PETRUS PHILOMENA DE DACIA: A PROBLEM OF IDENTITY

With a survey of the manuscripts

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INTRODUCTION

When that indefatigable student of Medieval MSS, Léopold Delisle, in 1887 was examining a 14th century codex in the Cathedral Library of Bayeux, he discovered an ecclesiastical calendar together with some *canones* explaining its use. The *canones* had the title *Canon supra kalendarium magistri Petri de Dacia, dicti Philomena*. Without publishing the text Delisle described it thus: "Ce n'est pas un simple calendrier liturgique, avec des notes astrologiques, comme on en rencontre dans presque tous les missels. Il est accompagné de tableaux à l'aide desquels on peut faire différents calculs astronomiques. Ces tableaux se rattachent aux oeuvres d'un astronome de la fin du XIII^{e} siècle, dont le nom est bien connu, mais dont les travaux n'ont point encore été suffisamment étudiés. Il s'agit de maitre Pierre de Dace"[1].

Since these words were written a considerable number of papers on Petrus de Dacia has been published. Nevertheless, the situation described by Delisle still prevails to a large extent. Petrus de Dacia is still frequently mentioned and we know something more about him than did Delisle. But with one important exception his works have not yet been sufficiently studied, and only two of them have been published. The majority are still

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1) L. Delisle, Le missel et pontifical d'Etienne de Loypeau, Eveque de Luçon, Bibliothèque de l'École des Chartes, Paris, 1887, 527-534, p. 532.

hiding in the manuscript departments of many libraries all over Europe together with a few that have found their way to America. Therefore, one of the principal prerequisites of improving upon this situation must be an attempt to survey the MS material as it is known at present. This is the purpose of this paper in which I have listed all MSS which are or can be attributed to Peter Nightingale. This list is presumably not exhaustive since at least one or two of Peter's writings are likely to be found in almost any collection of astronomical MSS from the 14th and 15th centuries. It may also be incorrect at some points since some of the ascriptions seem still to be dubious. Nevertheless, I hope that it will prove useful as a starting point for further research. It will be preceded by a short sketch of the vicissitudes of Peter Nightingale-scholarship up to the present time, and followed by a brief discussion of the major problem still unsolved.

THE EARLY TRADITION

The first time Petrus de Dacia was mentioned in print was in the great biographical encyclopedia of the learned Benedictine Johannes Trithemius which appeared in 1494. His entry deserves to be quoted in full: Petrus de Dacia: philosophus: calculator et astronomus inter omnes sui temporis excellentissimus atque celeberrimus: ingenio subtilis et clarus eloquio: diuinarum scripturarum et graeci sermonis non ignarus: Fertur multa in astronomia et arte calculatoria scripsisse opuscula: quae ad computum ecclesiasticum non inutilia iudicantur: quibus nomen suum ad noticiam posteritatis distinauit. Sed pauca eorum ad noticiam meam peruenerunt: De calculo seu computo: li. 1. Calendarium quoque: li. 1. Et tabularum suarum: li. 1. Caetera et si multa sint quae composuit: ad me tamen non venerunt. Claruit temporis Alberti imperatoris: Anno domini Millesimo CCC[2].

Almost all the early tradition of Peter stems from this short notice which thus rescued his name from oblivion as his own works gradually were forgotten. It was therefore fortunate that Trithemius's account was substantially correct. His short list of Peter's works is very incomplete, but not erroneous. His importance for calendary questions - the Medieval science of *compotus* - was duly stressed, and his *floruit* was correctly placed at about the year 1300. That Peter was well versed in Holy Scripture was also

2) Johannes Trithemius, Liber de scriptoribus ecclesiasticis collectanea, Basileae, 1494, fol. 76v-77r.

most probable although it does not appear from his writings from which the theological element is completely absent; but the fact that he was a canon at the important Cathedral of Roskilde - of which Trithemius was unaware - cannot but underline his theological qualifications. Only the assertion that Peter was conversant with the Greek language must be questioned. It is not impossible although very few 13th century scholars had any knowledge of Greek, but his extant works do not bear the statement out. It is possible that the humanist scholar Trithemius simply was unable to admit the possibility of learning without any knowledge of Greek. Another question is whether Peter had at least some Hebrew; we shall return to this problem in a later connection.

Petrus de Dacia was next mentioned in 1545 by Conrad Gesner[3] who took the material for his short notice from Trithemius and thus preserved the pure tradition. The same source was used in 1668 by Bulaeus who first mentioned another Medieval scholar of the same name: Anno Domini 1326, die Martis proxima ante Festum B. Thomae Apostoli, electus fuit M. Petrus de Dacia Canonicus Ripensis tempore hyemali in Rectorem[4]. But Bulaeus was careful to distinguish the two Peters: Alium commemorat Trithemius Petrum de Dacia, Philosophum, Calculatorem et Astronomum insignem, ingenio subtilem, clarum eloquio, Divinarum scripturarum et Graeci sermonis non ignarum, quem ait scripsisse multa ad Astronomiam pertinentia et claruisse temporibus Alberti Imperatoris an. 1300[5].

Ironically enough the care of Bulaeus became a trap for his successors. The very fact that two scholars with the same name, from the same country, and flourishing at approximately the same time were mentioned in the same paragraph inevitably led to confusion in historians who were less circumspect than the great French scholar. More confusion was due to Quetif and Echard who in 1719 identified the astronomer Petrus de Dacia with his namesake the famous Swedish Dominican author of the life of the mystic Christina von Stommeln[6]. This mistake was propagated by Fabricius in 1736 with

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3) Conrad Gesner, Bibliotheca Universalis sive Catalogus omnium scriptorum locupletissimus, Tiguri, 1545.
4) Bulaeus, Historia Universitatis Parisiensis, Vol. IV, Paris, 1668, p. 210.
5) Bulaeus, p. 982. - Bulaeus's statements are borne out by H. Denifle et A. Chatelain, Chartularium Universitatis Parisiensis, Vol. II, Paris, 1891, No 863.
6) Quetif et Echard, Scriptores ordinis praedicatorum recensiti, Vol. II, Paris, 1721.

the result that Petrus de Dacia from now on appeared as a Swedish Dominican, author of both a hagiographical work and of several astronomical treatises[7]. In this light he was presented by the Danish historian Erik Pontoppidan in 1740[8] who two years later succeeded in combining this already rather composite figure with the man who in 1326 was elected rector of the Sorbonne[9]. For that purpose he had to push this election back to the end of the 13th century without regard to Bulaeus's precise dating of the event. As late as 1771 another Danish historian, Jens Worm[10], uncritically adhered to this confused tradition by which the uninhibited imagination of the scholars of the enlightenment had succeeded in turning an obscure, but well defined astronomer into a phantastic chimera.

It was characteristic of the Dark Ages of Medieval scholarship that with the possible exception of Trithemius all the authors mentioned above wrote about Petrus de Dacia without having seen any of his works. This explains some of the confusion the dispersal of which must depend on at least some familiarity with the MS sources. A small beginning was made in 1739 by Bernard de Montfaucon[11] who succeeded in identifying a small number of Petrus's manuscripts without, however, making any impact on the work of contemporary historians. The first important step towards a better utilisation of the manuscript material was taken towards the end of the 18th century by Jacob Langebek whose monumental edition of the *Scriptores rerum danicarum* contained a text called *Calendarium Magistri Petri de Dacia* edited from the MS Ny kgl. Saml. 275^{a}, 4^{o} in the Royal Library of Copenhagen[12]. The editor supposed that this calendar was not only by Petrus de Dacia, but that it also was the holograph of the author whom he too identified with the Paris rector mentioned by Bulaeus. Furthermore, he called attention to another section of the same codex containing *Quatuor tabulae quadrantis* written in 1292 and tentatively identified as a work of the same

7) Jo. Alberti Fabricii Bibliotheca latina mediae et infimae aetatis, Vol. V, Hamburg, 1736, p. 762.
8) Erik Pontoppidan, Gesta et vestigia Danorum extra Daniam, Vol. I, Lipsiae et Hafniae, 1740, p. 381.
9) Erik Pontoppidan, Annales Ecclesiae Danicae diplomatici, Copenhagen, 1742, p. 521.
10) Jens Worm, Forsøg til et lexicon over danske, norske og islandske lærde Mænd, Vol. 1, Helsingør, 1771, p. 243.
11) Bernard de Montfaucon, Bibliotheca Bibliothecarum Manuscriptorum, Paris, 1739.
12) J. Langebek, Scriptores rerum danicarum, Vol. IV, ed. Suhm, Hafniae, 1786, p. 260 ff.

author. We now know that the editor was mistaken as to the calendar which is a version of the now well-known calendar of Robert Grosseteste which is still confused with Peter's calendar in many MS catalogues. He was more lucky in assuming that Peter also had written on the quadrant, as we are going to see. It is a deplorable fact, however, that this attempt to give the study of Petrus a more promising orientation by referring scholars to the actual manuscripts remained without consequence for a whole century. Nineteenth century authors were still satisfied with the older tradition, and it is of no use to follow their quite numerous but equally worthless references to our author. The Benedictines of Monte Cassino formed a notable exception by producing in 1880 a printed version of Peter's calendar, based upon one of their own MSS[13]. But this event passed completely unnoticed and, as far as I know, until the present day no scholar has ever referred to it.

The Results of Modern Scholarship

A new phase of the study of Petrus de Dacia was inaugurated in 1885 when the Swedish mathematician and historian of mathematics Gustav Enestrom in his journal Bibliotheca Mathematica inserted a query as to the author of a *Summa artis geometriae* known to him in two MSS, one ascribed to Petrus de Dacia, the other to Thomas Bradwardine[14]. The query was immediately answered by B. Boncompagni[15] who owned a third MS of the same treatise, ascribed to Petrus. The problem was solved later with the result that Bradwardine was revealed as the author, so that this attempt of ascribing a previously unknown work to Peter proved itself a failure. However, Enestrom followed the new line of research up with a series of three papers from 1885-86 in which he gave the first reliable survey of a number of MSS connected with the name of Petrus de Dacia[16]. The first of these papers were based only on library catalogues, but in the following two Enestrom published the results

13) Bibliotheca Casinensis seu Codicum Manuscriptorum [....] Series [....] Cura et studio Monachorum Ordinis S. Benedicti Abbatiae Montis Casini, Vol. IV, Monte Casino, 1880, 232-247.
14) G. Enestrom, Question, Bibliotheca Mathematica, No 2 (1885) 94.
15) B. Boncompagni, Sur un MS d'un traité de géométrie attribué à Petrus, Bibliotheca Mathematica No 4 (1885) 196.
16) G. Enestrom, Anteckningar om matematikern Petrus de Dacia och hans skrifter, Öfversikt av Kungl. Vetenskaps - Akademiens Förhandlingar, 1885 No 3, 15-28 (=Enestrom I), ibid. 1885 No 8, 65-70 (= Enestrom II), and 1886 No 3, 57-60 (= Enestrom III).

of his examination of a number of actual MSS. The immediate consequence was that Petrus now was credited with several hitherto unnoticed works, viz. a multiplication table, a *Tabula planetarum*, a *Tabula* lune, a *Tabula quantitatum dierum*, and a calendar with *canones*.

