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Arabic into Latin in Twelfth Century Spain: the Works of Hermann of Carinthia

By
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Among the translators working in Spain in the middle of the twelfth century one of the most interesting is Hermann of Carinthia[1]). He is interesting because of his wide knowledge of Latin learning for which, in part at least, his teacher, Thierry of Chartres, must have been responsible; because of the apparent care in which he chose which Arabic works to translate and recommend as teaching-books in a science curriculum for the Latins; and above all, for his courageous – though premature – attempt to synthesize the knowledge of the Arabs and the wisdom of the Latins in his *opus magnum* – the *De Essentiis* (1143). This complex cosmological creation has been the subject of extensive treatment elsewhere[2]). It might be useful, however, to summarize the information I have gathered on Hermann's other works, which are all closely bound up with translation from the Arabic, and to show how his life-work follows a careful pattern, within which his translation of Abū Maʿshar's *Introductorium* and his original work the *De Essentiis* stand out as landmarks. As Haskins had noted (op. cit. p. 56), »a list of Hermann's writings must take account of Robert of Ketton's collaboration«, and it is clear that Hermann and his close friend, Robert, Archdeacon of Pamplona, were studying many of the same works together. However, their translations seem to have been done individually, though very often for the sake of or at the request of the other.

This list is, of necessity, provisional. Its debt to Charles Haskins cannot be overstated. It was Haskins who first investigated Hermann's work in detail and brought to light the *De Essentiis* in 1924[3]). Further information has been taken from Richard Lemay[4]), Lynn

[1]) The standard biography and bibliography of Hermann of Carinthia is that of Haskins (see note 3 below): for further discussion of Hermann and his relations with his contemporaries see C.S.F. Burnett, »A Group of Arabic-Latin translators working in northern Spain in the mid-twelfth century«, in: *Journal of the Royal Asiatic Society* 1977, 62–108. I am indebted to Peter Dronke of Clare Hall, Cambridge, for bringing the works of Hermann to my attention, and showing the way to a field which has proved extremely fruitful.

[2]) C.S.F. Burnett, *The De Essentiis of Hermann of Carinthia and twelfth century thought*, Cambridge Ph. D. thesis, 1976; see also »Hermann de Carinthia, *De Essentiis*«, edición preparada y anotada por el P. Manuel Alonso, in: *Miscelanea Comillas*, V (Santander 1946) 7–107, and, for a critical reassessment of Alonso's conclusions, Theodore Silverstein, »Hermann of Carinthia and Greek: A Problem in the »New Science« of the twelfth century«, in: *Medioevo e Rinascimento, Studi in onore di Bruno Nardi* (Florence 1955) II. 683–99.

[3]) C. H. Haskins, *Studies in the History of Medieval Science*, Cambridge/Mass., (²1927 repr. New York 1960) chapter III, »Hermann of Carinthia«, pp. 43–66; henceforth abbreviated Ha.

[4]) R. Lemay, *Abū Maʿshar and Latin Aristotelianism in the twelfth century*, Beirut 1962 (Le.).

Thorndike[5]), and the Catalogues of Thorndike and Kibre[6]), and of Francis Carmody[7]). The older works of Moritz Steinschneider are still valuable[8]). On the whole, however, the list is based on my own consultation of the manuscripts. Those I have seen personally or on microfilm, I have marked with an asterisk. The symbols for the manuscripts correspond to those used in the editions of the works concerned; for those works which have not been edited, I have invented symbols, for ease in reference, and in preparation for future editions. The references to the *De Essentiis* of Hermann of Carinthia apply to my own edition of the work which is paginated according to the foliation of Naples BN MS. VIII. C. 50 (see no. IV. 1 below). In addition to those mentioned in notes three to eight, the following abbreviations are used:

Br. S = C. Brockelmann, *Geschichte der Arabischen Literatur*, Supplementband, Leiden 1937–42.
Br.^{2} = C. Brockelmann, *Geschichte der Arabischen Literatur*, 2nd. ed., Leiden 1943–49.
CCAG = *Catalogus Codicum Astrologorum Graecorum*, Bruxellis 1898–1936.

The works are listed in the following order:

I. Works of Mathematics and Astronomy.

Translations or ›editions‹:
1. Euclid, *Elements.*
2. (?) Theodosius, *De Spheris.*
3. (?) Al-Khwārizmī, *Zīj* (astronomical tables).
4. Ptolemy, *Planisphere* (1 June, 1143).

Original works:
5. (?) *Liber noster de circulis.*
6. (?) *Item liber de inveniendа radice et alius Hermanni Secundi de opere numeri et operis materia.*
7. (?) *Item Hermanni Secundi de compositione astrolabii.*

II. Works of Astrology and Meteorology.

Translation:
1. Sahl ibn Bishr, *Fatidica* (1138).

Original works:
2. *De Occultis.*
3. *Liber Imbrium.*

Translations:
4. Abū Maᶜshar, *Maius Introductorium* (1140).
5. (?) Abū Maᶜshar, *De Revolutionibus Nativitatum.*

III. Muhammadan Literature.

Translations:
(a) *De Generatione Mahumet,* (b) *Doctrina Mahumet.*

IV. Works consolidating Astronomy and Astrology.

Original work:
1. *De Essentiis* (1143).

Translation:
2. (?) Ptolemy, *Quadripartitum* and *Almagest.*

V. Conclusions.

[5]) L. Thorndike, *A History of Magic and Experimental Science*, New York 1922/repr. 1929 (T I = volume I, T II = volume II).
[6]) L. Thorndike and P. Kibre, *A Catalogue of Incipits of Mediaeval Scientific Writings in Latin*, London ^{2}1963 (TK).
[7]) F. J. Carmody, *Arabic Astronomical and Astrological Sciences in Latin Translation*, Berkeley 1955 (Car.).
[8]) M. Steinschneider, *Die Hebräischen Uebersetzungen des Mittelalters*, Berlin 1893/reprint Graz 1956 (St. H.); id., ›Die europäischen Uebersetzungen aus dem Arabischen‹, in: *Sitz. d. Kais. Ak. d. Wiss.*, phil.-hist. Kl., Wien, CXLIX. 4 (1904), CLI. 1 (1905), repr. together, Graz 1956 (St. E).

1. The *Elements* of Euclid.

Incipit: *Septem sunt omnis discipline fundamenta . . .* – Ha. 50
*Paris BN MS. lat. 16646, *saec.* XIII, fols. 1r-108r.

This MS., containing the first twelve books of Euclid's *Elements* in a version different from any other known, has been identified by Birkenmajer as the MS in the *Biblionomia* of Richard of Fournival described as containing *Euclidis geometria arithmetica et stereometria ex commentario Hermanni Secundi* (Ha. 50). The author's name does not occur in the MS. itself, nor have any convincing proofs of authorship been brought forward by Busard who is in the process of editing the MS.[1]). Clagett has shown that *commentarius* need not have been used in the modern sense of the word, and that ›Hermann's‹ *commentarius* was a revision of the translation by Adelard of Bath which Clagett calls Version II, but with further use of an Arabic text[2]).

Hermann shows himself familiar with the *Elements* in the *De Essentiis*[3]), and Robert of Ketton says that he has laboured over it[4]). I believe that the preface in Paris BN MS. lat. 16646 shows clear signs of Hermann's style and terminology. It is worth quoting this in full in order to correct some slight errors in the printed versions of Clagett (*op. cit.* 38) and Busard:

(fol. 2r) Septem sunt omnis discipline fundamenta, in quibus omnium rerum ad mathematice studia pertinentium firma essentie concepcio certusque (a) veritatis intellectus in quadam quasi materia et causa fundata existunt. Sunt autem hec: Preceptum, Exemplum, Alteracio, Collacio, Divisio, Argumentum et (b) Finis. Preceptum est integra sententie quedam et absoluta proposicio. Exemplum est precepti in actu et re quedam explanacio. Alteracio est que datum exemplum destruens alioque divertens, precepto non convenit, sicque per indirectam raciocinacionem, quod infringere nequid impossibilitate quadam confirmat. Collacio est conveniencium coniunctio. Divisio est disparium (c) disiunctio. Argumentum est racio ad veritatem precepti. (fol. 2v) Finis est conveniens omnium conclusio, quo adepto, deinceps extraneum in philosophie disciplinis restet. Atque hoc longius prosequi (d) locus non exigit. Nec enim huius singulariter sunt negocii verum omni (e) discipline diffusus (f) atributa. Nunc autem artis elementa quedam et quasi communes loci prestituendi sunt e quibus (g) sequencium racio promptius et evidencius proditura est.
(a) etiam certusque Clagett, Busard; *the MS seems to indicate that an* et *has been cancelled. (b) et* Clagett om. *(c) disputationum (?)* Clagett, Busard; *the word is clearly* disparium *but a crease in the folio has obscured it. (d) persequi* Clagett, Busard. *(e) omnis* Clagett. *(f)* diffusus *(clear in the MS) should perhaps be amended to* diffusius. *(g) equibus*, Clagett, Busard.

This preface is based on some introductory sentences which Hermann must have found in

[1]) H.L.L. Busard, ed., *The Translation of the Elements of Euclid from the Arabic into Latin by Hermann of Carinthia* (?), Leiden 1968 (books I–VI); *Janus* (1972) 125–187 (books VII–IX); books X–XII forthcoming. Busard cites, as possible evidence for Hermann's authorship, his ›peculiar declension of the word *diameter*‹, and the use of the word *essentia* ›which may refer to his work *De Essentiis*‹ (ed. 1968, pp. 2–3). This evidence, however, is weak, since Hermann shares his declension of *diameter* (using interchangeably the neuter form *diametrum, -i*, and the feminine form *diametros, -on, -i*) with Adelard, and other Latin writers (see *Thesaurus Linguae Latinae*, article ›diameter‹), and the word *essentia* never refers to the *De Essentiis*, in this version of the *Elements*.
[2]) M. Clagett, ›The Medieval Latin Translations from the Arabic of the *Elements* of Euclid‹, in: *Isis*, 44 (1953) 16–42, see especially pp. 26–7.
[3]) *De Essentiis*, 63rG, 66vG, 67rE–H, 67vC.
[4]) Preface to al-Kindī, *De Iudiciis* (Ha. 121): *Quamquam post Euclidem Theodosii cosmometrie . . . libencius insudarem.*

an Arabic original[5]). They appear in a more skeletal form in the preface to Gerard's translation of Euclid (Clagett [note 2] 38; see also p. 105 below) but here they are filled out with material which has the distinctive stamp of Hermann's philosophy:

(i) The same kind of sentence structure and vocabulary are found here and in the *De Essentiis*:

Elements	*De Essentiis*
(a) *Septem sunt omnis discipline fundamenta in quibus . . .* *Sunt autem hec: Preceptum, Exemplum, Alteracio . . .*	(a) (58 vB–C) *Ea vero sunt que . . .* *Sunt autem hec: Causa, Motus, Locus, Tempus, Habitudo.* (cf. also 58vD–E: *Tria sunt . . . omnis geniture principia*)[6])
(b) *Atque hoc longius prosequi locus non exigit.*	(b) (60 rD) *cum enim de prima et movente causa, quantum locus exigebat, expeditum sit . . .*

(c) *Integra* and *absoluta* and their cognates are used very frequently by Hermann:

Elements	*De Essentiis*
Preceptum est integra sententie quedam et absoluta proposicio.	(60 rC) *Hec sunt que . . . integritatem absolvant.*

(d) Note the metaphorical use of *explanatio*:

Exemplum est precepti in actu et re quedam explanacio.	(58 vE) *(forma) propositum ordinata quadam explanatione absolvit.*

(ii) Hermann emphasizes that there is an order inhering naturally within the subject-matter, to which the order of study must be made to correspond. This concept is repeatedly expressed in the *De Essentiis*, cf. 60rC-D:

Videtur autem omnino necessarium ut, inter initia ipsius tamquam thematis, fiat ordinata partitio quo facile amplectamur animo quid quo loco expectandum sit, neque id passim atque lege incerta, verum ipsa naturali consequentie serie.
»It seems completely necessary that amongst the first sections of the ›theme‹ as it were, there should be a well-ordered plan, so that we may easily grasp in our minds what to expect in which place, and not find the contents scattered haphazardly and following an uncertain law, but rather organized in the natural order of consequence itself«.

The five essences both ›bring all coming-to-be into actual existence‹ (58vD) and are the starting-point of all study of Hermann's second division of science – i. e. ›natural speculation‹ (cf. preface to *Planisphere*, below page 109).

Similarly, here, in respect to the ›mathematical discipline‹ – which corresponds to Hermann's first division of science – the ›seven foundations‹ not only provide the starting-

[5]) The fact that this material is Arabic in origin is corroborated by a passage in the *De Divisione Philosophiae* of Dominicus Gundissalinus, which is quoted by Busard (ed. books I–VI, p. 4 after ed. Baur, Gundissalinus De Divisione Philosophiae [*Beiträge z. Gesch. d. Philosophie d. MAs.* 4], Münster 1903): *Instrumentum eius est demonstracio, cuius demonstracionis partes diversis assignantur modis. Nam secundum Boecium sex sunt: proposicio, descripcio, disposicio, distribucio, demonstracio, conclusio. Secundum Arabes autem septem sunt, scilicet: propositum, exemplum, contrarium, disposicio, differencia, racio, conclusio, quorum omnium descripciones illorum est assignare, qui librum Euclidis incipiunt legere.* In fact, with the exception of one term (*racio* for *probatio*) Gundissalinus' list of Arab modes matches the list in Gerard's translation.

[6]) Another example of sentence structure which is identical to example (i) (a) occurs in Hermann's preface to Abū Maᶜshar's *Introductorium* (Ha. 46): *Septem (inquit) sunt omnis tractatus inicia.*

point for that study, but can also be considered in physical terms: as ›matter‹ and ›cause‹, or even – and the physical connotation is certainly present here – as ›elements, so to speak, of the art‹.

(iii) In the text the author looks forward to the study of astronomy:
(MS. lat. 16646, fol. 27r, Busard ed., 1968, p. 84) *Hic est igitur locus, qui quantum astronomice speculacioni generat adminiculum, cum qui* (read: *eum cui?*) *hic notus est, illic latere non possit*[7]).

In the *Planisphere* astronomy is the crowning achievement of ›mathematical study‹, and Hermann describes its principles in words reminiscent of this preface to Euclid:

Eius que motum sequitur, omnis vis et ratio in numero, mensura et proportione constat, ut omnis matheseos discipline et primordialis et finalis extiterit causa.

In short, there is nothing in the Euclid version in Paris BN MS. lat. 16646 which argues against an attribution to Hermann, and there are several considerations which, though not conclusive in themselves, suggest when taken together, that Richard of Fournival's attribution of the version to ›Hermannus Secundus‹ (which he may have found in the exemplar from which he had his copy made[8]) is correct.

2. (?) *De Spheris* of Theodosius – Ha. 51.

In the *De Essentiis* Hermann shows the same kind of knowledge of Theodosius' *De Spheris* as of Euclid's *Elements*. He quotes a definition (63vE) and uses two theorems from the work (77vB, D). Similarly, Robert of Ketton records his intention to work on the treatise, just as he says that he has already worked on Euclid's *Elements*[1]). If, as seems likely, Hermann and Robert's references to Euclid point to a version of the *Elements* by Adelard which Hermann eventually revised, then can we assume the same thing in the case of Theodosius? In fact, a ›Commentary‹ on Theodosius by Adelard is mentioned in the same *Biblionomia* of Richard of Fournival as Hermann's ›Commentary‹ on Euclid (Delisle, *Cabinet*, II.526, no. 42: *Dicti Theodosii liber de speris, ex commentario Adelardi*; this MS. has not been identified; for the term *commentarius* see p. 102 above). Moreover, one of the anonymous Latin versions of Theodosius' *De Spheris* shows abundant proof of the hand of Adelard. The *incipit* of this version is *Spera est figura solida*, which has, up to now, been attributed to Plato of Tivoli, on the grounds that it follows the same author's *liber Embadorum* in certain MSS. (see Ha. 51,31, St. E. no. 46, no. 98a)[2]). It seems clear, however, that *Spera est figura solida* corresponds in style, not with the works of Plato of Tivoli, nor with Adelard's translation of the *Elements* known

[7]) For this use of *adminiculum*, cf. *De Essentiis*, 58vD: *Nec preter hec* (i. e. the five essences) *extraneum aliquod necessarium sit adminiculum.*

[8]) For Richard of Fournival's method of procuring MSS. for his own scribes to copy, see R. H. Rouse, ›Manuscripts belonging to Richard de Fournival‹, in: *Revue d'Histoire des Textes* III (1973) 253–69.

