 7 ac samrad ac fodhmar 7 ac geimreadh.

Et don taibh astigh don speir so cumhdaigter 7 folamhnaiter 7 gluaister gach uili ni ar teithead co claechlighdis uair egin a stait no a suidheochan⁷ no a nordochan⁸ 7 is i so dani na plained co soimpaidtec 7 an talam co dogluasta, oir da mbeth an talam sogluasta ni coinneochadh la na aithi a cursa fein mar donit anois 7 ni derbochaighi⁹ cursa na plained 7 rotha na firmaminti mar doniter anois. Agus ni fuilit retlanna¹⁰ annsa speir sin. Agus adubradar na haineolaidh co fuil anam innti 7 gorab uaithi gabus gac uili ni anam.¹¹ Agus aderimsi gidh mor a cumachta¹² an gac uili ni da ndubrumar gorab o na tuismigteoir fein ghabus si na cumachta sin. Et da derbadh gorab edh ni feas ca hobair doni neach¹³ no co mbi tar eis a denmusa. Ma sedh o bis fis gac uili gnimha¹⁴ da tig on speir lanmoir againne sul doniter iat, as o nec eli doniter¹⁵ na gnimarta sin 7 ni huaiti fein.

31. SECUNDA SPERA POST MACSIMAM SPERAM ETCETERA. ¹Is i in dara¹ speir tar eis na speiri lanmoire 7 ²is foicse na hi don talmain Stodiace² .i. speir na comartadh 7 ata leis gan retlanna³ mar adubrumar an speir lanmor da beth, 7 gluaissidh⁴ o oirrcer co hiartar an domuin mar gluaisis si. Et da sailidar na harsanta gorab i so na nai speir ele 7 gorab cercall da cercallaib na speiri lanmoiri hi 7 scrisaidh Tolameus an baramail so a na lebar fein 7 adeir co ⁵fuair idir⁵ an speir lanmoir 7 Stodiacus na creasaib 7 na pollaib spas fada, oir fuair pol tuaiscertac Stodia[c] a

5 Z aeithi. 6 Z haimsire. 7 Z suigedh. 8 Z ordugadh. 9 B direoctaid. 10 Z retlanda. 11 Z ainm—e. 12 Z cursa. 13 Z om. 14 Z fis a denmusadh. 15 Z tigid. 1-1 B om. 2-2 Z is foicisi hi don talmain 7 Stodiace. 3 Z gac relta. 4 Z si add. 5-5 Z fuaradar.

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Moreover the very great sphere, which surrounds all the other spheres on every side, controls them and causes them to revolve from the east of the world to the west ; and this is the cause of night and day, light and darkness, and of the changes of the seasons, of spring and summer, autumn and winter.

Inside of this sphere everything is protected and controlled and set in motion, lest at any time they might change their state or position or order, and this is what causes the planets to revolve so easily while the earth is immovable. For, if the earth were movable, day or night could not preserve their own course, as they do now, and the course of the planets and spheres of the firmament could not be determined, as they now are. There are no stars in that sphere. The ill-informed have said that it has life and that everything receives life from it ; but I declare however great its powers over everything I have mentioned, that it receives these powers from its own creator. As a proof that it is so—it is not known what work anybody performs until it has taken effect. Then, since we know every action that is effected by the very great sphere before it has been performed, those actions are performed by some other being, and are not of itself.

31. SECUNDA SPHAERA POST MAXIMAM SPHAERAM ETCETERA. The Zodiac, *i.e.*, the sphere of the signs, is the second sphere after the very great sphere, and is nearer the earth than the latter, and [the Zodiac] is also without stars, as I mentioned that the very great sphere was, and it moves from the east to the west of the world like the latter. The ancients imagined that there are nine spheres in

ceitre ceiminnab *fichet* nis airde nan pol cedna ac an speir lanmoir. Et fuair pol deiscertac an Stodiace ceithre ceiminnab *fichet* eli fan pol cedna ag an speir lanmhoir. Et atait creasanna na speiri so ceithre ceiminnab *fichet* o celi a mullach na firmaminnti. Et as uime sin cuiris Tolameus deich *speireadha* ann ⁊ is don naomad speir labramaid an trat adermmaid grian no esca no plained ele da beit ⁶a ceim egin⁶ do comartaibh na speiri sin.

Et as i cuis fa ndobart na hanmanna so .i. Airgeis no Taubhrus, Leo etcetera, ar comartaib na Stodiace, ar son co tigid na hairdrinnaigh a speir na retlann ar comair⁷ na codac sin da⁸ Stodiace ar a mbi Airgei[s]⁹ no Tabhrus mar ainm, le cuma ⁊ le naduir na nainminntedh cedna againne annso, ⁊ gidedh ni fuil cruthugad¹⁰ is in doman a Stodiace, oir mar adubrumar, ni bi retla¹¹ ann.

Et darinneadar na feallsamain da chuid deg da Stodiace ⁊ adubradar comarta re gac cuit da rer anma ⁊ fdrach an raeda bis fai an comartha sin is in line direc a speir na retlann.¹² Et darinneadar mar sin da chuid deg don bliadhain da rer an da comarta deg sin na greine ⁊ adubradar mi re sibal na greine an gac comarta dib ⁊ do muinedar na feallsamain as [s]in examlacht na haimsiri da beth ann da rer sibail na greine o comarta co comartha ⁊ da rer a hardaithe ⁊ a hislithe, oir an trat tet grian annsa ced ponc dAirgeis tic exinocsium ann .i. comhtromacht lae ⁊ aithe¹³ ⁊ is annsin tinnscnus an terrach; ⁊ ni teit as no co mbi grian a nGemen ⁊ in trat teit grian a Cainnser as annsin as tosaic don tsamradh. Et ar mbeth di annsin a mullach a speiri thuas, teidhid an grian ¹⁴co mor¹⁴ agaid na talman ⁊ ar tiact di co ponc derinac Uirgo, cuiridh cric ar in samradh.

6-6 Z a ced comarta. 7 B comartha. 8 Z an. 9 Z Aries *et pass.* 10 Z cruth. 11 Z retlanna. 12 Z retland. 13 Z aidhti. 14-14 Z om.

¹S. Orbes omnes sunt novem. There is confusion in the Irish which, as it stands, gives no sense.

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all,¹ and that it [the Zodiac] is one of the orbits of the very great sphere. Ptolemy refutes this theory in his own book, and says that he found a great difference between the very great sphere and the Zodiac as regards its zones and poles, for he found the north pole in the Zodiac twenty-four degrees higher than the same pole in the very great sphere, and he found the south pole of the Zodiac another twenty-four degrees under the same pole in the very great sphere, and the zones of this sphere are twenty-four degrees from each other in the top of the firmament. Therefore Ptolemy establishes ten spheres, and we refer to the ninth sphere when we say that the sun, or moon, or other planet is in some degree of the signs of that sphere.

The reason that these names—Aries, Taurus, Leo, etc., are applied to the signs of the Zodiac is because the constellations in the sphere of the stars opposite that portion of the Zodiac which is called Aries or Taurus correspond in shape and nature to the same animals we have here [below]; but there is no figure at all in the Zodiac, because, as I have stated, there is no star in it.

The philosophers divided the Zodiac into twelve parts, and called each part a sign, according to the name or shape of the thing which is beneath that sign in the straight line in the sphere of the stars. Similarly, they divided the year into twelve parts according to those twelve signs of the sun, and called the course of the sun in each of the signs a "month"; and the philosophers taught that the change of season occurs according to the course of the sun from sign to sign, and according to elevation or depression, for when the sun enters the first point of Aries an equinox occurs, *i.e.*, equality of day and night, and then spring begins and does not depart until the sun is in Gemini; and when the sun enters Cancer, that is the beginning of summer. When it is there at the highest point of its sphere above, the sun heats the surface of the earth to a great extent, and when it arrives at the last point of Virgo, it brings the summer

Agus an trat teit co ponc derinnach Libra, bit an da[ra] exenocium¹⁵ ann 7 tinnsnaidh an fodhmar annsin 7 ní teit as no co mbi *grian* a ponc derinach Saigitarium.¹⁶ Et an trat bis a ponc deighinach Caipricornus tinnsnaidh an geimreadh 7 bith ann no co mbi aris a ponc deighinach Airgeis 7 tinnsnaidh annsin aris an terrach.

Et as i cuis *dabeir* co mbi geimread ann¹⁷ as fuaire na celi 7 geimreadh as *flichi* na ceili 7 geimridh as tirma na celi 7 samradh as teo 7 samradh as tirma na ceili ann .i. as i an *grian* doni earrach 7 samrad, fogmhar 7 geimredh 7 donit na *plaineid* ele na haimsera cedna. Agus an trat tic samradh na greine ann 7 bid na *plaineid* eli a comartha a ngeimrid fein, bit ¹⁸acmuinn mor fertana 7 fuachta¹⁸ is in tsamradh 7 an trat tic *geimread* na greine 7 bit na *plaineid* eli is na comarthaib foillsiges a¹⁹ samradh fein, bith gaeth 7 becan fertana 7 fuachta is in *geimread* sin co hairithe, 7 is mar sin do na haimseraibh eli 7 is i sin cuis ²⁰teas[a] 7 fuachta, tirmaigachta 7 *flicha*²⁰ ceithre naimser na bliadna .i. da rer imteachta na plained a comartaib an Stodiace mar dordaidh an tuismighteoir benaithi fein²¹ iat.

32. DICO QUOD SATURNUS PER CATUOR¹ ETCETERA. .i. Aderim mar atait ceithre glua[s]achta ag Sadurn co fuilit ceithre speiri aige a ngluaisinn se .i. an ced *gluasacht* dib, an speir lanmor o oirrcer co hiartar an domain. An dara *gluasacht*, a *gluasacht* nadurtha fein o iartar co hoirrcer an domhain. An treas *gluasacht* .i. *gluasacht* na speiri na fuil fein daingin 7 a siblaighinn co direc no tar a ais co luath no co hamluath. An cethramad *gluasacht* .i. *gluasacht* na speiri sa seantrom ata leth amuith da seantrom na talman 7 as ar in speir sin toctar *gac*² plained *gac* fad fedtar suas on talmain 7 *licter*³ sis gach foicsi fedtar don

15 Z *exenocium*. 16 Z do *thagitarium*. 17 Z *om*. 18-18 Z feartain 7 fuacht. 19 B an. 20-20 Z *teasigachta* 7 *fuardhachta* *flicha* 7 *tirme*. 21 Z *om*. 1 Z *quatuor*. 2 Z uile *add*. 3 Z *ligter*.

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to an end. When it arrives at the last point of Libra, the second equinox occurs, and then autumn begins and does not depart until the sun is at the last point of Sagitarius. When it is in the last point of Capricorn, winter begins and continues until it is in the last point of Aries again, and then the spring begins again.

The reason that one winter is colder than another, and a winter wetter than another, and a winter drier than another, and one summer hotter, and another drier than another, is because the sun is the cause of spring, summer, autumn, and winter, and the other planets cause the same seasons (sic).¹ When the summer of the sun occurs, and the other planets are in the sign of their own winter, there is a great deal of rain and cold in the summer; and when the winter of the sun occurs, and the other planets are in the signs which show their own summer, there is wind and little rain and cold in that winter especially. And similarly as regards the other seasons. The heat and cold, dryness and wetness of the four seasons of the year depend upon the movements of the planets in the signs of the Zodiac, as the Blessed Creator himself has ordained them.

32. DICO QUOD SATURNUS PER QUAT-
TUOR, ETCETERA. I declare, since Saturn
has four motions, that he has four spheres in
which he moves. The first motion [that of]
the very great sphere from the east of the world
to the west; the second motion, his own natural
motion from the west of the world to the east, the third
motion, the motion of the sphere in which he himself
is fixed, and in which he moves in a direct line, or back-
wards, swiftly or slowly; the fourth motion, the motion
of the eccentric sphere, and it is in that motion (lit. on
that sphere) every planet is raised as high as possible
from the earth, and is lowered as near as possible to

¹ S. Et nos non videmus planetas similiter.

talmain. Et is iat so na ceithre gluasachta ata ag na plainedaibh uili a negmus na greine ag a fuil da speir 7 da gluasacht.

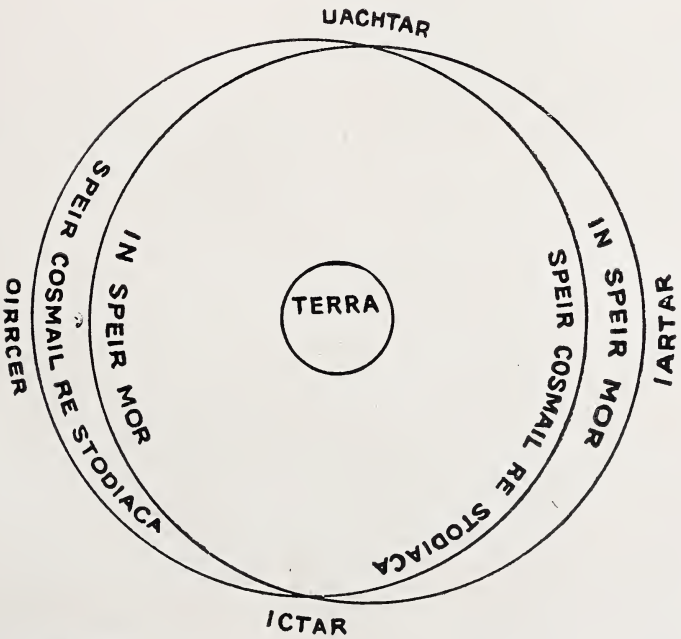
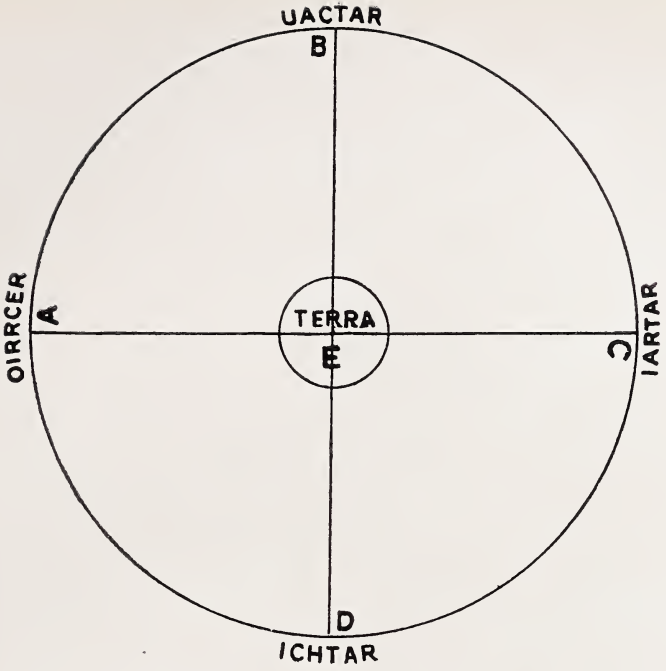
Et scribocad aris na ceithre speiri sin maille *re* na ngluasachtaib fein 7 dagen ar tosac fidair na speiri moiri 7 fidhair na talman ar a lar 7 cuirfed A na hoircher 7 B na huachtar 7 C na iartar 7 D na hichtar 7 is amlaid ata gluasacht na speiri moiri ó A co B 7 o B co C 7 o C go D 7 o D go h A.

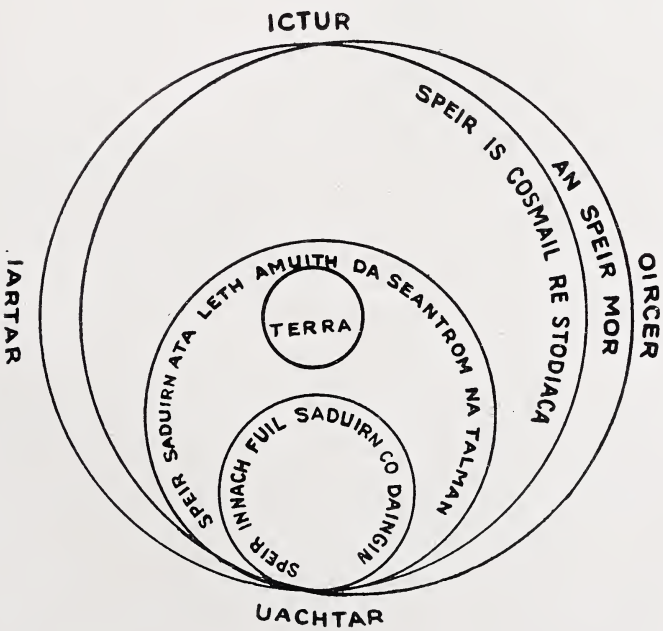
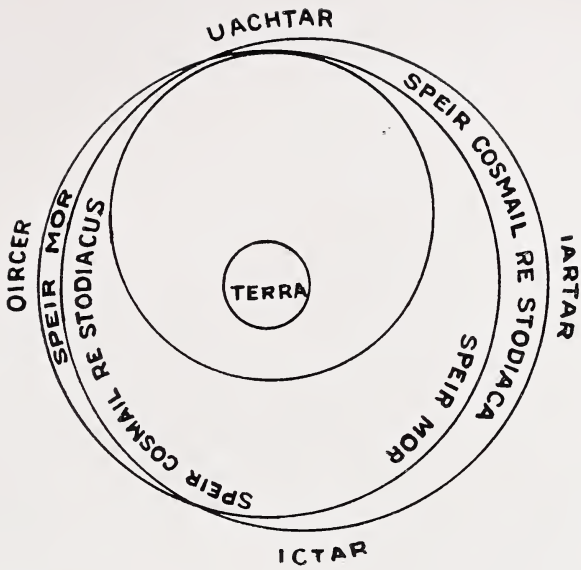
Et dagen fidair an dara speir noch gluaiseas o iarthur co hoirrcear an domain noch ata fan speir moir 7 ata sa line direach fan Stodiaca 7 is amlaidh ata Stodiaca gu claen 7 an speir lan mor go direach os ar cinn oir mar adubrumar as fada a poil 7 a ludrach o cheile.

Et dagen fidair an treas speir sa seantrum ata don taib amuit da tseantrom na talman don taibh astig don *da* speir roimhe 7 as e inadh a fuil seantrum na speiri so a ndeiscert seantrum na talman da ceim co leth da rer thomhais lethni na speiri 7 ata ar na roinn a fiche 7 a ced cuid, 7 ata an speir so a fogas don talmain da taibh de 7 a fad uada da taib ele.