Having thus founded the modern study of Petrus de Dacia Eneström entered into collaboration with the Swedish historian of literature Henrik Schück with the important result that Petrus the Astronomer now became disentangled from Petrus the Dominican, the latter being crowned as the first Swedish author of any importance. This became known with the publication of Schück's great history of Swedish literature in 1895 and his book on Scandinavian Medieval authors from the following year[17]. A corollary to this discovery was that Petrus no longer needed to be a Swede. The reason is the following. About the year 1300 the epithet *de Dacia* referred either to the kingdom of Denmark, or to the Dominican province of *Dacia* comprising Denmark, Norway and Sweden; accordingly a Dominican called *de Dacia* might be from any of the three Scandinavian countries, whereas a secular priest or cleric with the same surname would be Danish[18].

The year 1897 saw the printed edition of another work by Petrus de Dacia, and this time the result was met with general recognition. It was the treatise *De calculo* already mentioned by Trithemius and proved by Eneström to be a commentary on the *Algorismus vulgaris* of Johannes de Sacrobosco. It was edited by Maximilian Curtze and published by the Danish Academy of Science together with Sacrobosco's original text[19]. This publication proved Peter's importance to the history of Medieval mathematics in general, and to the theory of root extraction in particular. This was immediately pointed out by Cantor[20] upon whose account several later expositions of Peter's mathematics have been founded[21].

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17) H. Schück, Illustrerad Svensk Literaturhistoria, Vol. I, Stockholm, 1895, p. 343. - Cf. H. Schück, Bibliografiska och Literaturhistoriska Anteckningar, Stockholm, 1896, pp. 120 ff.

18) It is perhaps worth noticing that Quetif et Echard, op. cit. Note 6, interpreted *Dacia* as the old Roman province of that name, and accordingly made Petrus a Hungarian. There is no evidence at all for this assumption.

19) Petri Philomeni de Dacia in Algorismum Vulgarem Johannis de Sacrobosco Commentarius. Una cum Algorismo ipso..ed. M. Curtze, Sumptibus Soc. Reg. Scientiarum Danicae, Hauniae, 1897.

20) M. Cantor, Geschichte der Mathematik, 2. ed., Vol. II, p. 90, Leipzig, 1899-1900.

21) G. Eneström, Über die Geschichte der Kubikwurzelausziehung im Mittelalter, Bibliotheca Mathematica 14 (1914) 83-84. - R. S. Benedict, A

So far the renewed interest in Petrus de Dacia had led to no information whatever about his life or the circumstances under which he worked. An attempt to unfold some of the details of his career was made in 1916 when Duhem inserted a short paragraph on Peter as a mathematician in his *Système du monde*[22]. Relying upon a 15th century MS (CLM 11067, 159 r) listed by Curtze and referring to Petrus as a *bonus computista in villa Parisiensi* Duhem claimed that the author of the commentary on Sacrobosco must have written his work in Paris. That this was a mistake would have been clear to Duhem if he had been able to utilize an important paper published in 1912 by Ellen Jørgensen[23] who pointed out that in 1292 a certain Petrus de Dacia was mentioned twice as a member of the German nation of the university of Bologna. Since another MS of the commentary stated that the work was completed on the last day of July, 1291, (see CLM 14401, 179 r) it was almost unavoidable to identify the author of the commentary with the Danish scholar in Bologna. Shortly afterwards N. Beckmann[24] proved that the calendar published by Langebek in 1786[12] was due not to Petrus but to Grosseteste. This became even more clear in 1916 when A. Lindhagen[25] published his astronomical analysis of the essential features of Grosseteste's calendar.

The link between Petrus de Dacia and Italy became even better established in 1932 when E. Zinner drew attention to two MSS (CLM 25005, 50 r, and Amplon. 4° 368, 63 r)[26] of a treatise on astrology written by a

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comparative study of early arithmetics, Ann Arbor, 1914. - G. Rasch, Petrus de Dacia, in Prominent Danish Scientists, ed. V. Meisen, Copenhagen, 1932, 12-15.

22) P. Duhem, Le Système du Monde, Vol. IV, Paris, 1916, 29-30.

23) E. Jørgensen, Om nogle middelalderlige Forfattere, der nævnes som hjemmehørende i "Dacia", Historisk Tidsskrift, 8. Rk. Vol. 3 (1910-12) 253-260, cf. Friedländer et Malagola, Acta nationis Germanicae Universitatis Bononiensis, Vol. I, p. 40. - Petrus de Dacia is occasionally mentioned in three other papers by Ellen Jørgensen, viz. Studier over danske middelalderlige Bogsamlinger, Hist. Tidsskrift 8. Rk. Vol. 4 (1912-13) 1-67; Nordiske Studierejser i Middelalderen, ibid. 8. Rk. Vol. 5 (1914-15) 331-382; Bidrag til ældre nordisk Kirke og Litteraturhistorie, Nord. Tidskrift för bok- och biblioteksväsen 20 (1933) 186-198.

24) Alfraedi íslenzk, ed. K. Kålund og N. Beckmann, Vol. 2, København, 1914-16.

25) A. Lindhagen, Die Neumondtafel des Robertus Lincolniensis, Arkiv för Mat. Astron. och Fysik 11 (1916-17) No 2, 1-41.

26) E. Zinner, Petrus de Dacia, en middelalderlig dansk Astronom, Nordisk Astronomisk Tidsskrift 13 (1932) 136-146; cf. the German translation in Archeion 18 (1936) 318-329.(= ZINNER (2)).

certain *Magister Romanus* who called himself a practitioner (i.e. astrologer), adding that his book *De sedecim impedimentis in astronomia*[27] had been written upon the invitation of his teacher *magister Petrus philomena canonicus Rolkendis*. The book dates from about 1300 or a little earlier. This is compatible with the assumption that Peter worked in Bologna where a chair of astrology and mathematics was one of the distinctive features of the university already in the latter half of the 13th century[28]. The final proof came in 1936 when P. Lehmann published a letter (MS Berlin theol. lat. 8° 109) from Herman von Minden to a certain *Petrus Dacus* who was a resident of Bologna and obviously a constructor of astronomical instruments since Herman thanked him for the gift of a *spera insperata*. The letter is undated but belongs to the years 1286-90 when Herman was provincial of the German Dominicans[29]. It ends with an invitation to Petrus to go to Germany when he might wish to leave Italy.

Master Romanus called his teacher *canonicus Rolkendis*. Since *Rolkendis* presumably is a corruption of *Roskildensis* the inference is that Petrus de Dacia was a member of the cathedral chapter of Roskilde which at that time was the capital of Denmark. This was confirmed in 1932 when A. Krarup published a letter in which Pope Bonifatius VIII on July 4th, 1303 wrote (about ecclesiastical preferment of a Danish priest) to the bishop of Ribe, the prior of St. Canute's monastery at Odense, and *Petrus Philomena canonicus Roskildensis*[30]. The curious surname Philomena - i.e. Philomela, or Nightingale - proves that the pope addressed himself to the same person who a dozen years before had taught Magister Romanus in Bologna. Thus there is no doubt that Petrus de Dacia was connected with Roskilde, and that in 1303 he was back in Denmark where he must have held a rather important post in the ecclesiastical administration. That he must again have left Denmark and presumably died abroad seems to appear from the fact that his death was not recorded in the obituary of the chapter of Roskilde contrary to the usual practice when a canon of the cathedral died. It should be noticed

27) L. Thorndike, A History of Magic and Experimental Science, Vol. III, New York 1934, 647-649.

28) H. Rashdall, Medieval Universities, ed. Powicke and Emden, Vol. I, Oxford, 1936, 248 ff.

29) P. Lehmann, Skandinaviens Anteil an der lateinischen Literatur und Wissenschaft des Mittelalters, Sitz.-Ber. Bayer. Akad. d. Wiss., Phil. -Hist. Abt, München, 1936, Heft 2 53-54.

30) A. Krarup, Bullarium Danicum. Pavelige Aktstykker vedrørende Danmark, København, 1932, No 947, pp. 834-835; - cf. the Latin original in Diplomatarium Danicum, 2. Rk. Vol. 5, København, 1943.

that Peter's status as a canon of Roskilde once and for all precludes his having been a member of the Dominican order.

PETER NIGHTINGALE'S IDENTITY

There has been one other interesting, although rather conjectural attempt to link Peter Nightingale with Roskilde in another way than simply as a somewhat erratic member of the chapter. Already in 1912 A. A. Bjørnbo called attention to a text previously published by Langebek and pointing to a hitherto unknown form of scientific activity in Denmark during the latter half of the 13th century[31]. With the publication of the note book of the Roskilde canons in 1933 a little more light was cast upon this episode. A brief entry in this *liber daticus* revealed that during the whole of the year 1274 an unnamed member of the chapter made daily measurements of the meridian altitude of the sun by means of an astrolabe, that he used the observational data to calculate the length of the day by a *kardagas sinuum*, and that the result was entered day by day into the calendar of the chapter[32]. Unfortunately this is all we know since the actual calendar is lost. But Bjørnbo was aware that a similar calendar came into use in Paris towards the end of the century. He therefore supposed a certain influence from Danish upon French astronomy with the anonymous Roskilde astronomer as the connecting link. The question was whether this obscure person could be identified with Peter Nightingale.

Until now this problem remains unsolved, although Peter's connections with Paris have been proved beyond any possible doubt, mainly through the efforts of E. Zinner who already in his catalogue of astronomical manuscripts from 1925 had identified several hitherto unnoticed MSS ascribed to Petrus de Dacia[33]. In his paper from 1932[26] Zinner extended the list of such manuscripts to 40 doubtless and 16 more conjectural ascriptions. Furthermore he proved that Peter's calendar was calculated for the meridian and latitude of Paris and for the 76 year period 1292-1369. Thus Peter's connections with Paris were firmly established, although on other grounds than those suspected by Duhem. Zinner also pointed out that the calendar

31) A. A. Bjørnbo, Die mathematischen S. Marco-Handschriften in Florenz, Bibliotheca Mathematica 12 (1912) 97-132, in particular p. 116.
32) A. Otto, Liber Daticus Roskildensis, København, 1933, 32-33.
33) E. Zinner, Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes, München, 1925 (= ZINNER (1)).

published in 1296 by the Paris astronomer Guillaume de St. Cloud[34] for the 19 year period 1292-1311 and dedicated to Queen Mary of France embodied some of the features of the (now lost) Roskilde calendar that were also used by Peter Nightingale. Since no other canon of Roskilde, and no other Danish student at this time was known as an astronomer Zinner concluded that it was Peter Nightingale who observed at Roskilde as a young man and there calculated his table before he at a later time went to Paris to collaborate with Guillaume de St. Cloud.