[1]) Robert of Ketton, preface to al-Kindī, *De Iudiciis* (Ha. 121): *Quamquam post Euclidem Theodosii cosmometrie . . . libencius insudarem.* It is reasonably certain that the *De Spheris* is under discussion here, since there are several testimonies at this period to *cosmometria* meaning ›spherical geometry‹ (cf. Hugo of St. Victor, *Practica Geometriae*, ed. R. Baron, in: *Osiris* XII [1956] 187–8, and John of Seville[?] *Sententiae de diversis libris*, Oxford, St. John's MS. 188, fol. 97r).

[2]) For specimens of the two Latin versions see the preface to J. L. Heiberg's edition of the original Greek: *Theodosius Tripolites Sphaerica, Abh. d. Ges. d. Wiss. z. Göttingen*, Phil.-Hist. Kl. n. f. XIX. 3, Berlin, 1927. See also P. Ver Eecke's French tr. of Theodosius' *Sphaerica* (Bruges 1926) xxxv–xli. The printed version of Gerard's translation (Venice 1518, fols. 91v–104r) seems to be contaminated with variants from the other Latin version.

as Version I, but with Adelard's Version II (which Hermann's ›Commentary‹ on the *Elements* also follows). In fact, between Version II and *Spera est figura solida*, having made allowance for the addition of a third dimension, the terminology and phraseology is almost identical. I quote, for comparison, the other anonymous version of the *De Spheris*, of which the attribution to Gerard of Cremona (see TK.1523 and references there) seems to be confirmed by the parallels in terminology in his own translation of Euclid's *Elements*[3]):

Hermann (Paris BN MS. lat. 16646, fol. 3r, ed. Busard p. 10)	Adelard, Version II (Paris BN MS. lat. 7374A, fol. 1r)	Theodosius *(Spera est figura solida . . .)* (ed. Heiberg, op. cit. pp.x-xi)
(a) Circulus est figura plana una quidem linea contenta, que circumferencia nominatur, in cuius medio punctus a quo omnes linee ad circumferenciam exeuntes sibi invicem sunt equales, et hic quidem punctus circuli centrum dicitur.	(a) Circulus est figura plana una quidem linea contenta, que circumferencia vocatur, in cuius medio punctus a quo omnes linee ad circumferenciam exeuntes sibi invicem sunt equales, et hic quidem punctus circuli centrum dicitur.	(a) Spera est figura solida una tantum superficie contenta, in cuius medio punctus est a quo omnes linee recte ad eius superficiem exeuntes sibi invicem sunt equales, et hic punctus spere centrum dicitur.
(b) Diametros circuli recta est linea que super centrum eius transiens atque terminos suos circumferencie applicans circulum in duo media dividit.	(b) Diametros circuli linea est recta que super centrum eius transiens extremitatesque suas circumferencie applicans, circulum in duo media dividit.	(b) Dyametrus spere est linea recta per centrum spere transiens, extremitatesque suas superficiei spere applicans ex utraque parte.

Gerard, Euclid translation. (Paris BN MS. lat. 7216, fol. 1r)	Theodosius *(Spera est figura corporea . . .)* (ed. Heiberg, op. cit., p.viii, and Paris BN MS. lat. 9335, fol. 1r)
(a) Circulus est figura plana, una linea que (ex) circumferencia vocatur comprehensa, in cuius medio est punctum a quo omnes linee exeuntes ad circumferenciam sunt equales, alie videlicet aliis. Illud autem punctum circuli est centrum.	(a) Spera est figura corporea una quidem superficie contenta, intra quam unum punctorum ipsius existit, a quo omnes recte linee protracte que illi superficiei occurrunt, sunt adinvicem equales, et punctum illud spere est centrum.
(b) Diametrus circuli est linea recta transiens per ipsius centrum que pervenit in duabus partibus ipsius ad lineam comprehendentem ipsum secans eum in duo media.	(b) Meguar vero spere est quelibet recta linea per centrum transiens et ab utraque parte ad spere superficiem perveniens, cum ipsa figitur et spera circa ipsam volvitur.

Hermann (fol. 18r, ed. pp. 53–4)	Adelard, Version II (fol. 12r)	Theodosius *(Spera est figura solida . . .)* (p. x-xi)
(c) Circuli equales sunt, quorum diametra equalia . . .	(c) Quorum diametri sunt equales circulos equales esse necesse est.	(c) Equales sibi invicem dicuntur esse spere, quarum dyametri ad invicem sunt equales . . .
(d) Linea super circulum in utramque partem ducta, si	(d) Circulum contingere dicitur linea que cum circulum	(d) Speram contingere superficies dicitur que, cum speram

3) I leave open the question of the attribution of this version of the *Elements* of Euclid (*incipit*: *Ea a quibus procedit scientia ex qua res*, TK. 479) to Gerard, though this attribution seems to be well-founded (see M. Clagett, ›The Medieval Latin translations‹, in: *Isis*, 44 [1953] 28–9). It seems clear, however, that both this version of Euclid and *Spera est figura corporea* are the works of the same translator.

attingit nec secat, contingens circulum dicitur . . .	tangat in utraque eiecta parte non secat circulum . . .	tangat, in quamcumque partem eiecta fuerit, speram minime secat . . .
(e) Recte linee infra circulum equaliter a centro distant, ad quas a centro ducte perpendiculares equales sunt.	(e) Recte linee in circulo equaliter a centro distare dicuntur, cum a centro ad ipsas ducte perpendiculares fuerint equales.	(e) Circuli in spera equaliter a centro distare dicuntur, cum perpendiculares a centro spere ad ipsorum superficies ducte (equales) fuerint ad invicem.
(f) Plus autem distat a centro in quam longior perpendicularis cadit.	(f) Plus vero a centro dicitur distare in quam perpendicularis longior cadit.	(f) Circulus autem a centro magis distare dicitur, supra cuius superficiem cadens perpendicularis est longior.

Gerard, Euclid translation (fol. 13v)	Theodosius *(Spera est figura corporea . . .)* (fol. 1r)
(c) Circuli equales sunt quorum dyametri vicissim sunt equales . . .	(c) –
(d) Linea recta que circulum contingere dicitur est que circulo occurrens et in duas partes protracta non secat eum.	(d) –
(e) Dicitur quod elongatio rectarum linearum a centro in circulo equalis est cum fuerint perpendiculares a centro ad ipsas protracte equales.	(e) Circulorum in spera a centro elongatio equalis dicitur, cum perpendiculares, que a centro spere ad circulorum superficies protrahuntur, adinvicem sunt equales.
(f) Linea autem cuius longitudo a centro existit maior est super quam maior cadit perpendicularis.	(f) Circulus vero qui magis est remotus, est supra quem longior cadit perpendicularis.

On this evidence, it seems very probable that *Spera est figura solida* was translated by Adelard himself. Without a preface, it is difficult to tell whether Hermann had altered or ›edited‹ this translation, but it is likely that this version is related to, if not the same as, the version of Theodosius quoted by Hermann and mentioned by Robert. If a translation (or rather, a redaction) of *De Spheris* is to be attributed to Hermann, it may follow Robert's translation of the *Iudicia* of al-Kindī, which itself precedes Hermann's *De Occultis*.

3. (?) Translation of the Khorasmian tables (Al-Khwārizmī, *Zij*).

Ha. 44, Le. 37, Suter, ›Die astronomischen Tafeln des Muhammed ibn Mūsā al-Khwārizmī in der Bearbeitung des Maslama ibn Aḥmed al-Madjrīṭī und der latein. Uebersetzung des Athelhard von Bath‹ (*D. Kgl. Danske Vidensk. Selsk. Skrifter. 7 Raekke. Historisk og Filosofisk.* Afd. III.1) Copenhagen 1914.

Haskins quotes two passages in which Hermann claims to have made a translation of these tables:

(a) *quorum plus fialcurdaget azerea (in sectionibus formis) secundum fialcurdaget albatia (tardis) tractatur, que in translatione nostra zigerz Alchuarismi sufficienter exposuimus* (Abū Maʿshar, *Introductorium*, Naples BN MS. VIII. C. 50, fol. 43r; there is no equivalent in John of Seville's translation of the *Introductorium* to the words *que in translatione . . . exposuimus*; see Le. 37).

(b) *Albateni . . . et Alchoarismus quorum hunc quidem opera nostra Latium habet.* (This is a note in the text of Hermann's translation of Ptolemy's *Planisphere* [ed. Heiberg, s. below p. 108, clxxxvii]).

The *Planisphere* was addressed to Thierry of Chartres, Hermann's teacher (see no. 4 and no. 5 below). In the preface to the *Planisphere* Hermann recommends which text-books

to use for a programme of scientific education, and he promotes his own and his collaborator Robert of Ketton's translations. Note (b), occurring near the beginning of the treatise, can be taken in conjunction with these words of the preface. Of all the works recommended by Hermann, only the tables of al-Khwārizmī are known to have been in Chartres in the twelfth century[1]). Suter, in editing Adelard's translation, claims that there is evidence in the variants between Chartres MS. 214 and an Oxford MS. (Bodleian Auct. F.1.9) of another translation of the tables, which, he adds, may have been made by Hermann of Carinthia (op. cit. p. xiii). It is more likely that, if Hermann's name is to be associated with the tables, he would have revised Adelard's work, with occasional reference to the original Arabic – as he seems to have done with other translations made by Adelard (see nos. 1 and 2) and it might even be Hermann's revision that appears in either the Oxford or the Chartres MSS.[2]). Suter could not decide which of these MSS. diverged from the original version of Adelard (for which we have no other direct evidence), and it is regrettable that the version of the tables in Chartres MS. 214 can no longer be scanned for traces of the hand of Hermann.

Hermann also seems to know a set of tables by Abū Maʿshar called the *zīj al-kabīr* (Le. 36: Abū Maʿshar, *Introductorium* I.1, see below) which are attested, though not extant, in Arabic sources, and are identified by Pingree (with a slight hesitation) with the *zīj al-hazārāt* (the ›tables of the Thousands‹)[3]). These tables, based on the ›cycles of the Persians‹[4]) are, therefore, the same as, or derivative from, the *zich persarum aut indorum* to which Abū Maʿshar refers in *Introductorium*, VII.1 (Le. 37). Hermann writes (*Introductorium*, I.1, ed. Venice 1506, fol. a2v):

Hanc igitur universalem sapientiam Ptholomeus post Hamum, et ego (ait Albumasar) in tabulis nostris maioribus. i. e. fi zichene elkebir, celestium discursus persecutus sum: nos (i. e. Hermann) quoque hodie sequimur (Le. 36, n. 3)[5]).

Although al-Khwārizmī's tables also are based on Persian cycles[6]), they are clearly distinct from Abū Maʿshar's tables, and unless there is confusion in Hermann's own mind, it seems that he knew both works: the tables of al-Khwārizmī in Adelard's translation, perhaps revised and promoted in the French schools by himself (*opera nostra Latium habet*), and Abū Maʿshar's *zīj al-hazārāt* perhaps only in Arabic, and used in conjunction with the same author's *kitāb al-ulūf*. The occasional mention of tables by ›Hermann‹ in MS. catalogues (e. g. Cambrai MS. 950) appear to relate to Hermann of Saxony (14th.C.) rather than our Hermann.

1) Chartres MS. 214, destroyed in the Second World War; Chartres MS. 498 similarly destroyed, but available on microfilm.
2) I owe to the kind and assiduous services of Mr. J. Lipton of the University of California at Los Angeles the information that the two Chartres MSS. correspond very closely with each other, over against the Oxford MS.
3) See D. Pingree, *The Thousands of Abū Maʿshar* (London 1968) 2.
4) Pingree, *ibid.*
5) Pingree observes (art. ›Abū Maʿshar‹, in: *Dictionary of Scientific Biography*, ed. C. C. Gillispie, bibliography no. 3) that the phrase *ego ... persecutus sum* does not appear in the Arabic MSS. which he has examined. For Hermann's use of the Persian material in Abū Maʿshar's *zīj al-hazārāt* and *kitāb al-ulūf*, see C. S. F. Burnett, ›The Legend ...‹, in: *Journal of the Warburg and Courtauld Institutes* XXXIX (1976) 231–4.
6) See Pingree, *op. cit.* 37,49. O. Neugebauer (tr.), ›The Astronomical Tables of al-Khwārizmī‹ (*Hist. Filos. Skr. Dan. Vid. Selsk.* 4.2) Copenhagen 1962, 82–4.

4. The *Planisphere* of Ptolemy.

Incipit: *Quemadmodum Ptolomeus et ante eum . . .*
Ha. 47, Heiberg, *Ptolemaei opera astronomica minora* (Leipzig 1907) xii-xiii, clxxx-clxxxix, 225–59 (critical edition); E. Poulle, ›L'Astrolabe médiéval d'après les MMS. de la BN‹, in: *Bibliothèque de l'Ecole des Chartes* CXII (1954) 84, 100.

A Vatican MS. Reg. 1285, *saec.* XIII, fols. 153–162r (Hei.).
B Vatican MS. Vat. lat. 3096, *saec.* XIV–V, fols. 3r–14r (Heiberg).
C *Paris BN MS. lat. 7214, *saec.* XIV, fols. 211–217v (Hei., Poulle).
D *Paris BN MS. lat. 7399, *saec.* XIV, fols. 1–12r (Hei., Poulle).
E Oxford, Bodleian MS. Auct. F. 5. 28, *saec.* XIII, fols. 129–136r (Hei.).
F Dresden MS. Db. 86, *saec.* XIV, fols. 214–219r (Hei.).
G *Paris BN MS. lat. 7377B, fols. 73–81v (Poulle).
H Lyon MS. 328, *saec.* XIV, fols. 47–59 (TK 1190).

The early printed version (pp. 227–274 of *Sphaerae atque Astrorum coelestium ratio, natura, et motus*, I. Valderus, Bâle 1536) ascribes the translation to Rudolph of Bruges.
This work was once in Paris BN MS. lat. 16652 (Poulle) whose first folios are missing. There is no preface in MSS BCE. E includes several notes of Maslama translated into Latin (see Hei. clxxx-clxxxi). Signs of a second translation also occur in the marginal notes of E (Hei. clxxxvii-clxxxviii). Poulle writes, of the Paris MSS, that ›les textes sont quelque peu différents de celui de l'édition Heiberg‹.

Hermann's translation of an Arabic translation of Ptolemy's work made by Maslama al-Majrīṭī was once thought to be the only *medium* by which the *Planisphere* had come down to us[1]). The work explains the principles of the projection of the celestial sphere onto a plane circle – i. e. the principles on which the construction of an astrolabe is based[2]). The knowledge of these principles is the first step towards becoming a competent astronomer (and astrologer) and Hermann calls his work (p. 110 below):

primarium hoc opus celestisque scientie quasi clavem quandam (this excellent primary work and kind of key to celestial science).

He takes the opportunity to show (a) how knowledge of astronomy, and of the effects of the stars on the earth, follows on from this work, and (b) how his own scientific work relates to this celestial science. Hence he refers to his own translation of Abū Maᶜshar (see no. II.4 below) and to his *De Essentiis* which he has begun, but which is not yet finished. Since the *Planisphere* was completed at Toulouse (Tolosa; see M.-T. D'Alverny, ›Deux Traductions . . .‹, in: AHDLMA 16 [1947] 81) on June 1, 1143, the *De Essentiis*, also dated 1143, must have been completed later in the same year.

It is worth re-editing and translating Hermann's preface to the *Planisphere* because of its central position in demonstrating Hermann's philosophy, and, in part, to improve on some readings and punctuation in Heiberg's text, in the light of Paris BN MS. lat. 7377B, which Heiberg did not consult. I add some readings from Abū Maᶜshar, *Introductorium*, I.1, and V. 9 (Paris BN MS. nouv. acq. lat. 3091, fols. 113v–114r, and fol. 127r) to show how Hermann's conception of celestial science has been influenced by Abū Maᶜshar's ideas (as Lemay has already indicated, p. 286).

[1]) There is an Arabic text of the *Planisphere* (but not of Maslama's version) in MS. Istanbul, Aya Sofya, 2671 (see Toomer, article ›Ptolemy‹ in *Dictionary of Scientific Biography*, ed. Gillispie, 1970–76).
[2]) For the relationship between the *Planisphere* and the construction of astrolabes, see Toomer, articles on ›Ptolemy‹ and ›Theon‹ in *Dictionary of Scientific Biography*, and O. Neugebauer, ›The early history of the Astrolabe‹, in: *Isis*, 40 (1949) 240–56.

Hermann's preface to Ptolemy's *Planisphere*.

*Quemadmodum Ptolomeus et ante eum non*nulli veteris auctoritatis viri antiquas seculi scribunt historias, que cunctis disciplinalibus scientiis finis est, ipsa earundem omnium principium existit, nature comitata seriem cuius omnis fere terminus in originis meta concluditur. Quod quoniam presentis est negocii, locus exigit ab integro exponi, quo plane constet quonam presentis instituti spectet auspicium, ac, *ne longa fiat digressio, nichil prohibere* videtur quin, ad imitationem alterius translationis nostre, hic quoque breviter commemoremus, ne, si diutius insequamur, scribendis[1]) moram faciamus.