Et dagen⁴ fidair an cethramad speir noch connmas corp an plaineid innti co dangin dan taib astid do na tri speirib ele. Et as amlaid ata seantrum na retlaine sin mar ata seantrum na speiri a na fuil⁵ 7 as amlaid gluaises o iartar co hoirrcear an domain 7 a mullach na speiri sa seantrum ata leat amuigh da seantrum na talman ata seantrum na plained sin mar tairngi daingin dogluaisti⁶ 7 a speir 7 ni cursa direach⁷ mar soigit ata ag na plainedaibh⁸ ac⁹ cursa cruinn nadurtha mar roth cartach a sibul o iartar co hoircear an domain. Agus da mbeth tairngi a lethimill uachtarach na cartac dagenadh sibal o iartar co hoircear an domain a dul sis cumh na talman ni gluaisfeadh siar na soir 7 in trat da roithfeadh an talam dogenad a cursa da

4 Z aris *add.* 5 B fuilid. 6 Z dosgailti. 7-7 Z 7 an cursa edain (?) 7 an speir direach. 8 B plained. 9 Z *om.*





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the earth; and these are the four motions that all the planets have, except the sun, which has two spheres and two motions.

I will again describe those four spheres together with their motions themselves; and first I will make a figure of the very great sphere, and the figure of the earth in the middle of it, and I will place A in the east of it and B at the top of it and C in the west of it and D at the bottom of it, and thus is the motion of the very great sphere from A to B, from B to C, from C to D, and from D to A.

I will make a figure of the second sphere, which moves from the west of the world to the east, and which is under the very great sphere, and in the straight line beneath the Zodiac; and the Zodiac is oblique, and the very great sphere above it is straight, because, as I mentioned, its poles and its pivot (?) are far apart.

I will make a figure of the third sphere, the eccentric sphere, inside the two preceding spheres. The centre of this sphere is south of the centre of the earth¹ (sic) by two and a half degrees, according to the measurement of the diameter of the sphere, and is divided into one hundred and twenty parts;² and this sphere is near the earth on one side, and distant from it on another.

I will make a figure of the fourth sphere which confines firmly the body of the planet within itself, inside of the other three spheres. The centre of that star forms the centre of that sphere in which it is, and it moves from the west to the east of the world; and at the top of the eccentric sphere is the centre of those planets like a firm immovable nail in a sphere. It is not a straight course like that of an arrow that the planets have, but a circular natural course like that of a cart-wheel, moving from the west of the world to the east, and if there was a nail in the upper rim of the cart [wheel] moving from the west of the world to the east, whilst the nail would move downwards towards the

¹ S. recedit a medio eius.

² An interpolation.

claenadh¹⁰ o oirc^{er} co hiartar¹¹ 7 in trat deireochad o talmain suas ni gluaisfedh siar no soir. Et mar da suigeadh¹² an mullach uachtarach da gluaisfed annsin soir.¹³ Et as i so an cuis dabeir ar na plainedaib sibal direc uair 7 sibal tar ais¹⁴ uair ele 7 sibal digair¹⁵ uair 7 sibal mall uair ele da genamh.

33. POSTQUAM SATURNE SPERUS MOTUS ETCETERA. .i. tar eis mar dinnsimar¹ speir 7 gluasacht Saduirn 7 na plained ele inneosamaid anois cinnus impoid tar ais, re nabur retrogradcio .i. caissimpodh .i. an trat impoides an planed tar a ais o Airgheis co Pisis.

Et da cur sin a ceill dagen fidair da speir Saduirn 7 cuirfed don taib amuith dib speir na comartadh 7 dagen da cuit deg di 7 tar eisi sin cuirfed dan taib astigh di speir Saduirn sa seantrum ata don taib amuith da seantrum na talman 7 cuirfed na mullach tuas an speir ana fuil corp an plaineid co daingin 7 cuirfed na diaigh sin an talam na inadh² fein³ 7 E ar a lar 7 cuirfed Sadurn a ceithre cercallaib⁴ beca a dimcill a cercaille fein. ⁵Et cuirfed an ced cercall da na cercallaibh beca sin a mullach a cercaill fein⁵ 7⁶ line trit idir Airgheis 7 Pisis. Et an dara cercall a ninadh a ced comhnaighe 7 B ar a lar. An treas cercall a ninadh an caisimpoidh 7 C ar a lar. An cethramad cercall a ninadh an dara comhnaighe 7 D ar a lar. Agus tarrongad tri line o⁷ seantrum na talman suas tri Sadurn⁷ co cosmailus na comartad ata a speir na nairdrinnach ndaingin. Et as iat na linedha⁸ sin radarc na sul o talmain suas dinnsaighi Saduirn 7 cuirfed an lin[e] as dirgha dib sin

10 Z coimlinadh. 11 B an domuin *add.* 12 Z do tuighfedh. 13 Z *om.* 14 Z siubal claen, B sibil—. 15 Z diair. 1 B dinnsaidhmar 2 Z hinad. 3 Z *om.* 4 Z speirib. 5-5 Z *om.* 6 Z tri *add.* 7-7 Z o tseantrum talman tri Shadurn suas. 8 Z linidh.

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earth, it would not move westwards or eastwards, and when it would reach the earth, it would incline its course from east to west; and when it would rise up from the earth it would not move westwards or eastwards, but when it would reach the extreme top, then it would move eastwards; and this is what causes the planets to perform a direct course at one time and a backward course at another, and a swift course at one time and a slow one at another.

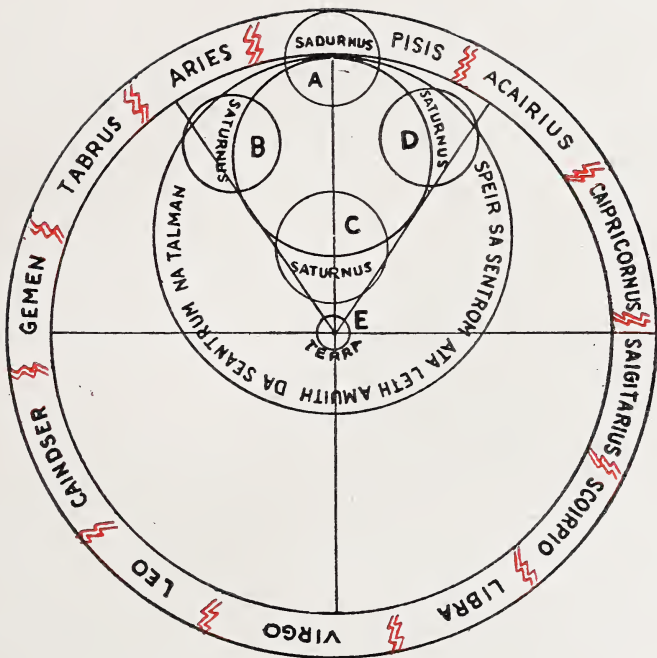
33. POSTQUAM SATURNI SPHAERA MOTUS, ETCETERA. Having spoken of the sphere and motion of Saturn and the other planets, I shall now tell how they turn backwards, which is called "retrogressio," *i.e.*, a back turning, *i.e.*, when the planet turns back from Aries to Piscis.

To explain that, I will make a figure of the two spheres of Saturn, and outside of them I will place the sphere of the signs and divide it into twelve parts, and then inside of it I will place the eccentric sphere of Saturn, and above at the top of it I will place the sphere in which the body of the planet is fixed, and then I will place the earth in its own position with E in the middle of it and Saturn in four small circles around its own circumference. I will place the first of those small circles at the top of its own circle and a line through it between Aries and Piscis; the second circle in the first stopping place, with B in the middle of it; the third circle in the place where it turns back, with C in the middle of it; the fourth circle in the second stopping place with D in the middle of it, and I will draw three lines from the centre of the earth up through Saturn to the figure of the signs which are in the sphere of the fixed stars. Those lines represent the sight of the eyes up from the earth towards Saturn, and I will draw the vertical line up

o talmáin suas dinnsaighi A, 7 is mar sin an trat bis Sadurn a ninad A a tosac Airgeis bith se annsa Stodiaca 7 soir co lan direach bis a sibal 7 ar sibal do mar sin sair a nAirgeis ceiminna airithi claenas [s]e co B 7 an trat tic annsin ní gluaisinn sair na siar 7 is ime sin as e sin a ced combnaighi; 7 an trat fagas an tinadh sin gluaisid siar co D 7 is e sin as inadh caisimpoid do; 7 as annsin bis *gluasacht* lan direach aigi o oirrcer co hiartar an domhain, 7 ac dul siar do an trat roites inadh C as e sin as inadh an dara comnaighi do oir ní gluaisinn annsin soir na siar. Et gibe neach dfeadh annsin o medon na talman suas dagebadh se annsin a Pisis an Sadurn da bi rôimhe an Airges 7 ar fagail⁹ D do thoir¹⁰ rachaid tar eis a ceili suas aris co hA. Et as i sin an chuis fa faicter na plaineid uair is mo na ceili iat, oir in trat donit caisimpodh chum na talman as ann as aibsigi daciter iat.

Et gach ní da ndubrumar ar speirib 7 ar gluasachtaibh 7 ar gach naduir ele da fuil ac Sadurn is coir na neice cedna do tuicsin ar Iubiter 7 ar Mars o nach fuil *deichfer* aturra na sibal ¹¹na na ngluasacht¹¹ na na ngnimartaibh. Et teagmaid na nethi cedna do na tri *plainedaibh* ata leath anis don grein gin co follus ar in re na neti sin tri roluas a speiri sa¹² seantrom ata leth amuith do seantrom na talman, oir in speir connmas¹³ in re co daingean as sair *ghluais* 7 an trat do ní an caisimpodh tar ais as siar *gluaise* 7 is ime sin nac follus an timpodh sin 7 gidedh is follus a sibul ele 7 a comnaighi, oir bith¹⁴ la ann a siblaiginn da ceim deg 7 la ele na¹⁵ siblaiginn ceithre *ceiminna* deg.

9 Z fagbail. 10 Z don taibh hoir. 11-11 Z om. 12 MSS. isin. 13 Z corp *add.* 14 Z bi. 15 Z ana.



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from the earth towards A, and thus when Saturn is in position A, it is in the beginning of Aries in the Zodiac, and its motion is eastwards full and direct, and when it has moved thus eastwards some degrees in Aries it inclines towards B, and when it arrives there it moves neither to the east nor west, and, therefore, that is its first halt, and when it departs from that position it moves back to D, and that is the place of its retrogression, and there it has a full direct motion from the east of the world to the west; and as it moves westwards, when it reaches position C, that is its second halting place, because there it moves neither to the east or the west. Whosoever would then look up from the middle of the earth he would find then in Piscis the same Saturn which was previously in Aries, and on its leaving D in the east it will mount by degrees again to A. That is the reason why the planets appear larger at one time than at another, because, as they make a retrogressive motion towards the earth, they appear at their largest.

All that I have said concerning spheres and motions and every other quality which Saturn possesses, ought to be understood with regard to Jupiter and Mars, since there is no difference between them in their course, or in their motion, or in their actions. The three planets that are above the sun experience the same things, although they are not evident from the moon on account of the excessive speed of its eccentric sphere, because the sphere which holds the moon firmly moves eastwards, and when it turns on its backward course it moves westwards, and, therefore, that revolution is not evident although its other course and its halting are evident, because one day it moves twelve degrees and another it moves fourteen degrees.

¹Da speir [na] nairdrinnach ndaingin:

34. HEC SPERO OCTAUO SITUATUR IN LOCO ETCETERA. .i. Ata in speir so ar na *suigiugad* san ochtmad inadh sa firmamint 7 ata ar na *cruthugad* da samlacus Airgeis 7 Tabrus² 7 Geimin 7 comarta³ eli Stodiace. Agus as amlaid *gluaisid* airdrinnaidh na speiri sin co cert comtrom 7 co comfada 7 go comhfogus da ceili is gac en aimsir tri bithu sir o iartar co hoirrcer an domain, oir ni bi luas na mailli na sibal direach na caisimpoth acu mar bis ac na retlannaib seacranacha. Agus bid⁴ ced *bliadhain* ac sibal en ceme⁵ da ceiminnaiB na speiri moiri.

35. AD HEC INDIGANDA GEOMITRICA SUNT. .i. Da lorgaireacht an adbuir so is egin¹ arrmainnte² geomitric dfagail da creidfeam³ co neamhcunntaburtach. Dagenum ma sedh⁴ fidair na talman 7 cuirfed E na seantrum 7 tarrongad cercall⁵ ele o na tuaiscert conuice a deiscert 7 tarrongad line direach o Pol Airtic co Pol Antairtic trit an talmain 7 tri cercall na talman 7 cuirfead A a mullach na fir[ma]minnti 7 B a pol tuaiscirt an *cercail*⁶ 7 C fai tis 7 D na pol deiscertach.⁷

Ma sedh gibe nec da beth a ninad E 7 dagebadh⁸ an astrolaib na laimh, oir⁹ is le sin dagebtar¹⁰ fis lan deimhin an raeda so, 7 da cuirfed a edan ar line medonac na hastralaibh 7 da coinnead hi ar snaithi o na ordoig sis 7 do fecfed Pol Airtic tri dha poll a da clar, *dagiaba*¹¹ se an pol sin comtrom risin talmain. Agus da siblaidh o E¹² se mili 7 tri *fichit* mile 7 da trian mili co B 7 an astrolaib da cur ar comuir¹³ Poil Airtic annsin 7 a fiachain triti mar do rinne roimhe, *dagiabtha*¹⁴ se ceim ar airdi

1-1, 2, Z *om.* 3 Z comtaradha. 4 Z bi. 5 B cene.
 1 Z duinn *add.* 2 Z ardomainti. 3 Z critfim. 4 Z ma sedh denum.
 5 Z cercalla. 6 Z na cercaille. 7 Z discirt. 8 Z dogebha 9 Z *om.*
 10 Z dogeabtar. 11 Z dogeaba. 12 B 7 *add.* 13 B ar comartha.
 14 Z dogeabta.

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Concerning the sphere of the fixed stars.

34. HAEC SPHAERA OCTAVO SITUATUR IN LOCO, ETCETERA. This sphere is situated at the eighth place in the firmament, and is formed after the pattern of Aries and Taurus and Gemini and the other signs of the Zodiac. The stars of that sphere move exactly, equally and equidistantly from each other at every season for ever and ever from the west of the world to the east, for they are not accelerated or retarded nor have they a direct course, nor a retrogressive motion like the wandering stars, and they spend a hundred years traversing one of the degrees of the great sphere.

35. AD HAEC INDICANDA GEOMETRICA SUNT. To pursue this study, it is necessary to obtain geometrical arguments, in which we can believe without doubting. I will make then a figure of the earth, and I will place E in the centre of it, and I will describe another circle from the north of it to the south, and draw a straight line from the Arctic Pole to the Antarctic Pole through the earth and through the orbit of the earth, and place A at the top of the firmament, and B in the north pole of the circle, and C down below, and D in the south pole.

Therefore, whosoever being in position E, should take the astrolabe in his hand (for with it will be obtained full certain knowledge of this matter), and placing his face along the middle line of the astrolabe which he holds suspended by a thread from his thumb, and beholding the Arctic Pole through the two holes of its two surfaces, would find that pole level with the earth; and if you travel three score six and two-thirds of a mile from E to B and then place the astrolabe opposite the Arctic Pole, and look through it as you did before, you would find it to be six degrees in height over the earth

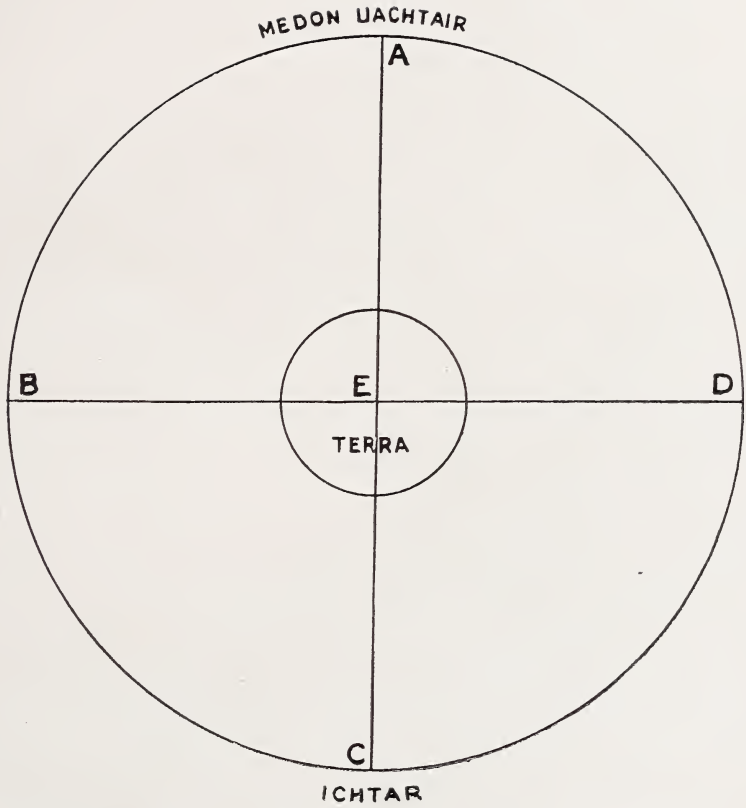
ann os cinn na talman 7 en ceim amhain do na tri *fichit* 7 do na tri ced ceim na hastrolaibh¹⁵ foillsiges a beith mar sin.

Et da [n]gluasir aris as sin dinnsaighe B, se mili 7 tri *fichit* mile ele 7 da trian mili 7 an astrolaib da cur ar comair¹⁶ in¹⁷ poil cedna 7 a fecain mar dorinne roimhe *dagiabad*¹⁸ se da ceim ann ar airdi os a cinn 7 mar sin co brach o E dinnsaighi B *dagiabadh*¹⁹ a cinn gach²⁰ se mili 7 tri *fichit* mili 7 da trian mili no co soitedh²¹ B, ceim ²²ag fas²² ar airdi ar in Pol cedna. Agus med na milted²³ sin uili ar en slighi, as edh donit siat da rer cainndigachta²⁴ na tri *fichit* 7 na tri ced ceim ata a dimcill speire na talman, ceithre mili *fichit* da miltib; as e sin tomus timcill o cercall an uisce 7 na talman. Et as *ed*, ata an alcoterra .i. a tighi cercailli na talman ocht mili do miltibh 7 is mar sin ²⁵is a ceithre mili do miltib²⁵ ata co sentrom na talman 7 is tri mili 7 *seachtadh*²⁶ is coir da gach *mili* acu sin da beth ann.

36. ANTIQUI LINEA AB ORIENTE AD OCCIDENTEM ETCETERA.¹ .i. Da smuaintigheadar na harsanta line dar lar² na talman co direach on a oircer conuig³ a iartar comtrom re line eccinoccialis⁴ 7 d'fagadar againne gorab comfada on line sin⁵ co Pol Airtic 7 uada co Pol Intartic.