Although this conclusion was set forth in a tentative way as an assumption for the time being, it agreed so well with well authenticated facts and was supported by so much circumstantial evidence that it was, and still is difficult to escape it. But Zinner had more in his bag. His list of MSS contained 11 copies of a *Tractatus quadrantis* and 4 copies of a *Tractatus de semissis* the first of which described the construction and use of the *Quadrans novus* invented by Profatius Judaeus (Jacob ben Mahir) while the other dealt with an *equatorium* (or computing instrument for mechanical calculation of planetary longitudes) of which nothing was known. All these MSS were ascribed to a certain Petrus de Sancto Audomaro who, however, in a single MS was called Petrus Danus de Sancto Audomaro. The two treatises were composed in 1293 in Paris and show the same kind of technical skill as Peter Nightingale had demonstrated the year before when he worked out his calendar in the same city. Zinner refused to believe that two highly competent astronomers working at the same time and in the same place, and both of them called by the name of Peter, could be different persons. The trouble was that at least two other scholars by the name of Petrus de Sancto Audomaro were known in Paris about the same time. One of these was a famous theologian whose career from 1289 to 1308 was traced in 1928 by P. Glorieux[35]. His extant writings were a series of *quaestiones quodlibetales* of a purely theological content listed by Glorieux who also credited him with both the quadrant and equatorium treatises. The other Peter of St.

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34) On Guillaume de St. Cloud see P. Duhem, Le système du monde, Vol. IV, Paris 1916, 10 and 580, and G. Sarton, Introduction to the History of Science, Vol. II, Baltimore, 1931, 996 f.

35) P. Glorieux, Notices sur quelques theologiens de Paris de la fin du XIII^{e} siècle, Archives d'Hist. doctr. et litt. du Moyen-Âge 3 (1928) 201-238, in particular pp. 223 ff. - Cf. P. Glorieux, Répertoire des maitres en theologie de Paris au XIII^{e} siècle, Vol. I, Paris, 1933, 404.

Omer was a canon who wrote on painting and the preparation of colours[36]. That these two authors should be responsible for a couple of very advanced astronomical works was almost unbelievable, and Zinner did not hesitate to reject this idea, proposing instead Peter Nightingale as the author of all astronomical works ascribed to Petrus de Sancto Audomaro.

This bold hypothesis has since remained unchallenged and was, in fact, accepted in the only two summaries of Peter Nightingale's life and works that have appeared since Zinner proposed it[37]. In the meantime some new MS material has come to light the most important of which was L. Thorndike's discovery in 1959 of both a treatise on an instrument called *eclipsorium* ascribed to Petrus Danus, and a treatise on eclipses ascribed to Petrus de Sancto Audomaro[38]. The fact that the latter treatise immediately precedes the former in the same codex (Firenze, Bibl. Naz. II,iii,24) once more underlines the problem of the possible identity of the two authors and makes a more careful investigation of the whole MSS material imperative if we wish to get a clear picture of Peter Nightingale as an astronomer and mathematician. If he is the same person as Peter from St. Omer he must be considered one of the most important astronomers about the year 1300 and credited with works covering all the fields of interest to astronomers of his day. If not, he will preserve his status as a Danish scholar of some interest to Medieval mathematics and calendary science. Everything considered there are reasons enough to try to undertake a survey of all the MSS connected with either of these names.

A SURVEY OF MANUSCRIPTS

In the following I shall present the results of such a survey carried out during the last thirteen years. At this stage it is necessary to underline its preliminary character. First, there is no doubt that the following lists of MSS are still incomplete, and that many more can be identified. For instance, the small *Tabula lune* is likely to be found in almost any

36) G. Sarton, Introduction II, 1041. - The "De coloribus faciendis" was printed by Mrs. Merrifield in her "Original treatises [...] on the arts of Painting", London, 1849. Cf. now the recent discussion and edition of this treatise by L. Van Acker (= Corp. Chr. Cont. med. 25, 1972).

37) O. Pedersen, The Life and Work of Peter Nightingale, Vistas in Astronomy 9 (1968) 3-10. - Cf. O. Pedersen, Peter Philomena of Dacia, Dictionary of Scientific Biography, Vol. X, New York, 1974, 540-542.

38) L. Thorndike, Some little known astronomical and mathematical manuscripts, Osiris 8 (1948) p. 53

codex of astronomical treatises from the fourteenth and fifteenth centuries. Next, the asterisks indicating the MSS which I have had occasion to examine personally show the extent to which I have had to rely upon manuscript catalogues, with the implication that some of the ascriptions may be erroneous. It goes without saying that any corrections, or supplementary material will be gratefully received.

The material is classified in three main groups, A: MSS usually ascribed to Petrus de Dacia, B: MSS usually ascribed to Petrus de Sancto Audomaro, and C: Uncertain attributions or unidentified works. For each MS the library, shelf mark, folio numbers and approximate date will be given, together with the title, incipit, explicit and colophon in cases where relevant information can be deduced from these. Modern names in capital letters are references to catalogues, lists of incipits and manuscripts, or other relevant material.

GROUP A: MSS ATTRIBUTED TO PETRUS DE DACIA

1. *Commentarius in Algorismum vulgarem*

1.1 Erfurt Amplon. 4^{o} 234, 123r-137v

Commentum proprium Johannis de Sacrobosco super algorismum de integris. Inc. Omnia que a primeua etc. In hoc tractatu determinatur de arte numerandi...

CURTZE p. iv.

1.2 Erfurt Amplon. 4^{o} 369, 152r-163r, saec. XIV^{1}

Expositio algorismi valde bona

CURTZE p. iv.

1.3 Erfurt Amplon. 2^{o} 394, 148r-154v

Optimum commentum super Algorismum de integris

CURTZE p. iv.

1.4 Leipzig Univ.-Bibl. 1470, 433r-444v, saec. XV.

CURTZE p. iv.

1.5 London Brit.Mus. Harl. 1.C.60, 53r-61r

ENESTRÖM II, p. 20.

1.6* München CLM 11067, 142v-159r, A.D. 1448.

Commentum magistri Petri de Dacia bone computista (sic) in villa Parisiensi super textum algorismi. ..... Explicit scriptum super algorismum editum a magistro Petro Daco bone compu-

tista in villa Parisiensi et conscriptum per me fratrem Theodoricum Ruffi ordinis fratrum minorum in Gronenberch ibidem lectorem conventus Anno Domini Millesimo CCCC^{o} Decima nona die Februarii.

ENESTRÖM III p. 66; CURTZE p. vi ff.

1.7* München CLM 14401, 169r-179v, saec. XIV.

Omnia que a primeua rerum origine processerunt. In hoc tractatu discurritur de arte numerandi ..... inuentum et completum anno domini 1291 in ultima die Julii ... per magistrum Petrum de Dacia dictum Philomenam.

ENESTRÖM I, p. 21, II, p. 65-66; CURTZE p. ix-x.

1.8* Oxford Bodleian 491, 116v-142r, saec. XIV^{2}

Incipit exposicio magistri petri de dacia super tractatum Algorismi. Omnia que a primeua rerum etc. In hoc tractatu determinatur de arte numerandi siue de numero practico ..... inuentum et completum anno domini 1292 ultima die julii, scilicet in festo beati petri ad vincula per magistrum petrum de dacia dictum philomenam.

Summary Catalogue No 2083. Probably the same MS as ENESTRÖM II, p. 20.

1.9 Oxford Bodl. Libr. Digby 166, 13r-20v, saec. XIII ex.

Expositio magistri Petri de Dacia super algorismum prosaicum. Omnia que a primeua rerum etc. In hoc tractatu determinatur de arte numerandi sive de numero practico.

Qu. Cat. Vol. IX. - Cf. ENESTRÖM II, p. 20.

1.10 Salzburg Cod. Salzb. IX.14, 93r-115r, A.D. 1431.

CURTZE p. iv.

Since the text of this commentary was edited by Curtze (see Note 19, p. 6) we shall not here describe it in any detail. Although some of the MSS are anonymous there is no reason to doubt the attribution to Peter Nightingale who is the only author mentioned, with the exception of Sacrobosco in 1.1 who is unlikely to have commented upon his own text. From 1.7 it is possible to date the commentary to July 1291. The date 1292 given in 1.8 is erased by a later hand, perhaps because it was known to be erroneous. Apart from Sacrobosco the only authorities quoted by Peter Nightingale are Aristotle's Metaphysics, Boethius's Arithmetica, and Avicenna's Metaphysics.

In the introduction he enumerates the four Aristotelian causes of mathematics in general and Sacrobosco's *Algorismus* in particular: The final cause is the perfect knowledge of everything in the universe since this presupposes mathematics; the efficient cause is an Arabic philosopher called *Algus* whose works were translated into Latin and later propagated by Sacrobosco; the formal cause is the division of mathematics into ten sections corresponding to the ten chapters of the commentary, and finally the material cause are the numbers as such.

2. *Tabula multiplicationis*

2.1* Firenze Bibl. Naz. II,iii,24, 214v-215v, saec.XIV.
Tabula magistri petri philomene de dacia ad inueniendum porcionem cuiuslibet numeri secundum porcionem cuiuslibet alterius.

2.2* Napoli Biblioteca Nazionale VII.A.26, 254r-255r, saec. XIV.
(Tabula multiplicationis without title or author).

2.3 Vatican Reg. Suec. 1452, 118r-119r.
Tabula magistri Petri Philomene de Dacia ad inueniendum propositionem <?> cuiusvis numeri.
MONTFAUCON I,2, p. 25 No 495; ENESTRÖM II, p. 20.

2.4 Vatican Reg. Suec. ?
Petri Philomeni de Dacia: ad inueniendas propositiones numerorum.
MONTFAUCON, ibid., p. 89, No 350; ENESTRÖM III, pp. 66-67 has sought this MS in vain and its existence is doubtful. It might be the same as 2.3.

The table contains all products a b of two integers a and b each of them running from one to 59. It would be of obvious use to astronomers having to perform numerous multiplications in the sexagesimal system. It supplements the method of multiplication described by Sacrobosco according to which the products of two small integers $a < 5$ and $b < 5$ were found by means of a small table learned by heart, whereas products of greater factors were reduced by repeated application of a procedure corresponding to the formula

$$a\ b = 10\ a - a\ (10 - b).$$

3. *Declaratio super Compotum*

3.1* London Brit. Mus. Harl. 3647, 2v-10r, saec. XIV.
Compotus manualis Petri de Dacia.

3.2* Venezia Bibl. Marz. 3573 (=VIII,18) 10 leaves, A.D. 1484.
Incipit prohemium in compotum metricum manualem secundum magistrum Gerlandum. Ut habeatur .... non sunt observandae. Et sic est finis presentis operis. Explicit compotus metricus manualis secundum Gerlandum cum declaratione Magistri petri de dacia copiata per me magistrum Nicolaum de Ripis (?).
LEHMANN p. 53.

Enestrom (II,26-27) supposed that Peter's *compotus* was a commentary on Sacrobosco's well known manual with the same title. The incipits quoted above show that this was not the case, but that Peter commented upon the so-called *Compotus metricus manualis*, a 12th century work which remained popular also after the introduction of the much better text book by Sacrobosco. It was often commented upon. A number of anonymous commentaries were listed in Zinner's *Verzeichnis* (1925) viz.