Narratur quippe, transacto primo et universali diluvio, qua primum undis ad priores alveos *reversis arida patuit, senem cum filiis superstitem*, cum ex Armenia temperatiores auras sequens inter Tigrim et Eufratem descenderet[2]), in quarto climate, qua postea Babilonia surrexit, constitisse.

Hic ex nepotibus eius quidam, ut ferunt, filius primogeniti (plane quidem antequam nepotum successio aut trans Kascarum aut citra Kufam[3]) haut longe a Mesopotamie terminis diffunderetur) *seu avita memoria commonitus seu divino* fortasse nutu (*Hei.* p. clxxxiv) commotus, primus sidereos cursus sequens effectus mirari cepit. A quo paulatim sequentis etatis studium in orbem derivatum[4]) in tantum usque accrevit, quoad plane demum deprehenderet omnem superioris mundi scientiam principe loco in ge*minas dividi species – in motus celestes* et motuum effectus – tanto quidem intervallo discretas, quanta est inter disciplinale studium et naturalem speculationem distantia. Quarum eius, que motum sequitur, omnis vis et ratio in numero, mensura et proportione constat, ut omnis matheseos discipline et primordialis et finalis extiterit causa. *Est enim stellarum mo*tus omnino bipartitus – in eundem et diversum – quorum alter accidentalis omnibus idem, alter proprius omnifariam diversus atque eidem contrarius, uterque circularis, ut necesse fuerit ad concepti artificii constitutionem et dimensioni[5]) circulorum et habitudini ad invicem

Abū Maᶜshar, *Introductorium* V. 9
(BN MS. n.acq.lat 3091, fol. 127r)

Quemadmodum Ptolomeus et preter eum quamplures veteris auctoritatis viri antiquas seculi hystorias memoriter retrectantes narrant, ab universali diluvio quod universam terram operiens[a]) omni fere prioris seculi memoria deleta, paucas admodum animas superstites reliquit ex omnibus mundi nationibus, in Caldea primum siderei motus atque virtutis concepto *studio sapientia nata deinde successu temporis* adolescens paulatim in orbem dirivata est.

Narrant quippe transacto diluvio qua primum undis ad priores alveos reversis arida patuit Noe cum filiis superstitem cum ex Armenia temperatiores auras sequeretur usque qua postea Babilonia surrexit, pervenisse. Deinde re*nascente mundo nepotes eius ab hoc medio* undique versum penes Tygrin usque Kascarum[b]), ab Eufrate usque Kufam temporis successu diffusos.

Inter quos primum ut aiunt unus ex filiis Sem, seu avita memoria instructus, seu divino proprii ingenii dono illustratus, sidereos cursus sequens effectus mirari cepit. A quo sequentis etatis studium in tantum usque adcrevit quoad ex omni celo tam signiferi circuli partium quam stellarum infra discurrentium pro sua cuiusque virtute firmata.

Introductorium, I.1 (fol. 113v) Partimur igitur omnem syderum stellarumque scienciam gemina specie – in motus celestium ac motuum[c]) effectus. Prima quidem species mathematica, universalis sapientia vocatur, integram etenim perfectamque tradit scienciam quantitatis et habitudinis circulorum motuumque celestium in se cuiusque primum, deinde ad alios, tum usque ad terre globum... (fol. 114r) unde omnis sciencie primordium, partem rationi tribus ex locis, compoto, proportione et mensura argu*mentum necessarium infert*... Secunda vero naturalis in suo quidem genere non minus universalis stellarium corporum naturas et proprietates in se primo, tum accidencium inferioris mundi ducatus partim crebris quibusdam sensibilibus experimentis, partim naturali speculatione quadam insequitur.

1) scribentis *Hei.*
2) descendit *Hei.*
3) Rufam *Hei.*
4) deviatum *Hei.*
5) dimensionem *Hei.*

a) universali quod universam terram diluvio operiens MS.
b) rascarum MS.
c) motum MS.

ipsorumque motuum momentis singula proponi studia. Quorum quoniam primi traduntur autores Indi, Perse et Egyptii inventionem secuti sunt, que disciplina primis ordinavit gradibus. Idem ergo motus quoniam equabilis est circuli super centrum et axem immobilem omnia continentis spere, seorsum hunc scribendum duxit Ptolomeus, quippe primum in ipso tamquam vestibulo astronomie quasi thema quoddam totius studii proponens, prout idem diversi principium et equalitatem inequalitatis cardinem intellexit, nec, opinor, sine imitatione Abracaz, quem in omni celesti motu auctorem habet, quemadmodum Sicheum in motus effectu. Ex quibus et duo Ionica lingua collegit volumina, in primam[6]) Sintasim, in secundam[6]) Tetrastim – Arabice dicta Almagesti et Alarba, quorum Almagesti quidem (*Hei.* p. clxxxv) Albeteni commodissime restringit, Tetrastim vero Albumasar non minus commode exampliat – in utroque et ipse et sequaces eius eas dividentes[1]) ordinant, ut quoniam altera submota, alteram relinqui impossibile est, nec convertitur illa naturaliter, ut finis est disciplinalis studii, naturalis quoque speculationis existat origo; cuius prior pars superioris mundi, ut sequens inferioris, naturam contemplatur – id autem est materiales rerum causas, quemadmodum illa formales, omnis videlicet geniture principia post primam ipsam causam utrumque moventem, ut in eo quod de essentiis instituimus, plenius patebit. Cum itaque motus quidem sit huiusmodi, effectus vero motum consequens, omne hoc studium ab eodem motu rectissime inchoat.

Introductorium, V. 10 (fol. 127r) Indi vero primi seculi partes seu ita primum habuerint seu Caldeorum inventione postea recuperarint, prout rectius eis visum est, stellarum terminos aliter ordinantes . . .

Quod igitur omnium humanitatis studiorum summa radix et principium est, cui potius destinarem quam tibi, quem primam summamque hoc tempore philosophie sedem atque immobiliter fixam varia tempestate fluitantium studiorum anchoram plane quidem, ut novi, et fateor (nec enim diis placeat me, sicut iners volgus solet, invidia teneat, ut sponte quidem aut mendacio locum prestem aut veritatem dissimulem) tibi, inquam, diligentissime preceptor Theodorice, quem haut equidem ambigam, Platonis animam celitus iterum mortalibus accomodatam. Quo factum est principaliter, ut non aliter quam aureis culmis Cererem, maturo palmite Bacchum, unum te Latini studii patrem astronomie primitiis donandum iudicarim, quippe cum nec ego quid[2]) offerrem melius, haberem, nec tibi sapientie dono quicquam acceptius cognoscerem; secundo vero, ut id quod solertiam tuam minime latere potest, aliis quoque per te innotescat (*Hei.* p. clxxxvi) interim: quanta presumptione astronomie nomen usurpant, qui necdum principium eius viderint, que sine tribus premissis ita recte possibilis est, ut Ycarus volare potuit, nisi forte his, que novo freti ingenio conversis discipline gradibus a fine incipiunt, – qui tamquam neglecto naturali gressu retrocedentes postpositis nimirum luminibus cecum carpant iter necesse est; tertio vero ut, quoniam tanti viri primarium hoc opus celestisque scientie quasi clavem quandam labor noster nunc tandem Latio confert, antequam in profanas insidiantium manus incideret, tua sanctissima constaret auctoritate. Quantam enim putas hominum partem hoc tempore superstitem, que propria contenta sorte non alieni cupiditate boni ferveat aut potius odio contabescat? Que passio maxime Latinitatis inopiam hucusque fovit, necdum, licet[3]) pereunte materia, quiescens; quin me quoque, qui longe inter alios latere putabam, usque adeo sepius impellat, ut, tamquam cedens invidie voto, remisso tanto labore, potius ad commune quodlibet vivendi negotium confugiam – cum presertim cunctis iam animi divitiis postpositis, nichil preter fortuitas opum sarcinas in pretio videam – nisi unum te virtutis exemplar haberem; quem nec labor vincit, nec delicie temperant, nec denique potentissi-

[6]) in prima(m) sintasim, in secunda *Hei.* (the agreement is with *scientiam* or *disciplinam*, cf. *altera submota*, *alteram relinqui* below).
[1]) *read* dividendas?
[2]) quod *Hei.*
[3]) nec, dum licet *Hei.*

ma pervertit ambitio; ut tu quoque ceteris diffugientibus deserte et tamquam mediis exposite fluctibus philosophie naufragium patiaris. Tuam itaque virtutem quasi propositum intuentes speculum, ego et unicus atque illustris socius Rodbertus Ketenensis ›nequitie dispicere, licet plurimum possit‹, perpetuum habemus propositum, cum, ut Tullius meminit, misera sit fortuna, cui nemo invideat. His habitis, ne diu differamus, ab ipsis eius verbis tractatus initium statuamus, non alia transferendi lege quam qua id ipsum Maslem in Arabicam transtulit.

Translation:

Just as Ptolemy and, before him, several other men of venerable authority write the ancient histories of mundane events, that which is the aim of all scientific teaching is the beginning of the same teaching, since it follows the order of nature by which every end is brought round into the turning post of the beginning. Since this is our present duty, this is the place to describe it from the beginning, so that it should be clear in what direction the auspices of the present treatise face. So that the digression does not become too long, nothing seems to prevent us from copying our other translation, and briefly relating the story here also. In this way we will not delay the writing by digressing too far.

It is said that when the first and universal flood had passed, the waves returned to their former beds, and where the dry land first appeared, an old man who had survived with his sons, came down from Armenia, following more temperate breezes, into the land between the Tigris and the Euphrates, and settled in the fourth clime, where later Babylon arose. Here, one of his grandsons, a certain son, as they say, of the first born (clearly before the succession of descendants poured either across Kascarus, or this side of Kufa not far from the boundaries of Mesopotamia), whether warned by an ancestral memory or perhaps inspired by a divine will, first followed the courses of the stars and began to wonder at the effects. From him the study of the following age spread over the world and grew to such an extent that at last it clearly understood that the science of the higher world had in the first place to be divided into two species – into the movements of the heavenly bodies and into the effects of these movements; the distinction was as great as the distance between mathematical study and natural speculation.

The whole strength and reason of the science which follows the movements consists in number, measurement and proportion, which are the primordial and final cause in every mathematical discipline. For stellar motion is divided into two parts – the Same and the Different – of which the one which is ›accidental‹ to all is the Same, and the one that is ›proper‹ and of all varieties is Different, and contrary to the Same; both are circular. Thus it was necessary to put forward single studies to construct an intelligible method, for the measurement of circles, for the relation between them, and for the variations of the movements themselves. The Persians and Egyptians followed the invention of these studies of which the Indians are said to be the first authors. This invention is the teaching which governs the first steps. The motion of the Same is the movement of a uniform circle round the immobile centre and axis of the sphere containing everything. Ptolemy throught this should be described differently, in that he proposed it first in the very vestibule, as a kind of ›theme‹ for the whole study, in that he understood the Same to be the beginning of the Different, and equality to be the hinge of inequality. I think, in this, he was copying Abracaz (*Hipparchus*) *whom he believes to be the authority in all celestial motion*, just as he follows Sicheus in the effects of the movement. From these, and in the Greek tongue, he collected two volumes: the *Sintasis* for the first discipline, and the *Tetrastis* for the second – in Arabic called the *Almagest* and the *Alarba*. Al-Battānī has appropriately made the *Almagest* more concise (?), and Abū Maᶜshar has, no less appropriately, expanded on the *Alarba*. In both works Ptolemy himself and his followers, in dividing the disciplines, ordain that when one is removed the other cannot be left, but the process cannot be reversed by nature, as the end of mathematical study is the beginning of natural speculation. Of the latter, the first part considers the nature of the upper world, the second part, the nature of the lower world – that is the material causes, just as the nature of the upper world is the formal causes of things, and both are the principles of all coming-to-be after the first cause moving them both (i. e. God), as will be shown more fully in the work concerning the essences, which we have already begun. Since therefore, the movement is of such a kind, and the effect follows the movement, the whole of the study begins most correctly from the movement of the Same.

To whom, therefore, can I dedicate that which is the deepest principle and root of all studies of humanity rather than to you, who, I know, and therefore plainly confess, hold the first position in philosophy in these times, and are, as it were, an unmoveably secure anchor in the turbulent storms of ever-changing doctrines? If it pleases the Gods, may envy not make me, like the indolent masses, voluntarily allow myself to lie, or hide the truth before you, most worthy teacher Thierry, in whom, I am convinced, the soul of Plato has once again been brought down from heaven and fitted to mortal man. Thus it is that, just as Ceres is presented with the golden grain stalks, and Bacchus with the ripe grape-vine, so I have judged that you, the one father of Latin studies, should be presented with the principles of astronomy: since neither have I anything better to offer, nor do I know anything more acceptable to you than a gift of wisdom. Secondly, that which can hardly escape the notice of your intelligence, might, through you, be known to others also: the extent of the presumption of those people who usurp the name of astronomy, when they have not even understood the principle of it. Astronomy without three premisses is just as possible as flying was for Icarus. Unless certain men rely on a new kind of intelligence by which the steps of learning are reversed and they begin at the end, and, as if abandoning the natural way of proceeding, they walk backwards – then it is not surprising, when the light is behind them, that they must find their way in darkness. Thirdly, so that when our labour now at last brings to the Latin world this excellent work of such a great author, the key, as it were, to celestial science, it might be set on its feet by your most sacred authority before it falls into the profane hands of men lying in wait to attack us. For how great a part of mankind do you think is left in our day, who happen to be content with their own life, and do not seethe with a desire for someone else's fortune, or rather, wear themselves away with hatred? This attitude of mind has fostered a serious lack of Latinity up to now, and it is not yet coming to an end although the material is disappearing[1]). Even I, although I long thought that I would remain unknown amongst other people – even I suffered the pressure of this attitude so incessantly that, as if yielding to the threats of envy, and leaving my mass of work, I would have sought refuge in some common business of life – especially when I saw that all the riches of the mind were put aside and nothing but the baggage of wealth given by fortune was held to be of worth – unless I had you as such a paradigm of excellence: you, who are not overcome by work, corrupted by frivolities, or perverted by the mammon of ambition, but who stand firm on the deserted deck when everybody has fled from the ship of Philosophy as it founders on the high seas. Gazing at your excellence as into a mirror set before us, I and my excellent and famous companion, Robert of Ketton, hold as our constant motto: ›despice evil, in spite of its power‹, for, as Cicero says, ›woe to him whom no man envies‹. Having established that, I will not put off the treatise any longer, but let us start at the beginning with the words of the treatise itself, using no other law of translating than that by which Maslama translated it into Arabic.

5. (?) *Liber noster de circulis*

There are several references in Hermann's and his pupil Rudolph of Bruges' works which point to the discussion, apparently by Hermann himself, of one particular astronomical problem – the value of the obliquity of the ecliptic (which is equal to the number of degrees of latitude between each of the tropics and the equator):

(a) *Planisphere*, ed. Heiberg 229, Hermann's gloss clxxxvii: *Metitur igitur deprehensio nostra utrumque arcuum NG et GH partibus XXIII punctis fere LI ex eis que CCCLX totum ABGD circulum metiuntur, que par est distantia utriusque tropicorum a circulo equinoctiali*, (p. clxxxvii) *quem locum a Ptolomeo minus diligenter perspectum cum Albeteni miratur et Alchoarismus, quorum hunc quidem opera nostra Latium habet, illius vero comodissima translatione studiosissimi Roberti mei industria Latine orationis thesaurum accumulat, nos discutiendi veri in libro nostro de circulis rationem damus.*

(b) *ibid.*, p. 234 and p. clxxxvii: *His habitis, metiemur in primis utrumque arcuum GH et GT partibus XXIII punctis LI secundis XX ex eis, que CCCLX circulum rectum metiuntur; que par*

[1]) i. e. to avoid the darts of envy men have stopped even trying to distinguish themselves, so now there are very few distinguished men, but even these men are hated.

est, ut prediximus, utriusque tropicorum ab equinoctiali distantia in spera corporea, (p. clxxxvii) *quod quamquam, ut supra meminimus, alii XVI, alii XVIII punctis minus inveniant, non tamen in ortu signorum magnopere curandum gignit discordiam* (Hermann refers the reader to passage (a), but gives extra information – ›some people find the value less than Ptolemy's value by 16 minutes, others by 18‹ – which, presumably, can be found in the *liber de circulis*).
(c) Rudolph of Bruges, *Treatise on the Astrolabe*, Naples BN MS. VIII. C. 50, fol. 81r: *Est enim maxima solis declinatio prout Ptholomeo placet XXIII graduum et LV* (read: *LI*) *punctorum. Quidam vero XXIII et XXXV punctorum metiuntur. Cum vero parum interest, Ptholomei sententiam prout maioris apud astrologos habeatur auctoritatis in medium proponamus.*
(The information given here is so similar to that in passage [b] that Rudolph must be using either the *Planisphere* or the *liber de circulis* directly).
(d) *De Essentiis*, 63vE-F: *Quo facto, educit ex eodem centro in utramque partem lineam rectam usque in intrinsecam planitiem spere, acutis hinc inde angulis – ut secundum Eratosthenem Ptholomeus describit – ad quadrantem ferme recti anguli; firmatisque linee terminis, ad mensuram eius aptavit semicirculum ... inflectensque semicirculum, perfecit secundam speram quam declivem* (i. e. the oblique) *nominavit ... de qua, quantum Telesmatici aliter sentiunt qualiter habendum sit, in astronomia non pretermisimus.*

It is probable, on the evidence of these passages, that *in libro nostro de circulis* (i. e. ›the book concerning the circular courses of the heavenly bodies‹) and *in astronomia* refer to the same work, which, Hermann implies, is accessible to his readers. Two other references in the *De Essentiis* seem to refer to another passage in the same work (*Astronomia*) – this time concerning the nature of epicycles:

(a) 66rG-H: *Tum fere circa centrum A – ut in astronomia firmavimus – describetur epiciclus Veneris circulus.*
(b) 68rB-C: *Postremo circa centrum G – quemadmodum in astronomia constitutum est – perficimus circulum brevem loco epicicli cuiuslibet stelle.*
(For a reference to another passage *in astronomia*, see 65vH).