Et is idir an line sin 7 Pol Airtic ata cuit daitrib⁶ na ndaine don talmain gin co soaitribthi⁷ an cuit sin uile de. Et on line cedna co Pol Antartic, ni fedann ainmide is in doman beth beo ann tri imarraid teasa. Oir os annsa speir sa seantrom ata leth amuith da seantrom na talman, imarcear⁸ corp na greine a timceall

15 B astrolaice. 16 B ar comartha. 17 Z *om*. 18, 19 Z dogeabha. 20 Z gaca. 21 Z roithed. 22-22 Z comfagas. 23 Z milteg. 24 Z candiachta. 25-25 Z is ag a cethair do miltaib. 26 B 7 *feth*. *Leg.* 7 s—*eth*. Z tri mile ar feth an fad is coir *etc*. 1 Z Antequi linea ab orienti ad occidentem. 2 Z a cert lar. 3 Z conuigi. 4 Z exonocialis. 5 Z sis. 6 Z daitreabuibh. 7 Z soaitreabhtha. 8 Z inmarcear.



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and one of the three hundred and sixty degrees of the astrolabe proves it to be thus.

Again, if you move another three score six and two-third miles from that towards B, and place the astrolabe opposite the same pole, and look as before, you will find two degrees in height overhead, and so on, always, from E to B, for every three score six and two-third miles until one would reach B, one would find the same pole increasing in height by one degree. The amount of all those miles put together in accordance with the amount of the three hundred and sixty degrees which are in the circumference of the sphere of the earth, make 24,000 miles, which is the circumference measurement, including the orbit of the water and of the land. And the *alkoterra*, *i.e.*, the diameter of the earth, is eight thousand miles, and, accordingly, it is four thousand miles to the centre of the earth, and for every mile of those [to the centre] there ought to be three and one-seventh miles [of circumference].

36. ANTIQVI LINEA AB ORIENTE AD OCCIDENTEM, ETCETERA. The ancients imagined a line through the middle of the earth directly from the east of it to the west co-incident with the equinoctial line, and they handed it down to us that that line is equidistant from the Arctic and the Antarctic Poles.

Between that line and the Arctic Pole is the habitable part of the earth, although that entire portion is not habitable. No living thing on earth can exist from the same line to the Antarctic Pole, on account of the excessive heat. Because, since it is in the eccentric sphere that the body of the sun is borne around the earth,

na talman ⁊ os don taibh sin⁹ ata claenad na speiri sin as egin gorab rotheo¹⁰ an taeb sin na gach taeb eli don talamh ⁊ as bec ar a mo an teas ata sa taib sin nan fuacht ata sa taibh eli ar a comhair. Et as ime sin, a ndeiredh na codac u¹¹ tuaigh don talmain, tre rofad¹² na greine uada, ni fuil en raed ach a¹³ lan da nelaib dorcha ⁊ da gaith¹⁴ ⁊ dfertain, da reodh ⁊ do shneachta ⁊ dfuacht mor. Agus is ime sin ata an tinad sin doaitrebtha, ⁊ an tinad cheana ata fa in¹⁵ line eccinoccialis measardha.

Et atait laeithe ⁊ aiteda¹⁶ na bliadna gus an en raed comfada re celi annsan inadh sin. Et as on line sin ata egecinoccialis¹⁷ conuic an crith tuaiscertaigh doaitrebtha¹⁸ ata an cuit fedtar datrebhadh don talmain. Darinneadar na harsanta seact codcanna¹⁹ don cuid sin ar²⁰ fad o oirrcer co hiartar na talman mar foillsiges an fidair so.²¹

²²Do nádair na crich sin.²²

Et as on line ata fai eccinoccialis tinnschnus an ced clima ar letead ⁊ ata ar fad mar adubrumar o oirrcer co hiartar an domain ⁊ ni teit an la ar fad tar²³ da uair deg ⁊ da drian uaire ²⁴go direach fa do sa bliadain²⁴ ⁊ ni bi nis girra na en uair deg²⁵ ⁊ treis mir uaire. Et bith an²⁶ grian ²⁷fa dho sa bliadhain²⁷ os cinn lucht na crice sin .i. an trat teit si o deiscert co tuaiscert na firmaminti ⁊ as sin co deiscert aris ⁊ mar sin bid da²⁸ samrad an en bliadain is in cric sin. Et ni claenann an²⁹ scaili co brach annsa cric sin on a tuaiscert conuic a deiscert.

Nadair an dara clima: dani imarcaig gainim³⁰ na crici sin co rothe hi fein, oir tet teas na grein[e] astec annsa ngainim ⁊ bruithid ⁊ doighidh aghaidh³¹ na talman ⁊ an trat tig gaeth mor ann cruinnigid an gaineamh ⁊ do-

9 Z sis. 10 Z teo. 11 B ud. 12 Z fad. 13 Z ach. 14 Z gaeith. 15, 18, 22-22, Z om. 16 Z oidheda. 17 Z ecinocialis. 19 Z cotanna. 20 Z a add. 21 Z this add. 23, 24-24, 25 B om. 26. 27-27, 31 Z om. 28 Z a. 29 B om. 30 Z imureraid gainme.

DEISCERT

OIRCEB

LEATH NA TALMAN DOAITRIBTA TRE IMARCRIDH TEASA

AN CED

CLIMA

AN II

CLIMA

AN III

CLIMA

AN IIII

CLIMA

AN V

CLIMA

AN VI

CLIMA

AN VII

CLIMA

IARTAR

TUAISCERT

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and since that sphere inclines towards that side, that side of the earth must necessarily be much hotter than any other, and the heat which is on that side scarcely exceeds the cold which is on the other side opposite it. Consequently, at the extreme northern portion of the earth, on account of the great distance of the sun from it, there is nothing but many dark clouds and much wind and rain, frost, snow and excessive cold. On that account that place is uninhabitable, and the part which is along the equinoctial line temperate.

The days and nights of the year are exactly of equal length in that place. The portion of the earth which is habitable extends from that line along the equinoctial as far as the uninhabitable district in the north. The ancients divided that portion into seven parts in all, from the east of the earth to the west, as this figure demonstrates.

Concerning the nature of those lands.

From the line along the equinoctial begins the first zone as regards latitude, and extends in longitude, as I mentioned, from the east of the world to the west. And the whole day does not exceed twelve hours and two-thirds exactly twice a year, and is not shorter than eleven hours and one-third. Twice in the year the sun passes over the inhabitants of that region, *i.e.*, when it moves from the south of the firmament to the north, and from thence to the south again; consequently, there are two summers in one year in that region. In that region, from north to south of it, the shadow never inclines.

The nature of the second zone.

The excessive amount of the sand of that region makes it too warm, because the heat of the sun penetrates the sand, and scorches and burns the surface of the earth; and when a high wind comes it collects the sand and

ni cnuic 7 sleibti dhe 7 uair ele, scailidh e. Agus³² daine duba re *nabarthar* fir gorma³³ 7 fuilt chasa acu lucht aitribthe³³ na crici sin. Agus ata acmainn mor oir annsa cric sin tre *imarcruid* teasa na greine ac bruith aithe³⁴ na talman. Agus ni³⁵ ha³⁶ fedanaib 7 a cuisleannaibh na talman dageibter an tor sin mar dageibter an tairgead 7 in sdan 7 na mitaill ele sin, acht ar a uachtar. Agus ni teit an la tar tri huairibh deg suas co brach na tar da uair deg sis annsa cric sin.

Naduir an treas clima : as ludha teasbac na cric sin na na crici roimhe oir ni bhi an grian is in line direach os a cinn co brac acht a solsticum in tsamraidh tamall gerr 7 is mesardha an cric sin na gach cric da ndubrumar. Et as amlaid ata lucht aitribthi³⁷ na crici sin 7 dath riabach 7 fuilt cassa 7 cuirp caela acu. Agus is gerr suas o talmain fasaid croinn na crice sin. Agus ni teit an la tar ceithre huairib deg suas 7 ni mo *thet* tar deich nuairib sis co brat annsa cric sin.

Naduir an cethramad clima : as mesardha coimplex na crici so na na cric³⁸ ele adubrumar, oir ni fuil imarcruidh³⁹ fuachta na teasa acu 7 atait acmainneach conaith fa crannaib examla 7 fa tortaib imda na talman 7 fedaid lucht aitribthe⁴⁰ na ced crici 7 in dara crich soaitrib⁴¹ ⁴²da dhenamh⁴² innte co nembraedlach. Et as amlaid atait lucht aitribthi⁴³ na crici sin a ndath buighe idir geal 7 riabac 7 atait inntleachtach somuinti 7 cuimhne fhada acu 7 eagna mor 7 is annsa cric so as lia⁴⁴ da bhi da lucht an iuil mhoir 7 na heagna 7 da lucht an *croide* mhoir⁴⁵ 7 arrachtus cuirp ; 7 is ferr blas uisce na crici sin na na cric ele. Et ni teit an la tar cuig uairib deg suas na tar naoi uairib sis co brach is in cric sin.

32 Z do ni *add.* 33-33 Z fuilt chasa bis ar lucht aitreabhtha. 34 Z aidhthi. 35 B *om.* 36 Z a. 37 Z aitribta. 38 Z criche. 39 Z imarcaidh. 40, 41 Z aitribh. 42-42 Z *om.* 43 Z aitriba. 44 Z liath 45 Z na croideda mor.

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forms hills and mountains from it and at another time scatters it. The inhabitants of that region are black people called "negroes," with curly hair. There is a great abundance of gold in that region, because the very great heat of the sun parches the surface of the earth. Not in the veins and hollows of the earth is the gold found, as are silver, tin and other metals, but on its surface. Day never exceeds thirteen hours, or is less than twelve hours in that region (*sic.*).

The nature of the third zone.

The heat of these regions is less than that of the previous one because the sun is never in a straight line above it except for a short time in the summer solstice, and that climate is more temperate than either of those I have mentioned. The inhabitants of that region are of a swarthy colour, with curly hair and slender bodies, and the trees of their country do not grow to any height, and day does not exceed fourteen hours, and neither is it ever less than ten hours in that region.

The nature of the fourth zone.

The climate of this region is more temperate than that of the other regions I have mentioned, because they have no excessive cold or heat, and they abound and are rich (?) in strange trees and many fruits of the earth, and the inhabitants of the first and second regions can dwell in it easily and without danger. The inhabitants of that region are of a yellow colour, between white and swarthy, they are intellectual and refined, with good memories and much wisdom; and in this country the greatest number of people of great knowledge and wisdom, generosity and physical strength have been. Also the water of that country tastes better than that of the others. Day never exceed fifteen hours, nor is less than nine hours, in that region.

Naduir an cuigmad clima .i. is ludha a teas 7 is mo a fuacht nan cric⁴⁶ sin roimpi 7 gidhedh as lia⁴⁷ a croinn 7 as fearr toradh a ngort. Agus is amlaid atait lucht aitribthi na crice sin 7 coirp mesardha acu, a ndath cumusca, as foicsi ⁴⁸da *geal* na da riabac⁴⁸, is ludha a negna 7 as girra a saedhal 7 is conaithi⁴⁹ iat na lucht na crici roimpi; 7 fasaidh an la co se huairib deg 7 bith ar dombisec co hocht nuairib annsa crit sin.

Naduir an seiseadh⁵⁰ clima: as ludha a teas 7 is mo a fuacht 7 is ludha torad a crann 7 a ngort tri mhed a fuachta na na cric⁵¹ roimpi 7 is imdha⁵² sneachta 7 fertain 7 neil 7 tobair⁵³ 7 srota 7 cnuic 7 slebti na crici sin. Et as amlaid ata lucht⁵⁴ na crice sin 7 cuirp anmanna acu, a nath *geal* 7 fuilt thslime 7 iat co bruidimail domuinti. Et atait secht nuaire deg is in la as faidi ⁵⁵sa cric sin⁵⁵ 7 ocht nuaire co leth sa lo as girra.

Naduir an sechtmad clima⁵⁶: easbaidh teasa 7 acmainn fuachta. Et as amlaid atait lucht aitribthi na crici sin indtleachtach⁵⁷ (!) domunta 7 ciall anmann 7 cumne bruidemail 7 cirp anmanna 7 fuilt findbuidhi tslime.⁵⁸ Agus da ndeachdais lucht aitribthi na crici so is in ced cric no sa dara cric no da ticdis lucht na crici sin innte so dagebdais bas leth ar leth tri *claechlod* an air.

Et as mar sin an cethramadh cric as mesarda 7 is ferr acu leth ar leth, oir ata mesaracht nimhe⁵⁹ ac oileamain na crici sin tar cach. Et ocht nuaire deg an la as faidi sa crith sin 7 se nuaire an la as girra.

46 Z na na cricha. 47 Z liath. 48-48 Z do geile na do riabhacht. 49 Z co—n—ti. 50 Z seiseadh (*in full*). 51 Z criche. 52 Z lia. 53 Z *om.* 54 Z aitrebhta *add.* 55-55 Z aca. 56 Z .i. *add.* 57 B. intritach (?) 58 B 7 fuil, finna 7 buidhi tslime. 59 Z nemda.

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The nature of the fifth zone.

Its heat is less, and its cold greater than that of the preceding region, and yet their trees are more numerous, and the fruit of their fields more excellent. The inhabitants of that country have medium-sized bodies, their complexion is neutral, nearer to white than to swarthy, their intelligence is inferior and their life shorter, and they are richer (?) than the people of the preceding climate. And day extends to sixteen hours, and diminishes to eight hours in that region.

The nature of the sixth zone.

Its heat is less and its cold greater than that of the preceding regions, and the produce of its trees and fields is less than that of the preceding regions, on account of its coldness, and great is the snow and rain, and (many are) the clouds, wells, rivers, hills and mountains of that region. The inhabitants of that region have weak bodies, are of fair complexion, with smooth hair, while they are savage and uncouth. The longest day of that region is of seventeen hours duration, and the shortest day eight and a half (*sic*).

The nature of the seventh zone is, lack of heat and excess of cold.

The inhabitants of that region are crafty (?) and uncouth, with weak minds and brutish memories, and weak bodies, and smooth, fair, yellow hair; and if the inhabitants of this region went to the first or second region, or if the inhabitants of those regions came to this one, both of them would die on account of the change of climate.

Therefore, the fourth region is the most temperate, and is the best of them, all things considered, for the mildness of the heavens nurtures that region beyond all. The longest day in that region [*i.e.*, the seventh] is eighteen hours, and the shortest six.

Do na hinadaibh a na fuil an bliadain uile na hen la 7 na hen aithe.

37. DUO IN TERRA LOCA ESSE NOUIMUS ETCETERA. .i. Da inadh ar aithnit duinn ar talmain .i. inadh acu is in line direach fa Pol Airtic, an dara hinadh is in line direc fa Pol Intairtic a na fuil an bliadain uili na hen la 7 na hen aithi¹ oir atait se mhi na henla 7 se mhi eli na hen aithi.² Et gibe neach dabeth a nderedh tuaiscirt na talman annsan inadh a mbet Pol Airtic .i. ludrac tuaiscirt na firmaminti annsa line direach os a cinn, dacithfedh se cercall an line diridh ata a cosmulas³ re cercall na comartadh⁴ na timceall 7 dacithfedh⁵ amlaid sin⁵ gluasacht na firmaminti mar gluasacht bron. Agus mar sin, an trat teit grian annsa line direach annsa ced cuit dAirgeis eirghidh⁶ si thoir fo talmain don inadh sin adubrumar 7 doni la do 7 tic na timceall mar broin 7 impoidh o oirrcer co deiscert 7 o deiscert co hiarthar 7 o iartar co tuaiscert 7 o tuaiscert aris co hoircear, 7 bith mar sin ac sirsibal timcill a nen ceime⁷ no co teit⁸ co Cainnser 7 as annsin bis annsa ceim sin as airidi a fedann si dul as cinn an inaidh sin 7 roinnidh si an la fada sin a nda chuit comtroma 7 bith⁹ as sin ag isliugad tar eis a ceili no co teit si a nderedh na hoidche¹⁰ 7 boinid annsin a solus don inadh adubrumar 7 bith la mar sin annsan inadh sin o medon mhís Marta co medon mis Seiptimpir.¹¹

Et an trat teit grian a ced¹² ponc Libra, tinnscaidh an aiche¹³ an tinad cedna do dhorcugad 7 bith an grian annsin ac sibal fa cuairt¹⁴ ¹⁵mar broin¹⁵ ag isliugad sis tar eis a ceili fo talmain no co ti annsa ced ponc da

1, 2, 10 Z oidhti. 3 Z ata cosmail. 4 Z comartada. 5-5 Z annsin. 6 Z a teid. 7 Z ceim. 8 Z co ti. 9 Z bi *et pass.* 11 Z mi Desimbir. 12, 15-15 Z *om.* 13 Z aidhthi 14 Z guairt.

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Concerning the places where the whole year is one day and one night.

37. DUO IN TERRA LOCA ESSE NOVIMUS, ETCETERA. We know two places on the earth, one in the straight line under the Arctic Pole, the other in the straight line under the Antarctic Pole, where the whole year is one day and one night, since six months are one day, and the other six months one night. Whosoever would be at the extreme north of the earth in the place where the Arctic Pole would be, *i.e.*, the pivot (?) of the north of the firmament in the straight line above him, would see the circle of the straight line which coincides with the circle of the signs around him, and thus would see the motion of the firmament like the motion of a quern; and thus when the sun enters the straight line in the first part of Aries, it rises in the east under the earth with reference to that place I mentioned, and causes day there, revolving around it like a quern, and turns from east to south and from south to west, and from west to north and from north again to the east, and [the sun] continues thus constantly revolving in the same degree until it arrives at Cancer. Then being in the highest degree it can possibly reach, over that place, it divides that long day into two equal parts, and from that gradually sinks until it comes to the end of the day, when it deprives the aforesaid place of its light. And thus there is day in that place, from the middle of the month of March until the middle of the month of September.

When the sun enters the first point of Libra, night begins to darken the same place, and the sun is then moving in a circuit, like a quern, sinking gradually underneath the earth, until he

Caipricornus ⁊ ni fedann isliugad tairis sin,¹⁶ annsin is medon¹⁷ dan aice¹⁸ moir sin. Et tinnsnaidh an grian eirgi an uair sin suas tar eis a celi as an inadh sin no co ted si annsa ced ponc dAirgeis ⁊ tinnsnaidh la annsin aris annsan inadh adubrumar. Et mar sin bith en aithi¹⁹ fhada annsan inadh sin o medon mi Septimpir co medon Mar[ta].