No 3155	Stuttgart	Mat. 4^{o} 33	saec. XIII
No 3156	Erfurt	Amplon.4^{o} 346	saec. XIII
No 3157	Wien	VIN 5239+5239*	saec. XIV-XV
No 3160	Metz	638	saec. XV

It is possible that one or more of these are identical with Peter's commentary which has never been examined. According to 3.2 it begins with a preface explaining why science in general is a good thing: Ut habeatur primum De anima, scientia est de bonis et de difficilimis, quod sic probatur. Cuius finis est bonus ipsum quoque bonum est. Finis scientie est bonus. Ergo scientia bona est. - Quod finis scientie sit bonus probatur quia per scientias ad virtutes, per virtutes ad beatitudinem pervenitur, beatitudo siquidem ex aggregatione perfectio est (?) omnium bonorum. - Iterum probatur quod finis scientie sit bonus, quia scientia ad deum finaliter ordinatur, qui est bonus. Ergo scientia est bona. - Quod deus sit bonus dicit Algazel: deus est summe qualitate bonus, summe quantitate magnus, ubique presens nusquam per singularem cohabitationem vel circumscriptionem. - Apparet igitur ex premissis, quod scientia sit bona, cum ad deum, ut dictum est, finaliter ordinetur. Next the utility of the *compotus* in particular is proved by a commonplace reference to St. Augustine: Quatuor igitur attestan-

te beato Augustino sunt necessaria in domo domini, scilicet grammatica, musica, canones, et compotus. The author then divides the science of *compotus* into two main branches termed *philosophicus* and *ecclesiaticus* respectively. The former is a "scientia infallibilis secundum motuum corporum tempora manifestans" of which he does not wish to treat here. The latter is "scientia secundum usum ecclesiae temporis distinctiva et de ista presens est intentio, quia iste libellus vocatur compotus ecclesiasticus metricus et manualis". Finally the four Aristotelian causes of the commentary are explained, with the author himself as the efficient cause: Causa efficiens sive compilator (MS compilatio) huius opusculi fuit magister petrus de dacia.

4. *Kalendarium Magistri Petri de Dacia*

4.1 Bamberg R.B. Misc. 176, 12r-16r, saec. XIV.
Ascribed to Petrus de Dacia. Part of a Book of Hours. - FISCHER, Catalogue III, p. 90; ZINNER (2), No 37.

4.2 Basel Univ.-Bibl. F.I.23, 2r-5v, saec. XV.
ZINNER (1), No 2076; (2), No 12.

4.3 Basel Univ.Bibl. F.V.15, , saec. XIV-XV.
ZINNER (1), No 5484: Mit Angabe des Tagesdauer und Sonnenhöhe gemäss Petrus von Dänemark.

4.4 Bayeux Cath. Libr. 61, 1r-7r, saec. XIV.
Canon super kalendarium magistri Petri de Dacia dicti Philomena.
Cat. Gén. Dept. X, Paris 1889, 325 f.; L. Delisle, op. cit. Note 1.

4.5 Bern Bibl. Bongarsiana 524, 12r-19r, saec. XV.
Canon super Kalendarium magistri Petri de Dacia compositum ad meridianum Parisiensem.
ENESTRÖM II, p. 22; THORNDIKE, Osiris 8 (1948) 53; ZINNER (1), No 2075; (2), No 14.

4.6* Cambridge Corpus Christi 347, 146r-158r, c. A.D. 1300.
In hoc primationum ciclo 4 linee descendentes.
JAMES, Catalogue II, p. 181f.

4.7* Cambridge Univ. Libr. Ii.3.3., 4r-10r, ca. A.D. 1300.
Ad noticiam huius kalendarii habendam.

4.8* Cambridge Univ. Libr. ad 6860, 38v-41v, saec. XIV.
Quere inter numeros in superiori parte istius tabule.
THORNDIKE-KIBRE, col. 1191.

4.9 Darmstadt Landesbibl. 765, 173v-174r, saec. XIV.
ZINNER (1), No 2068; (2), No 9.

4.10 Edinburgh Crawford Library.
The catalogue p. 488 mentions a *Kalendarium perpetuum* attributed to Peter Nightingale.

4.11 Erfurt Amplon. 2^{o} 263, 61r-67v, A.D. 1349.
Optimum kalendarium (Anon.)
SCHUM, Catalogue p. 171; ZINNER (1), No 2067; (2), No 33.

4.12 Erfurt Amplon. 2^{o} 267, 197r-199v, saec. XIV.
Canon super kalendarium Petri de Dacia. In ista parva...
SCHUM, Catalogue p. 177; THORNDIKE-KIBRE, col. 685.

4.13 Erfurt Amplon. 4^{o} 362, 63r-72r, A.D. 1313.
Sciendum quod hoc kalendarium cepit inicium a.D. 1311...
SCHUM, Catalogue, p. 606; Zinner (1), No 5331.

4.14* Firenze Bibl. Naz. II. iii. 24, 232v-239r, saec. XIV.
In hoc primationum ciclo 4 linee descendentes/
Quere inter numeros in superiori capite tabule principalis
THORNDIKE, Isis 50 (1959) 37; THORNDIKE-KIBRE, col. 680.

4.15 Glasgow Hunterian Museum 444, 1r-7r, saec. XIII-XIV.
In hoc primationum ciclo quattuor linee descendentes.
YOUNG and AITKEN, Catalogue, p. 367 read: In hoc prima communi ciclo, and ascribe the calendar to Johannes de Saxonia.

4.16* København Roy. Libr. Add. 447,2^{o}, 38r-44r, saec. XIII-XIV.
Canones 38r, calendar 38v-44r.

4.17* København Roy. Libr. Thott 240,2^{o}, 1r-7r, A.D.1441. In French: Cy commence la table de maistre piere de dacia.
ENESTRÖM II, p. 25; ZINNER (2), No 36 dates it to the XIII century.

4.18 Leiden Univ.-Bibl. Scal. 66, 39v-47r, saec. XIV.
Explicit secundus canon magistri petri de dacia dicti philomeni supra kalendarium suum ab eo noviter compilatum.
Catalogue I, p. 26; ZINNER (1), No 2064; 1932, No 8

4.19 Leipzig Univ.-Bibl. 4° 1487, 1r-9r, saec. XIV.
Attributed to Magister Petrus de Dacia.
ZINNER 1925, No 2065; 1932, No 10.

4.2o London Brit. Mus. Arundel 220, 312v- , saec. XIV.

4.21* London Brit. Mus. Harl. 3647, 10v-16v, saec. XIV.
In hoc primacionum ciclo 4 linee descendentes.
(Fol. 1v is an old index where the MS is listed as Kalendarium Lincolniensis).

4.22* London Brit. Mus. Reg. 12. C. xvii, 1r-8v, saec. XIV.
In hoc primationum ciclo 4 linee descendentes.

4.23 London Roy. Coll. of Arms, Arundel 20, 1r-15v, saec. XIV.
Calendarium Magistri Petri de Dacia.
(Photostat copy in the Roy. Libr. Copenhagen).

4.24 Lyon Bibl. Mun. MS 1649, 14 leaves, saec. XIV-XV.
Canon supra kalendarium magistri Petri de Dacia.
Cat. gén. Dept. Vol. XXX, 1, p. 511; ZINNER (2), No 31.

4.25* Madrid Bibl. Centr. 17 961, 4r-10v, saec. XIII.
Canon super kalendarium magistri petri de dacia. In ista prima tabula sunt 4^or^ cicli ..... Explicit canon super kalendarium magistri petri de dacia dicti philomena.

4.26* Mainz Stadtbibl. 562, 116r-137v, saec. XV.
Valde bonus kalendarius (sic).
With cycles beginning 1463, 1482, 1501, 1520.

4.27 Metz Bibl. Comm. 464, saec. XIV.
Calendar and Canon super kalendarium magistri Petri de Dacia (First part of a Book of Hours).
Cat. gén. Dept. Vol. V, p. 176.

4.28 Milano Bibl. Ambrosiana N.55.sup., 1r-2r, saec. XIV.
Quere inter numeros in superiori parte istius tabule THORNDIKE-KIBRE col. 1191. - I suppose this is the MS listed by ZINNER (2), No 29 after ENESTRÖM II, p. 23, who quoted Montfaucon p. 522.

4.29 Monte Cassino MS 193, 13r-26r, saec. XVI.
Printed in Bibliotheca Casinensis, IV, Monte Cassino 1880, pp. 232-247.
ENESTRÖM III, p. 58 f.; ZINNER (2), No 30.

4.3o München CLM 3512, 289v-295v, A.D. 1300.
Attributed to Magister Petrus de Dacia.
ZINNER (1), No 2059; (2), No 5.

4.31 München CLM 5640, 66r-83v, saec. XIV.
ZINNER (1), No 2070, (2) No 2.

4.32 München CLM 5963, 7v-13r, saec. XIV-XV.
ZINNER (1), No 2071, (2), No 6.

4.33 München CLM 14270, 163v-169v, saec. XIV.
ZINNER (1), No 2060; (2), No 3.

4.34 München CLM 19414, 181r-188v, saec. XIV.
Attributed to Magister Petrus Dacus.
ZINNER (1), No 2066; (2), No 1.

4.35 München CLM 24514, 142r-148r, saec. XIV.
ZINNER (1), No 2061; (2) No 4.

4.36* Oxford Bodl. Libr. Ashmole 360, 151r-158r, saec.
BLACK, Catalogue col. 275.

4.37* Oxford Bodl. Libr. Ashmole 1522, 9r-16v, saec. XIII-XIV.
An old index at the end of the codex says Kalendarium magistri Petri cum tabulis Gerlandi.
BLACK, Catalogue col. 1426.
ZINNER (2), No. 19.

4.38* Oxford Bodl. Libr. Bodl. 464, 58r-71v, c. A.D. 1318.
Canon super sequens kalendarium ad veram coniunctionem solis et lune accipiendam. Compositum a fratre Rogeri Bacon. Kalendarium sequens extractum est a tabulis tholetanis Anno domini 1292. In ista parva tabula sunt quattuor linee....

4.39* Oxford Bodl. Libr. Rawlinson C 117, 140v, saec. XV.
Canon super kalendarium magistri Petri de Dacia dicti Philomena. Quere inter numeros in superiori parte.
MACRAY, Catalogue C, col. 49.

4.4o* Oxford Bodl. Libr. Savile 17, 2r-8v, saec. XIV.
Kalendarium nouum magistri petri de dacia. Hic incipit canon super calendarium. Quere in superiori parte.
Summary Catalogue No 6563.

4.41* Paris Bibl. Nat. Lat. 7298, 1r-7r, saec. XIV.
In hoc primacionum ciclo 4 linee descendentes. Anonymous.

4.42 Paris Bibl. Nat. Lat. 7475, 66r-71v, saec. XIV.
Doubtful.

4.43* Paris Bibl. Nat. Lat. 14068, 34v-38r, saec. XV.
Canon super kalendarium nouum magistri petri de dacia. In capite istius tabule sunt.

4.44* Paris Bibl. Nat. Lat. 15121, 14v-20r, saec. XIV.