In that he claims that his book on the circles ›gives the reason‹ (passage [a]) above; the ›reason‹ is, presumably, the mathematical *rationale* for the facts and figures given in Ptolemy, al-Khwārizmī and al-Battānī)[1]) it appears to have had the same kind of purpose as the *De Essentiis* (see p. 110 above) in providing an introduction to, and a sound foundation for, the material in the more complicated and detailed text-books which Hermann and Robert had been translating.

6. (?) Richard of Fournival, *Biblionomia*, no. 45

(Delisle, *Cabinet*, II, 526): *Item liber de inveniendа radice et alius Hermanni Secundi de opere numeri et operis materia.* Ha. 50.

The manuscript in question has not been identified[1]), and Hermann makes no reference to works with these titles, although they would not be out of place amongst his œuvre.

7. (?) Richard of Fournival, *Biblionomia*, no. 59 (Delisle, *Cabinet*, II 527): *Item Hermanni Secundi de compositione astrolabii.*
The manuscript in question has been identified as Paris BN MS. lat. 16652 (Birkenmajer, ›Biblioteka Ryszarda de Fournival‹, in: *Rozprawy of the Cracow Acad.* LX.4 [1922], see

[1]) cf. the opening of the *Planisphere* (ed. Heiberg 227): *Cum sit possibile ... ut in plano represententur circuli in speram corpoream incidentes ... consultum visum est in veritate scientie, ut, qui scire velit hec, describat demonstrantem r a t i o n e m.*
[1]) The MS. was once in the Sorbonne library (Delisle, *Cabinet*, III, 68, catalogue no. LVI. 32).

R. E. Rouse, ›Manuscripts belonging to Richard de Fournival‹, in: *Revue d'Histoire des Textes*, III [1973] 253–269). The work in this MS. corresponding to Richard's description is the *De Mensura Astrolabii* of Hermannus Contractus. This is one of the set of three works on the astrolabe which commonly occur together (e. g. in MS. lat. 16652, and Migne PL 143. 379–412), but of which none can be assigned to Hermann of Carinthia – as Haskins has shown (51–3)[1]). Hermann himself never implies that he has written a work on the astrolabe. His translation of the *Planisphere* provides a firm foundation for an intelligent use of an astrolabe, and his pupil Rudolph of Bruges' treatise (*Cum celestium sperarum*) seems to have been designed specifically to follow on from this translation: In the preface Rudolph refers to the stereographic projection described in the *Planisphere*, and quotes the work's opening words (see below), and in the body of the work he refers the reader to the translation of the *Planisphere* by his master Hermann:

(E. Poulle, ›L'Astrolabe médiéval . . .‹ 84, BN MS. lat. 16652, fol. 25v) *sed qui huius inequalitatis rationem nosse desiderat, Planisperium Ptolomei Hermanno Secundo translatum legat.*

It is worth quoting Rudolph's preface in full, to show how he is a true disciple of Hermann, both in the brief hints of his astrological beliefs he gives here, and also in the complex style of his Latin:

(Ha. 56, Naples BN MS. VIII. C. 50, fol. 80r, Paris BN MS. lat. 16652, fol. 24r) *Cum celestium sperarum diversam positionem stellarum diversos ortus diversosque occasus mundo inferiori ministrare manifestum sit, huiusque varietatis descriptio ut in plano representetur sit possibile, prout Ptholomeo eiusque sequaci Mezlem qui dictus est Aloukakechita visum est, pro posse suo huius instrumenti formulam dilectus* (Naples MS. om.) *dilectissimo domino suo Johanni David Rodulfus Brugensis Hermanni Secundi discipulus describit*[2]).
›It is clear that each different position of the celestial spheres administers different risings and settings of the planets to the lower world, and it is possible for a description of this variation to be represented on a plane (as was seen by Ptolemy and his follower Maslama who is called ›Aloukakechita‹). Therefore, as far as he is able, Rudolph of Bruges, the disciple of Hermannus Secundus, describes the formula for such an instrument for his most dear master John David[3]).‹

A treatise on the astrolabe is attributed to Hermann's collaborator Robert of Ketton,, and, although in at least one MS. of this work (Oxford BL, Canon. MS. misc. 61, fol. 22v) Robert cites his own tables on the meridians of Toledo and London (Ha. 123), there are considerable differences between the MSS. (Ha. 122) and Poulle casts doubt on the authorship[4]). The relation of this treatise to the *Planisphere* and Rudolph's work needs to be investigated.

[1]) Haskins' statement (51) – ›the third (Migne PL 143.405–412) is probably by Hermann‹ – is uncharacteristically ambiguous (which Hermann?).
[2]) Steinschneider (St. H. 569) reads Abū Karechita. Because of the mention of Ptolemy and Maslama in the preface, it has been assumed that this work is a translation or adaption of a work by Maslama (Ha. 56, TK. 285). In fact, the reference here is to the *Planisphere* of Ptolemy translated into Arabic by Maslama (ed. Heiberg 225): *Cum sit possibile . . . ut in plano represententur circuli in speram corpoream incidentes . . .* We should, therefore, call *Cum celestium sperarum* an original work of Rudolph of Bruges rather than a translation or a ›description of an astronomical instrument of Maslama‹ (Ha. 56).
[3]) Haskins is mistaken in assuming that John David is the same as John of Seville (see M.-T. D'Alverny, ›Avendauth‹, in: *Homenaje a Millás-Vallicrosa* I [Barcelona 1954] 29–32). Plato of Tivoli's dedication of a translation to the same John David (D'Alverny, *loc. cit.*) may suggest some relationship between Hermann, Rudolph and Plato of Tivoli.
[4]) E. Poulle, ›L'Astrolabe médiéval d'après les MSS. de la BN‹, in: *Bibliothèque de l'Ecole des Chartes* CXII (1954) 87: ›Robert de Chester, sur les usages (*of the astrolabe*) – imprimé a

1. *Zaelis (i. e. Sahl) Fatidica* or *Pronostica* or *Liber Sextus Astronomie.*

Incipit: *Secundus post conditorem.*

St. H. 603–7, St. E. no. 51, Ha. 44, Car. 44–45, Le. 16–17, TK. 1424.

V Vatican MS. Pal. lat. 1407, fols. 18–38 (Ha.).

M Metz MS. 287, fols. 333–350, *saec.* XV (Ha.).

C *Cambridge University Library, MS. Kk. iv. 7 (Ha.; Haskins, following the printed catalogue, gives fol. 102 as the beginning of the work; in fact, the work is found on fols. 107r–122v; the catalogue dates the MS to the 15th cent.).

G *Cambridge, Caius College MS. 179 (110), fols. 295–345 (Ha.).

P *Cambridge, Pembroke College MS. 227, pp. 133–177 (Ha.).

D *Oxford, Bodleian MS. Digby 114, fols. 176–199v (Ha.).

The treatise in *British Museum, Sloane MS. 2030 (T. II. 391) is not the *Fatidica*. Carmody adds several more MSS.: Basel F. III. 8, fols. 44r–48v, Berlin 965, fols. 1–63, London, British Museum, *Harley MS. 80, *Sloane MS. 3847, *Oxford Bodleian MS. Digby 46, *Ashmole 304, printed *Prague 1592. Of these, Berlin 965 and *Prague pr. 1592 are both a work attributed to ›Zebel‹ (inc.: *Zebelis sapientis arabum de interpretatione diversorum eventuum secundum lunam in 12 signis zodiaci*); Harley 80 and Sloane 3847 are both the *De Imaginibus* of Zael (TK. 351); Digby 46 and Ashmole 304 are the *Experimentarius* corpus attributed to Bernardus Silvestris; Basel F. III. 8 and Erfurt Amplonian Quarto 361 (mentioned in T. II. 391) I have not seen.

MSS.C and P are both followed by a short work attributed to Hermann the German entitled *experta cognitio imbrium et ventorum*, after which follow Arabic-Latin glossaries, apparently to the *Fatidica*. The glossary in MS.P (p. 178) is very brief and is repeated in MS.C (fol. 122r). However on fol. 123r of MS.C a whole page is divided into columns, with the Arabic terms on the left and the Latin translations on the right. For many Arabic terms no translation is given, and some unusual Latin words occurring in the text of the *Fatidica* are in the Arabic columns (e. g. *eluviones, fatidica, genecia, genezie*)[1]). C and P also share many of the same marginal notes, though C includes, in addition, some very interesting diparaging comments, often introduced by *videtur quod iste actor* (i. e. *auctor*), cf. fol. 120v: *contrarium dicit supra*, and fol. 108r: ›If it happened in the first degree of Taurus in the time of the author, this author would have had to live before the time of Ptolemy, which I don't believe‹ (my translation).

The title of the work is *Fatidica Zaelis* (G) or *Zael de revolutionibus* (CP). After this we find in MSS.GCP:

Incipit atahuuil alalem id est pronostica (*pronosticatio* G) *zael iben bixir* (*zahel ibenbiru* CP) *hermanni secundi translatio. Sextus astronomie liber.*

The Arabic author is well-known: Abū ʿUthmān Sahl ibn Bishr ibn Hāni' al-Isrā'īlī (Br. S. I.396, Br.^{2} I.252). Hermann also gives the Arabic title of the work: *atahuuil alalem*, i. e. [*kitāb*] *taḥwīl al-ʿālam*, ›the book of the revolution of the universe‹ (cf. St.E p. 34) – hence the Latin title *De revolutionibus*. This title corresponds to the title *kitāb al-aḥkām fī taḥwīl an-nujūm* (MS. Alex. Ḥurūf 16) ›the book of judgements by the revolution of the stars‹, which Brockelmann identifies with *kitāb al-mudkhal fī aḥkām*

Pélouse vers 1464 sous le nom de »Robertus Anglicus«; il est d'une extrême banalité et ne contient aucun élément susceptible de vérifier l'attribution à Robert de Chester‹.

[1]) There is no evidence that Hermann composed these glossaries (as Thorndike claims T. II. 84); the occurrence of some of his Latin terms in the Arabic column argues against his authorship. I hope to prepare an edition of these glossaries and similar, earlier, lists of Arabic words with their Latin translations.

an-nujūm (MS. Berlin 5883, oct. 2478, 3072) ›the book introducing judgements by the stars‹. Brockelmann gives no indication that this work was ever translated into Latin. Only a close comparison of Hermann's work with the Arabic original could show whether, in fact, we have discovered a Latin translation of the work. According to Brockelmann it is a different treatise by Sahl (*k.al-majmūᶜ fi'l-aḥkām*, ›the complete book on the judgements‹), whose Latin translation is the *Introductorium de principiis iudiciorum* (= *liber Zehel iudei introductorius ad scienciam iudiciorum astrorum*; see below). The complex tradition of Sahl's astrological works (or work), which provide a valuable testimony to the astrology of the Greek, Dorotheus, can only be resolved by a careful comparison of Arabic originals and the Latin translations. It is hoped that the work begun by Victor Stegemann (*Dorotheus . . . und . . Sahl*, in: Monographen des Archiv Orientálni 11, Prague 1942), and continued by David Pingree (edition of Dorotheus[2])) will clarify the situation. Hermann's work corresponds to no treatise in the Latin corpus of Sahl's works (translated, perhaps *in toto*, by John of Seville, and usually appearing as consecutive treatises in the same MS. – e. g. Paris BN MS. lat. 16204, pp. 433a–500b). This corpus consists of five treatises:

(i) p. 433a, *incipit liber Zehel iudei introductorius ad scienciam iudiciorum astrorum in interrogationibus.*
(ii) p. 441a, *liber secundus Zehel de 50 preceptis.*
(iii) p. 445a, *incipit liber tertius Zehel iudei de interrogationibus qui dicitur liber iudiciorum arabum.*
(iv) p. 482a, *incipit liber Zehel israelici de significatore temporis in interrogationibus.*
(v) p. 488b, *Zehel israelici liber electionum incipit.*

Hermann's work may well be the sixth book (*sextus astronomie liber*) of the same corpus out of which these five treatises were translated (see further p. 120).
The subject-matter of the *Fatidica* is *pronostica*, which Hermann defines in the *De Essentiis* as the prediction of events pertaining to the universe, or to nations as a whole, rather than to the individual (e. g. war, famine, earthquake, conflagration and flood, pestilence and change of world-rule):

Preterea trium partium et alie subdivisiones tam apud geneziacos quam in pronosticis crebro reperiuntur: . . . in pronosticis autem utriuslibet generis ex hisdem item modis in varia mundi accidentia per diversas terrarum partes, ac preterea – quantum (ab Abumaixar) ex Alkirenet accedit – per eadem item genera tripartitis . . . Ex omnibus igitur his instauratur multiplex pronosticorum speculatio per diversa loca in varios temporum motus: hinc enim astrologi varios seculorum casus, hinc diversos humani generis status, hinc etiam diversa mundi imperia metiuntur (De Essentiis, 70rH–70vB).
»Moreover (divisions) of three parts and other sub-divisions are frequently found both in nativities and in prognostics: . . . (*the method of nativities is described*) . . . In prognostics of any of the two kinds (the divisions are found) by these same methods in respect to various happenings to the universe through different parts of the earth, and, moreover, as Abū Maᶜshar adds from his book *al-qirānāt* (*conjunctions*) they are divided into the same three kinds . . . From all these (movements of time) begins the complicated speculation of prognostics according to different movements of time in different places. From this, astrologers measure the different events of the centuries, the different conditions of the human race, and the different world-rules.«

In his translation of Abū Maᶜshar's *Introductorium* I.5, we find that the prediction of

[2]) See Pingree (ed.) *Dorotheus Sidonius Carmen Astrologicum*, Leipzig 1976.

such events depends on the knowledge of the *annorum seculi revolutiones* (ed. Venice 1506, fol. b2r).

Hermann shows himself to be particularly interested in this aspect of astrology in the *De Essentiis*[3]), and may have excerpted book VI from Sahl's astrological corpus because of his special interest. The first sentences have the tone of an introduction to this excerpt, and may be original to Hermann himself:

Secundus post conditorem orbis et moderator sol ut superne ducatum potentie, ita omnium inferioris mundi accidentium, principale gerit consilium. Omnes etenim terrarum alternationes primum solis motu, deinde ceterarum comitatu metimur, unde nec aliter diverse terrarum partes varias stellarum vires (vices ?) patiuntur quam diversis temporum successionibus varii rerum eventus administrantur. In speculandis igitur omnibus mundi per orbem accidentibus, primo, anni dominus omnis huius artificii dux eligendus est, cuius auspicia solis munere sumuntur.
Diligenter etenim in primum arietis punctum solis introitu servato . . .

»Second after the Creator of the world, and moderator (of things) is the Sun, which, as it controls all the higher power, so it holds the principal power of decision over all happenings in the lower world. For we measure all cycles of the earth, first, by the movement of the Sun, then, by the companionship of the other planets (with the Sun). Hence different parts of the earth suffer different planetary forces, just as different events are administered by different successions of time. Therefore in investigating all the happenings through the world, first, the ›Lord of the Year‹, must be chosen, as the director of the whole method; he takes up his authority from the gift of the Sun.
The Sun's entry into the first degree of Aries must be observed carefully . . .«

The grandiloquence of this opening passage is typical of Hermann's style, and recalls the words of Cicero's *Somnium Scipionis* 4.2: *Deinde de septem mediam fere regionem sol obtinet, dux et princeps et moderator luminum reliquorum, mens mundi et temperatio.* The words *diligenter etenim in primum arietis punctum . . .* may be the beginning of the Arabic treatise, and match what, at the beginning of a translation by John of Seville, would be: *scito horam introitus solis in primum minutum arietis*[4]).