Et mar sin, gebe neach do beth a ndeiscert²⁰ na talman annsan inadh a mbeth Pol²¹ Antairticc .i. ludrach na firmaminte as a cinn co direach, dacithfedh cercall an line dhirigh ag impodh mar broin as a cinn; ⁊ in trat darachadh an grian sa line direach sa ced ponc da Libra, deireochadh si thoir fa²² talmain da neach da beth annsan inadh adubrumar ⁊ da thinnscaidh la do, ⁊ dimpodh timcill mar broin o oirrcear²³ co tuaiscert ⁊ o tuaiscert co hiartar ⁊ o iartar co deiscert ⁊ o deiscert co hoirrcear na firmaminte.

Et mar sin ni fanann ag sir dhul timcill gan dul fai don inad adubrumar no co tet si annsa ced ponc da Caipricornus ⁊ ar mbeth di annsa ponc sin as airdi a fedann dul don inadh sin doni da chuit don la fada sin ⁊ ni fanann ag isliug[ad] tar eis a ceili no co tet sa ponc deighinach do Pisis ⁊ cuirid dered ar in la annsin ⁊ bith an la sin ann o medon Seiptimpir co medhon Marta. Et annsin, an trat tet grian annsa ced ponc dAirgeis, tinnsnaidh an aithi²⁴ an tinadh sin adubrumar do dorcugad ⁊ bith an grian annsin ac dul timceall ⁊ ac isliugad tar eis a ceili fo talmain no co tet si annsa ced ponc do Cainnsir innus nach fedann si beth nis isli don inadh sin ⁊ as annsin as medon²⁵ dan aithe mhoir sin. Et ni fanann an grian ag erge aris tar eis a celi no co tet annsa ced ponc da Libra ⁊ tinnsnaidh an la fada cedna aris ⁊ bith an aithe adubrumar ann o medon Marta co medon Seiptimpir.

16 Z sis *add*; B tairsi sin. 17 B medonac. 18, 19 Z aidhthi.
20 MSS. tuaiscert. 21 Z *om*. 22 Z fon. 23 Z hiartar. 24 Z aidti.
25 B medonac.

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enters the first point of Capricorn; beyond that he cannot sink, and then occurs the middle of that great night. At that time the sun begins to rise gradually from that place, until it enters the first point of Aries, and day begins again in the place I mentioned. Consequently there is one long night in that place from the middle of September until the middle of March.

Similarly, whosoever would be in the south of the earth in the place where the Antarctic Pole would be, *i.e.*, the pivot (?) of the firmament directly overhead, would see the circle of the straight line turning like a quern overhead; and when the sun would enter the straight line in the first point of Libra, it would rise in the east under the earth with reference to a person who would be in the place that I mentioned, and day would begin with reference to him, and the sun would revolve like a quern from east to north, and from north to west, and from west to south, and from the south to the east of the firmament.

Thus, it continues ever revolving without sinking, with reference to the place I mentioned, until it enters the first point of Capricorn; and when it has arrived at that highest point it can reach, it divides that long day into two parts and continues gradually sinking until it enters the last point of Pisces; it brings the day to a close then, the day which lasts from the middle of September until the middle of March. Then, when the sun enters the first point of Aries, night begins to darken the aforementioned place and then the sun keeps revolving and sinking gradually under the earth, until it enters the first point of Cancer, so that it cannot be lower with reference to that place, and then occurs the middle of that great night. The sun continues rising by degrees until it enters the first point of Libra, and the same long day begins again; and the night I described lasts from the middle of March until the middle of September.

Do na gaethaib, cred iat 7 casa ticit siat.

38. ASSERUNT¹ ANTEQUI PHILOSOPHI ET-CETERA. Oir aderaid na feallsamain arsanta co fuil Eur^{us} te tirim 7 Zepherus² te fliuch 7 co fuil Boreas fuar tirim 7 Auster fuar fliuch. Et. aderaid blod do na dochturib nach mar sin at[a] Xepherus³ na Auster ach gorab fuar fliuch ata Xepherus³ 7 gor ab te fliuch Auster. Agus ni fedarsa an do naduir choitcinn⁴ na ngaeth na an da naduir na ngaeth a cricaib airifhe adubradar sin, oir daciaimaid examlacht na ngaeth a natarrach na cric oir ata Eur^{us} 7 Stepterus⁵ fliuch a cricaib ann 7 tirim a cricaib ele, gidh[edh] inneosadsa naduir choitceann⁶ deimin na ngaeth uile.

Oir an taer, ar na tegadh⁷ on grein, medaigter 7 letnaigter e 7 ataidh se 7 eirgid ceo dub dorcha as in fhairgi suas isin aer 7 doni nel de tuas 7 an trat boineas an ceo sin risin aer fuar tuas⁸ 9 cumgigter co prap asteac e⁹ 7 dabeir sin air siled 7 leagad¹⁰ 7 fertain da denamh dhe.¹¹ An trat ceana tecmas an ceo sin na fairgi thuas ar in aer te tirim fein 7 an taer a na celi 7 tocar¹² suas iat let ar let co hinadh an roigh no co flaitimnas¹³ an fuachta, 14 cumhgaidter annsin iat¹⁴ 7 bit annsin aer. 15 Is i¹⁵ naduir an aeir the 7 naduir¹⁶ an inaid fuair a contraracht ar a cele 7 ni fuilngid¹⁷ beth a nen inadh 7 is uime sin telgidh an tinadh an taer as 7 18 bith ga teilgin 7 ag rith¹⁸ o inadh co hinad¹⁹ a gluasacht an aeir 7 as e an gluasacht sin an aeir an gaeth, 7 gach med bis an tadb^{ur} as a tic an gluasacht as moidi an gaeth. Adhbur ele as a tic an gaeth²⁰ .i. an tan bis cath no troid ga tobairt ag imad na

1 Z dixerunt. 2 Z exipliris. 3 Z Stipteris. 4 Z ticsina. 5 Z Sditempirus. 6 Z ticsinac. 7 Z thsugad. 8 Z fuas. 9-9 B corpaidter 7 cumhdaidter asteach e na ceili. 10 B leagaid, Z leadhadh. 11, 15-15 Z om. 12 Z toctar. 13 Z flaitheamnas. 14-14 Z cumdigter 7 craidhtheair iad andsin. 16 \angle aris add. 17 Z fuilngedh. 18-18 Z tid ag raeth. 19 Z 7 add. 20 Z gluasacht.

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Concerning the winds; what they are, and whence they come.

38. ASSERUNT ANTIQUI PHILOSOPHI, ETCETERA. Although (lit. for) the old philosophers say that Eurus is warm and dry, and Zephyrus warm and wet, and that Boreas is cold and dry, and Auster cold and wet, some of the doctors declare that neither Zephyrus or Auster are so, but that Zephyrus is cold and wet, and Auster warm and wet; nor do I know whether they said so with reference to the general nature of the winds, or with reference to the nature of the winds in certain countries, since we perceive a difference in the winds in various countries, because Eurus and Zephyrus are wet in some countries, and dry in others; however, I shall relate the general certain nature of all the winds.

When the air has been heated by the sun it expands and becoming extended, dilates, and a black dark vapour rises from the sea up into the air and is converted into a cloud above, and, when that mist comes in contact with the cold air above it suddenly contracts, which causes it to flow and dissolve, and converts it into rain. Moreover, when that sea vapour and the air come in contact with each other above in the warm dry atmosphere, and both together are drawn up to the frost region or to the domain of cold, they there become contracted and remain in the atmosphere. It is the nature of the warm air and that of the cold region [to be] opposed to each other, and they do not endure to remain in the same place, and, consequently, the [cold] space drives out the air, and being continually expelled it runs from place to place setting the atmosphere in motion. That motion of the air is the wind, and the greater the cause whence the motion arises, the greater the wind. Another cause of wind: When a battle or conflict is being fought by large hosts and vast troops,

sluadh 7 ag imad na narm na ngluasacht, 7 seitfedhac na ndaine, 7 cuit acu ac tethedh 7 an cuit eli ga leanmain, rithid²¹ an taer seimh rompa 7 togaidh se gaeth.

Et mas ail let an ni sin adubrumar ar togail²² na gaithi is an aer fuar²³ tar eis a teidhti²⁴ da derbadh co follus, gab baisin cugad 7 cuir uisci an a mbed da orlac no tri ar doimhne 7 cuir soitec folamh gloine ann 7 lig doib mar sin ²⁵fedh na haithi co maidin a ninadh²⁵ fuar egin 7 dagebair²⁶ mocrac an soiteac sin lan daer calcaithi²⁷ fuar 7 impodh a bel fai san uisci sin ata sa baisin 7 cuir iat le celi an inadh egin re teas na greine²⁸ tar eis eirghi dhi, 7 in trat teidhfis an taer tiudh²⁹ sin³⁰ annsa gloine, fasaidh 7 ³¹attaidh 7 lethnaidh,³¹ 7 bidh ag iarraidh inaidh is mo 7 o nac fuil aigi inadh a rachad ach tri bel an tsoithidh sis annsan uisci, teit ³²fan uisci sin³² sis 7 togaid e suas co bel an baisin. Et daciter e mar sin mar lan mara ag fas tar eis a ceili no³³ co ndoirter e uair ann tar in mbaisin amach. Et as e sin foillsighes co fasann 7 co natann an taer da bi sa soiteac adubrumar. Et lig do mar sin aris no co ti an aithi ar cinn 7 mar imeocas tes³⁴ an lae 7 ticfas fuacht na haithi cruinneochaidh an fuacht sin ³⁵ an taer da bhi sa soitec cedna a na soitec fein³⁵ aris 7 calcochaidh e annsin 7 tuitfidh³⁶ an tuisci sin na inad fein aris.

Ma sedh o dani ³⁷an becan aeir sin³⁷ an fas mor sin, as derb gorab mor an fas doni an taer uile no³⁸ cuit de na speir fein.

21 Z raethid. 22 Z a togbail. 23 Z tirim *add.* 24 Z aithnithi. 25-25 Z oidhti a ninad. 26 Z dogeabtar. 27 Z calcaidhti. 28 Z re grein. 29 Z tiughaidh. 30, 32-32, 33 Z *om.* 31-31 Z lethnaigi 7 attaidh. 34 B trid. 35-35 Z an taer cedna asdeac in a soithech fein. 36 B tuitfedh. 37-37 Z becan an aeir. 38 B an *add.*

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with the movements and panting of the men, some of them fleeing and others in pursuit, the rarefied air flies before them, and raises wind.

If you wish to prove clearly this aforementioned matter concerning the rising of the wind into the cold air after it has been heated, take a basin and put water into it to a depth of two or three inches, and place an empty glass vessel in it, and leave them there during the night until morning in some cool place; and in the morning you will find that vessel full of cold condensed air. Turn it mouth downwards in the water which is in the basin, and place them both in some place exposed to the heat of the sun, when it has risen; and when the condensed air in the glass becomes heated, it expands and dilates, and spreads and seeks a larger space, and since it has no way of escape except through the mouth of the vessel down into the water, it goes down into the water, and lifts it up to the mouth of the basin. It appears then like the full tide, gradually growing until, sometimes, it overflows the basin. It is that which proves that the air which was in the aforesaid vessel expands and dilates. Leave it so again until the following night, and as the heat of the day departs, and the cold of the night comes, that cold will collect the air that was in the same vessel into its own vessel again, and will condense it there and the water will fall into its own place again. Thus, since that small quantity of air becomes so much dilated, it is certain that the whole atmosphere becomes greatly dilated or portion of it in its own sphere¹ (?).

¹ S. Quomodo ergo aer implens mundum et qui implet orisantas.

¹Do na nelaibh, don toirnidh 7 don fertain 7 do na soidnenaibh.¹

39. ²SOL MARIA 7 FLUMINA TERRA USQUE LOCA² ETCETERA. Togaid an grian as an fairgi 7 as na srotaibh 7 as na hinadaibh *fliucha* eli dethaidhi 7 ceo nach fedtar dfaicsin tre³ na seimhe, acht mocrac no tratnona 7 an trat tocar⁴ suas iat annsan aer the⁵ scailter 7 lethnaidter 7 cumuscter iat ar fud an aeir sin oir as inann naduir doibh. An trat ceana tocar⁶ suas annsan aer *fuar* iat, dluthaiter 7 cumgigter⁷ asteac na celi iat 7 doni nel dib 7 mar as naduir do na netib *cosmaile* a ceili dinnsaighe, mar tiadaid na srota isin⁸ fairgi, tiagaid na neil as lugha acu sin, ⁹oir is edroma iad⁹ 7 is usa leo gluasacht dinnsaige na nel is mo, 7 doni en motar mor dorcha dibh 7 bith ainsein tre¹⁰ naduir te da beth aigi 7 in taer fuar na timcill a contraracht 7 ag imrascail¹¹ re ceili.

Et an trat as treise don air 7 claides an nel ceanglaid 7 calcaidh a buird don taib amuith 7 doni sneachta dhe. Et mar isn an trat bis an teasbach¹² astigh annsa nel ar na timcullad amuith ag an fuacht 7 a nel ar sicc 7 ar cruadugad na thimeill, [da] siredh da rer a nadur [a], inad ina fasfadh 7 ana natfadh¹³ 7 an* lethnocadh 7 o nac liginn a nel daingin do an toibriugad sin da deanamh crothaid e¹⁴ co cumhachtach 7 brisid 7 teid fodhair mor aduatmar as an mbrisidh sin re nabarthar toirrnec 7 le treisi na *brigi* le ndentar an brisidh sin¹⁵ teit soidhnein 7 teinntec as in mbrisidh sin 7 tuitidh as in mbrisidh sin minrainn beca an neil sin ar mbrisidh 7 ac bualad fa ceile. Ac teacht anuas minbrisidh¹⁶ fein a ceili aris 7 mar roitid an chuit is foicsi don talmain don aer bainid teas

1-1 Z *om.* 2-2 Z Sol in mare flumina terre usque loco. 3 Z re. 4, 6 Z toctar. 5 Z tes—i. 7 B cumscaidter. 8 B sin. 9-9 B an taer 7 na neil. 10 B tree. 11 Z imrusgbail. 12 Z teas. 13 Z nanfadh. 14 Z croth—de, B crotaithe. 15 B 7 *add.* 16 B minbrisidh.

* *Sic* MSS.

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Concerning the clouds, thunder, rain and lightning.

39. SOL [CURRIT SUPER] MARIA ET FLUMINA ET LOCA, ETCETERA. The sun draws from the sea and from rivers and other wet places, vapours and mists which, owing to their thinness, are invisible except in the morning and evening, and when they are drawn up into the hot air, they are scattered and spread and mingled with the air, since they are of the same nature. On the other hand, when they are drawn up into the cold air, they become compressed and contracted within themselves and they are converted into clouds, and since it is the nature of like things to approach each other, as the rivers enter the sea, so do the lesser of these clouds approach the larger clouds since they are lighter and can move more readily. And they become one large dark mass, and since that mass is warm by nature, and the cold air surrounds it, they are opposed, and contend with each other.

When the air is the stronger, and overcomes the cloud, it binds and condenses the edges without, and converts it into snow. Consequently, when the heat is inside in the cloud, and it is surrounded by the cold without, with the cloud freezing and hardening around it, it would seek, according to its nature, a place where it could extend and dilate and spread; and since the dense cloud does not suffer it to do so, the heat shakes it powerfully, and it (the cloud) breaks, and a great and terrible sound, called thunder, results from that breaking, and with the strength of the force by which that rupture is caused, thunder-bolts and lightning result from that rupture, and small fragments of that cloud fall, striking and breaking against each other. As they descend, they break each other again into small pieces, and when they come in con-

an inaidh sin a cnapain¹⁷ corra dib 7 doni cruinn iat 7 titidh na clocha sneachta 7 is iat na minbainnedha¹⁸ beca ferthana bis trit an sneachta an chuid sin bointer de ar leaghadh.¹⁹

Agus gac med bis an *teas* sin adubrumar 7 in fuacht as moidi an contraracht bis atorra 7 mar medaidter an contraracht medaigter an toirneac 7 an teinntec tic uadha. Et an cuit nach tic don nel sin cum²⁰ talman lethnaigi se ar fud an aeir 7 doni teinnteach dhe. Et an cuit don teinntidh tic chum na talman scoiltidh si cnuic 7 sleibti 7 tollaidh an talam 7 marbaidh daine 7 ellach.

Agus da derbad gorab on contraracht adubrumar tic an toirnea[c] da cuiridar²¹ na feallsamain a eisimplair²² air sin,²² on an trat curtar duilleog²³ glas ar teinid,²⁴ suil loiscter i ar mbuain an tesa re, brister hi maille *re* fogar. Et mar sin an trat curtar iarann *derg* a nuisci, bainid contraracht an da ni sin fodhar lan mor astu. Ma sedh o dani contraracht na corp mbec an fodar so, is mor an fodar as coir do na corpaib mora da denamh.

Et is lia toirneac 7 teinnteach 7 soighnein isin earracht²⁵ isin fogmar na²⁶ is na haimseraib ele oir as idir an samrad te 7 an geimredh fuar atait an da aimsir²⁷ sin. Et na neil togas seididh na gaeithe don talmain suas is in aer ata *fuar fliuch* cael seimh gan *teas* gan tirmaigeacht ach an med bis is [na] nelaib sin fein, ni fuil contraracht acu.

Et dealaid²⁸ an chuit trom bhis is na nelaib sin²⁹ reodh na²⁹ mbainnedhaib 7 do ni fertain de. Et an trat teagmhas an nel sin ar in aer te, tanaidh³⁰ se e 7 doni aer dhe aris³¹ 7 tre asaenta contrarachta *teasa* 7 *fuachta*, *tirme* 7 *fliche* an aeir sin doni nel mora duba dhe 7 doni fertain mor do na nelaib sin 7 duairib ann doni baineda mora fertana 7 cloit sneachta reamra³² don adbur cedna 7 is annsan earrac 7 annsa fodhmar as minca bid siat; 7 an

17 Z 7 a *add.* 18 B minbainnedh. 19 Z ledha. 20 Z na *add.* 21 B credadar. 22-22 Z sis. 23 Z duillibar. 24 Z tine. 25 Z na. 26 Z 7. 27 Z contrara *add.* 28-28 B dealaiter; Z deal—. 29-29 Z re a . . . (*blot*) n; *leg*, *reo*? 30 Z tanaigin. 31 Z *om.* 32 Z ramar.

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tact with the part of the atmosphere nearest the earth the heat of that place deprives them of their knobby points, and renders them spherical, and the hailstones fall, and the small drops of rain that mingle with the snow come from the part which it loses as it melts. The greater the aforementioned heat and cold, the greater the opposition between them, and as the opposition is increased, the thunder and lightning which results from them is increased. The part of the cloud which does not fall to the earth spreads throughout the atmosphere, and is converted into lightning. The part of the lightning which comes to earth splits hills and mountains, and penetrating the earth, kills men and cattle.