4.45* Paris Bibl. Nat. Lat. 15125, 8r-14v, saec. XIV.
In ista tabula sunt quatuor linee cicli ad sciendum .....
Explicit canon super kalendarium magistri petri de dacia. Deo gratias.
DUHEM (cf. note 22) dated the MS to A.D. 1292.

4.46* Paris Bibl. Nat. Lat. 15125, 27r, saec. XIV.
En cest calendrier a 4 lignes.
(French translation of the canon).

4.47 Paris Bibl. Nat. Nouv. Acq. Lat. 375, saec. XIV.
Canon super kalendarium magistri Petri de Dacia. Folding calendar with unnumbered leaves. - L. Delisle, Catalogue Nouv. Acq. 1875-91, p. 91.

4.48* Paris Bibl. Nat. Nouv. Acq. Lat. 1893, 1r-8v, saec. XIV.
In hoc primacionum ciclo. iiii. descendentes ciclis...

4.49 Salamanca Univ. Libr. SAL 2662, 59r-65r.
Incipit canon in kalendarium lincolniensis episcopi de nouo correctum. In primationem ciclo 4 linee descendentes.
BEAUJOUAN 1962, p. 175.

4.5o Salzburg St. Peter. B.ix,14, 26r-27v, saec. XV.
Attributed to magister Petrus de Dacia. Presumably incomplete.
ZINNER (1), No 2073; (2), No 18.

4.51 St. Florian Stiftsbibl. XI,432, 1r-7r, saec. XV.
ZINNER (1), No 2072; (2), No 16.

4.52 St. Gallen Stiftsbibl. 610, 13r-38r, saec. XV.
Tabula quantitatum dierum Petri de Dacia.
ENESTRÖM II, p. 25; ZINNER (1), No 2077; (2), No 15.

4.53 Stams Stiftsbibl. 12, 39r-49v, saec. XV.
ZINNER (1), No 3828 ascribes it to Grosseteste.

4.54 Vatican Vat.lat. 3114, 59v-66v, saec. XIII-XIV.
Doubtful.

4.55 Wien Nat. Bibl. VIN 1728, 4r-7v, saec. XIV.
ZINNER (1), No 2062; (2), No 17.
4.56 Würzburg Univ. Bibl. Mp. j. 2° 11, 1r-14r, saec. XIV
ZINNER (2), No 11.

In most cases the calendar of Peter Nightingale is provided with a *canon* explaining its use. In the early Copenhagen MS (4.16* of the list above) this *canon* begins: In hoc primationum ciclo 4 linee descendentes 4 ciclis decemnovalibus deserviunt in quibus lune cum sole coniunctio secundum motus <medios> invenitur. This must be considered the original *incipit* of the *canon* which in this MS is rather long and gives detailed information of how the calendar in A.D. 1369 may be adapted to another 76 year-period after the expiration of the period 1292-1368 for which it was originally calculated. Some MSS contain, however, a shorter version of the *canon* with the *incipit:* Quere in superiori parte istius tabule numerum annorum; this is, for instance the case of the printed version of the MS No 4.29. The matter is, however, complicated by the fact that the *canon* contains a brief table of the golden letters belonging to 19-year cycles from A.D. 1292 to A.D. 1653. This table usually has the heading In ista parva (prima) tabula sunt 4 cicli sive linee, or In capite istius tabule sunt. In cases where this small table is placed in front of the text of the *canon* the calendar may accordingly be listed with one of the incipits just mentioned. A further complication is apparent in No 4.7* where the *canon* begins Ad notitiam huius kalendarii habendam. This is the well known *incipit* of Grosseteste's calendar the whole *canon* of which is here substituted for the proper *canon* of Peter Nightingale. This shows that the confusion of the two calendars began almost immediately, and that it is impossible to identify Peter's calendar by means of the *incipit* only. The only certain way of distinguishing this calendar from its predecessor seems to be the numbers in the four columns of the 19-year cycles with which they are both provided. In Peter Nightingale's calendar they are as follows (see No 4.7* or No 4.29).

Linee primationum lune

	Primus	Secundus	Tertius	Quartus
Jan 1	•14 s	6 s	•23 s	15 s
- 2			g 19•	
- 3	•10 g	•2 g		•11 g
- 4	•22 p	15 p•	•8p	24 p•

while according to Lindhagen (cf. note 25) the calendar of Grosseteste begins in the following way

Quatuor cycli naturalis computi

	Primus	Secundus	Tertius	Quartus
Jan 1	t 2		t 14	t 8
- 2	h 21	h 15	h 9	
- 3			q 22	h 3
- 4	q 10	q 4		q 16

The meaning of these numbers is, for instance, that in a year with the golden letter t belonging to the first of the four 19 year cycles the new moon will occur two hours after midnight on Jan 1 according to Grosseteste whose calendar was calculated for the period 1208-1284. Peter's calendar was valid for the period 1292-1368 and had accordingly different values. Moreover the new moons were calculated to an accuracy of one quarter of an hour. This was indicated by the dots placed in one of the four corners of the small square cells of the calendar containing the hours and the golden letters. The existence of such dots is perhaps the most rapid way of distinguishing the calendar of Peter Nightingale from that of Grosseteste since the latter had no dots and gave the times to an accuracy of one hour only. This greater accuracy must be one of the reasons why Peter's calendar became so popular in the later Middle Ages and had its life prolonged by two later 76-year periods after the expiration of the period for which it was first designed. The magnificent French MS 4.17*

proves that the calendar was still highly esteemed as late as 1441. Another 15th century MS (4.26*) called it a *Valde bonus kalendarius* (sic) and in the *canon* to one of the Lunar diagrams listed below (5.28) the reader is asked to *Quere in kalendario magistri petri de dacia, qui magis appropinquat veritati.* Wheter Peter's calendar really increased the accuracy to which the lunations could be found is another question. Zinner's preliminary investigations[26] led him to conclude that the later calendar was in fact more reliable than its predecessor, but further research seems necessary before the question can be solved in a satisfactory way.

A special feature of Peter's calendar is the information of the behaviour of the sun found in most of the MSS although in several different ways. Thus the early 14th century MS 4.14* is provided with a column containing the *declinatio solis* in degrees and minutes for each day of the year. To the right hand side of this column a later hand had added another column giving the length of daylight *Ad civitatem Neapolis sive ad latitudinem 40 graduum* for which the longest day is stated to be $14^h\ 51^m$. Similar columns are found in 4.1, 4.3, 4.19, 4.34, 4,35, and 4.52, and presumably in many other MSS. A special case is that of 4.29 where there are three columns relating to the sun with the headings *Declinatio solis, Quantitas diei*, and *Altitudo solis* respectively. Here the maximum meridian altitude of the sun is found to be $64^\circ\ 43'$ corresponding to a geographical latitude of $48^\circ\ 50'$. This is the latitude of Paris in agreement with the statement in 4.5 that the calendar was calculated for the meridian of this city; accordingly we have good reasons to suppose that the Monte Cassino MS was made in Paris. More puzzling is the fact that the first of the three columns does not - in spite of its heading - give the declination, but the ecliptic longitude of the Sun. As far as we know at present this is the only version of the calendar in which this function is tabulated.

As for the author and date of the calendar there is no room for doubt. Many of the MSS are anonymous, but all the rest ascribes the work to *magister Petrus de Dacia dictus Philomena* except 4.38* where Roger Bacon is mentioned as the author. This is without doubt a mistake, although the scribe was correct in the following statement dating the calendar to 1292 in accordance with the first year of the *tabula parva.*

Everything considered, it seems that even the preceding survey of the MS material is sufficient to warrant the conclusion, that in A.D. 1292 Peter Nightingale was in Paris and here calculated a calendar for the

period 1292-1368, providing it with a table of lunations given with an accuracy of one quarter of an hour, and with one or more columns of information of the day to day behaviour of the sun. Probably there was a column of the declination of the sun, and another of the length of daylight in Paris. This would make it similar to the now lost Roskilde calendar of 1274. The inclusion of the latter column would make the calendar valid only for the latitude of Paris. Since the MS 4.14* only contains the column of declinations at the same time as it seems to be of French provenance one is tempted to assume that booksellers in Paris made copies for export which contained declinations only, but could be supplemented with a column of daylight at the place where they were to be used. But there is no doubt that this cannot be known for certain until all the MSS have been much more completely examined.

5. *Tabula lune*

5.1 Bamberg R.B. Misc. 176, 12r, saec. XIV.
Ascribed to Magister Petrus de Dacia.
ZINNER (2), No 37.

5.2 Bamberg Math.-astron. 4, 149v-151v, saec. XIV.
Ascribed to Magister Petrus de Dacia.
ZINNER (1), No 2078; (2), No 38.

5.3* Barcelona Bibl. Centr. 162, 27v-28r, saec. XV.
Tabula magistri petri de dacia.

5.4 Bayeux Cathedral Libr. 61, 9v-10r, saec. XIV.
Tabula ad sciendum in quo signo sit luna et in quo gradu illius signi.
Catalogue général des Manuscrits, Vol. X (1889) 325.

5.5 Bern Bibl. Bongarsiana 524 A, 10r-v, saec. XIV.
Ad locum lune habendum quolibet die.
THORNDIKE, Osiris 8 (1948) p. 53.

5.6* Bruxelles Bibl. Royale Add. 4622, 1r and 9r-v, saec. XV.
Diagram in Latin with medical notes in French.

5.7 Budapest National Libr. 29, 39r, saec. XIV.
Tabula signorum docet in quo signo sit luna.
Catalogue pp. 29-30.

5.8* Cambridge Corpus Christi College 347, 159r, saec. XIV.
Tabula magistri Petri de dacia dicti philomena ad locum etiam lune habendum.
JAMES, Catalogue II, 181f.

5.9* Cambridge Trinity College O.ii.45 (=1149), 98v-99r, saec. XIV.
In hac tabula sequenti potest inueniri in quo signo sit luna quolibet die.
JAMES Catalogue III, 156.

5.10 Cambridge Trinity College O.vii.2 (=1330).
Patrus Dacus de inueniendo loco lune.
JAMES Catalogue III, 345f. - Missing.

5.11* Cambridge Univ. Libr. Ii.1.13, 40r-v, saec. XIV.
In hac tabula signorum potest inueniri in quo <signo> sit luna.
Catalogue III, 323.

5.12* Cambridge Univ. Libr. Ii.1.27, 57r, saec. XIV.
Hec tabula docet in quo signo sit luna.
Catalogue III, 347.

5.13* Cambridge Univ. Libr. Ii.6.5, 97v, saec. XIII-XIV.
Diagram with Roman numerals.

5.14* Cambridge Univ. Libr. Mm. 4. 43, 271v-272r, A.D. 1298?
Tabula fortune. Si societatem alicuius volueris aspice cursum lune in quo signum sit..... Cum volueris scire in quo signo luna sit accipe etatem lune in prima linea istius tabule.

5.15 Canterbury Collegium Sti Benedicti.
Tabula magistri Petri de Dacia dicti Philomena.
ENESTRÖM II, p. 24 after a catalogue from 1698.
The present location of this MS is unknown.