The date of the translation is given in MSS. M and D, of which D has:
Explicit fedidica Zael Banbinxeir Caldei. translatio Hermani 6i astronomie libri. Anno domini 1138, 3° kal. octobris translatus est (Ha. 44).

This is the earliest dated work of Hermann. He has already, however, developed both the highly compressed and literary style which is distinctive of his major works, and a technical vocabulary which is consistent with that of his other works, cf., for example:

(i) *ducatus* for Arabic dalāla = the action of the planets and stars over earthly events (tr. *significatio* by John of Seville, see Le. 68).
(ii) *genezia* (from γενεθλιαχά) for the more usual *nativitates*.

In only one other work (*De Indagatione Cordis* or *De Occultis*, no. 2 below) does Hermann refer to his own translation of a work by Sahl:

vel ex eis .x. que in translatione Zahel Benbresit . . . enumeravimus (Oxford, Bodleian MS. Laud. Misc. 594, fol. 151rb).

It is probable that Hermann found a much more sophisticated and exciting theory of astrology in Abū Maᶜshar's corpus, which he has already come into contact with when

[3]) *De Essentiis* 69vH, 71rH (see C. S. F. Burnett, ›The Legend of the Three Hermes and Abū Maᶜshar's *Kitāb al-Ulūf* in the Latin Middle Ages‹, in: *Journal of the Warburg and Courtauld Institutes*, XXXIX [1976] 231–4).
[4]) This is, in fact, the incipit of Abū Maᶜshar, *Liber Experimentorum*, but *Scito . . .* is the first word of the incipits of most of the treatises in the astrological corpus of Sahl in Paris BN MS. lat. 16204.

he writes *De Indagatione Cordis*, and which, for him, supersedes entirely the work of Sahl when he comes to write the *De Essentiis* (1143): as we see from the quotation above (p. 116), it is to Abū Maᶜshar's *kitāb al-qirānāt*, not to the *Fatidica*, that he refers his reader, as the authoritative work on prognostics.

2. *De Occultis*

The query set against this work by Haskins (p. 51) has been removed by Lemay (17–18). It consists of three loosely related astrological tracts: *A Hic liber maioris in astronomiam commenti albumazar abalambricum ... cuius oppositum dexter eius exagonus est; B Astronomie iudiciorum omnium bipertita est via ... celi medio terre cardini finem; C Omnis iudicanda res ut primum necessarium habet certissimam ducis inventionem.*

In some MSS. A and/or C are not found.

D *Dijon MS. 1045, fols. 148r–172r, *saec.* XV (Ha.). Title (fol. 172r): *Hermanus de occultis;* B 148r–170r; C 170r–172r.

E *Dijon MS. 449, fols. 17r–25r, *saec.* XV (*Cat. gén. ... Départments* V, 109). Title: *Albumasar de occultis;* A fols. 17r–18r; B 18r–25r.

B Berlin MS. 963, fols. 130a–138b, *saec.* XV (Lc.). Title: *Liber Hermanni contracti* (sic) *de indagacionibus cordis et rebus occultis;* B 130a–?; C ?–138b[1]).

L Leningrad, Acad. Scient. XX. Ab–III.1, fols. 155–173. *saec.* XIII–XIV (Lc.). Title: *Albumasar, liber quadrifariam partitus, de meditationibus cordis;* A 155–?; B ?–168; C 168–173[2]).

O *Oxford, Bodleian MS. Laud. Misc. 594, fols. 144r–153v, *saec.* XIV. Title: *Incipit Hermannus de indagatione cordis:* A 144r–145v; B 145v–153r; C 153r–v.

P New York, Plimpton MS. 163, *saec.* XV, fols. ?–16r (Car. 107) C. Title: *Modus iudicandi secundum Messahala*; Incipit: *Omnis iudicanda res est ut primum necessarium habet ...*

An excerpt from this work is contained in Avignon MS. 1020, fols. 108–109, *saec.* XV[3]): Title: *De rebus absconditis et primo de proprietatibus planetarum quando sunt significatores seu duces rerum absconditarum; incipit: Saturnus dux in signis igneis indicat viliora* (= MS.O, fol. 148ra); *explicit: ad oriens albus* (= MS. O, fol. 150vb, 12 lines from bottom of page); table at end of MS. (fol. 179v): *iste rubrice sunt supra extracte de libro Hermenni de indagacione secretorum.* Another extract appears in Boston Public Library 1488, fols. 1v–6v, *saec.* XIV (Car. 99) with the title *Liber de meditationibus cordis Albumasar.* The *incipit* quoted by Carmody (*In disponendis stellarum radicibus orientibus iuxta*) corresponds to the beginning of the chapter called *sentencia dirigendi* in MS. O (fol. 145v). The MS. clearly contains at least parts of tracts A and B, but I have failed to find the *explicits* given by Carmody (*signo vel signorum gradus vivendum* or *ut autem dictum est*). A brief continuation of these extracts in this same MS (fols. 7r–v) is listed separately by Carmody 106–7: *liber absconditorum*, corresponding to MS. O fol. 149r). At least two chapters from the *De Occultis* occur in Paris BN MS. lat. 7316A (*saec.* XIV), fols. 86v–87r (= MS. O, fols. 149r–v); see L. Thorndike, »The Latin translations of astrological works by Messahala«, in: *Osiris* XII (1956) 52, note 4.

Carmody and Thorndike (T. II. 84–5) confuse the *De Occultis* with the *Introductorium* of Abū Maᶜshar.

Tract A is explicitly called *Liber maioris in astronomiam commenti albumazar abalambricum* (»The book of the greater commentary on astronomy [astrology] of Abū Maᶜshar al-Balkhī«) and the major part of it (MS.O fols. 144r–145v as far as *ab oriente incipiet*)

[1]) See V. Rose, *Die Handschriftenverzeichnisse der Kgl. Bibl. zu Berlin* XIII (Berlin 1905) 1205–6. The *explicit* given by Rose corresponds to the *explicit* of tract C and, presumably, the *explicit* of tract B occurs earlier in the MS.

[2]) See CCAG XII, *codices rossicos* descripsit M. A. F. Šangin (Bruxellis 1936) 209.

[3]) I am indebted to J. Lipton of the University of California at Los Angeles for this information.

summarizes book eight of the *Maius Introductorium* of Abū Maᶜshar[4]). What is strange is that there is no indication that Hermann summarized his own translation, and there is a striking difference in terminology (e. g. a major division – the *partes signorum* – is called *partes domiciliorum* in *De Occultis*). It is possible that, in spite of the title, the section on *partes* in the *De Occultis* comes (i) either from Abū Maᶜshar's own summary of his *Kitāb al-madkhal al-kabīr ᶜalā ᶜilm aḥkām an-nujūm* (*Maius Introductorium*), for tract A of the *De Occultis* matches the sense, though, again, not the terminology or phraseology, of *sermo* 6 of Adelard of Bath's translation of Abū Maᶜshar's *Kitāb al-madkhal as-ṣaghīr* (*Isagoge Minor* or ›Lesser Introduction‹)[5]), and there is an *Albumasar minor Hermanni* in a MS. which has not been identified (see p. 126 below); (ii) or from Abū Maᶜshar's tract on *partes*, *Kitāb as-sihām* (not extant in Arabic) which may duplicate the material in the Greater and Lesser Introductions[6]).

In MS.L tract C is called *alius tractatus de absconditis secundum alios qui valet ad ducem inveniendum*, and in the margin of MS.O (fol. 153v, in a later hand) there are written the words: *Haly de electionibus etc.* These words, however, refer to the contents of MS. Laud. Misc. 594 as a whole, and are insufficient justification for attributing the work to ᶜAlī ibn Aḥmad al-ᶜImrānī[7]). The work, rather, summarizes a procedure described by Māshā'allāh *in libro suo qui septem claves intitulatur*[8]) and there is nothing against attributing the translation to Hermann. Moreover, in MS.D tract C is clearly included in the *De Occultis* and is followed by the words: *explicit Hermanus de occultis.*

In the case of tract B, the paragraphs have been copied in the same wrong order in MSS.E and O. There are indications in both these MSS. of the correct sequence of paragraphs, and this is found in MS.D. MS.E seems to have been corrected in detail from MS.D, which exhibits a large number of variant readings.

Hermann describes his work-method in the following way (MS.O, fol. 149ra):

Rerum absconditarum generi magis firma quedam species subiacet, de absconditis videlicet aut suffosis pecuniis thesaurisque antiquitus sive recentum. Quod artificium cum ex diversis scriptoribus colligere vellemus, sententie dissonancia ipsorum pocius sua cuiusque verba a nobis in latinum sermonem transformata in medium adducere compulit, ut si queque sors in locum adduxerit magis proprie, cum non tanti sit laboris, nichil pigeat singulos experiri.

4) Of Hermann's translation in the edition of Venice 1506, chapter I, the first page of chapter 3, and the first paragraph of chapter 4 are omitted in the *De Occultis*, but, otherwise, the *Introductorium* is summarized quite closely up to folio h6v. There is no evidence of any connection between the *De Occultis* and John of Seville's translation of the *Maius Introductorium*.

5) See D. Pingree, article ›Abū Maᶜshar‹ in *Dictionary of Scientific Biography*, ed. C. C. Gillispie, 1970–76, bibliography no. 2. Adelard consistently transliterates *sahm* (›lot‹ or *pars*) as *cehem*, whereas Hermann, both here and in his translation of the *Fatidica*, writes *zahm*.

6) See D. Pingree, *art. cit.*, bibliography no. 33.

7) The attribution was made by Moritz Steinschneider (*Zs. f. Math. u. Physik* XII [1867] 23), who was followed by Thorndike (TK. 998). Carmody refers to the same work where it occurs in MS. L (Car. 107).

8) MS. O, fol. 153ra, MS. D, fol. 170r. This work appears to be the *mafātīḥ al-qadā'* (›The Keys of Judgements‹) which exists only in a Persian and a Latin translation (see D. Pingree, article ›Māshā'allāh‹ in the *Dictionary of Scientific Biography* ed. C. C. Gillispie, 1970–6). I have not seen the edition of the Latin translation by M. A. F. Šangin, »Latinskaya paragrafa iz utrachennogo sochinenia Mashallaha ›Semi Kluchey‹«, in: *Zapiski Kollegii Vostokovedov* 5 (1930) 235–242, nor the chapter called ›claves que per singulas domos singula pandunt iudicia et primum de solis et lune proprietatibus secundum Messahala‹ in: *Liber Messahala de 14 proprietatibus stellarum* (in reality, a collection of the *sententiae* of several astrologers), Oxford, Digby MS. 47 (see Thorndike, ›The Latin Translations of astrological works by Messahala‹, in: *Osiris* XII [1956] 71; Le. 18).

›A more certain species underlies the genus of hidden things – viz, hidden or buried money and treasure chests, whether old or recent. Although we wished to deduce a procedure from various writers, the incompatability of their opinions forced us rather to put forward the words of each one of them, translated by us into Latin, so that, in the hope that every fate might bring about something more proper to itself(?), no-one should be ashamed to try each author, since it does not require much effort.‹

He gives an example of his selection at the beginning of tract B (MS.O fol. 145v):

Astronomie iudiciorum omnium bipertita est via: una siquidem est questionum, genezie sive etiam annalium, altera consilii et cogitationis hominum et rei abscondite personarumque proprietatum. Que ut natura diversa creavit, ita ad intellectum eorum astronomie speculacio dissimili ratione ducit. Cuius specierum suus queque tractatus exequitur. Primum itaque nobis est, quemadmodum Messehalla tradit, siderum stellarumque natura, quantum hoc genus postulat, speculanda; tum, ut Hermes exponit, quantum de accidentibus eorum attinet, prosequendum; postremo qua indagine dux omnis huius artificii eligi possit simulque adminicula eius adhiberi insinuabimus.

›All astrological judgements divide into two paths: (i) questions, nativities and annals; (ii) the thought and consideration of men, hidden things, and characters of persons. Since nature made these two paths different, so astrological speculation brings about their understanding through different kinds of reasoning. And each species of judgement is served by its own textbook. Therefore, first, the nature of the stars and planets should be investigated by us as far as the subject demands (we follow the tradition of Māshā'allāh); then, we must consider what is relevant concerning their accidental properties (as Hermes explains); finally, we will become familiar with the method by which the leader of the whole of this procedure can be chosen, and, at the same time, how his subsidiaries can be used.‹

The *compendium*-like approach is common in works of *Iudicia*. The opinions of different astrologers concerning a particular set of questions were frequently brought together in Arabic astrological works of this kind, and Hermann may have relied heavily on one such compilation. However, he claims to have made the compilation himself, and it is indeed possible to recognize some of the individual works that he used:

(i) *vel ex eis .x. que in translatione Zahel Benbresit ... enumeravimus* (MS. O fol. 151rb). The reference is to the first book of Sahl ibn Bishr's *Iudicia*, where the ten ›hinderances of the moon‹ are discussed (see V. Stegemann, *Dorotheos von Sidon und das Sogenannte Introductorium des Sahl ibn Bišr* [Prague 1942] 56–58, and Oxford, Bodleian MS. Bodley 430, fol. 62r). Other citations refer to the fourth book of Sahl – *De significatore temporis*, or *liber horarum*, cf. MS. O, fol. 151va, MS. D, fol. 23v: *Deinde indagemus quod genus Zahel benbixir* [*in*] *suo seorsum integro volumine tractat qui liber horarum nominatur ... Ait enim Zahel, quoniam alteratio figurarum stellarum circulique status mutatio proventuum inferioris mundi varietas est, alteratio vero figurarum bipertita est, longo scilicet et lato, longo quidem nunc orientalis est stella, nunc occidentalis, lato nunc australis, nunc septentrionalis.*
This passage corresponds so closely to the translation of Sahl in Paris BN. MS. lat. 16204, p. 482 that both must be translations from the same Arabic original[9]). For evidence that Hermann himself translated at least three of the books of Sahl's *Iudicia* see ›A Group of Arabic-Latin translators working in Northern Spain in the mid-twelfth century‹, in: *Journal of the Royal Asiatic Society*, 1977, 69–70.

(ii) The citations from Aomar Tiberias (ᶜUmar ibn al-Farrukhān aṭ-Ṭabarī) correspond closely to passages from Aomar in the *Liber novem iudicum*, and the same phrases appear in both works[10]). It is apparent that Hugo of Santalla was the translator of Aomar's *De Iudiciis* (incipit:

[9]) See Br.S p. 396, Sahl ibn Bishr no. 3: k.al-Auqāt, MS. Berlin oct. 2591, *de temporum significatione ad iudicia*; see TK. 1410–1411, and above p. 116 (no. iv).

[10]) e. g. MS. O, fol. 149rb–149va (*Aomar autem Tiberias ... rem absconditam designat*) corresponds to the chapter of the *Liber novem iudicum* called *De thesauris et rebus absconditis Aomar*; cf. the phrases *de pecunia querat quam ipse recondiderit, locumque* .. and *discretione habita querenti oriens* which are common to both the *De Occultis* and this chapter of Aomar.

Quoniam totius astronomie fructus circa rerum proventus TK. 1305), which was incorporated into the *Liber novem iudicum*[11]), For Hermann's use of the work of Hugo see below, p. 133–4.

(iii) Even more interesting are the citations of al-Kindī which correspond word for word with Robert of Ketton's translation of the *Iudicia* of al-Kindī: e.g. MS. O, fols. 149va–b matches the *Iudicia* in Oxford Ashmole 369 fol. 100rb (chapter heading: *de thesauri repertu*). Robert, in his preface to the translation, states that he was turning to an astrological work at Hermann's express demand, and that Hermann had picked out al-Kindī as ›the most convenient and true amongst the astrologers‹[12]).

It is possible that Hermann was gathering together a set of translations of Arabic *Iudicia* treatises out of which he intended to compose a *summa* of judicial astrology. Until the Arabic and Latin works on *Iudicia* have been thoroughly sifted through, it is difficult to make more than superficial comments on the sources of the *De Occultis*. Perhaps it is of interest, however, to conclude by listing the authorities mentioned in *De Occultis*, without attempting to explore more thoroughly the form in which Hermann knew their work (I refer to the folio numbers of MS. O):

Albukarz (Albucas D) 150vb.
Albumazar: 144r *Hic liber maioris in astronomiam commenti albumazar abalambricum;* 151rb *in albumazar commentatione.*
Alkamaz (Alheamaz D) ›auditor‹ of Māshā'allāh 149ra.
Alkindi post (i. e. follower of) messehallam 149va.
Aomar (without *cognomen*) 152ra.
Aomar Beufargamus 151ra.
Aomar Tiberias 149rb, 151ra; ›follower of Hermes, Dorius (i. e. Dorotheos), Ptolemy and Māshā'allāh‹ 151ra; cf. also 151vb ... *quod expertum se reffert Tyberias in domo Ben Iafar* (MS. D).
Durius (i. e. Dorotheus) 146r, 151ra.
Hermann's own *liber cogitationis* 151rb (= ?; cf. title in MSS. BO: *De Indagatione Cordis*).
Hermes 144r, 151ra, 152rb.
Indi 153vb.
Liber iudiciorum de salute circa dies creticos 152rb.
Messehalla: 145v *Quemadmodum Messehalla tradit, siderum stellarumque natura;* 147va *Messehalla in primo libro;* 153ra *Messehalla in libro suo qui septem claves intitulatur.*
Perse 144v, 153vb.
Ptolomeus 151ra.
Rasis 146ra.
Welis 144r.
Zahel: 151rb. Hermann's own translation (see p. 120 above); 151va *Zahel benbixir (in) suo seorsum integro volumine tractat qui liber horarum nominatur;* 151vb *Beinbixir fi kiteb aloukat* (*in libro temporum* DE).
Zymus quidam grecus 149rb.