As a proof that thunder results from the contrariety I mentioned, the philosophers have cited an example: when a green leaf is put upon fire, before it burns, when the heat comes in contact with it, it breaks with a sound. In the same way when red [hot] iron is put into water, the contrariety of these two things draws a tremendous noise from them. Then since the contrariety of small bodies produces this noise, large bodies ought to produce a great noise.

There are more thunder, lightning and thunderbolts in spring and autumn, than in the other seasons, because these two seasons occur between the warm summer and the cold winter. The clouds which the blowing of the wind draws up from the earth into the cold, wet, thin attenuated air, without heat or dryness, except what is contained in the clouds themselves, possess no contrariety.

The heavy part which is contained in those clouds separates from them in drops, and is converted into rain, and when the cloud meets the warm air, it (the air) rarefies it and converts it back into air, and through the disagreement due to the contrariety of the heat and cold, dryness and wetness of that air, it is changed into large black clouds, and those black clouds are changed into heavy rain; and sometimes the same substance is converted into large drops of rain and great hailstones, which occur most frequently in spring and autumn, and when they occur in the summer,

trat bit isin tamrad, tri mhed na contrarachta sin adobrumar da beth isin aimsir sin tar na haimseraib ele, as ann is mo an doinnn. Et an trat teagmas gaeth mor re linn na don[i]nne sin ann, casaidh si na neoil³³ a na celi tuas is in aer 7 ceanglaidh iat 7 cuiridh cumtha examhla orra 7 sailid na haineolaidh gorab dreagana³⁴ iat 7 dacimaid an casad cedna ag a thobairt ag an ghaith ar luaitridh na talman.

Agus gidh a nen taib doniter an toirneach 7 an teinnteach as tusca daciter an teinntec na cluinter an toirneach. Agus as i cuis dabeir sin, oir daci an radharc ar en tslighe an raed ata a fogas do 7 an raed ata a fad uadha, mar nach tusca daci se an talam na³⁵ na reltanna is faidi uadha a firmamint. Et ni mar sin don esteacht, oir is tusca dacluinn an fogar as foisci do nan fogar as faidi uadha, 7 da cur sin a ceill do tsamladar na doctuire cedfaidh an eisteachta re broin, oir da mbeith cluas a poll na bron da c[luinfe]d* gan deitfir gach ni do bedh a fad uaithi a fogus [di, o]ir* is amlaid ata cedfaid na cluaisi na haer noch ata na corp chael tseim tsogluaisti 7 is mo 7 is seime 7 is luaithi a gluasacht na gluasacht an uisci.

Et an trat donit brisead egin no bualad no fodhar ele is in aer, an taer as foicse don fodhar sin, gluaisidh se an fodar uadha dinnsaighe ³⁶na codac ele don aer 7 mar sin tar eis a ceile idir randaib in aer no co tet an fodhar fa deoigh³⁶ annsa cluais 7 on cluais conuic an inchinn noch brethnaiges idir an fogar is mo 7 in fodar is luga 7 idir an fodhar a[s] seime 7 an fodar as reimhe.

Et da tsamladar ar in nos cedna cedfaidh na sul³⁷ re stoc ³⁸noch ga³⁸ fuil ceann cumhang 7 gac fad³⁹ teit amach on ceann³⁹ sin as fairsingiugad doni 7 is mar sin teit radarc na sul tri fedan fethach on incind cu mic imrisan

33 Z neil. 34 Z dreagain. 35 Z naid. 36-36 B na codac ele as foicse do dan (sic) fo aer 7 gluaisidh an cuitt sin an foghar cedna dinnsaighe na codach eli don aer 7 mar tsuiter e as a ceili idir nelaib in aer no co tet fa deoigh. 37 Z an radaire. 38-38 Z aga. 39-39 Z amach ted on ceann *MS torn.

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on account of that season possessing so much of the contrariety I mentioned, compared to the other seasons, the tempest is greater then. When a great wind accompanies that tempest, it gathers the clouds together up in the sky, and binds them, and makes them assume different shapes, and ill-informed people think that they are dragons. We perceive the dust of the earth being whirled around by the wind in the same way.

Although the thunder and lightning are produced simultaneously, the lightning is seen before the thunder is heard. The reason of that is that the eye sees what is near it and what is distant from it in the same way, for it does not perceive the earth any sooner than it does the stars that are most distant from it in the firmament. That is not the case with the hearing, for one hears the sound that is near sooner than the sound which is distant; and in explaining that, the doctors compared the sense of hearing to a quern, for if there were an ear in the opening of the quern, it would hear everything near to it and distant from it indiscriminately, because the sense of the ear is like air, which is a thin, rarefied movable body, the motion of which is greater, smoother, and swifter than that of water.

When some disruption, or striking, or other noise occurs in the air, the air which is nearest that noise propels the sound away from it, towards the other parts of the air, until finally it enters the ear, and passes from the ear to the brain, which distinguishes between the greatest and the least, and between the gentlest and the loudest noise.

In the same way, they compared the sense of sight to a trumpet which has a narrow end, and the further from the end it is the broader it becomes, and thus the sight of the eye passes through the sinewy vein from the brain

na sul 7 bit ceann cumang eige annsin mar bis ag⁴⁰ an stoc 7 bith a sirletnugad amac no co ngabann an fidair fecas ris⁴¹ 7 impoid asteach aris 7 beirid leis cruth 7 cuma 7 dath an raeda sin chum na hincinne.

¹Do na hainminntib fastacha nemcedfadaca.¹

40. UNEUERSA ANIMATA INSENSIBUS ILIA² ETCETERA. .i. Gach uili ni neimcedfadach ag a fuil anim, fedaidh se fas uada fein,³ oir dacimaid is na coilltibh 7 is na cnocaib moran da chinelaib crann ar a fasann toradh uatha fein 7 gidedh as cruinne 7 as fearr oilter toiraid na crann cuirid lamha daine na iat. Agus ni fhed crann is in doman fas ach na inad 7 na aer nadurtha fein. Agus as e sil na nethead neimhcedfedach ag a fuil anim fastach as cruth adburtha doib, oir dob ail le Dia darinne iat brig³ silta da beth innta as a fasfadh a gne comhtrom comhcosmail fein tar eis a ceili co brach; 7 mar sin an trat tuites an sil sin asin talmain attaid se o *fliche* na feartana ac tuitim air.

As e naduir an usci dul asteach is gac en corp a negmais cuirp daingin 7 bith an grian, ar tedhadh an tsil sin, ac tarraing a uisceamlachta as, oir as i naduir na greine gac uili uisceamlacht do tharraing suas 7 fasaidh annsin as in gran, ar na tedadh 7 ar na *fliuchad*, an geineamhain nadurtha da bhi a cumhachtaib folaidh don taib astid ann .i. adbur planda, comcosmail ris in planda o tainic fein roimhe 7 bit an talam a sir *tobairt fliucha* do a ninad na *fliucha* beires an grian uadha 7 fasaidh annsin brig annsin on da ni sin re nabar ainim fastac 7 fasaidh cuislenna as sis re nabar *precmha* in a tairriginn se *oileamain* na talman chuigi. Et an trat tairrnges an grian na *fliuchadain* cedna, tairrngid le an brig folaidteach 7 crutaidter di gega 7 *duilleabar* 7 *blath* 7 toradh 7

40 Z om. 41 Z aris. 1-1 Z om. 2 Z Insensibelia. 3 Z breaks off.

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to the pupils of the eyes, and there has a narrow end like a trumpet, and it widens out until it meets the object which it beholds, and turns in again, carrying the shape form, and colour of that object with it to the brain.

Concerning animate, growing objects, destitute of sensation.

40. UNIVERSA ANIMATA INSENSIBILIA, ETCETERA. Every thing which has life, and which is destitute of sensation, can grow of itself, for we perceive many kinds of trees on which fruit grows of itself in the woods and hills, although the fruit of trees which human hands plant is more carefully and better cultivated than they. No tree in the world can grow except in its own natural place and climate. It is the seed of objects which have vegetable life, and are without sensation, which gives them material creation (?) because God, who made them, desired that they should contain the power of propagation whence would grow for ever in succession their own like corresponding kind; and thus when that seed falls above the earth, it becomes swollen from the wet rain falling upon it.

It is the nature of water to penetrate every body, except an impenetrable one, and the sun having heated that seed, draws its moisture out of it, because it is the nature of the sun to draw up every moisture, and then there grows from that grain, after its being heated and moistened, the natural growth which was contained in its hidden powers within it, i.e., the germ of a plant like unto the plant from which it originally sprang; and the earth is ever supplying it with moisture in place of the moisture which the sun draws from it, and then a force is generated from those two things called "vegetable life," and veins grow down out of it, [the plant] called roots, through which it draws to itself the nutriment of the soil. When the sun draws [up] the aforesaid moisture, it draws with it the hidden force, and from it are created boughs, foliage, blossoms

bid a sir fhas mar sin no co scarinn dhas 7 an toradh bhis air as a[s] sil 7 is adbur da letheid sin da plannda aris.

Tri gneithe ata do no nethib fasas .i. cuid dib da tet a nduilleabar sa geimread 7 tic orra aris is in tsamradh. An dara gne na teit a nduilleabar sa geimr[id] dib na sa tsamradh. Et tres gne teit as gus an en raed sa geimread 7 fasaíd as a sil sin a letheid fein isin tsamrad.

Et adeir arđmaigister na feallsaman .i. *Aristoteles* gorab tri gneithe ata ar na nethib fastacha nemced-fadacha .i.⁴

⁴ B breaks off.

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and fruit, and it continues ever thus growing, until it ceases to grow, and the fruit which is upon it is its seed, and is the germ of a similar plant again.

There are three kinds of growing things [*i.e.*, plants] : some of them lose their foliage in winter and it comes on them again in summer. The second kind, which does not lose its foliage, either in winter or summer. The third kind dies, except for one thing, in winter, and from that seed a similar one grows in summer. The great master of philosophers, *i.e.*, Aristotle, says that objects with growth and devoid of sensation are of three kinds :—

REFERENCES.

- ACL = Archiv für Celtische Philologie.
Contrib. = Meyer's Contributions to Irish Lexicography.
D = Dineen's Irish-English Dictionary.
IT = Irische Texte.
O'C = O'Clery's Glossary.
O'D = O'Davoren's Glossary.
O'R = O'Reilly's Irish-English Dictionary.
RC = Revue Celtique.
TBC = Táin Bo Cuailgne (Windisch.)
TBB = Tri Biorghaoithe an Bháis (Atkinson.)
TDG = Tóruigheacht Diarmuda 7 Grainne.
ZCP = Zeitschrift für Celtische Philologie.

GLOSSARY.

The following glossary contains the rarer words occurring in the text, together with such as are used in specialised or technical meanings. The words are cited exactly as they occur in the MS., but *h* has been used with *c* and *t* aspirate. The numbers refer to the pages.

- Acmainn, acmuinn** 124, 138, abundance.
- acmainnech** 50, co h. heavily (of rain); 52, mightily; 138, abounding in.
- adhama** 43, lodestone, ZCP II., 242.
- adbar, adtur** *passim*, cause, reason; 12, *et pass.* subject; 36, 40, 152, material, substance; 156, 153. a. planda, germ of a plant.
- adburtha** 156, material (*adj*)?; cruth a.
- adhuist** 59, 52, *g.sg.*, August; *also* a. must 52.
- aentadach, aentaghach** 18, 20, agreeing, in agreement with.
- aer** *passim*, air, atmosphere; 156, climate.
- agaíd, aigid** *passim*, surface; a. na talman.
- aibsech** 96, 106, prodigious, enormous; aibsidhi, aibsighe, 74, 94, 96, 130, *superl. compar.*
- aicid** 40, 66, an accident, non-essential; aicidi *g.sg.*; aicidib 12, *d.pl.*
- aicidech** 40, 50, 66, accidental.
- ail** 80, *in phr.* is ail lium, I suppose, assume.
- ailime** 40, *g.sg. of* ailim, alum.
- aimsera** 8, *n.pl.* seasons; aimseraib 152, *d.pl.*, aimsir 152, *dual*; aimser 4, *g.pl.*
- aimserda** 58, co h. at regular intervals, periodically.
- aimserachta** 60, *g.sg.*, periodicity.
- aindeonach, ainneonach** 66, 68, co h. independently, nonessential, *the opposite of* 'nadurtha'; 66, mar as aicideach gac ni aindeonac 7 mar as [s]justant gac ni deonac nadurtha; is contrardha an gl. ainneonach 7 in gl. nadurtha da ceili; *also* an gluasacht bhis co hainneonac do ni, foreign to a thing, unnatural in a thing; 110, gl. ainneonac minadurtha.
- aineoin** 54, 58, da a. forcibly.
- ainmesarda** 14, 64, immoderate, excessive.
- ainminic** 54, seldom.
- ainmintib** 8, *d.pl. of* ainmhídh animal; ainminnti 64, *n.pl.*, ainminntedh 122, *g.pl.*, ainmide 134, a living thing.
- airdrennach, airdrinnach** 4 *et pass. g.pl. of* ardreann, ardrinn, a star; ardrinnaig, ardrinnaid, *n. pl.*
- aithfegadh** 10, *et pass.*, i na. in comparison with.
- aitreabachan, aitreabocan** 62, 64, *v.n.* dwell, inhabit, *cf.* suidheochan, lethnochon, 120.
- aitrebhaid** 64, 3 *pl. pres. ind.* dwell, inhabit, *v.n.* aitreab.
- aitrebh** 34, dwelling, abode.
- aloes** 72, aloes (L.)
- amluath** 74, *et pass.* slow.
- amluas** 58, 74, tardiness, slowness.

- anabsech** 106, not excessive.
anim 156, life; a. fastach, vegetable life.
anagnathadh 52, evil custom (?).
anmaine 68, *compar. of anbhfann.* weak.
anmainne 76, 106, weakness, a. radairc.
anmainnigter 76, *pass. pres. ind;* anmainneochtaig 76, *pass. 2. fut.* of anbfainnigim, I weaken.
anmann 140, weak (usually written anbhfann); anmanna 140, *pl.*
apium 72, parsley (L.)
ardaithe 122, *g.sg. of* ardugad, raising, elevation.
armainnti 2, *et pass. d.pl. of* armaint *fr. L.* argumentum; also *spelt* ardomaint, arrdamaint, arrdomaint *in text.*
arrachtus 138, strength, a. cuirp, physical strength.
arraigecht 42, antiquity.
arsatan 2, *subst. adj. g.pl.* ancients, elders; also na harsanta 120, 134, 136, na feallsamain arsanta 146, *n.pl., cf. curanta: curata.*
arsud 72, age, antiquity.
asaenta 2, 152, disagreement, contrariety.
asaentadach 20, not agreeing, opposed to.
ascaill 16, *d.sg. axle fr. L.* axilla.
astrolaic 84, astrologer *fr. L.* astrologus.
astrolaib 132, 134, *g.sg. id.* astrolabe
atrebadh 136, *v.n.* inhabiting, aitribthe 138, 140, *g.sg.* lucht a. inhabitants.
ataidh, attaidh 146, 148, swells, dilates, expands; atfadh 100, *3 sg. 2 fut.*
atharrach 146, *lit.* change, a na. na crich, in various countries.
athontai 2, athontaidh 72, *2 fut. pass.,* athainter 72, *pres. incl. pass. of* aithnim, I know, recognise.
atmaireacht, atmaracht 20, 22, 24, 32, convexity.
atmar 32, convex.
atrocadh 74, *2 fut. of* athruighim, I change, alter.
Bacail 28, *v.n.* hindering, preventing.
bainneda 152, *pl. of* bainne, a drop.
baisin 148, bowl, basin.
berud 42 = berbud, boiling.
beres as 102, *pres. ind. rel.* continues, lasts; beris air 86, spreads, extends over; *lit.* overtakes.
biseach 90, increase; bisidh 46, *g.sg.*
blod 14, *et pass.,* a part, piece, some.
boga 22, bow, curve.
bolad 72, smell.
borbpecach 52, very sinful.
bord 88, 90, edge, border; buird, 88, 159, *pl.*; bordaib 52, *d.pl.,* banks of a river.
brethnaiges 154, *pres. ind. rel.* discerns, judges, distinguishes.
brig 12, *et pass.,* meaning, force, b. na raiteadh; 12, 14, essence, b. a teasighachta; b. a fuardhachta.
britin 50, heat, parching; bruithéan O'R., bruithneadh, TBG. p. 323.
britnech 50, hot, glowing, parched (of soil); bruithneach O'R.

- bron** 142, 154, *g.sg.*, of bró, a quern ;
broin 142, 144, 154, *d.sg.*
- bruidmail** 140, brutish, savage.
- bruithfedh** 62, 2 *fut.*, bake, parch ;
bruithid 136, *pres. ind.*, bruith,
138, *v.n.*
- buaidhertha** 8, troubled, confused.
- bun** 52, source of a river ; ar bun
56, 86, in progress.
- bunaid** 32, *g.sg.* of bunadh, origin ;
an siraidhi b. Eternal First Cause.
- Cabain** 44, *n.pl.* of cabán, hole,
cavern, crevice.
- caebaib** 44, *d.pl.* of caeb, lump, clot,
mass.
- caeraib** 44, *d.pl.* of caer, a blaze,
flash of fire.
- cail** *passim*, quality, characteristic,
property.
- caillidecht** 62, quality, nature.
- cainndigecht** 74, 76, 104, quantity,
size, cainndigachta 134, *g.sg.*, *fr.*
L. quantitas.
- caisimpoth, caissimpoth** 20, 128,
130, 132, a turning back, retro-
gression.
- caithe** *passim* = choidche, ever.
- calcaidh** 34, 38, becomes hard, con-
centrated ; 42, 150, condenses, *lit.*
becomes calceous ; calcochaidh
148, *fut.* ; calcaithi 148, *past part.*
condensed ; calcadadh 36, *v.n.*
- cannuir** 40, *g.sg.*, cainniur *n.sg.*,
perhaps for caindebor, cannebor,
= "Koth" TBC. l. 2250 ; *cf.*
candabar *i. cac*, ut est, cein bes
tond a cinn fo channabar O'Dav.
429. *Seems to mean* 'dust' *in*
text.
- cartach** 64, *g.sg.* of carta, a cart ;
gl. cartach where gl. rotha car-
tach *seems intended* ; *cf.* roth
cartach, 126.
- casa, cassa** 138, *pl.* of cass, curly.
- casluath** 29, *adj.* swiftly turning.
- ceachtar** 94, one of three ; c. do na
tri plainedaib ; 96, one of any
number, 102, one of two.
- ceangal** (re celi) 70, union ; ceangal
42, binding.
- ceasta** 2, *n.pl.* of ceist, a question,
fr. L. quaestio.
- ceathra** 106, 108, = ceithre.
- cetharduil** 58, 60, 62, the four ele-
ments ; cethardula, 58, 60, *g.sg.*
- cedfaidh** 154, sense ; c. an eisteachta ;
c. na cluaisi ; c. na sul.
- ceim** *passim*, a degree.
- ceithreuilneach** 98, quadrangular,
cercall *passim*, circle, circuit, orbit,
g.sg. cercaill and cercaille ; *pl.*
cercaill and cercalla ; *fr.* L. cir-
culus.
- ciineadhachaibh** 40, 48, *d.pl.* of
ciineadh, a race, tribe, people.
- cinn** *in phr.* ar cinn, following,
ensuing, *with reference to time*,
an aithi ar c. 148.
- cinta** 106 (*lit.* fault), occasion.
- cladachaib** 48, *d.pl.* of cladach,
beach, shore.
- claechligher** 20, 72, 74, *pres. ind.*
pass., claechlighid 32, *act.*, claech-
liges, *rel.*, claechlifadais 6, 2 *fut.*
3 *pl.*, claechlifad 32, 3 *sg.*, change,
alter.