5.16 Edinburgh Univ. Libr. 126, 7v, A.D. 1482?
Tabula signorum ad sciendum in quo signo luna sit cotidie.

5.17 Edinburgh Crawford Libr. Roll from c. A.D. 1339.
Tabula magistri petri de dacia ad sciendum in quo signo sit luna et in quo gradu illius signi.
COPELAND, Catalogue, p. 488.

5.18 Erfurt Amplon. 4° 362, 63r/72r, saec. XIV.
Tabula medicorum composita a magistro Petro de Dacia que docet invenire in quo signo est luna in quolibet die anni.
SCHUM, Catalogue, p. 606.

5.19 Erfurt Amplon. 4° 387, 1r, saec. XIV.
Tabula magistri Petri de Dacia ad sciendum.
SCHUM, Catalogue, p. 648; ZINNER (1), No 2080; (2), No 34.

5.20* Firenze Bibl. Laur. Ashb. 211 (143), 186v, saec. XV.
Anonymous.

5.21* Firenze Bibl. Laur. Plut. 18 sin. 6, 95r, saec. XIV.
Tabula magistri petri de dacia ad sciendum in quo signo sit luna in quolibet die anni a media nocte sui incepto.
ENESTRÖM II, p. 24; III, p. 67; ZINNER (2), No 27.

5.22* Firenze Bibl. Naz. II.iii. 24, 240v, saec. XIV.
Tabula petri daci de loco lune inueniendo in quolibet die anni a media nocte sui incepto.

5.23 Glasgow Hunterian Libr. 444, 8v, saec. XIII-XIV.
Tabula petri daci de loco lune inueniendo in quolibet die anni.
Catalogue, p. 367.

5.24* København Royal Libr. GKS 1810,4°, 65v, saec. XIV.
Tabula signorum. Anonymous.

5.25* København Royal Libr. Thott 4° 825, 39r, saec. XV.
Tabula phisicorum de duodecim signis.

5.26* København Royal Libr. Thott 4° 825, 151r, saec. XV.
Anonymous.

5.27* København Royal Libr. Thott 4° 825, 221v, saec. XV.
Anonymous.

5.28* København Royal Libr. Add. 2° 447, 57r, saec. XIII-XIV.
Tabula lune ad inueniendum locum eius, videlicet in quo gradu signi est. - 56v: Ars istius tabule lune sequentis.

5.29 Leipzig Univ. Bibl. 2° 1484, 3v-4r, saec. XV.
ZINNER (1), No 2082; (2), No 35.

5.30 London British Museum Add. 35317, saec. XV.
Part of a book of hours.

5.31* London British Museum Arundel 207, 31v, saec. XV.
Tabula ad sciendum in quo signo fuerit luna quolibet die anni.

5.32* London British Museum Arundel 220, 312v, saec. XIV.
Anonymous.

5.33* London British Museum Egerton 831, 9v-12r, A.D. 1327?
Tabula ad sciendum in quo signo luna est omni die et in quo gradu eiusdem in sequenti tabula secundum magistrum Petrum.
ENESTRÖM II, p. 23; Zinner (2), No 26.

5.34* London British Museum Egerton 847, 18v-19r, c. A.D. 1400.
Tabula lune ad sciendum omni die eius signum.

5.35 London British Museum Harleian 267, 217r.
Tabula de loco lune inveniendo.

5.36 London British Museum Harleian 1785, 19r.
Dubious.

5.37 London British Museum Harleian 1811, 31r.
Tabula ad inveniendum locum lune et moram eius sub quolibet signo.

5.38* London British Museum Harleian 3647, 10v, saec. XIV.
Ad locum lune habendum videas quota est dies.
(The table itself is missing.)

5.39 London British Museum Harleian 3814, 76v.
Dubious.

5.40* London British Museum Reg. 12.C. XVII, 8v, saec. XIV.
Tabula petri daci de loco lune inveniendo.

5.41* London British Museum Reg. 12. G. IV, 132r, saec. XIV.
(Part of a medical codex.)

5.42* London British Museum Sloane 263, 31v, saec. XIV.
Tabula ad inveniendum signum in quo luna cotidie fuerit.

5.43* London British Museum Sloane 514, 8r, saec. XIV^2.
Ad inveniendum in quo signo sit luna secundum veram primacionem.

5.44* London British Museum Sloane 568, 7r, saec. XIV.
Tabula ad inveniendum in quo signo sit luna per mensem.

5.45* London British Museum Sloane 568, 15r, saec. XIV.
Tabula medicorum ad inveniendam lunam in signis, cum explicatione.

5.46* Madrid Bibl. Centr. 17 961, 11r, saec. XIII (?)
Tabula magistri petri de dacia dicti philomela (sic) ad sciendum in quo signo sit luna et in quo gradu illius.

5.47 München Bayer. Staatsbibl. CLM 3512, 295v-297v, AD 1300.
Ascribed to Magister Petrus de Dacia.

5.48 Münster Universitätsbibl. 4°530, 69r seq., saec. XIV.
ZINNER (1), No 10 934.

5.49 Oxford Bodleian Library Cod.misc. 161 (?)
ENESTRÖM (2) p. 23, after COXE III, 534.
ZINNER (2), No 20.

5.50 Oxford Bodleian Library Cod. misc. 248, 44v, saec. XV.
Tabula magistri petri de Dacia ad sciendum in quo signo sit luna.
ENESTRÖM (2) p. 23, after COXE III, 626.
ZINNER (2), No 23.

5.51* Oxford Bodleian Library, Bodl. 464, 72v-73r, AD 1318.
Tabula magistri Petri de Dacia ad sciendum in quo signo sit luna.... Canon super tabulam Magistri Petri de Dacia dicti philomena ad locum etiam lune habendum.
Summary Catalogue No 2458; ENESTRÖM (2) p. 23;
Zinner (2) No 25.

5.52* Oxford Bodleian Library, Bodl. 551, 236r, saec. XIV.
Tabula magistri petri de dacia ad sciendum in quo signo sit luna (later addition to a 13th century codex).
Summary Catalogue 2303; ENESTRÖM (2) p. 24.

5.53* Oxford Bodleian Library Savile 17, 9r, saec. XIV.
Petrus de Dacia. Canon ad sciendum locum lune.
Summary Catalogue 6563.

5.54* Oxford Bodleian Library Wood D.8, 152v, circa AD 1484.
Tabula lune ad sciendum omni die omnibus signis et in quo signo est.
Summary Catalogue 8538.

5.55* Paris Bibl. Nat. Latin 7292, 270v, saec. XV.

5.56* Paris Bibl. Nat. Latin 7298, 8v, saec. XIV.
Tabula petri daci de loco lune inveniendo in quolibet die anni.

5.57* Paris Bibl. Nat. Latin 7351, 2v+13r, saec. XIV.
Tabula ad sciendum in quo signo sit luna.

5.58* Paris Bibl. Nat. Latin 7366, 32v-33v, saec. XIV.
Tabula prima que dicitur tabula lune.

5.59* Paris Bibl. Nat. Latin 7416 B, 51r, saec. XIV.
Tabula ad inveniendum in quo signo luna sit.
(Uses Roman numerals.)

5.60* Paris Bibl. Nat. Latin 7475, 59r, saec. XIV.
Hec tabula docet in quo signo sit luna secundum naturalem lunationem, id est de prima ad primam.

5.61* Paris Bibl. Nat. Latin 14 068, saec. XV (?).
(Used as cover of a codex).

5.62* Paris Bibl. Nat. Latin 14 068, 24v, saec. XV.
Tabula lune ad sciendum in quo signo luna sit.

5.63* Paris Bibl. Nat. Latin 15 125, 28r, saec. XIV.
Tabula signorum que dicitur tabula medicorum.

5.64* Paris Bibl. Nat. Nouv. acq. lat. 1893, 8v, saec. XIV.
Tabula petri daci de loco lune inveniendo.

5.65* Paris Bibl. Ste. Geneviève 1043, 50r, saec. XIII-XIV.
Tabula ad sciendum in quo signo sit luna.

5.66 Rennes Bibl. Municipale 593, AD 1303.
Ascribed to Maitre Pierre de Dace.
ENESTRÖM (2) p. 25; ZINNER (2) No 32.

5.67 Rome Boncompagni's Library 302, 5r-v, saec. XIV.
Tabula Petri Daci de loco lune inveniendo.
ENESTRÖM (2) p. 24, (3) p. 67.

5.68 Rome Boncompagni's Library 327.
ENESTRÖM (3) p. 67.

5.69* Rome Bibl. Naz. Vitt. Em. 301, 2r, saec. XV.
Ad sciendum in quo signo est luna quocumque tempore.
(Addition to a codex of an earlier date.)

5.70 Salamanca Bibl. Universitaria SAL 2662, 66v, saec. XIV^2
Tabula Petri Daci de loco lune.
BEAUJOUAN, Manuscrits etc. p. 176.

5.71 Salzburg St. Peter B. IX. 14, 26r-27v.
Ascribed to Magister Petrus de Dacia.
ZINNER (1) No 2081, (2) No 18.

5.72* Stockholm Royal Library X.773, 5r-v, saec. XV.
Sequitur tabula petri daci de loco lune inveniendo.

5.73* Valencia Bibl. Universitaria 216, 57v, saec. XV.
(Spanish text as part of a Spanish encyclopedia.)

5.74* Vatican Vat.lat. 3114, 68r, saec. XIII(?).
Tabula petri daci de loco lune inveniendo.

5.75 Vatican Reg. Suec. 1452.
Ascribed to Magister Petrus Philomena de Dacia.
ZINNER (2) No 39.

5.76 Wien Österreich. Nat. Bibl. VIN 2367, 1r/12v, saec. XIII.
ZINNER (1) No 3818.

5.77* Wien Österreich. Nat. Bibl. VIN 5509. 14v, saec. XV.
Dubious.

Many of these MSS are anonymous, but all the rest are unanimous in ascribing the *Tabula lune* to Petrus de Dacia, or Petrus Dacus, also called Philomena (in 5.15, 5.51, and 5.75) or Philomela (in 5.46). In fact, the Middle Ages knew of no other author. Later the matter was confused when Hervagius inserted the table in his edition of the works of the Venerable Bede (Basel 1563) from which it has passed into Migne, although here placed among the Didascalica spuria et dubia[39].

In the MSS the *Tabula lune* appears in two apparently quite different forms. Most common is a diagram in the form of a square divided into 144 smaller squares arranged in 12 lines and 12 columns, each of them containing the name of one of the 12 zodiacal signs in their proper order both from top to bottom and from left to right. The columns correspond to the 12 months of the year, and the lines to intervals of 2 or 3 days of a complete synodic period, or, in other words, to the age of the moon reckoned from the last conjunction. Thus at a glance at the diagram one can find the sign in which the moon is found in a given month when its age or phase is known. Therefore, this form of the diagram answers the question *in quo signo sit luna quolibet die.*

The other form of the table gives more detailed information by answering the question *in quo gradu illius signi.* It has the form of a table with 28 columns and 13 lines inscribed with the integer numbers from 1 to 30 running from the top of the first to line 4 of the third column. Then they start again. This arrangement is repeated until the whole table is filled, except for the four last lines in the 28th column. A text entitled *Ars istius tabule lune sequentis* appended to 5.28 explains the construction

39) Migne PL, col. 753-754.

of the table and also how to use it in connection with *kalendario magistri p. de dacia qui magis appropinquat veritati*. It appears that the table is based on a zodiacal mean month of 27 days and 8 hours and a corresponding mean daily motion of 13^{o} 10' *et paulo plus quod est quasi insensibile*. That also this form of the table is due to Peter Nightingale appears from 5.33 and 5.46.