Of Hermann's specific technical vocabulary we find the words *ducatus*, *genezie sive annalium*, and *decanus*[13]).

[11]) cf. C. S. F. Burnett, ›A Group of Arabic-Latin translators working in northern Spain in the mid-twelfth century‹ to appear in the *Journal of the Royal Asiatic Society* 1977, 62–108. Hugo's authorship is clearly stated in Oxford Bodley MS. 430, fol. 64v. The work follows the *De Occultis* in MS. E. I am at present, working on the sources and constitution of the *Liber novem iudicum.*

[12]) Haskins has edited the preface (121–2).

[13]) *Ducatus* MS. O, fol. 144r, cf. the use of *ducatus* in *De Essentiis* 74rC, and in the *Fatidica* of Sahl (see p. 117 above); *genezie sive annalium*, MS. O, fol. 145v, see p. 117 above; *decanus* MS. O, fol. 153ra, cf. *decanus* in place of John of Seville's *facies* in Abū Ma'shar, *Introductorium* VI, and *De Essentiis* 59rF.

3. *Liber Imbrium*

Incipit: *Cum multa et varia de imbrium cognitione ...*
Explicit: *occurunt sed steriles.*
Ha. 49–50, Car. 85–87, TK. 319, G. Hellmann, »Die Wettervorhersage im ausgehenden Mittelalter«, in: *Beiträge z. Gesch. d. Meteorologie* (Berlin, 1917) II. 168–229, esp. 219.
Haskins mentioned six MSS.:

C *Cambridge, Clare College, MS. 15 (c. 1280 [TK. 315]), fols. 1–2. Early 14th cent. list of contents: *Liber ymbrium quem edidit Hermannus.* Rubric: *Incipit dei nomine liber imbrium.*

D *Dijon MS. 1045, fols. 187–90 (see *Catalogue général ... Départments ...* V, 271). Incipit: *incipit liber de pluviis ab Hermano de Kanto* (?) *a judico* (read: *indico?*) *in latinum translatus ... Explicit liber de imbrium et nubium cognicione ab Hermano de Kanto* (?) *de judico (see above) in latinum translatus. Deo gratias.*

V *Vienna. Bibl. Nat. MS. 2436, fols. 134vb–136va. Rubric: *Incipit tractatus m. hermanni de mutacione aeris subtilis.* Explicit: *occurrant, sed mediocres. Finitur hermanni liber de ymbribus et pluviis.*

M Venice, St. Mark's, Cl.xi, 107, fol. 53 (Valentinelli, *Catalogue* IV.285).

Bo Boncompagni MS. 107(4), *saec.* XIV, fols. 63r–v (Narducci, *Catalogo* [Rome 1892] 69). Title: *Judicium imbrium.* Followed by Hugo of Santalla's tr. of Jafar (see below).

O Oxford, Corpus Christi College, MS. 233, fol. 122 (T. I. 652) Tr.anon. Title: *Japhar philosophi et astrologi Aegyptii.*

To these can be added:

Ca *Cambrai MS. 168, *saec.* XIV, fols. 104r–106v. Anonymous, but followed by a circular diagram of the mansions of the moon in the centre of which is written: *figura 28 mansionum lune, libri ymbrium jafar superioris scilicet etcetera* (in fact, the »figure« is mentioned in the text of Hugo's tr. of Jafar, which is not in this MS., see Paris BN MS. n. a. lat. 3091, fol. 106va).

P *Paris BN MS. nouv. ac. lat. 3091, fols. 106v–107r, *saec.* XIII. The translator is not named, but the treatise is attributed to Sahl ibn Bishr: Rubrics: *Incipit Zeel de pluviis ... explicit Zeel de pluviis.* Approximately half of Hermann's work (from *Venus in Scorpione ...* to *Solem vadit*) has been lifted out of its context, and inserted into Hugo of Santalla's tr. of Jafar, which precedes the *Liber Imbrium* (fols. 104vb–105rb). The insertion makes no sense. Perhaps a page in the exemplar had been misplaced.

Pa *Parma, Bibliotheca Palat. MS. Pal. fondo Parm. 720 (*saec.* XIII), fols. 430r–432r. No title. In the bottom margin of the MS: *liber de imbribus.* Followed by Hugo's tr. of Jafar.

Pr *Prague, Bibl. Univ. MS. 433 (III.C.2) fols. 54v–56r, and 184v–186v (TK). It is clear that the earlier part of this MS. was copied from the later. The same »chapters« (*ventorum cognicio ex pluviarum experientia, utrum res vetus vel nova, ad cognoscenda loca absconditę rei et perdite* etc.) follow Hermann's treatise in both parts of the MS., the variant readings correspond for the most part (hence I refer to both exemplars by the single sign Pr), and the rubrics are the same:
Rubric: *De pluviis.* Explicit: *occurrunt set steriles.* No author is named.

L London, British Museum, Royal MS. 12. E. XXV (c. 1300), fols. 170r–(172) (TK).

R Oxford, Bodleian MS. Rawlinson D. 1227 (*saec.* XIV) fols. 106ra–108rb. (TK).

B *Paris BN MS. lat. 7329, fols. 73v–75v. The *Liber Imbrium* follows Hugo's tr. of Jafar as an extra chapter: *capitulum de hiis que superius diffuse dicuntur hic summatim pertractantur* ... (margin, later hand: ... (cut off by edge of page) *libellus de imbribus*).
Explicit: *explicit liber de pluviis yndorum etc.*

Y *Oxford, Bodleian MS. Canonicus misc. 396, fols. 91v–92v. Title: *Capitula Imbrium Iohannis Yspalensis* (St. H. 567). Work incomplete.

E Erfurt, Amplonian MS. Q 365, fols. 50–52, *saec.* XII (Schum's catalogue).

Am Erfurt, Amplonian MS. Q 361, fols. 127–8, *saec.* XIV (Schum's catalogue).

Z *Paris, BN. MS. lat. 7440, fols. 33r–v. Work lacks beginning; the folios of the MS. are in the wrong order, and the first words on folio 33r are: *diligentius attendere deportetur.* Soon after follows the rubric *Expositio Portarum*, and the section beginning *Antiquorum porro astrologorum.*

The treatise beginning *Antiquorum porro astrologorum peritissimi* (TK. 111) is, in fact, an extract from Hermann's *Liber imbrium* and is found separately in Erfurt, Ampl. MS. Q 374, fols. 86r–v, *saec.* XIV.

The *Liber Imbrium* may also occur in several other MSS. (see Car. 87).

This work appears to be a summary of, or a compilation from, Arabic or Latin treatises, rather than, strictly, a translation[1]), as is made clear in the short preface (collation of CPVPrPaCa – I have mentioned only the most significant variants):

Cum multa et varia de imbrium cognitione precepta Indorum tradat auctoritas, eam (*ea* VPr) *summatim transcurrere* (*transferre* Pa Pr) *diversorumque diversam sententiam sub quodam compendio redigere curavi, ut quicquid verborum numerositas occultabat, aut physicorum* (*philosophorum* Pr) *dissona multitudo* (*altitudo* Ca) *variabat* (*narrabat* CaPr) *plerumque etiam incontinua scribentium digressio dilatabat, simplicis pagine brevitas absque omni scrupulo representet.*

›Since the authority of the Indians hands down many different teachings concerning the recognition of rainstorms, I have tried to run through the subject briefly and to reduce to a kind of summary the different opinions of different men, so that, whatever the multitude of words used to hide, or the discordant throng of scientists used to adulterate, and especially whatever the interminable ramblings of writers used to spin out, might be represented without complication within the space of a single page.‹

There is no reference within the treatise to the authorities which Hermann draws upon, but his claim to summarize the teachings of the Indians leads us naturally to the work by ›Jafar Indus‹ on rains. This exists in what appear to be two separate translations[2]), one beginning *Sapientes Indi de pluviis iudicant secundum lunam* ... (TK. 1377), and the other beginning *Universa astronomie iudicia prout Indorum asseverat auctoritas* ... (TK. 1546). From the preface to the second (incipit: *Superioris discipline inconcussam*

[1]) The *de indico ... translatus* of MS. D is an inference from the mention of the *auctoritas Indorum* in the first sentence of the *Liber Imbrium*. The *edidit Hermannus* of MS. C may be a more accurate description of Hermann's part in the composition of the work.

[2]) I do not believe that *Sapientes Indi* is
(a) one of the ›depraved translations‹ which Hugo complains of in his introduction: these translations are, in Hugo's own words, *prolix*, and therefore cannot be shorter than his own work, which is based on an ›abbreviation‹ (see [b]). Since Hugo believes the work to have been written by an Indian, the translations which he despises may be from ›Indian‹ into Arabic rather than from Arabic into Latin.
(b) Nor is the *Sapientes Indi* the *Abbreviatio Cillenii Mercurii* (this name appears in various forms) which Hugo claims to follow, since Hugo's work is fuller, and retains some Arabic words which are not in *Sapientes Indi*.
That ›Jafar‹ is Abū Maʿshar (Abū Maʿshar Jaʿfar ibn Muḥammad ibn ʿUmar al-Balkhī) is not unlikely since Abū Maʿshar claims to follow the authority of the Indians (*Introductorium*, V. 9 and also p, 110 above); and there exists a work of Abū Maʿshar whose title matches that of Hugo's translation (St. H. 567, Br.[2] I. 251: *kitāb ikhtiyārat as-sāʿāt* (= *liber mutationum temporum*) cf. also Pingree article ›Abū Maʿshar‹, in: *Distionary of Scientific Biography*, Bibliography no. 34). It is surprising, however, that Hermann or Hugo, if they used Abū Maʿshar's work directly, should call him an astrologer of the Indians, when they both knew his real name and identity perfectly well, from other works which they had translated. Perhaps it is the unknown figure ›Cillenius Mercurius‹ who mystified Abū Maʿshar's work, and perpetrated the appellation ›Jafar Indus‹, which is in keeping with his own exotic *nom de plume*. Only a comparison of the Arabic (British Museum MS. ar. 445, part 12) and the Latin translations, can determine the relation between the works.
The most comprehensive work on books of meteorology, and the Indian sources of their astrological theory, remains the exceedingly detailed and learned article of Steinschneider, ›Ueber die Mondstationen (Naxatra) und das Buch Arcandam‹, in: *Zs. der Deutschen morgenländ. Ges.* XVIII (1864) 118–201. For a clearer and more concise study of Indian influence in meteorological works see D. Pingree ›The Indian and pseudo-Indian Passages and Elements in Greek and Latin Astronomical and Astrological Texts‹, in: *Viator* (1976) 141–196.

veritatem) it is clear that the author of this translation is Hugo of Santalla (Ha. 77). A comparison of the first chapter of each version will show clearly that it is the same material which is being handled by two different translators or compilers:

Paris BN MS. lat. 16204 p. 386.	Paris BN MS. n. a. lat. 3091, fol. 104rb (P), and MS lat. 7329, fol. 66v (B).
(a) Sapientes Indi de pluviis iudicant secundum lunam, considerantes ipsius mansiones et	(a) Universa astronomie iudicia prout Indorum asseverat auctoritas a lunari ducatu potissime manare creduntur.
(b) coniunctiones vel aspectus planetarum ad ipsam.	(b) Communiter (?) vero eiusdem cum aliis stellis admixtione ducunt originem;
(c) Alii sapientum maiorem partem iudiciorum de pluviis ad lunam referunt.	(c) ea (*sc.* iudicia) enim ubi inquirunt in mundanorum generatorum effectum, perfectam et ceteris pleniorem proprietatem assumunt.
(d) Indi totum iudicium soli lune attribuunt, asserentes ipsam significatricem huius mundi universi et mediatricem inter res terrenas et planetas.	(d) Hec (*sc.* luna) autem inter cetera omnia tamquam unicum et singulare affirmat, quatenus ipsa ex sui summa et integra perfectione, totius scientie et agnitionis ducatum, tamquam mediatrix assumit, quod apud antiquorum sapientes multis declaratum constat argumentis.
(e) Recipit enim a superioribus planetis et stellis fixis vim quam dat terris quoniam circulus eius proximus est puncto terre.	(e) Universa enim rerum significatio ex stellarum efficacia de lunaris nature contemperatione (comparatione *P*) procedit. Luna namque universas stellarum figuras profecto vendicat ... cum eo perfectior in receptionis statu et evidentioris efficacie quia videlicet universali (immobili *P*) centro, terre inquam, affinior discurrit, et effectus omnium in hoc mundo sub se complectitur (complentur *P*).

Neither of these versions are slavish translations of an Arabic original (as is obvious, for example, in the case of the anonymous translation of al-Kindī's *De Pluviis* [*incipit: Rogatus fui* ... TK. 1364]). Both have a literary quality, though Hugo's translation is more opaque and wordy. The two versions have the same material up to the point where the highly interesting physical theory behind weather-forecasting ends (MS. lat. 7329, top of folio 68r; MS. lat. 16204, top of column 387b). From this point onwards *Sapientes Indi* ... adds two more paragraphs of theory (including the opinion that the speed of rainfall depends on the velocity of the moon) and then draws to a close (*explicit*, p. 387b: *non pluet nisi Mars aspexerit Iovem vel Saturnum, si dispositor temporum Deus gloriosus et sublimis voluerit*[3]). Hugo's work continues with a comprehensive list of the effects of each combination of planets and signs of the zodiac, which is followed by chapters on physical, geographical and even historical changes affected by the climate. The scope of these chapters bears witness to the range and the significance of the *genre* of astrological meteorology, but does not concern us directly here[4]).

[3]) This phrase, if nothing else, betrays this work as, ultimately, deriving from an Arabic work.

[4]) Al-Kindī's treatise, *Rogatus fui*, emphasizes the serious, and even ›spiritual‹ nature of the knowledge of meteorology (St. H. 564, Le. 46–48), and, for Abū Maʿshar, the changes in the seasons and in the weather within each season from year to year, are the first and most obvious proofs of the validity of astrology (*Introductorium*, I.1). Such meteorological treatises are, in fact, not only of relevance to medieval astrology, but also very fruitful sources of medieval physical and metaphysical theory, and have never been studied in detail from this

Hermann's *Liber Imbrium* is clearly related to Hugo's translation of Jafar. It is adjacent to Hugo's longer work in several MSS. (C,M,O,P,Pa,Bo,B,E, and cf. Ca), and in one manuscript (MS.B) it has up to now escaped notice by being tagged onto the end of Hugo's work as an extra chapter (fol. 73v): *De hiis que superius diffuse dicuntur hic summatim pertractantur.*

The *Liber Imbrium*

cannot, in fact, be a straight-forward summary of Hugo's work, since it includes a section on the ›opening of the doors‹ (*Apertio portarum*)[5]) which does not occur in Hugo's text, and it uses an Arabic word *athoreie*[6]) (= ath-thurayyā, the name of the third ›lunar mansion‹) which I have not found in Hugo's text. If we can place any confidence in the rubrics of MS. P, Hermann's work might be based on a *Liber Imbrium* of Sahl – though we have no evidence of such a treatise amongst his Arabic works[7]).

However, the terminology used by both Hermann and Hugo is remarkably close (I quote in brackets after Hugo's text, the translation of the same passage in *Sapientes Indi*, from Paris BN MS. lat. 16204):

Hermann, MS. Ca, fol. 104r	Hugo, MS. lat. 7329, fol. 66v
(a) ..ex subscriptis certissimum *manat* iudicium ...	(a) (Incipit) Universa astronomie iudicia ... a lunari ducatu potissime *manare* creduntur.
(b) Hoc etiam idem Martis et Veneris sub Scorpione *conventus* indicabit ... luna in eorum *oppositione* aut *tetragono discurrens.*	(b) ...*discurrit* ... *conventu* et *oppositione* atque *tetragono.* (p. 386: apparent in oppositionibus et coniunctionibus et quadratis)
(c) (fol. 106r) luna in humida mansione stelle in humida mansione *existenti applicans*, pluvias ostendit.	(c) (fol. 67v) Si (luna) in humida mansione discurrens Saturno pariter in humida *existenti* ... nec stella alia sub eorum *applicatione* ... ymbres ... portendunt. (p. 387: Si aspexerit Saturnum et utrumque fuerit in mansione humida et non sit impeditus Saturnus ab aspectu Iovis, erunt nubes ... et pluvia).