- claechlod** *passim*, change, alteration, *v.n.* of claechligim; claechlighthi 68, 74, *pl.*
- clae** 126, oblique.
- clae** 100, 110, 128, 136, *v.n.* inclining; claeas 64, 100, claeann 136, inclines.
- claidhi** 50, a trench.
- clar** 20, 28, 32, 132, a flat surface, plane; claraib 88, *d.pl.*, na c. lethna; 6, 36, 110, a plank.
- cle** 70, adverse, inauspicious (of stars).
- clima** 136, 138, 140, clime, zone, region, *fr.* L. clima.
- cloithshneachta, clocha sneachta** 42, 152, hailstones.
- enapain** 152, *pl.* of cnapán, a knob, a lump; c. corra, knobby points.
- cnoc teineadh** 4, volcano.
- cobsaidh** 58 (con + fossaidh), steady, unchanging.
- codach** 136, 154 *g.pl.* of cuid, part, share, portion; codeanna 136, *n.pl.*
- coicrieh** 54, boundary.
- coimhlethan** (ri) 84, coextensive with.
- coimplex** 138, 'complexion' in the mediæval sense of L. *complexio*, physical constitution; *cf.* TBG. 236, 16.
- coinneomhadh** 32, coinnemadh 132, coinneochad 120, 2 *fut.*, conmmhas 126, 130, *pres. ind. rel.*, congmail 8, 68, conmmail 6, *v.n.* of cong-baim, I support, keep, preserve.
- comaisi** 60, of equal age.
- comartha** 36, 62, sign, token; *passim*, a sign of the Zodiac; comarthad *g.pl.*, comarthaib *d.pl.*
- comercuinn** *passim*, round, spherical.
- comnaige, comnaidhi** 8, 16, remaining, stopping, halting; 60, permanency; na c. 8, 102, stationary; 128, 130, stopping place, inad a ced comhnaighe *etc.*
- comor** 116, as large as
- comoradh** (re) 12, *v.n.*, comparing.
- comtrom** *passim*, equal; 88 spherical, c. mar samail liathroidi cruinde; 20, 32, level. clar c.; c. risin talmain; 132, 134, co-incident, c. re line eccinocialis.
- comhtromacht** 20, 122, equality.
- conaith** 138, c. fa crannaib examla. rich in (?); *perhaps for* conáigh. conáich, *g.sg.* of conách, prosperity, wealth, success, *used as adj.*, *cf.* cronán conaig, M.G. July 18; co conaich cadusach, Cog. 140, 11; ciall chonaich, rich in sense, RC. xii. p. 320; *compar.* conaithi 140, *cf.* ní as conaichi *gl.* felicior Ir. Gl. 1128. (Contribb.) *also* croch in gadaighe conaigh RC. vii, 358; Mag. nEine na niath cconaigh, 3. C. 13., 455.
- congluais** 10, conclusion; conglu-aistib 2, *d.pl.*; *fr.* L. conclusio.
- contrartha** *passim*, opposite, contrary to.
- contrardacht, contraracht** *passim*, opposition, contrariety.
- corpordachta** 26, 42, *g.sg.* corporality, materiality, solidity.
- corra** 152, *pl.* of corr, round.
- costrasta** *passim*, hitherto.
- creasaib** 120, *d.pl.* of crios, belt, zone; creasanna 122, *n.pl.*

- crefoe** 38, a sod of earth, dust, powder, clay; crefoigi 40, *g.sg.*
- crich, crith**, *passim*, land, region, district.
- crith** 38, *lit.* shaking, c. na talman, "terrae motus," an earthquake.
- cruinn** *passim*, round, spherical; cruinne 40, *comp.* more carefully.
- cruinne** *passim*, roundness, sphericity.
- cruth** *passim*, shape, form; 156 c. adhburtha, creation; (?).
- cruthaig** *passim*, *pret.* cruthaidter 156, *pres. ind. pass. of* cruthaigim, I create.
- cruthghad** 2, formation, creation; 114, shape, form; 122, figure.
- cuairt** 64, 108, course, revolution.
- cubaidh** 38, *pres. ind., lit.* bends, constrains; c. se e fein, it compresses itself.
- cucumeraib** 46, *d.pl. of* cucumer, cucumber.
- cucurbitaib** 46, *d pl, fr.* cucurbita, gourd.
- cuil** 96, cuilib, *d pl.* an angle, a quadrate *Translates* quadratura of S. A quadrate is an aspect of the heavenly bodies at which they are distant from each other 90°.
- cuirid** 156, *3 pl. pres. ind.* sow; cur 56, *v.n.*
- cuisme** 14, frost.
- cuma** *passim*, shape, form; cumtha 154, *pl.*
- cumhga** 116, narrowness.
- cumgacht** 116, cumgachta *g.sg.* 118, narrowness.
- cumgaigter, cumgigter** 74, 146, 150, *pres. ind. pass., cumhgochaidhi* 74, *2 fut. pass. of* cumguigim I become narrow, contract; cumangaim, D.
- cumhang** 154, 156, narrow.
- cumscaidinn** 88, *pres. ind.* moves, cumseugad 68, *v.n.* motion; cum-scaithi 16, *g.sg.*
- cumasca, cumaisce, cumusca, passim**, compounded, composed, mixed; 140, neutral (of colour, complexion).
- cumaister, cumuisgter, cumuseter**, (in), 14, 56, 60, 66, 150, *pres. ind. pass., cumuscadh* 58, 60, *pret. pass*, cumusctaidh 62, *past. subj. pass., cumusceotaid* 58, *2 fut. pass. of* cumuscaim. I compound, mix, mingle.
- cunntabairt** 76, doubt.
- Daingean** *passim*, firm, solid; 156 impenetrable; 114, 128, fixed (of stars), airdrinnaigh daingne.
- daingne** 38, solidity, firmness, d. 7 dluithe na talman.
- daingnidh** 54, contracts, *lit.* makes fast, firm; dluthaid 7 d. an taer sin.
- dasacht** 42, intensity; d. na fuar-dhachta.
- dasachtach** 38, intense.
- da ririb** 14, really, essentially.
- dealaidh** 152, separates, divides.
- deallraigteach** 98, bright, shining, possessing light.
- deichfer, deitfir** 130, 154, difference; gan d. indiscriminately.

- deise** 66, 94, *g.sg. of dias*, two, a couple.
- deimniter** (deimnigter) 36, *pres. ind. pass. of deimnighim* I make certain, assure, prove.
- denmhusa** 120, *g.sg. of denmus*, effect, result.
- deonach** 66, essential. *See ain-deonach.*
- deor, deoir** 50, 54, drop.
- derbad** *passim, v.n., derbochaighi* 120, *2 fut. pass. of derbuigim*, I prove.
- dergadh** 72, *v.n.*, becoming discoloured; (?) *lit.* reddening.
- dethaidhi, dethaighi** 150, 26, *pl. of deathach*, smoke, vapour, mist.
- diameiter** 90, diameter.
- digair** 128, swift.
- dilis, diles** 6, proper, belonging to, appropriate; *gan gl. d. acu*, without motion of their own; *disli* 110, *superl.* (with metathesis); 112, full, complete, *se mhi d.*
- dinge** 16, *v.n. of dingim* I push, wedge, press against.
- dingmala** 2, *g.sg. of dingmail*, ding-bail, *lit.* a warding off, a match for; *is d. do na heolcaibh*, it is fitting for; *cf.* the common expression 'fear a diongbhála.'
- direch** *passim*, straight; *gluasacht d.*, vertical motion; *dirgha* 128, *superl.*
- dluithi** 38, compression, firmness, solidity.
- dluthaid** 54, *3 sg. pres. ind.*; *dluthaither* 150, *pres. ind. pass. of dluthaim*, *dluthaigim*, I pack close, compress, condense.
- doaitrebtha, doaitribthe, doaitrebthi** 64, 112, 136, uninhabitable.
- dobeir** (ar) (a) 42, 108, *et pass.* causes; *dobeir air eirghi thoir, etc.* (b) 78, name; *tri hanmanna ele daberid na feallsamain uirri.*
- doceadaithi** 86, unpermissible.
- doclaechlighthi** 76, unchangeable, immutable.
- dofulaingi** (dofulaingthi) 86, insufferable.
- dogluaisti** *passim*, immovable.
- doirtfea** 50, *2 fut. 2 sg. of doirtim*, I pour; *doirter* 148, *pres. ind. pass.*, *dortad* 52, *v.n.*
- doimne** 38, 148, depth; *d. na talman*, the bowels of the earth.
- doirb** 70, gloomy, unfavourable (of stars).
- domain** 106, deep; *doimne* 40, *pl.*
- dombisech** 140, decrease; *dombisidh* 46, *g.sg.*
- domeallta** 20, unfailling; *arrdamaint d.*, an indisputable argument.
- domuinti, dumunta** 140, rough, uncouth, intractable.
- donaidhi** 70, adverse, inauspicious (of stars); *lit.* wretched, miserable.
- dorchadus** *passim*, darkening, eclipse.
- dorus** 56, mouth (of a river); *doirsib* 54, *d pl.*
- doscailte** *passim*, immovable; 2, difficult to solve; 60, obscure, indissoluble.
- dotruailligthe** (-dthe) 16, 60, incorruptible, indestructible.

- dreaguine** 92, 100, *g.sg.* of dreagon, dragon; dreagana 154, *pl.*
- druid** 18, surface.
- drut** 110, *v.n.*, moving, advancing.
- dubadh** 70, *v.n.* charring.
- duthchas** (duchas) 16, nature, instinct; duchusa 20, *g.sg.*
- duil** *passim*, element.
- duilidhe, duilita** *passim*, elemental, belonging to the elements.
- Ealadhna** 2, 8, *pl.* of ealadha, art, science, skill; e. saora 8, *seems to mean* exact sciences; ealadhan 70, *g.sg.*
- ealach** 54, 152, cattle, flocks.
- easlan** 74, unsound, unhealthy.
- easparta** 98, evening.
- eccinocsium, exenocium** *passim*, equinox; L. aequinoctium, *later* equinoxium.
- eccinocialis, egecinocialis** *passim*, equinoctial.
- ecintacha** 2, 92, *pl.* of eicintach, forcible; darmainntib e.
- egmuis, egmus**, (in e.) 86, 94, 126, 156, except; 6, 98, besides, as well as (*cf.* Eriu I. 80. a neagmais a ndearnad do ghreasuibh 7 dionnsaighthibh); 14, although, a n. co nabartar *etc.*; 60, without, a n. gach uili cail.
- eigríd** 42, ice, *usually* oighridh.
- eisimlair** *passim*, example.
- eitridhi, eitrighi** 36, a furrow, channel; eitrib, *d.pl.* of eitre.
- eslaini** 46, 76, weakness, disease, ill health.
- examla** 138, 154, *pl.* of examail (en + cosmail), unusual, strange; egsmala 34, different.
- examlacht, eggsamlacht** (en + cosa-mlacht) *passim*, change, variety, difference, *hence* characteristic; e. na crich 100, different lands; e. na naimser 120, the changes of the seasons.
- Fad** 102, 136, longitude.
- faideochaidh** 62, 2 *fut. pass.* of faduighim, I lengthen.
- fairsinge, fairsinga** 116, 118, wide-ness, extent.
- fairsingeochtai** 74, 2 *fut. pass.*; fairsingigter 74, *pres. ind. pass.* of fairsingigim, I widen, extend; fairsingiugad 154, *v.n.* broadening, widening.
- fare** 26, 76, along with; *cf.* RC. XIX, 386.
- fasta** 62, 72, *g.sg.* of fás, growing, increasing.
- fastach** 156, 158, *adj.* having growth; anim f. *translates* 'anima vegetabilis' of S.
- feallsam** 18, philosopher; feallsamain *pl.*; O.I. felsub *fr.* ph. lo-sophus.
- fechain** *passim*, ac f. in comparison with.
- fedan** 154, vein, pipe, hollow, cavity; fedanaib 44, 138, *d.pl.*
- fedann** 56, obtains, finds, *as in* I.O., ad-cota,—éta,

- feramail** 70, masculine.
- fethach** 154, sinewy, full of veins.
- feras** 48, 50, *pres. ind. rel.*, *ferfadh* 50, 2 *fut. of* *feraim*, I pour, rain; *v.n.* *fertain*, *g.sg.* *fertana passim*.
- fiadain** 102, wild, uball f.
- fidair** *passim*, *g.sg.* *fidrach*, figure, diagram; *fidracha* 34 *pl.* shapes; *fr.* L. *figura*.
- firderedh** 96, extreme wane (of the moon).
- fir gorma** 64, 138, *pl. of* *fer gorm*, negro.
- fiuchadh** 40, *v.n.* raging (of the sea); *lit.* boiling.
- flaithimnas** 146, domain, region.
- fliche** *passim*, moisture, damp.
- fiuchadain** 26, 156, *pl. of* *fiuchadán*, moisture, vapour; *fiuchán*, D.
- fochainn** 4, cause, reason.
- foicsi** 24, 96, nearness.
- foillseochaidi** 22, 2 *fut. pass.*, *foillsigid passim*, 3 *sg. pret.*; *foillsiges passim*, *pres. ind. rel.*; *foillsiugad passim*, *v.n. of* *foillsigim*, I make known, discover, explain, elucidate; *foillsigid* 22, *pres. ind.* illuminate; f. an *grian* an *leath* don *talmain*.
- foirfi** (*foirbhthe*) *passim*, perfect, complete.
- folach** 112, setting (of the sun), *lit.* concealment; *folaidh* 156, *g.sg.*, *ina cumachtaib folaidh*, in its hidden powers.
- folad** 44, substance, essence.
- folaidtheach** 165, hidden, secret.
- folaitheir** 82, *folaidter* 106, *pres. ind. pass.*; *foilghes* 102, *pres. ind. rel.*; *foileochaidi* 22, 2 *fut. pass.*; *faileochadh* 32, 102, 2 *fut. act. of* *foluigim*, I hide, conceal.
- folam** 18, empty, unoccupied; *inad* f. a vacuum.
- folamhnaiter** 120, *pres. ind. pass.*; *follamnaigid* 120, 3 *pl. pres. ind. of* *folamnaigim*, I control, rule, govern; *follamnugad* 6, 8, *v.n.*
- frithbuailter** 46, *pres. ind. pass.*, is reflected.
- fuachaise** 40, *pl. of* *fuachais*, hole, cavern, den.
- fuadaiges** (le) 112, (*intrans.*) *pres. ind. rel.*: moves, advances; (*cf.* *Mod. Ir.* *d'imthigh se leis*); *fuadaidh* 114, *fuadaigidh* 34, (*trans*) 3 *sg. pres. ind. of* *fuadaigim*, I snatch, carry off.
- fual** 42, urine.
- fuardhacht** *passim*, coldness.
- fuarlaidhi** 50, 52, *n.pl. of* *fuarloch*, flood, *fuarlochaib* 50, *d.pl.*
- fuilngthech** 14, passive; *cail* f. a passive property.
- Gabail** (re) 16, 54, contending with; *gabaidh* (re) 54, *gabann* (re) 16, 156, *pres. ind.*, *gabtar riu* 40, *pres. ind. pass.* meet.
- geineamuin** 156, *v.n.* generation, growth.
- genter** 10, *pres. ind. pass. of* *geinim*, I generate, produce.
- gerugad** 118, enlightening, *lit.* sharpening; *da g. inntleachta an legtora*.

- glactar** 12, *pres. ind. pass.*; glacmaid, glaccamaid 12, 14, 1 *pl. pres. ind. of* glacaim, I touch; glacadh 14, glaccadh 72, *v.n.*, touch, feel.
- goirt** 40 *adj.* salt, talam g.
- glotain** 18, *d.sg. of* glota, bosom, O'R. (?); embrace. (?) *cf.* IT. iii. p. 322, Rothmaired in cú ina glotain in macc bec; *glotu*, belly (Stokes); TDG, Part II., § 31, roleigiodar an ghaoth a nglotain an tseolchraim; 3. C. 13, 866, ní meipic bhios ós baire leathain a lán gaoithe a nglotain siúil; B. iv. I. fo. 50. l. 11. a ngloitnibh na nglainbhreideann siuil.
- gnathochann** 52, use, vogue, fashion; (?) *cf.* lethnochon, súidheochan, 120.
- gné** 72, 92, 100, 114, 156, kind, species; gneithe 158, *pl.*
- gnimach** 14, active; gnimacha 12, 20, *pl.*; cail g. an active property.
- gnimaidhidh** 44, 3 *sg. pres. ind.*; gnimaidhid 38, 3 *pl.*, works, acts, operates.
- gnimarth** 70, actions, functions (of heat, etc.); gnimarthad 62, *g.pl.*
- grinn** 32, careful, accurate, in detail; grinne 70, *compar.*
- grinneall** 40, coarse gravel, sea bottom, bottom of a pit.
- grinnigh** 24, examine, consider carefully (?). *Evidently the same word as occurs in foll. passages*:—Eriu II. i. p. 24, feacaisom beous for a ngrinigud som. IT. IV. p. 185, grindiuğud cacha dala 7 cacha caingne is co grind tucais in carpat dam; *notice here the play on the words 'grindiuğud' and 'grind.'* Franciscan MS. of *Agallam* has 'glindiuğad,' in this passage; it is evidently same word as Mod. I. *glinneamhuin*, scrutinizing, with interchange of *r* and *l* *cf.* biorar: biolar.
- guin** 90, wane (of the moon); *lit.* wounding, then failure, decrease; firderedh 96, evidently describes the same phase. Rúithnedh an eusga an uair ghontar. K.M. Miscellany, p. 172; le linn guin na rae. GJ. No. 148, pp. 207, 208 (change of the moon). Gach aon . . . do bhiodh tinn le goin an rae. Math. iv. 24. (Gadelica I. p. 293).
- Iacinetis** 72, jacinth; a mineral, a variety of zircon. Name also applied to cinnamon, topaz, and sapphire; L. *hyacinthus later iacinctus*, iacanthus.
- ichtar** *passim*, bottom, lower part; often for 'south' in text.
- imaidh** 76, image.
- imaraib** 36, *d.pl. of* imaire, ridge.
- imarceraid**, imareridh, imarcaig, imarcaid, *passim*, excess.
- imbualadh** 36, beating to and fro (?); usually mutual beating or mighty [beating.