The question of accounting for the motion of the moon through the zodiacal signs was a standard subject matter in Medieval computistical literature so Peter Nightingale was by no means treading new paths when he composed his tables. His only claim to any originality seems to be that he isolated the question and devoted a particular, short work to it, whereas it in the usual compotus-literature only figured as part of a more comprehensive exposition. This can only mean that the question must have gained a new importance to his own time. The very large number of extant MSS point to the same conclusion. Now professional astronomers could have had no special interest in a rather crude table of this kind based on mean motions only. It must accordingly have been composed for a different group of clients. The fact that the table is called *Tabula medicorum* in 5.45 and 5.63 and *Tabula phisicorum* in 5.25 reveals that it was destined for use by the medical profession. In fact, medicine became still more imbued with astrology from the 13th century on when doctors had to perform phlebotomy and other operations according to the most propitious auspices of the heavens. A direct proof that the lunar table was meant for astrological purposes is found in the Egerton MS 5.33. Here the table is accompanied by a text beginning Consequenter hic sequntur exposiciones signorum secundùm predictum magistrum petrum de dacia, and continuing with an unambiguous defense of astrology: Multum prodest scire in quo signo est luna omni die, quia ipse secundum ptholomeum in almagesti (sic!) in istis inferioribus ceteris planetis maiorem habet efficaciam, tam racione propinquitatis eius ad terram, tam racione velocitatis eius in cursu suo. Among the ensuing rules we quote only a part of the first: Quando luna est in ariete, bonum est loqui cum nobilibus potentibus, et exire ad pugnandum [....] capud lauare, radere, medicari, sanguinem de naribus minuere, exire de carcere, de egritudine conualescere, matrimonio contrahere, religionem intrare, purgacionem accipere.

If this text be an authentic work by Peter Nightingale it shows that he was not opposed to the prevailing astrological ideas of his day,

although his other works are almost completely devoid of references to astrology. On the other hand the medical application of the *Tabula lune* is no sufficient reason for placing him among the physicians of the Middle Ages[40].

6. *Tabula planetarum*

6.1 Edinburgh University Library 126, 8r, saec. XV.
Tabula ad sciendum quis planeta regat qualis hora diei.

6.2* Køhenhavn Royal Library Thott 825, 4°, 163r, saec. XV.

6.3* Køhenhavn Royal Library Thott 825, 4°, 222v, saec. XV.

6.4* London British Museum Egerton 831, 9v, saec. XIV (A.D. 1327?)
Tabula planetarum secundum magistrum petrum de dacia.

6.5* Oxford Bodleian Library Savile 17, 9v, saec. XIV.
Tabula planetarum.
Summary Catalogue 6563.

6.6* Oxford Bodleian Library 531, 236v, saec. XIII-XIV.
Tabula ad sciendum quis planetarum regnat in qualibet hora diei.

6.7* Paris Bibl. Nat. Latin 14 068, 23v, saec. XV.
Tabula planetarum.

6.8* Paris Bibl. Nat. Latin 15125, 31r, saec. XIV.
Tabula planetarum.

The ascription of this table to Peter Nightingale rests exclusively on 6.4 and until further evidence is available it is impossible to say whether the table is authentic. In several MSS it follows just after the *Tabula lune* so perhaps there is no reason why it should not be numbered among the genuine works. The complete title of 6.4 is Hic est tabula planetarum secundum magistrum petrum de dacia parisius facta. This shows that the table can not be earlier than A.D. 1292 when Peter began his work in Paris.

The table itself is a very simple matter. It is a diagram with 49 small squares in 7 lines and 7 columns. From left to right the columns are

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40) Here we disagree with the late J. W. S. Johnsson who transcribed the French medical text in 5.6, regarding it as one of Peter Nightingale's works. This unpublished transcription is found among Johnsson's papers in the Royal Library of Copenhagen as MS Add. 4° 1221.

headed Dies sabbati, Dies Jouis, Dies Martis, Dies Dominica, Dies Veneris, Dies Mercurii, and Dies Lune, written above the names Saturnus, Jupiter, Mars, Sol, Venus, Mercurius and Luna respectively. In the next line the names of the planets appear in the same order, but here beginning with Jupiter, and so on. The first line is marked with the numbers 1, 8, 15 and 22 which indicates that these hours are 'governed' by Saturn on Saturdays, by Jupiter on Thursdays etc. In the next line the corresponding hours are 2, 9, 16, and 23. The basic principle is nothing more than the well known correlation between the seven planets and the seven days of the week: the 168 hours of the week are numbered consecutively reckoned from the first hour of Saturday which is given to Saturn. The next is given to Jupiter, and so on, in the usual order of the planets. It then appears that the 25th hour will belong to the sun, which shows that the day after Saturday is Sunday; the 49th hour will belong to the moon and indicate a Monday, etc. The table gives a compact survey of all these correlations. Here again the astrological interest is predominant.

7. *Tractatus eclipsorii*

7.1* Firenze Biblioteca Nazionale II.3.24, 208rb-214ra, saec. XIV.
Prohemium in tractatum eclipsorii petri daci. Prolixitatem que etiam plurimos in proiectione eclipsium laborantes ..... uel infra existens eum non contingat.
THORNDIKE, Osiris 8 (1948) p. 53.

7.2* Napoli Biblioteca Nazionale VII.A.26, 243ra-253vb, saec. XIV.
Incipit tractatus instrumenti eclipsium magistri petri de dacia. Prolixitatem que quamplurimos in proieccione eclipsium laborantes ..... eclipsis solaris est 7 graduum et 11 minutorum ab alterutro nodorum. Explicit.

Until now these two MSS are the only known copies of a *Tractatus eclipsorii* or *Tractatus instrumenti eclipsium* by Petrus Dacus, or Petrus de Dacia. The text describes the construction and use of a computing instrument for predicting solar and lunar eclipses, called an *eclipsorium* or an *instrumentum eclipsium*. In 7.1 the construction is illustrated by three carefully drawn figures whereas there are no illustrations in 7.2. The instrument consists of a thin plate of wood or metal inscribed with several concentric and graduated circles both on the front (facies) and the back side

(dorsum), and a rotating, circular disc called *volvella*. The fact that this word is occasionally spelt *novella* - a very common copyist's error in treatises of this kind - shows that neither of the two MSS above is a holograph. The instrument itself will be described in more detail in a separate publication.

The *Tractatus eclipsorii* is important for more reasons than one. Firstly, there is no justification for doubting its ascription to Petrus de Dacia whom both MSS mention as author of the text. This shows that Peter took an active interest in the invention and construction of instruments for performing astronomical computations by means of a mechanical device. In consequence he can be placed in the long series of makers of such instruments inaugurated one generation before in the Latin world by Campanus of Novara[41].

Secondly, although Peter's interests in astronomical instruments dated back at least to his sojourn in Bologna - as we already know from the letter from Herman von Minden referred to above (page 8) - there is no doubt that he constructed his eclipsorium (or at least wrote the treatise) during his stay in Paris. In 7.1 a passage on the use of the instrument ends with the words ... et inuenies diem et horam, minutum et secundum quo luna soli conjugetur (211ra) siue opponetur per medios motus parisius, incepta die qualibet in meridie precedentis. In 7.2 the word parisius is replaced by the more satisfactory ad meridianum parisiensem (247ra). Thus there is no doubt that the instrument was destined for use in Paris or in another place with the same geographical longitude. However, Peter had also other places in mind. In 7.1 another passage ends: et habebis tempus vere coniunccionis vel opposicionis equatum ad parisius (sic) , cui 25 minutis superadditis erit tempus eiusdem coniunccionis vel opposicionis ad roskildis dacie (212ra). Thus the text in 7.1 confirms the suspicion that Petrus de Dacia was connected with the city of Roskilde in Denmark already before he went abroad. The statement that Roskilde is 25 minutes of time, or 6° 15' east of Paris (the true value is 9° 45') is the earliest known value for the longitude of Roskilde which does not usually figure in the Medieval lists of geographical coordinates. The MS 7.2 does not refer to Roskilde, but to an unnamed locality: ad meridianum civitatis cuius longitudo ad orientem de parisius est 32 minutorum temporis.

41) F. J. Benjamin & G. J. Toomer, Campanus of Novara and Medieval Planetary Theory, Madison and London, 1971.

Thirdly, the treatise refers to various astronomical tables which the author says he has calculated himself. They have not been previously identified and will be listed below.

Finally, it is worth noticing that the treatise in general uses the Latin astronomical vocabulary which had become standard during the latter half of the 13th century, for instance through the widely used text-book *Theorica planetarum*, often - but wrongly - ascribed to the 12th century translator Gerard of Cremona[42]. There is, however, one exception which appears in the following passage on the equation of time: Quia igitur propter inequalitatem ascensionis buth solis superadditam reuolucionibus celi diurnis, efficiuntur dies naturales inequales (7.1, 212 ra; cf. 7.2, 249 va). Here the term *buth* denotes the instantaneous velocity, i.e. the true, unequal daily motion, of the sun. It is a Persian word derived from Sanskrit. It entered Western astronomy through Adelard of Bath's translation of al-Khwarizmi's astronomical tables[43], but is very rarely found elsewhere. Consequently, it seems probable that Peter Nightingale was acquainted with these tables which had become rather old-fashioned at his time.

The precise date of the *Tractatus eclipsorii* can not yet be ascertained. We have seen that it was written during the period when the author worked in Paris. This gives AD 1292 or perhaps the end of 1291 as a terminus a quo. The text itself provides only one further clue, viz. a reference to the actual value of the so-called precession of the 8th sphere - addas motum octaue spere qui nunc est lo gradus et 22 minuta. This would give the exact year when the treatise was composed if only we knew to which of the several theories of precession its author adhered, but this is still a matter for further research.

8. *Tabule medie coniunccionis et opposicionis*

8.1* Firenze Biblioteca Nazionale II.3.24, 211ra-b, saec.XIV

8.2* Napoli Biblioteca Nazionale VII.A.26, 247v, saec.XIV

A comparison with 7.1 and 7.2 shows that these tables are included

42) See O. Pedersen, The Theorica Planetarum-Literature of the Middle Ages, Classica et Mediaevalia 23 (1962) 225-232. - For the vocabulary see O. Pedersen, A Fifteenth Century Glossary of Astronomical Terms, Classica et Mediaevalia, Dissertationes IX (1973) 584-594.