Parallels can also be drawn between Hugo's terms and phraseology, and passages in the *De Essentiis* of Hermann:

Hugo	Hermann
(a) stellarum *efficacia* (fol. 66v)	(a) The *efficacie virtus* of the heavens, 63rH, 63vH.
(b) integra perfectione (*ibid.*)	(b) perfecte integritatis, 58vD.
(c) ducatus (*ibid.*)	(c) *De Essentiis* 74rC, cf. pp. 117 and 121 above.
(d) sub ipsius (lune) etiam *ascensu et descensu* in ethere (p. 386: elevacionem vel descensum in circulo egresse cuspidis).	(d) quantitatem *ascensus et descensus lune*, utpote per circulum centrum terre excedentem, 66rB.
(e) *effectus omnium* in hoc mundo.	(e) *omnium* rerum *effectum*, 58vE.

standpoint (cf. Le. 46–48); Steinschneider's study (see p. 123 note 2) considers these works in respect to the theory of lunar mansions contained within them.

5) The section on the *Apertio portarum* in Hermann's *Liber Imbrium* is entirely different in its matter from the short tract beginning *Apertio portarum dicitur cum coniungitur planeta* (TK. 112); Thorndike considers these two tracts to be the same (*loc. cit.*).

6) MS. Ca, fol. 104v: *harum etiam nonnulle in athoreie et in exordio tauri.*

7) The *Liber de Mutatione Temporum* of Sahl is on a different subject – viz. the right time to ask a question to your astrologer – and is the fourth book of the Sahl corpus translated by John of Seville (see p. 116 above).

That Hermann's terminology should match Hugo's is of more significance than that his work should derive from *Superioris discipline:* the use of the same technical vocabulary between Hugo and Hermann suggests a close and personal association between them – whether as master and pupil, or as collaborators, it is difficult to tell (see further below pp. 133–4).

No date is to be found in any of the MSS. of the *Liber Imbrium*, and the work is not cited in any other work of Hermann's. If a treatise of Sahl is the original, one is tempted to place it close, in date, to the *Fatidica*, and the similarity between the short introductory passages in the *Liber Imbrium* and the *Fatidica* would add support to this. The introduction to the subject matter of the *De Occultis* (p. 120 above) is also similar to that of the *Liber Imbrium* in its length, and in its broad survey of the kind of authorities on which the work will depend.

4. *Maius Introductorium* of Abū Maᶜshar

Incipit: *Apud Latinos artium . . .*
Ha. 45–47, Car. 90, Le. *passim*, TK. 116.

C Munich MS. clm. 25004, 1480 A.D., fols. 1–88 (Le.).
D Darmstadt MS. 765, *saec.* XIII, fols. 1–43 (Le.).
Pe Pesaro MS. 1649, *saec.* XVI (Le.).
N *Naples BN MS. VIII. C. 50, fols. 1–56v, *saec.* XII (Ha. Le.).
O Oxford, Corpus Christi College, MS. 95, fols. 59ra–117ra (Ha. Le.).
E Erfurt, Amplonian MS. Q 363, fols. 38–58 (Ha. Le.).
F *Florence BN, Con. Sop. J. II. 10 (San Marco 200) *saec.* XIII, fols. 1–54v (Ha. Le.).
V Vatican MS. Vat. Lat. 4603, *saec.* XIII, fols. 1–59v (Ha. Le.).
P Parma, Bibl. Palat. MS. Pal. fondo Parmense 720, *saec.* XII–XIII, fols. 344r–402v (Ha. Le.).
R *Manchester, Rylands Library MS. lat. 67, *saec.* XIII, fols. 170–217v (Ha. Le.).
M *Paris BN MS. n. a. lat. 3091, *saec.* XIII, fols. 113v–141r (Le.).

Printed at Augsburg 1489 and 1495, Venice 1506 (Le.). MS. F is incomplete. Lemay gives a full description of the MSS. (Le. 384–5). Lemay has prepared an edition of the Arabic original and the Latin translations of John of Seville and Hermann of Carinthia, which, it is to be hoped, will be published in the near future.

The exact title, which Hermann gives in the preface to his translation, is *Introductorium in astrologiam.* This work is a translation of the *kitāb al-madkhal al-kabīr ᶜalā ᶜilm aḥkām an-nujūm*, ›the large book introducing the science of making judgements from the stars‹, which exists in several Arabic MSS. (Le. 380). An earlier translation by John of Seville is not used by, and perhaps not known to, Hermann. The date of Hermann's translation is given as 1140 (Le. 16; Naples MS. VIII. C. 50, fol. 40v, ed. Venice 1506, fol. f4v: *hoc vero nostro tempore id est anno incarnationis domini 1140*).

Lemay gives no further explanation of the *Albumasar minor Hermanni* formerly in the collection of Gerard of Abbéville (once in the Sorbonne Library, see Ha. 45). If this work was, as Haskins conjectures, the same as the *Introductorium*, Hermann's translation would be called *minor* in contrast to John of Seville's fuller translation. The *Albumasar minor* however, may be an earlier translation of a work by Abū Maᶜshar: in the *De Occultis* (see no. 2 above) Hermann refers to a translation of a *commentatio Albumazar* (*ex eis .xi. qui in Albumazar commentatione enumeravimus:* Oxford, Bod. MS. Laud. Misc. 594, fol. 151rb) and tract A of the *De Occultis* could come from the translation of the abridged version of the *Introductorium* made by Hermann himself (see p. 119 above). Hermann makes it clear that his translation of the *Introductorium* is his first major

work. He furnishes the translation with a substantial preface (edited in full by Haskins 45–47), in which he defines and justifies his translating procedure. In the preface to his translation of the *Planisphere* he implies that the *Introductorium* is the one work of his already known to Thierry:

quod ... nichil prohibere videtur quin, ad imitationem alterius translationis nostre, hic quoque breviter commemoremus (ed. Heiberg CLXXXIII).
›Nothing seems to prevent us from copying our other translation and briefly relating the story here also[1]).‹

5. (?) *De Revolutionibus Nativitatum* of Abū Maᶜshar.

There is evidence that Hermann made a translation of another work by Abū Maᶜshar, called, in Arabic, *kitāb taḥāwīl* (or *aḥkām taḥwīl*) *sini al-mawālīd*, ›the book of the revolution of the years of Nativities‹ (Brᵉ. I. 251). In his translation of the *Introductorium*, I.V, Hermann calls this kind of astrological work *annales:*

(for predicting events concerning individuals, one must refer to) *genezia annalibus aut questione*[1a]).
In the *De Essentiis*, 70rH, he writes:
Quas Abumaixar in annalibus suis usque ad tria milia numerat, quem numerum nec nos in eiusdem libri translatione pretermisimus.

This quotation comes from a passage in the *De Essentiis* (70rH–70vB) which is very carefully written. Hermann is defining the two main branches of astrological prediction, and text-books concerning each of them. Both these text-books are works by his preferred master, Abū Maᶜshar. He refers to the *kitāb al-qirānāt* under its Arabic title (*Alkirenet*) without mentioning a translation (see p. 116 above)[2]). He refers to the *annales* of Abū Maᶜshar as his own translation. This work is not the *Introductorium*, and it is not unlikely that he translated other works by Abū Maᶜshar.
The best-known Latin version of Abū Maᶜshar's *De Revolutionibus Nativitatum* is that made from the Greek translation of the original Arabic. This Latin version dates from the thirteenth century[3]). I have looked at Paris BN MS. lat. 7439, fols. 44v–107r, MS. lat. 10270, fols. 87r–139r and MS. lat. 7324, fols. 1r–24v, which are clearly this translation from the Greek (*incipit*: *Sole nativitatis tempore* ... TK. 1516, Car. 94–95). I have discovered that the *De Revolutionibus Nativitatum* found in the corpus of translations of Abū Maᶜshar's works in Paris BN MS. lat. 16204, 353–369 is, in fact, a résumé of this same work of Abū Maᶜshar[4]) – either the translation of an Arabic summary of the work,

[1]) As Lemay has pointed out (p. 286) the story in question is found in the *Introductorium*, V. 9 (ed. Venice, 1506, fol. e3r; see p. 109 above).
[1a]) cf. John of Seville's translation of the same passage (Cambridge Univ. Libr. MS. Kk. i. 1, fol. 10vb): *nativitate hominis, aut revolutione anni illius vel eius interrogationibus de esse suo*; Hermann's *annales* clearly corresponds to John's *revolutio anni illius* in this passage, see also *Introductorium*, V. 9 and *De Occultis* MS. O fol. 145v (p. 121 above).
[2]) John of Seville's translation of a work of Abū Maᶜshar called in Latin *De Magnis Coniunctionibus*, although covering much of the same ground as *kitāb al-qirānāt*, is probably a different work; see *Encyclopédie de l'Islam* (Leiden 1960) I. 143 (›Abū Maᶜshar‹, article by Millás Vallicrosa), but see Pingree article ›Abū Maᶜshar‹ in *Dictionary of Scientific Biography*, ed. C. C. Gillispie, bibliography no. 8.
[3]) Pingree has edited the Greek text (Teubner, Leipzig 1968) and gives a short account of the Arabic-Greek-Latin tradition of the work.
[4]) A résumé was made in Arabic by al-Sijzī in his *Al-Jāmiᶜ al-Shāhī* (see Pingree, art. cit., bibliography no. 19).

or a Latin summary of the complete Arabic work. The title and brief preface to the work are as follows (Paris BN MS. 16204, p. 353):

Rubric: *In nomine domini misericordis et pii incipiunt sententie de revolutione annorum ex libro albumasar in revolutione nativitatum exercere* (read: *excerpte*).

Cum tempus breve est operandi et opus revolutionis annorum prolixum, necesse est nobis pauca e multis excerpere omnino (read: *quominus?*) *de tanti operis fructu vacui remeamus causa neglegentie.*

›In the name of God the merciful and compassionate, here begin the opinions concerning the revolution of years, being excerpted from Abū Maᶜshar's book on the revolution of nativities.‹

›Since time has an immediate effect, and the work on the revolution of years is long-winded, it is necessary for us to excerpt a few words out of many (so that) picking out the fruits of such a large work, we may not return empty-handed through leaving it alone altogether.‹

A comparison of the opening sentences of the work with the translation from the Greek (Paris BN MS. lat. 10270, fol. 87r) shows the extent of the abbreviation:

MS. lat. 16204, p. 353 (*Cum tempus breve*)	MS. lat. 10270, fol. 87r (*Sole nativitatis tempore*)
Ante omnia autem dicendum est (a) quid utilitatis possumus consequi de revolutione annorum vel	(*Chapter* II) (a) (*rubric*) De Utilitate Revolutionis.
(b) quid necesse est annum revolvi, cum in ascendente nativitatis significantur omnia que sunt nato futura, ut quidam contradicentes revolutioni dixerunt;	(fol. 87v) (*Chapter* III) (b) (*rubric*) Contra eos qui non acceptant revolutiones annorum. (*incipit*) Quidam de contradicentibus dixerunt non opus esse revolutionem annorum, conantes probare hoc per duas probationes, per unam quidem quod horoscopus et figura secundum nativitatem significant hominibus accidentia. Una ergo est annorum revolutio. Per aliam vero dicunt quod significatio nativitatis fortior est significatione revolutionis . . .
(c) ad quod respondendum est quod sagacitas philosophorum testatur humani eventus significationem non posse ex uno significatore comprehendi sed a duobus vel plus,	(c) Nos quidem tribus modis redarguimus, uno quidem quod non una dispositione planete argumentamur rem futuram sed duabus vel pluribus . . .
(d) quia unius erit *rei* testimonium in tanto negotio non potest sufficere. (p. 353 cont.)	(d) Alia vero ratio sic procedit, quod planeta quando significabit in nativitate aliquod bonum vel malum non cognoscitur a nativitate quantitas illius . . .
(e) Auctoritate ergo maiorum debemus revolvere annos quia in revolutione annorum sunt planete in aliis (p. 354) locis in quibus non erant in nativitate, et necesse ut commisceantur eorum significationes, significatio scilicet nativitatis cum significatione revolutionis.	(e) Tertia quidem ratio talis est, quod planeta indicat presentia preterita et futura, et significat per commixtionem presentis ad preteritum et (fol. 88r) futurum et facimus comparationem ad alterutra tempora argumentamur rem diligentius qua de causa non est superflua annorum revolutio.

There is nothing to suggest that *cum tempus breve* is the *annales* of Hermann. The style of the Latin, the terminology (*significatio* instead of *ducatus* – the term Hermann uses [see p. 117 above], and chapters introduced by *Scito* [see p. 117 above] and the nature of its inclusion in the Abū Maᶜshar corpus of John of Seville (Paris BN MS. lat. 16204)

suggest that this treatise, too, was translated by John[5]). The *annales* of Hermann, therefore, still awaits discovery.

III. *Muḥammadan Literature.*

(a) *De Generatione Mahumet,* (b) *Doctrina Mahumet.*

Ha. 47, M.-T. D'Alverny, »Deux traductions latines du Coran du Moyen Age«, in: AHDLMA 16 (1947) 69–131; *ead.*, »Quelques MSS. de la Collectio Toletana«, in: *Studia Anselmiana* 40 (1956) 202–218.

Paris, Arsenal MS. 1162, *saec.* XII (D'Alverny).
Oxford, Bodleian MS. Seld. supra 31 (Ha., D'Alverny).
Oxford, Merton College, MS. 313 (D'Alverny).
Vatican MS. Vat. lat. 4012 (D'Alverny).
Cambridge, Corpus Christi College, MS. 335 (Ha., D'Alverny).

De Generatione Mahumet only:
Oxford, Corpus Christi College, MS. 184 (D'Alverny).

Doctrina Mahumet only:
Paris BN MS. lat. 3391 (D'Alverny).

Both edited by Theodore Bibliander and printed with the *Koran* (*Basel 1543) I. 189–212. D'Alverny lists further MSS. in »Quelques MSS . . .« E. Cerulli (*Il »Libro della Scala«* [Vatican 1949] 391–9) has edited an extract from the Vatican MS. (fols. 18v–24).
J. Kritzek (»Robert of Ketton's translation of the Qu'rān«, in: *Islamic Quarterly* II [1955] 309–412) has announced the forthcoming publication of his editions of the entire corpus of Muḥammadan literature commissioned by Peter the Venerable, of which Hermann's two translations form a part. Some of these works (but not including the translations of Robert and Hermann) were published in 1964: James Kritzek, *Peter the Venerable and Islam*, Princeton 1964.

(a) *De Generatione Mahumet, et nutritura eius, quod transtulit Hermannus Sclavus* (Bibl. ed.: *Dalmata*) *scolasticus subtilis et ingeniosus apud Legionensem Hispanie civitatem* (D'Alverny).

According to D'Alverny the Arabic original of this collection of rather fanciful Muḥammadan legends is not known; Kritzek (»Robert of Ketton's translations . . .« 310) identifies the original as *kitāb nasab al-rasūl* by Sa'īd ibn 'Umār.

(b) *Doctrina Mahumet que apud Saracenos magne auctoritatis est ab eodem Hermanno translata cum esset peritissimus utriusque lingue, latine scilicet et arabice* (D'Alverny).

The Arabic original of this work exists in Paris BN MS. ar. 1973 and 1974 and has been printed in Cairo (D'Alverny, »Deux Traductions« 84). Kritzek (»Robert of Ketton's translation . . .« 310) identifies the work as *Masā'il Abi-al-Hārith 'Abdallāh ibn Salām.*

These works, commissioned by Peter the Venerable, and bound together with Robert of Ketton's translation of the *Koran* and *Chronica mendosa Saracenorum*, were composed between 1141 (when Peter found Hermann and Robert working at astronomy on the banks of the Ebro) and 1143 (when Peter sent the works to St. Bernard). As commissioned works they do not form part of Hermann and Robert's programme of translation and exposition of scientific texts but Hermann does include quotations from the *Koran* and from Muḥammadan legend in the *De Essentiis* (59rD-E, 59vA–B, 70vC–D).

[5]) The Abū Ma'shar corpus in the early Paris BN MS. lat. 16204 (13th century), consists of texts in the same style, and following on from each other in a regular pattern (the rubrics alternate: *In nomine domini . . .*, *hic est liber . . .*, *in nomine domini . . .* etc). Some of the works are clearly attributed to John of Seville (either here or elsewhere) and, unless there is strong evidence otherwise, it seems fair, at this stage, to hypothesize that the whole corpus was translated by John.

IV. Works consolidating Astronomy and Astrology

1. *De Essentiis*

Incipit: *Atlantidum his diebus . . .*
N *Naples BN MS. VIII. C. 50, *saec.* XII, fols. 58r–80r.
L *London, British Museum, MS. Cotton, Titus D. IV, *saec.* XIV, fols. 75r–138v, lacking beginning and end.
C *Oxford, Corpus Christi College, MS. 243 (1423 A.D.) fols. 91r–115v.