- imehubaid** 26, co hi. suitably, appropriately; 70, favourable, auspicious (of planets).
- imdenam** 82, shape, form.
- imillige** 10, outermost, *superl.* of imeallach, bordering.
- impoidid** (i) 42, *pres. ind.* turns, changes into; i. i naduir na talman, adopts the nature of the earth.
- impodh** *passim, v.n.* turning, evolution; *in phr.* re na impodh 24, *vice-versa, lit.* with its turning.
- imrascail** 150, contending.
- inchinn** 46, 154, brain.
- inmedonach** *passim*, middle.
- inne** 38, inmost part, interior; i. na talman.
- inntod** (i) *v.n.* 42, turn, change, becoming converted into.
- iomitric, geomitric, passim**, geometry, *g.sg.* of iomitreach; iomitre occurs 30, geometreachta 92, geomitric 94, 132; *fr.* L. geometrica.
- isliugadh** 142, 144, *v.n.* declining, sinking; islithe 122, *g.sg.*, depression; islides 56, *pres. ind. rel.*
- Labain** 40, muddy; *g.sg.* of lábán; láib, mud; lách, muddy D. Labb, lap. .i. loth no cechair, O'Dav.
- laca** 46, 104, cheek (of the moon), laca rinne, facing us. *Or read* laimh rinne, ZF. (?)
- ladh** 36 mud, mire; a l. na mara; *cf.* Songs of Summer and Winter (Meyer), p 25, lath, W. llaid, hence lathach; also ZCP III. p. 46, ni meirb docengat latha, sloughs. (?)
- laidigtar** 46, laidhditer 74, *pres. ind. pass.*, laigidithi 74, *past subj. pass.* of laighdighim I lessen, decrease.
- lan re** 88, full moon.
- lanmor** *passim*, very great; in speir 1, "sphaera maxima."
- lasad, lassad** 44, burning.
- lasair** 44, 96, 98, light, flame, beam of light.
- leagad** 146, 152, melting, dissolving.
- leanmháin** 98, a l. continually, always (?).
- leithimillech** 84, outer, outmost; cercall l.
- leithne** *passim*, wideness, extent; 114, amplitude; cainndigeacht leitne a speiri fein = *quantitatem amplitudinis orbium suorum.*
- lethni** 54, dilation (of air).
- lethan** 88, flat, level, *the opposite of* 'cruinn.'
- lethead** 102, 136, latitude.
- lethimill** 126, outer edge, rim.
- lethnaidh** 54, 148, spreads, dilates.
- lethnaigi** 152, lethnaigid 26, 3 *sg. pres. ind.*; lethnaigter 146, lethnaidter 150, *pres. ind. pass.*; lethnochad 150, 2 *fut. pass.*; lethnugad 28, *v.n.*, widens out, spreads, dilates, amplifies.
- lethspeir** 88, hemisphere.
- liathroid** *passim*, ball, sphere; liathroidi *g.sg.*
- linad** 44, 46, filling, flowing (of the tide).

- linas** 48, *pres. ind. rel.*, lintar 50, *pres. ind. pass.*; linfaide 50, 2 *fut. pass.*; linad 52, *pret. pass.* of linain, fill, flood (of rivers); linaid 42, 3 *pl. pres. ind.* (of wells).
- line** medonach an domain 64, the Equator.
- lionn ruad** 42, bile; choler O'R. In a fragment of a medical tract included in R. II. I., l. r. is much discussed as one of the four "humours"; the others are 'fuil derg,' 'lionn fionn,' and 'lionn dub.'
- locfadais** 62, 2 *fut.* 3 *pl.* of locaim, I hinder, refuse.
- loisgnech** 10, burning.
- lorgaireacht** 132, *v.n.*, following, tracing out; da l. an adbuir so, to pursue this subject.
- luas** *passim*, speed, swiftmess; l. cumscraithi 16, 'velocitas.'
- luathaiges** 20, *pres. ind. rel.*, hastens, accelerates.
- ludrach** 126, 142, 144, a pivot, foundation, seat; a stay, a hold; mooring, D. Also lundrach. Sludrach .i. fundamentum O'C.
- Ma** 52, =um a.
- macasamla** 68, *pl.* of macsamail, copy; daghenadh a m. isin firmamint, would produce similar effects in the firmament.
- maille** *passim*, slowness; m. cumscraithi 16, 'tarditas.'
- mallaiges** 20, *pres. ind. rel.* of malluigim, I retard.
- meallad** 6, gan m. without fail; *lit.* deception, delusion.
- medaigther** 46, 74, 146, 152. *pres. ind. pass.*; medaithi 74, *past subj. pass*; medochaidh 74, 2 *fut. pass.* of meduigim, I increase, augment.
- mesarda** *passim*, temperate, moderate, mild.
- mesardacht** 140, mildness; mesardachta 62, *g.sg.* regularity.
- mianach** 40, a mine.
- mie imrisan** 154, *pl.* of mac imrisan, pupil of the eye.
- millsi** 42, *superl.* and *pl.* of milis, fresh (of water, in contrast to salt water).
- minaiter** 34, *pres. ind. pass.* of minighim, I polish, make smooth.
- minbainneda** 152, *pl.* of minbainne, a small drop.
- minbrisd** 150, 3 *pl. pres. ind.* break into small pieces.
- miniasgaib** 36, *d.pl.* of miniasg. small fish.
- minrann** 150, *pl.* of minrann, fragment.
- mir** 136, piece, portion fraction; treis mir uaire, $\frac{1}{3}$ hour.
- mitaill** 138, *pl.* of mitaill, metal.
- mnaamail** 70, feminine.
- mocrach** *passim*, =moctrath early, in the morning; cf. the spelling 'mochrach ar na barach' LL. 104a, 26; mocrach (no tratnona) 150, translates 'in diliculis,' S., diluculum, daybreak.
- monad** 52, money, mintage, *fr.* L. monetum; then stamp, kind, type. ZCP. I. 380, Teora fidhbhuidi 7 is dia

- eroicnib sin donither monad don righ fria creic 7 cundrad na crichi; p. 384, eirel is monad doibh fria creic 7 cunrad; p. 372, cu fiadlmhilaib ecennus da gach mhonad for bith, (= kind); also ZCP. II. 272, note, and 290, tristeil don monadh chetna; Eriu iv. I. p. 57, tugadh ced da gach crodh do 7 ced uinghe da gach monadh 7 errad an righ feisin.
- mothar** 150, cluster, collection, mass.
- muchfadh** 84, 2 fut. of 'múchaim' I extinguish; here=obscure.
- mullach** *passim*, top, highest point, often for north.
- Naduir** *passim*, nature, fr. L. natura; written n with r suprascript throughout text for all cases.
- nadurtha** *passim*, natural; also written n with r suprascript.
- a neach as ludha** 96, (for do neach), at least.
- neachtar** 58, either, one of two.
- neamcumusca** 14, *et pass.*, uncompounded, unmixed, simple.
- neamfallech** 62, co n. without neglect, unfailingly.
- neamhfoirfi** 66, imperfect.
- eamneachtarda** 70, neutral, not belonging to either.
- neasacht** 54, nearness, proximity.
- neascoidi** 46, *pl.* of neascoid, ulcer, boil; also neasc as Z.
- neimeasbadhach** 3, co n. without fail.
- neimcedfadach** 156, destitute of sensation, translates 'insensibilis.'
- nematmar** 28, not sloping, not convex.
- nembuaigertha** 8, co n. orderly, without confusion.
- nemcunntabartach** 30, 132, co n. without doubting, unquestionably; nemcunntabartacha 36, *pl. adj.*
- nemmeascaithi** 8, without confusion.
- nemmellta** 68, 92, co n. without fail.
- nuimir** *passim*, number; nuimrech *g.sg.*
- Oibriugad** *passim*, action, function; oibrighi *pl.*
- oileamain** 140, *v. n.*, nurturing; 156, nutriment; oilter 156, *pass. pres. ind.*, cultivate (of plants).
- oilbeim** 16, obstruction, obstacle; 'stumble' D., 'stumbling block' O'R.
- oiredha** 118, loftiest, highest, generally oireaghdha, illustrious.
- oisceol** 52, 1 *sg. fut.* of osclaim, I open, disclose.
- ordochan** 120, order, arrangement.
- Plained** *passim*, a planet.
- planda** 156, 158, a plant.
- pol** *passim*, pole; poil *n.pl.*, pollaib 120, *d.pl.*

- prap** 146, *co p.* quickly, suddenly.
- prechmha** 156, *pl.* = *prémhacha*, roots.
- primh** 88, 90, 104, 108, prime (of the moon); *ar a prim .i. ar a ced solus* 88, 104, *i.e.*, in its first quarter.
- primcaile** 12, 70, *n.pl.*, *primcailedh*, *primcailib* 14, *g.pl.*, *d.pl.* of *primcáil*, principal, essential property.
- primhgluasachtaibh** 10, *d.pl.*, of *primhgluasacht*. prime, principal motion.
- pinn** 102, point (?) *fr.* Fr. point (?), *an pinn si a ndorchaiter an grian*. The passage in which the word occurs, like other passages in XXIV., does not appear in S.
- puisdian, pusdian** 72, dough (?) *for pistam .i. taes* (?) ACL. I. 336.
- Raed** 136, *in phr.* *gus an en raed*, exactly; 158, 'except for one thing; *cf. gur ith sé i go dtí cúinne beag, Cnó Coilleadh Craobhaighe*, p. 35.
- rann** *passim*, part; *ranna pl.*
- rannaighi** 92, partial.
- re** *passim*, moon.
- rebaigh** 40, tears, breaks.
- reime, roime** 42, 28, *superl.* of *remhair*, thick, solid; 154, loud (of sound), *an fodar as r.*
- remhrigid** 26, amplifies, increases, renders thick; *ramrugadh, reamrugad* 28, *v. n.*
- reodh** 136, frost, hoar frost; *reoigh* 14, *roigh* 146 *g.sg.*
- resun** 2, reason; *r. na daennachta*; *resuin* 60, *g.sg.*, *resuin* 84, *pl.*, *resunaib* 2, *d.pl.*; reasonings, calculations, 'raciones.'
- retlainne** 126, *g.sg.* of *retlann*, star; *retlanna passim, pl.*; *retlannaib* 22, *d.pl.*; O.I. *rétglu*, Mid. I. *révla*, Mod. I. *reult*; *retla occurs* 122.
- riabach** 138, dark, swarthy.
- roithinn** *passim, pres. ind.* of *roithim* (= *roichim*) I reach, arrive; *roitit 3 pl.*, *roithfeadh 2 fut.*, *co roith* 76, to, as far as.
- roth** 118, 126, *rotha* 116, wheel; *rotha* 116, *g.sg.*, orbit; *cumhga, fairsinge an r.*; 68, sphere, *a gac rotha do rothaib na firmaminti, also* 120.
- Sallter** 106, *pres. ind. pass.* of *sailim*, I think; *ma s. let dfaicsin.* if you mean to see.
- salltecht** 42, saltness.
- sailti** 40, 42, *adj.* salt; *blas s., uisci s.*
- saimeolad** 104, *1 sg. fut.* of *samlaim*, I imagine, assume; *do samladar (re)* 154, *3 pl. pret.* compare.
- salann** 42, *subst.* salt.
- samail** 48, image, likeness, figure; *s. cercaille an re*, 48.
- samlachus** 132, pattern, likeness, image.
- sbas** 80, space; *spas* 120, *translates* 'differentiam.'

- scaili** *passim*, shadow.
- scailid** 54, 3 *sg. pres. ind. of scailim*
I loosen, solve, dissolve; *here*
spreads, dilates (of air); *also*
scailter 150, *pres. ind. pass.*; scail-
fithe 62, 2 *fut. pass.*; scailfes 12,
fut. rel. elucidate, s. amach brig
na raiteadh so; scailedh 54, *v. n.*;
dilation; scailidh 42, 54, dissolv-
ing, dissolution; scailti 62, *g. sg.*
- sceighidh** 48, bursts forth; *usually*
sceithidh.
- scoltidh** 152, splits.
- scrisaidh** 120, destroys; s. an
baramhail, refutes; scris 30,
60, *v. n.*, scrisfaide 8, 2 *fut. pass.*
- scrudadh** 2, *v. n.* investigate, examine.
- scubaid** 54, sweeps.
- sdan** 138, tin.
- seachranach** 32, 70, erroneous, in-
correct; seachranacha 132, *pl.*
wandering (of stars).
- seachnaidh**, sechnaidh, 92, 100,
avoids.
- sechran** 30, error.
- seicreidi** 2, *pl. of seicreid*, secret,
fr. L. secretum.
- seimh** 42, volatile (?) (of water),
capable of being vapourised and
condensed (?); 68, smooth, corp-
mor s. *and seimhe* 154, *compar.*,
148, rarefied (of air); seime 154,
superl. gentle (of noise), an fodhar
as s.; co s. 28, directly, without
opposition.
- seimhe** 150, thinness (of mist).
- seitfedach** 148, panting.
- sentrom** *passim*, centre, *fr. L.*
centrum.
- serb** 40, 42, sour, sharp, acid, bitter.
- serui** (serbi) 72, pungency.
- sibal** *passim*, journey, course; s.
na greine, s. an re.
- siblach** 20, co s. moving, running,
(of rivers).
- siblaighes** 100, *pres. ind. rel.*, moves;
an trat s. an re.
- sicc** 150, ar s. freezing.
- siladh** 62, *v. n.* generate, propagate;
silta 156, *g. sg.*, brig s. the power
of propagation.
- siledh** 54, 146, *v. n.*, flow; tsilis 54,
pres. ind. rel.
- silteach** 10, 20, liquid, flowing.
- siraigeacht** 60, lastingness, per-
manency, perpetuity.
- sithlodi**: 42, *v. n.* strain, *fr. sithal*,
a vessel, cup, *L. situla*, *W. hidl.*
- slan** 74, healthy, sound.
- slighaithe** 88, polished, smooth (?),
sliogtha, *D.*
- sligeanaib** 36, *d. pl. of sligéan*, shell-
lime 140, *pl. of slim*, smooth
(of hair).
- smir** 46, marrow.
- smuaintidh** 28, *imper.*, imagine;
smuainteochoas 26, *fut. rel. of*
smuaintighim, I consider, ponder
on; smuaintiugad 76, *v. n.*
- smuit** 26, smuiti, *g. sg.*, mist, vapour.
- snaidhes** 88, *pres. ind. rel.*, moves,
lit. creeps; snáighim *D.*
- sna maidh** 88, moves, advances,
lit. swims.
- snoighter** 34, *pres. ind. pass. of*
snoighim, I cut, chip, carve;
snaighthi 36, *p. part.* polished.

- soaitreabta**, soaitribthi, 6, 134, habitable.
- soidnein** 150, 152, *n.pl.*, soidnenaibh 150, *d.pl.*, lightning, usually saighnéan.
- soillsiges** 88, 98, *pres. ind. rel.*, soillsighter 90, 92, 98, *pres. ind. pass.*, soillsiugad 104, *v.n. of* soillsighim, I illuminate.
- soimpaidthech** 120, easy to revolve.
- soirb** 70, favourable (of stars).
- soitheach** 148, vessel.
- soithid**, soithinn *passim*, reaches.
- sogluasta**, sogluaiste *passim*, movable.
- solaidi** 26, *g.sg. of* soláid, solution.
- solus** (*a*) *passim*, *subst.* light.
 (*b*) 86, 90, 98, illumined; s. on grein.
 (*c*) 106, *adj.* light, lightgiving.
- somuinti** 138, refined.
- sooscailte** 34, dissoluble.
- spechlai** 28, spectacles.
- speir** *passim*, sphere, orbit; 86, cone; is ar cuma speiri ata sgaili na talman, S. . . et quod umbra terre est conus.
- stait** 120, state.
- Stodiaca** *passim*, Zodiac.
- suidheochan** 120, position, situation.
- suidhiughadh**, suighiughadh, *passim*, position, situation.
- suidhid** 50, *pres. ind.*, suighes *pres. ind. rel.*, suidfedh *3 sg. 2 fut.*, suck, absorb; sughaim, D.
- suigiter** 78, *pres. ind. pass. of* suighighim, I place, situate.
- sunradach** 2, 46, *co s.* particularly, especially.
- sustaint** 8, 40, 70, 76, *substaint* 18, *sustainnte* 18, *pl.*, substance
- Taib** 154, a nen taib, simultaneously; in hora una S.
- tair** (le) 44, (tairicim) finishes, comes to an end; taire 86, *pres. subj.*
- talmanachta** 26, *g.sg. of* talmanacht, materiality, thickness (of mist).
- talmanda** 42, 62, 70, earthly, terrestrial, material.
- tanaidh** 152, renders thin, rarefies.
- teasbach** 150, heat, teasbaid 70, *g.sg.*
- teasighacht** *passim*, heat.
- tecmann**, tecmas, *passim*, happens, occurs; tecmas a (in) 100 arrives; tegemaddais 86, *3 pl.*, *2 fut.*
- techt** 8, ar t. growing.
- teigid**, telgid, 44, 54, 146, drives, pushes, expels; teilgin 146, *v. n.*
- teidhid** 122, *pres. ind.*, teighes, teidhes 38, 54, *rel.*; teidhfis 148, *fut. rel. of* teidhim, I heat; tegadh 146, tedhadh 156, *v.n.*, teidhti 148, *g.sg.*
- teinntech** *passim*, lightning, teinntigi *g.sg.*
- teinntighi** 44, *adj.* fiery.
- teit** (tar) 66, surpasses.
- tic** (le) 114, ticid 122, *3 pl.*, agree with, correspond to.

- tigernaigenn**, *tigernaighes* (i) 14, 46, preponderates in.
- tigernas** 14, preponderance; *lit.* lordship; 60, t. do gabail ar, to prevail over.
- tighi** 134, = *tiughi*, diameter, *lit.* thickness.
- timeallas** 90, *pres. ind. rel.* surround; *timcullad* 150, *v. n.*
- timeill** 62, *subst.* round, course.
- timsaigter** 16, *pres. ind. pass. of* *timsaighim*, I gather, hence conclude; *timsaighe* 54, *v. n.* crowd, press together.
- tinne** 46, *compar. of* *teann*, strong.
- tirmighacht** *passim*, dryness.
- tirmochad** 62, 2 *fut.* dry up.
- tiugh** 28, dense, *tiudh* 148, condensed (of air); 94, thick.
- tobair** 50, *g.sg. of* *tobar*, source of a river, *ar son rofad tobair an thsrota* on Eghift.
- toclaigh** 36, digs, *tocailt* 34, *v. n.*
- toirnech** *passim*, thunder.
- toirt** 96, bulk.
- tollaidh** 40, 152 pierces; 92, penetrates.
- tomus** 134, measurement; *tomais*; 126, *g.sg.*
- tosanach** 30, *adj.* first.
- traigaid** 42, 3 *pl. pres. ind.* dries up; usually *trághaidh*; *tragad* 44, 46, 48, *v. n.* ebbing of the tide; *traighti* 62, *g.sg.*, decrease.
- tragain** 40, *blas t.* (?)
- tromidacht** 20, *truimeacht* 18, heaviness.
- truailled** 64, *v. n.* corruption.
- tuarasebail** 8, 10, description, account.
- tuismead** 6, *v. n.* creation; 100, produce, cause.
- tusca** 66, superior, *compar. of* *tóisech* first, chief; 10, nearer, comes before; 80, 154, earlier, sooner.
- tusmigher** 44, *pres. ind. pass. of* *tusmighim*, I generate, produce.
- tusmigteoir** *passim*, Creator, First Cause.
- Uachtar** *passim*, upper part; often for north in text; also surface, *u. na talman*, 138.
- uisceamlacht** 156, wateriness, moisture.
- urdail** 116, like amount, equivalent.

NOTES

Read Baibileoine *for* Baillleoine, diagram facing p. 84, left hand side.

Diagrams facing p. 90 and top diagram facing p. 92 do not agree with text, as explained on page V

25004

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THE IRISH TEXTS SOCIETY was established in 1898 for the purpose of publishing texts in the Irish language, accompanied by such introductions, English translations, glossaries, and notes as might be deemed desirable.

The Annual Subscription has been fixed at 7s. 6d. (American subscribers, two dollars), payable on January 1st of each year, on payment of which Members will be entitled to receive the Annual Volume of the Society, and any additional volumes which they may issue from time to time.

Vols. I., II., and III.* are now out of print, but Vols. IV. to XIII. can still be obtained by new members joining the Society at the original Subscription of 7s. 6d. for each year.

The Committee make a strong appeal to all interested in the preservation and publication of Irish Manuscripts to join the Society and to contribute to its funds, and especially to the Editorial Fund, which has been established for the remuneration of Editors for their arduous work.

All communications should be addressed to the Hon. Secretary, Miss ELEANOR HULL, 20 Hanover Square, London, W.

*A new Edition of Volume III. was published in 1911, as the annual volume for 1909.

IRISH TEXTS SOCIETY.

THE Fifteenth Annual General Meeting of this Society was held on April 24th, 1913, at 20 Hanover Square, London, W., Dr. E. C. Quiggin, Lecturer in Celtic at Cambridge University, presiding. The minutes of the last meeting having been taken as read, the Hon. Secretary presented the

FIFTEENTH ANNUAL REPORT.

Two volumes have been published since the last General Meeting of the Society, namely, Mr. J. G. O'Keeffe's edition of the middle-Irish romance called *Buile Suibhne Geilt*, and the second volume of Rev. John MacF'rlean's edition of the Poems of David O'Bruadair. These form the Society's publications for the years 1910-1911.

In addition to the offers of books mentioned in the last Report, all of which are making progress in the hands of their several editors, the Council have much pleasure in announcing that their President, Dr. Douglas Hyde, has offered to edit for the Society portions of the large collection of Irish folk tales which have come into his hands as the result of prize competitions offered at the various *feiscanna* of the Gaelic League throughout the country.

This unique and valuable collection of folk tales, sufficient probably to fill three of the Society's volumes, has by Dr. Hyde's vigilance been preserved from dispersion or destruction, and he reports that he is making favourable progress with the first volume with the assistance of one of his students who is helping him in the arrangement and preparation of the tales. At the Council's suggestion, the stories are being arranged in groups according to the districts in which they have been collected. Though differing somewhat from the regular course of work adopted by the Society for their publications, the Council feel confident that the production of a volume of folk tales will be welcomed by Irish speakers and by folk-lorists throughout the world.

Another offer of considerable interest is that of an edition of an Astronomical tract prepared by Miss M. Power as a piece of research work for the M.A. degree of the National University and for which she obtained that degree with First Class Honours.

The main text is taken from a MS. in the Royal Irish Academy (B. II. i.) and is a translation of Latin originals, the chief of which is now preserved in the Bodleian Library, Oxford, these Latin originals being themselves founded upon an Arabic treatise by Messahalal or Mascha Allah, a Jewish Astronomer of Alexandria, who flourished shortly before 800 A. D., and whose work was translated into Latin in the 13th century.

The exact date of the Irish translation cannot be determined, but its language, which is practically that in use amongst good Irish speakers of the present day, points to the fourteenth or early fifteenth century as the probable date. The style is simple and straight-forward, becoming almost colloquial in parts, and the text affords an interesting example of the instruction in scientific subjects given in Irish schools of the period.

Miss E. Knott having learned that some copies of Tadhg Dall O'Higgin's Poems not found in Dublin were deposited in the Advocates' Library, Edinburgh, she has during the summer spent some time in Edinburgh for the purpose of transcribing and collating these poems.

Mr. Tadhg O'Donoghue reports that the prose text of his volume is ready and that 30 out of the 45 poems are prepared for press. The proposal to issue this book, which deals with the poems relating to the O'Neills of Clandeboy, has attracted the attention of His Excellency The O'Neill of Lisbon, who has sent a special donation towards the expenses of its publication.

Rev. P. S. Dinneen is hard at work on his volume of Keating's Indices and Genealogies. He reports that considerable progress has already been made with the preparation of this, the fourth and final volume of the Society's Edition of Keating's *History of Ireland*; but the work is necessarily tedious and slow.

The Council is making active efforts to bring its publications up to date.

Among the volumes that have now been offered to the Society, several of which are in a more or less advanced state of preparation are the following :--

POETRY.

- (1) Third and final volume of the Poems of David O'Bruadair, edited by Rev. J. MacErlean, S.J.
- (2) Bardic Poems of Tadhg Dall O'Higgin, edited by Miss E. Knott.
- (3) Bardic Poems relating to the O'Neills of Clandeboy, edited by Tadhg O'Donoghue, B.A.
- (4) Bardic Poems relating to the O'Reilly and Maguire families, edited by Dr. E. Quiggin, F.G.C.C., Cambridge.
- (5) The Poem-book of Hugh mac Shane O'Byrne, edited by J. H. Lloyd.
- (6) The Contention of the Bards, edited by Professor T. O'Nowlan.

ROMANCE AND FOLK LORE

- (7) Irish Folk Tales, edited by Professor D. Hyde, LL.D.
- (8) A new Version of the Agallamh na Senorach, edited by Professor D. Hyde, LL.D.
- (9) A Late Meath Romance, Teagbhalaibh Dubh Mac Deaghla, edited by Joseph H. Lloyd.

TRANSLATIONS.

- (10) An Astronomical Tract, edited by Miss Maura Power, M.A.
- (11) The Irish Version of Statius, edited by Rev. Professor G. Calder, B.D.

SAINTS' LIVES.

- (12) Lives of St. Declan and St. Mochuda, edited by Rev. P. Power.

INDICES.

(13) The Indices and Genealogies to Keating's History of Ireland, edited by Rev. P. S. Dinneen, M.A.

The Council learn with satisfaction that the second volume of Keating's History of Ireland has been placed on the degree course of the National University of Ireland for the current year.

DICTIONARIES.

The sale of Dictionaries has been steady, over 200 copies of the larger and about 800 copies of the smaller dictionary having been disposed of during the year.

The total number of Members now stands at 663, twenty-nine new members having joined the Society during the year.

- | | |
|--|---|
| 1. Dr. Josef Baudis, | 16. Lib. of University, N. Carolina. |
| 2. Anthony J. Brogan. | 17. Library of University College,
London. |
| 3. Miss E. Gore-Browne. | 18. Daniel McCann. |
| 4. J. J. Cashman, | 19. Norman MacLeod. |
| 5. Professor Edward G. Cox. | 20. Mercantile Library, Philadelphia. |
| 6. Hon. J. D. Crimmins. | 21. Nat. Library of Wales. |
| 7. Craobh na h-Eireann Oige (per Miss
G. L. Griffin). | 22. Professor Wm. A. Nitze. |
| 8. Miss Ellen Fitzgerald. | 23. T. O'Donovan. |
| 9. Maig read Nic Gearailt. | 24. His Excellency The O'Neill. |
| 10. Rev. Ed. Flannery. | 25. Eugene M. O'Neill. |
| 11. A. Martin Freeman. | 26. F. H. Skrine. |
| 12. J. W. Jeurwine, LL.B. | 27. Rev. H. P. Smyth. |
| 13. Miss Rose M. Kavana. | 28. Charlton Walker. |
| 14. Thomas Keliher. | 29. Tomás D. Mac Gearailt. |
| 15. W. W. Lyman, Jr. | |

The adoption of the Report was moved by Mr. R. Flower, seconded by Mr. T. W. Rolleston, supported by Mr. J. Bartholomew, and carried.

Mr. S. Boyle, Hon. Treasurer, then submitted the Annual Financial Report and Balance Sheet.

THE IRISH TEXTS SOCIETY—FINANCIAL STATEMENT,

Year ended 31st March, 1913.

THE SOCIETY'S ORDINARY PUBLICATIONS.

RECEIPTS.	DISBURSEMENTS.
£ s. d.	£ s. d.
To Balance from previous year, .. 260 10 6	By Editing, 65 0 0
„ Subscriptions, .. 170 0 2	„ Postage and Stationery, 6 8 0
„ Donations, .. 150 17 3	„ Printing, 16 16 11
„ Interest on Deposit 12 15 8	„ Publishers, 243 2 1
	„ Salary (Assistant-Secretary), .. 15 0 0
	„ Sundries, 11 19 6
	„ Balance, 235 17 1
£594 3 7	£594 3 7

BALANCE ACCOUNT.

ASSETS.	LIABILITIES.
£ s. d.	£ s. d.
To Balance down :—	By Balance (including
Cash in	subscriptions for
Bank 230 17 1	vols. not yet pub-
Cash on	lished), 235 17 1
hand 5 0 0	
235 17 1	
„ Society's Share of	
Stock on hands, ..	

THE SOCIETY'S IRISH-ENGLISH DICTIONARIES.

RECEIPTS.	DISBURSEMENTS.
£ s. d.	£ s. d.
To Receipts already published, .. 2729 5 10	By Payments already published, .. 2347 4 3
„ Sales (net), .. 135 0 2	„ Printing and Binding 6 0 0
	„ Postage and Stationery, 1 16 3
	„ Sundries, 6 2 0
	„ Salary (Assistant Secretary) .. 15 10 0
	„ Balance, 487 13 6
£2864 6 0	£2864 6 0

BALANCE ACCOUNT.

ASSETS.	LIABILITIES.
£ s. d.	£ s. d.
To Balance down :—	By Balance, 487 13 6
Cash in Bank, .. 487 13 6	
„ Stock in hand, ..	

SAM BOYLE, *Hon. Treasurer.*

Examined and found correct.

April 22nd, 1913.

C. R. COOKE TAYLOR, } *Auditors.*
E. W. LYNAM. }

In presenting this Report, the Hon. Treasurer, Mr. Boyle, continuing the interesting retrospect of the Society's work which he gave at last year's meeting, showed that the Society had achieved a success which exceeded even the most sanguine hopes of its original founders. The work of the past year had placed the Society in a still more satisfactory position. During all the years of the Society's existence it had been a matter of grave concern to the Council and the cause of some considerable misunderstanding to the members scattered all over the world that the learned Editors of the Volumes had, on more than one occasion, found it impossible to complete their works in time to have each volume issued within the year for which it was due, without leaving evidence of haste and inaccuracy that would be inconsistent with the high standard of excellence aimed at by Council and Editors. Having issued two volumes this year, the Society is now practically up to date with its publications, being only in arrear for 1912, and it is hoped that the volume for that year will soon be issued. On the subject of the actual cost of production (printing, binding, etc.) of the volumes Mr. Boyle gave some interesting figures. The cost of production, apart from editorial and administrative expenses, of the 13 volumes amounted to nearly £2,000, and it is satisfactory to know that the whole of this expenditure, incurred in the first instance by the publishers, has now been repaid except a sum of about £150 still due to the publishers on the last three volumes issued. A large accession of new members (which it is hoped the existing members of the Society will help to introduce) subscribing for volumes for past years still in stock, will soon pay off this small debt to the publishers, after which the sale of back volumes will afford a substantial permanent annual income to the Society, enabling the Council to undertake much important work to which their limited resources at present are unequal.

It will be observed that the receipts under the head of "donations," which in 1911/12 amounted to only £28, have in 1912/13 amounted to £150.

This gratifying increase has been due chiefly to two generous donations, one that of a member who sent the Hon. Treasurer the munificent gift of £125 from Nice, and the other the gift from Lisbon from the princely representative of the great Ulster race of "O'Neill." But many members in remitting their annual subscriptions sent 10s., viz., 7s. 6d. subscription and

2s. 6d. donation, a kind and thoughtful means of furthering the interests of the Irish Texts Society in its great aim of rescuing from the oblivion of Libraries the priceless treasures of Gaelic literature still left to us, to be the bases and models of a great Gaelic literature of the future.

It was gratifying to have present at the annual meeting an esteemed representative of the Scottish Gaels, Mr. J. Bartholomew, of Edinburgh.

The adoption of the Report was proposed by Mr. J. Buckley, seconded by Mr. Frank MacDonagh, and carried.

A warm vote of thanks to the Auditors for their kind services in auditing the Accounts for the year was proposed by Mr. Rolleston, seconded by Mr. Boyle, and carried unanimously.

Miss Hull proposed, and Mr. Rolleston seconded the following addition to Rule IV.:—“ to whom the Executive Council may add by co-option not more than two members, who shall retire annually.”

After discussion, the new addition to the Rule was carried unanimously.

The retiring members of Council, Mr. A. W. K. Miller, Keeper of the Printed Books, British Museum; Mr. Ernest Rhys, and Mr. J. Buckley, M.R.I.A., were re-elected.

The Officers of the Society were re-elected as follows:—Professor Douglas Hyde, LL.D. (President); Miss Eleanor Hull (Hon. Sec.), and Mr. Samuel Boyle (Hon. Treas.). Mr. E. W. Lynam and Mr. C. R. Cooke-Taylor were re-elected as Auditors.

The meeting then terminated.

GENERAL RULES.

OBJECTS.

1. The Society is instituted for the purpose of promoting the publication of Texts in the Irish Language, accompanied by such Introductions, English Translations, Glossaries, and Notes, as may be deemed desirable.

CONSTITUTION.

2. The Society shall consist of a President, Vice-Presidents, an Executive Council, a Consultative Committee, and Ordinary Members.

OFFICERS.

3. The Officers of the Society shall be the President, the Honorary Secretary, and the Honorary Treasurer.

EXECUTIVE COUNCIL.

4. The entire management of the Society shall be entrusted to the Executive Council, consisting of the Officers of the Society and not more than ten other Members, to whom the Executive Council may add by Co-option not more than two members, who shall retire annually.

5. All property of the Society shall be vested in the Executive Council, and shall be disposed of as they shall direct by a two-thirds' majority.

6. Three Members of the Executive Council shall retire each year by rotation at the Annual General Meeting, but shall be eligible for re-election, the Members to retire being selected according to seniority of election, or, in case of equality, by lot. The Council shall have power to co-opt Members to fill up casual vacancies occurring throughout the year. Any Member of Council who is absent from five consecutive Ordinary Meetings of the Council to which he (or she) has been duly summoned, shall be considered as having vacated his (or her) place on the Council.

CONSULTATIVE COMMITTEE.

7. The Consultative Committee, or individual Members thereof, shall give advice, when consulted by the Executive Council, on questions relating to the Publications of the Society, but shall not be responsible for the management of the business of the Society.

MEMBERS.

8. Members may be elected either at the Annual General Meeting, or, from time to time, by the Executive Council.

SUBSCRIPTION.

9. The Subscription for each Member of the Society shall be 7/6 per annum (American subscribers, two dollars), entitling the Member to one copy (post free) of the volume or volumes published by the Society for the year, and giving him the right to vote on all questions submitted to the General Meetings of the Society.

10. Subscriptions shall be payable in advance on the 1st January in each year.

11. Members whose Subscriptions for the year have not been paid are not entitled to any volume published by the Society for that year, and any Member whose Subscription for the current year remains unpaid, and who receives and *retains* any publication for the year, shall be held liable for the payment of the full published price of such publication.

12. The Publications of the Society shall not be sold to persons other than Members, except at an advanced price.

13. Members whose Subscriptions for the current year have been paid shall alone have the right of voting at the General Meetings of the Society.

14. Members wishing to resign must give notice in writing to the Honorary Secretary, before the end of the year, of their intention to do so: otherwise they will be liable for their Subscriptions for the ensuing year.

EDITORIAL FUND.

15. A fund shall be opened for the remuneration of Editors for their work in preparing Texts for publication. All subscriptions and donations to this fund shall be purely voluntary, and shall not be applicable to other purposes of the Society.

ANNUAL GENERAL MEETING.

16. A General Meeting shall be held each year in the month of April, or as soon afterwards as the Executive Council shall determine, when the Council shall submit their Report and the Accounts of the Society for the preceding year, and when the seats to be vacated on the Council shall be filled up, and the ordinary business of a General Meeting transacted.

AUDIT.

17. The Accounts of the Society shall be audited each year by auditors appointed at the preceding General Meeting.

CHANGES IN THESE RULES.

18. With the notice summoning the General Meeting, the Executive Council shall give notice of any change proposed by them in these Rules. Ordinary Members proposing any change in the Rules must give notice thereof in writing to the Honorary Secretary seven clear days before the date of the Annual General Meeting.

LIST OF MEMBERS.

(Members are earnestly requested to send Notice of Changes of Address to the Hon. Sec., 20 Hanover Square, London, W., to avoid mis-postage of Books and Notices).

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Arlen, Charles R.	... Chichester House, Chancery Lane, London, W.C.
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FOR VOLUMES IN PREPARATION

See Pages 5-6.

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