Completed at Béziers in 1143 (see *explicit*), the *De Essentiis* forms an integral part of Hermann's scientific programme. It is announced in the preface of the *Planisphere*, and it cites many passages from Hermann's translation of Abū Maᶜshar's *Introductorium*. The extensive quotations from Euclid's *Elements*, Theodosius' *De Spheris*, and Ptolemy's *Almagest* suggest that Hermann is in the process of working on these works, though there is no clear statement in the *De Essentiis* that he has already made a translation or redaction of any of them.

2. (?) *Quadripartitum* and *Almagest* of Ptolemy

There remains the question of two anonymous Arabic-Latin translations, of the *Almagest* (only in fragments) and the *Quadripartitum* of Ptolemy respectively. These are found in a few MSS. and occur together in Wolfenbüttel MS. Gud. lat. 147 (Ha. 110–111).
The preface to the Wolfenbüttel version of the *Quadripartitum* reproduces almost *verbatim* certain phrases from Hermann's preface to Abū Maᶜshar's *Introductorium:*

Quadripartitum (Ha. 111)	*Introductorium* (Ha. 45–6)
Prolixitatis exosa latinitas artium principia prescriptione quadam insignire sollicita est ut sequens negotium gratiosius elucescat. In huius igitur initio iuxta expositionem .7. sunt que consideranda premittuntur: auctoris intentio, operis utilitas, titulus libri, nomen auctoris, ordo librorum in disciplina, cui parti scientie tractatus innitatur, et operis partitio. Intentio quidem est suscepti operis dilucida consummatio et utilitas est diligentius intuentis compubescens instructio.	(a) ego prolixitatis exosus, et quasi minus attinencia, cum et hunc morem Latinis cognoscerem, preterire volens, ab ipso potius tractatu exordiri pararem . . . (b) Apud Latinos artium principiis quedam ars extrinseca prescribi solet . . . (c).vii.inquit (*sc. Abū Maᶜshar*) sunt omnis tractatus inicia: auctoris intentio, operis utilitas, nomen auctoris, nomen libri, locus in ordine discipline, species inter theoricam et practicam, partitiones libri. . . (d) Intentionis, inquit, exposicio rei summam breviter et absolute proponens discentis animum attentum parat et docilem; utilitatis promissio laborem allevians internum animi quendam affectum adaptat (*order of clauses: b, c, a, d*)

Lemay (pp. 19–20) has pointed out another intriguing correspondence between the two works:

Quadripartitum Parma. Bibl. pal. MS. pal. 719, fol. 322r	*Introductorium* ed. Venice, 1506, fol. f2v
Insule etiam Boreales cum suis habitaculis ut Scotia, Ybernia, maior Britannia in qua patria nostra excestrici.	Istria tres (partes) maritima et montana, in medio patria nostra Carinthia.

On this evidence Lemay attributes the translation to Robert of Chester (= Robert of Ketton), and interprets the date given in the *explicit* of the work (Aug. 29, 1206) as ›a

reference to the Spanish era which Robert was wont to use (therefore, 1168 A.D.)‹. An alternative explanation is that the author of the translation deliberately modelled his preface and style of signature on Hermann's translation of the *Introductorium* which seems to have been associated with this translation in the MS. tradition from an early date[1]). In any case, the Arabic date – *23 die almuharan, anno Arabum 603* – which is given alongside the *annus domini*, corresponds exactly to Aug. 29, in the year 1206 of the Gregorian, not of the Spanish, era[2]).

The translation of the *Almagest* was the eventual aim of Robert of Ketton's mathematical and astronomical studies, and Hermann gives clear indications that he knew the work directly – in either Arabic or Latin – in the *De Essentiis*[3]). In that we probably have versions used by Robert and Hermann of two works ›preparing the way for‹ the *Almagest* (see nos. I.1 and I.2 above), is it possible to attribute to either of them a translation of the *Almagest*, which may have been the first to have been made in the Latin West?[4]) We have one testimony to Hermann of Carinthia as ›the translator of the *Almagest*‹[5]). It is hardly possible that he can be identified with the *Hermannus* (without epithet) who, in one MS., is named as the author of the translation made in Sicily in about 1160[6]). This translator, working entirely from Greek, followed a programme of study which runs parallel to that followed by Robert and Hermann in Spain: he translated the *Elements* of Euclid[7]), and had worked on more advanced works of Euclid, and the *De Motu* of Proclus, before embarking on the *Almagest*[8]).

It is, therefore, amongst the versions from the Arabic that one must look for evidence of Hermann's translation. The fragments of an unplaced translation of the *Almagest* in Wolfenbüttel MS. Gud. lat. 147 are found also in Madrid BN. MS. 10113 (see Millás-Vallicrosa, *Las traducciones orientales en los manuscritos de la Biblioteca Catedral de Toledo* [Madrid 1942] 149–150) and in Vatican MS. Vat. lat. 2057 (see Theodore Silverstein, *Medieval Latin Scientific Writings in the Barberini Collection* [Chicago 1957] 47-8; see also 101–2 for another testimony). We have, as evidence of this translation, only Ptolemy's introductory chapter, and alternative translations as marginal notes to Gerard's well-known translation. For Millás (loc. cit.) and Kunitzsch (*Der Almagest* [Wiesbaden 1974] 84, 94–5) these testimonies have not seemed sufficiently numerous or original to prove that another translation existed in its entirety. The one indication from the intro-

[1]) The two works occur in the same 13th cent., MS. at Florence (BN Con. Sop. J. II. 10 [San Marco 200]); at Parma the *Introductorium* is found in Bibl. pal. MS. pal. 720 (12–13th cent.) and the *Quadripartitum* is in MS. 719 of the same *fonds;* Mlle. D'Alverny of Paris informs me that these two MSS. came from England.

[2]) The 23rd, Moharrem, 603 was the 30th Aug. 1206 of the Gregorian era (H.G. Cattenoz, *Tables de Concordance*, Rabat, 1954). Kunitzsch has already noted this fact (*Der Almagest* [Wiesbaden 1974] 95).

[3]) See especially text of, and commentary on, *De Essentiis* 67rA–67vH (Cambridge Ph. D. thesis 1976).

[4]) For the Sicilian translation from the Greek see below; Gerard's translation from the Arabic is dated 1175.

[5]) Ha. 53 (Louvain MS. 217): *Hermannus iste astrologus fuit natus de Karinthia, non Contractus de Suevia, et transtulit Almag.*

[6]) Ha. 53.

[7]) J. E. Murdoch, ›Euclides Graeco-Latinus‹, in: *Harvard Studies in Classical Philology* LXXI (1966) 249–302.

[8]) Ha. 157–165, 191–193.

ductory chapter, of a possible connection of this translation with the work of Hermann, is the terms used for the division of science, which correspond to those used in the preface to the *Planisphere:*

Planisphere (above p. 109)	Wolf. MS. (Ha. 107)	Gerard's tr. (Ha. 106)
Omnem superioris mundi scientiam principe loco in geminas dividi species – in motus celestes et motuum effectus – tanto quidem intervallo discretas, quanta est inter *disciplinale studium* et *naturalem speculationem* distantia.	O quam bonum quod divisit Aristotiles partem *speculativam*, cum divisit eam in tria prima genera *naturale, disciplinale* et *divinum.*	O quam bonum fuit quod Aristotiles divisit *theoricam* cum eam in tria prima genera distribuit, in *naturale, doctrinale,* theologicum.

I suggest, therefore, that there may be a connection between the Arabic-Latin translations of the *Almagest* and *Quadripartitum* occurring in the same manuscript, and they may both depend in some way on works by Robert and Hermann. However, from the description of these translations given by Haskins and Lemay, neither of them can be attributed directly to Hermann or to Robert.

V. Conclusions.

More than one work of Hermann appear in the following MSS.:

Naples BN MS. VIII. C. 50, *saec.* XII (Nos. II.4 and IV.1).
Parma, Bibliotheca Palat. MS. fondo Par. 720, *saec.* XII–XIII (Nos. II.3 & 4).
Paris BN MS. nouv. acq. lat. 3091, *saec.* XIII (Nos. II.3 & 4).
Dijon MS. 1045, *saec.* XV (Nos. II. 2 & 3).

In all except the Naples MS., one of the two works involved is the very commonly occurring *Liber Imbrium* (no. II.3). Richard of Fournival himself possessed at least the *Planisphere* (no. I.4) and Hermann's version of Euclid's *Elements* (no. I.1), and he attributes several other works in his possession to Hermann (see nos. I.6 & 7). Only in the case of Naples BN MS. VIII. C. 50 can one speak of a *corpus* of Hermann's works. This MS. contains the two fundamental treatises for Hermann's teaching on ›natural speculation‹, and the only known work of his only known pupil – Rudolph of Bruges. In general, Hermann's works seem to have become separated at an early date, and to have had different manuscript traditions. From Hermann's own testimony, one would expect there to have been a diffusion of his works through and from the Cathedral library at Chartres. He dedicates his translation of the *Planisphere* to Thierry who, at the time of dedication (1143) was Chancellor at Chartres, and he refers in it to his translation of Abū Ma'shar implying that Thierry was already familiar with it (see p. 127 above). He also recommends other works translated by Robert and himself, and announces his *De Essentiis.* There is no evidence, however, in the choice of works in Thierry's own teaching manual – the *Heptateuchon* – that Hermann's programme of scientific education, or any of the individual works he mentions, had any impact at Chartres. Only in the case of the tables of al-Khwārizmī are MSS. at Chartres (MSS. 214 & 498 [*Heptateuchon*]) known to have contained a work recommended by Hermann (see p. 107), and if these tables are in Adelard's original version, they may have been at Chartres before Hermann wrote his preface. Do the distribution of the MSS. of any of Hermann's works suggest a common source in Chartres?

Of the works listed above, nos. I.1–3 are, or could be, revisions of works already translated by Adelard of Bath, and suggest that Robert and Hermann were building on a corpus of mathematical and astronomical works which had already been established. Their study method was, perhaps, to read the Arabic texts with the help of these translations, and then Robert, or Hermann, would write out his own ›text-book‹ as the fruit of their common research. The words *commentarius* and *translatio*, applied to this kind of text-book, cannot, therefore, be taken strictly in the modern sense of the words ›commentary‹ and ›translation‹.

In his preface to the *Koran*, Robert sketches for Peter the Venerable, the plan for a ›divine work‹ (PL 189.660):

tibique celesti, celum omne penetranti, celeste munus voveo, quod integritatem in se scientie complectitur. Que secundum numerum et proportionem atque mensuram celestes circulos omnes et eorum quantitates et ordines et habitudines, demum stellarum motus omnimodos, et earumdem effectus atque naturas, et huiusmodi cetera diligentissime diligentibus aperit, nunc probabilibus, nonnumquam necessariis argumentis innitens.

›I promise to your celestial highness, whose vision penetrates the whole of heaven, a celestial gift which embraces within itself the wholeness of science. This reveals most thoroughly to those who apply themselves thoroughly, according to number and proportion and measure, all the celestial circles and their quantities, orders and relations, and finally all the various movements of the stars, and their effects and natures, and everything else of this kind – relying now on probable arguments, sometimes on necessary arguments.‹

There is a correspondence between Robert's conception here and the two parts of Hermann's programme of scientific education described in the same year (1143) in the preface to the *Planisphere* (see no. I.4 above p. 109):

(a) The ›mathematical study‹:

Robert	Hermann
que secundum numerum et proportionem atque mensuram . . .	*omnis vis et ratio in numero, mensura et proportione.*

There is, in both writers, the same departure from the much-quoted biblical verse (Sapientia 11.21): *in mensura, et numero et pondere disposuisti.*

(circulorum) quantitates . . . et habitudines	*dimensioni circulorum et habitudini ad invicem.*

(b) The ›natural speculation‹:

Robert	Hermann
(stellarum) effectus atque naturas	*motuum effectus . . .* (cf. *Introductorium*, I. 1: *secunda [species] . . . stellarium corporum naturas et proprietates)*

The text-books of Hermann's programme, consisting of his own works and translations – the *Elements* of Euclid, the *Planisphere* of Ptolemy, the *De Essentiis*, and Abū Ma'shar's *Introductorium* – form a corpus out of which such a work containing the ›whole of science‹ might be built. The addition of Robert's translation of al-Battānī's *Opus Astronomicum* and a translation of Ptolemy's *Almagest* would complete the framework for such a work. It does not matter too much whether such a work was ever finished – it certainly has not been found. What is more important is that Robert and Hermann could conceive of an entirely new summa of scientific knowledge, based on sources which were almost completely unknown fifty years previously, but which were to remain standard text-books for many centuries to come.

Hermann's interests, however, diverged from Robert's in that he was attracted to astrology, both in itself, and in its position as a key to the explanation of all physical phenomena within the universe. In this interest, in the particular Arabic astrologers he favours,

and in the terminology he uses, Hermann is very similar to Hugo of Santalla. Hermann is the only contemporary author who is known to have had access to Hugo's translation of ps.-Apollonius' *De Secretis Nature*[1]). He appears also to have made use of Hugo's translation of ʿUmar ibn al-Farrukhān's *De Iudiciis* (see p. 120–1 above), but most striking of all, is the congruence between Hugo and Hermann's technical vocabulary, not only in their works concerning rains (p. 125 above), but also in, for example, their regular use of *genezia* for ›nativities‹ and *ducatus* for the action of the heavenly bodies[2]). Robert's presence at Pamplona and Tudela is testified by Peter the Venerable and charters from 1143 to 1157[3]); *magister Hugo* appears in two documents of November 11, 1145 at Tarazona[4]). It would be intriguing to know what part, if any, Hermann had to play in the political feuds between the neighbouring bishops of Pamplona and Tarazona over the possession of Tudela, in which Robert of Ketton was one of the protagonists.

Much work remains to be done. The manuscripts of astrological works, in particular, (both Arabic and Latin) have still received very little attention. For anonymous treatises, as scientific a method as possible is needed for comparing the styles of different authors, and different technical vocabularies. But it is to be hoped that the contributions of the individual translators working in Spain, and their contacts with each other, will gradually become clear.

[1]) De Essentiis 65v: *His duobus* (i. e. Sun and Moon) *in omnem generationem tamquam – ut Apollonius Thebanus affirmat – mundi parentibus fundatis*, cf. ›De Secretis Nature‹, Paris BN MS. lat. 13951, fol. 31r: *Prodigiorum operatio ex uno, quemadmodum omnia ex uno eodemque ducunt originem ... cuius pater Sol, mater vero Luna;* De Essentiis 72vD–E: *Apollonius in Secretis Nature ... cum, ut ipse scribit, solus in deserto subvertisset aram solis quemadmodum inscriptio suadebat, nec Hermetis antro quod subtus invenerat propter exspirantem flatum lumen inferre posset, subito sibi quendam affuisse refert, qui lucernam componere docuit, statimque evanuit.* This is a summary of the story told by Apollonius in MS. lat. 13951, fols. 1v–2r. I am grateful to Mlle. M.-T. D'Alverny for pointing out the special relationship of *De Secretis Nature* to *De Essentiis*. An edition of *De Secretis Nature* is under preparation by Mlle. D'Alverny.

[2]) For *genezia* see Hugo's preface to Māshā'allāh, ›De Nativitatibus‹ (Ha. 76): *sic et in genezia, nativitatum dico speculatione* (For Hermann's use of *genezia* see pp. 117 and 121 above); for *ducatus* see Hugo's tr. of al-Kindī, *Iudicia*, c. 1, Cambridge, Clare College MS. 15, fol. 69ra (For a full discussion of the hitherto unnoted fact that Hugo translated some of the treatises later incorporated into the *Liber 9 iudicum* see C. S. F. Burnett, ›A Group of Arabic-Latin translators working in northern Spain in the mid-twelfth century‹, in: *Journal of the Royal Asiatic Society*, 1977, 62–108).

[3]) For Robert's ecclesiastical career see A. Martín Duque, ›El Inglés Roberto, Traductor del Corán‹, in: *Hispania Sacra*, 22 (1962) número 88, and J. Goñi Gastambide, ›Los obispos de Pamplona del siglo XII‹, in: *Anthologica Annua*, 13 (1965) 254–64 (I am grateful to Sr. Goñi for advice on the testimonies to *magistri* in the Cathedral Library at Pamplona). Some of the dates and places of the charters to which Robert is a witness are difficult to reconcile with the dates and places of composition of works attributed to the same Robert.

[4]) The evidence of Hugo of Santalla's prefaces shows that he was under the patronage of Michael, Bishop of Tarazona from 1119 to 1151 (Ha. 67 ff.); the documentary evidence for a *magister Hugo* at Tarazona can be found in J. M. Lacarra, ›Documentos para el estudio de la reconquista y repoblación del valle del Ebro‹, in: *Estudios de Edad Media de la Corona de Aragón*, V (1952) nos 357 and 358.