43) A. Bjørnbo, R. Besthorn und H. Suter, Die astronomischen Tafeln des Muhammed [....] al-Khwarizmi, København, 1914, pp. 22, 78 and 90.

in the *Tractatus eclipsorii* and therefore almost certainly the work of Petrus de Dacia. This is confirmed in the *canones* to his calendar of AD 1292 where he refers to tabulas meas coniunctionum supra parisiis latitudinem (see 4.16, 38rb). The tables are four in number, viz.

8a) Tabula medie coniunccionis solis et lune in annis Christi solaribus ad parisius

8b) Tabula medie opposicionis solis et lune in annis Christi solaribus ad parisius

8c) Tabula communis medie coniunccionis solis et lune in annis Christi solaribus expansis

8d) Tabula communis medie coniunccionis et opposicionis solis et lune in mensibus kalendaribus

This is according to 8.2. In 8.1 the word solaribus in 8a and 8b is replaced by collectis and in 8c by expansis ad parisius; in 8d the same MS has latinorum instead of kalendaribus.

Each of these four tables has four columns of tabulated values of

I Tempus medie coniunccionis [resp. opposicionis] solis et lune

II Medius motus solis et lune

III Argumentum lune verum

IV Argumentum latitudinis lune

Preceded by an entrance column containing the independent variable, viz. the 24-year periods from 1217, 1241.....1433 in 8a and 8b; singular years in 8c; and the twelve months in 8d. This entrance column is lacking in 8.1 in the sub-tables 8a and 8b.

9. *Tabula quantitatum dierum*

9.1* Firenze Biblioteca Nazionale II.3.24, 216v, saec. XIV.
Tabula temporis diurni ad medium septimi climatis.

9.2 St. Gallen Stiftsb. 610.
Tabula quantitatum dierum Petri de Dacia.
ENESTRÖM (1) p.25, No 17, after Scherrer's catalogue.

9.3* Napoli Biblioteca Nazionale VIIA.26, 256v, saec. XIV.
Tabula temporis diurni ad medium septimi climatis.

This is a table of the length of daylight as function of the longitude of the sun in the ecliptic, and calculated for the mean latitude of the 7th climate. In Ptolemy's *Almagest* this geographical zone corresponds to a

latitude of 48^{o} 32' where the longest day is stated to be 16 hours (Alm. II,13). In the table we consider here the longest day is 15 hours 56 minutes. This would correspond to a slightly smaller latitude. It is probable, nevertheless, that the table is calculated for Paris (modern latitude 48^{o} 50') and that the ascription in 9.2 to Petrus de Dacia is correct.

GROUP B: WORKS ATTRIBUTED TO PETRUS DE SANCTO AUDOMARO

10. *Tractatus de Semissis*

10.1 Basel Universitätsbibliothek F.III.25, 1r-16r, saec. XIII -XIV.
Quoniam non conceditur nobis.....
..... similiter est impossible sicut eclypsis lune.
ZINNER (1) No 2055, (2) No 56.

10.2* Cambridge University Library Gg. 6.3, 322ra-330rb, saec. XIV.
Tractatus semissis. Incipit prohemium eius de instrumenti (sic) quod vocatur semissis (sic). Quoniam non conceditur nobis ..... non impedire solem eclipsari in sequentia coniunctione vel 2^{a} vel 3^{a} vel sic de aliis. Explicit.
Catalogue III, p. 215.

10.3* Cues Stiftsbibliothek 214, 1r-9r, saec. XIV.
Composition instrumenti domini petri de Sancto audomaro.
Quoniam non conceditur nobis ..... 6 annos mouetur 5 minutis cum dimidio. Explicit de veris locis planetarum.
ZINNER (1) No 2057; (2) No 54; Zinner has only noticed the first part of the treatise, i. e. fol. 1r-4v.

10.4* Erfurt Amplon. 4^{o} 366, 58r-68r, saec. XV.
Tractatus semisse. Quoniam non conceditur nobis ..... impossibilis sicut eclipsis lune. Explicit tractatus semissarum magistri petri de Sancto Odomaro.
ZINNER (1) No 2056; (2) No 53.

10.5* Firenze Biblioteca Nazionale II.3.24, 225ra-228ra, saec. XIV.
Incipiunt tractatus de semissibus. Quoniam non conceditur nobis ..... in pluribus gradibus vel minutis reperiatur, erit directus. Expliciunt utilitates supra semissas.

10.6* London British Museum Arundel 88, 87r-88v, saec. XV.
Quoniam non conceditur nobis ..... est superius ars situacionis centri deferentis solis.

10.7* London British Museum Harleian 3647, 215ra-224vb, saec. XIV.
Quoniam non conceditur nobis ..... Et hec de latitudinibus planetarum sufficiant.

10.8* Melk Stiftsbibliothek 51, 107r-111r, saec. XV.
Quoniam non conceditur nobis .... 6 annos mouetur 5 minuta cum dimidio etc. Explicit usus et utilitas semissarum.
ZINNER (1) No 2058; (2) No 55.

10.9* Paris Bibliothèque Nationale Nouv. acq. lat. 1893, 79va-91rb, saec. XIV.
Incipit tractatus de semissis ad omnes planetas equandos.
Quoniam non conceditur nobis ..... sit electa recto modo anime recte. Explicit. Explicit instrumentum equacionum petri quod vocatur semisse.

This long text describes the construction and use of an instrument for determining planetary longitudes. This was usually done by means of one set of tables of mean motions (giving mean positions at a given time) and another set of tables of equations (corrections transforming mean into true positions). This procedure was called to "equate" the planet (equare). It involved much tedious, numerical work. The *Theorica planetarum* by Campanus of Novara mentioned above showed how a part of this work could be performed in a purely mechanical way by means of a set of six computing instruments - later called *equatoria* - each of which contained several graduated circles. The treatise with which we are here concerned describes an *instrumentum equacionum* (cf. the explicit of 10.9) which represents a considerable step forward in the history of these analogue computers. Campanus's six devices were here replaced by one single instrument serving all the planets. Moreover the graduated circles are replaced by half-circles whence the name *semissae* or *semissa* by which the instrument became known. No specimen of a *semissae* has survived, but a modern reconstruction has been published by the present author[37], and we shall not here go into further details as to the instrument itself or its place in the history of Medieval astronomy.

37 see p. 11.

Of the nine MSS identified until now only 10.1, 10.4, and 10.9 seem to contain the complete text which in 10.9 is divided into a Prohemium and 10 chapters of which we quote the opening and concluding words as an aid of identifying other, possibly truncated versions which might turn up in the future.

I Capitulum in compositionem instrumenti. Cum igitur hoc instrumentum componere intendas ..... est superius ars situacionis deferentis solis. - This first chapter describes the construction of the instrument and contains a small table of the necessary numerical parameters.

II Quoniam cum centris mediis et mediis argumentis inueniuntur equaciones planetarum ..... et sic habebis tuas tabulas correctas. - This is an instruction in how to use tables for determining mean positions, obviously intended for the benefit of readers with only a slight knowledge of astronomy.

III Cum volueris examinare per hoc instrumentum ..... in 6 annis mouetur 5 minutis cum dimidio. - Here the use of the instrument is described in great detail.

IV Ex iam itaque dictis inuenies verum locum planete ab ariete ..... ponuntur plus 2o minuta in tabula azarchelis quam in presenti tabula. - Here the author describes the motion of the sun and the moon, and is also concerned with corrections to the Toledo tables which - like their Toulouse version used by the author - are erroneous because the apogee of the sun has moved since al-Zarqali's time.

V Si autem tempus vere coniunctionis solis et lune desideras ..... et mercurii 7 et lune 12. - An explanation of how to use the instrument for computing conjunctions of the sun and the moon.

VI Si autem scire volueris motum planete in una die ..... in tabula medii motus illius planete. - A very brief chapter of 15 lines on how to find the daily motion (i. e. the velocity) of a planet.

VII Si autem scire velis utrum planeta sit retrogradus ..... et quod inde proueniet erit eius centrum verum. - On the determination of stationary points and retrograde motions.

VIII Cum sol non deuiat ab ecliptica zodiaci ..... cum magna difficultate et inquisitione. - On how to use tables to find the declination of the sun, and declinations and latitudes of the other planets.

IX Theoricam motuum latitudinis planetarum iam conueniens est perscrutari ..... et hoc de latitudinibus planetarum sufficiant. - A continuation of the previous chapter.

X Cum eclipsim lune et eius quantitatem prompte et euidenter inuenire volueris ..... et similiter est possibilis sicut eclipsis lune. - A long, final chapter on the computation of eclipses to which 10.9 adds the following verses

Prauos euentus
habet ordo rei male tentus
Resque fit electa
recto modo anime recta

The date of the *Tractatus de semissis* is easily established from a passage towards the end of Chapter III where the author is referring to the actual value of the precession (conceived in the Medieval sense as the total motion of the starry sphere reckoned from a given epoch): Est autem motus octaue spere in tempore nostro, quo computantur anni ab incarnatione domini nostri jhesu christi 1293 perfecti, in 10 gradibus et 10 minutis (cf. 10.3, 9 ra; 10.7, 219va; 10.8, 111rb; 10.9, 84va). This does not simply mean the year A. D. 1293 according to our usual calendar. The term *anni perfecti 1293* means that 1293 complete years have elapsed since the incarnation of Christ which, in this system, is supposed to have taken place on March 1 in the year 1 B. C. According to what the author says is that the treatise was written during the year beginning A. D. 1293 March 1. However, in 10.5 the date is different: Est autem motus octaue spere in tempore nostro, quo computantur anni domini 1299 perfecti, 10 gradibus et 15 minutis et 30 secundis. This can be explained on the assumption that the copyist of the Firenze - MS not only changed the year from 1293 to the year 1299 when he was actually writing, but also increased the value of precession by 5'30" to adjust it to a date six years later. This increase corresponds very closely to 1° in 66 years which is one of the standard rates of precession, ultimately derived from the Arabic astronomer al-Battani.

The place where the treatise was written can be inferred from another passage in the same chapter: Ideo ut parisius habeantur medii motus planetarum, oportet addere unum gradum et 15 minuta medio motui Saturni per tabulas tholosanas inuento (10.9, 83va). This shows that the author is here

concerned with adapting the Toulouse-tables to the meridian of Paris. This leaves no doubt that he wrote his work in the French capital.

Who the author was is a much more difficult question. In most of the nine MSS listed above he remains anonymous, and only 10.3 and 10.4 gives his name as Petrus de Sancto Audomaro, that is, Peter of St. Omer. In the explicit to 10.9 he is simply called Petrus. We have already touched upon the question whether this Peter might be the same as the author of the first nine titles of this survey. We shall later revert to this problem in the concluding remarks of this paper. Here we shall only note a remark found in Chapter 3, saying: erit itaque locus augis deferentis solis in 28 gradu geminorum ipsius none spere, et hoc declaravi in tractatus cuiusdam noui quadrantis (10.9, 84va). Thus there is no doubt that the author of the Semissae is the same as the author of the following treatise on our list.

11. *Tractatus novi quadrantis*

11.1* Bruges Bibliothèque Municipale 523, 46r-62r, saec. XIV[1].
Quoniam conceditur opus istius instrumenti ..... usus et utilitates apertum (sic) et paratum. Explicit compositio et verificatio quadrantis magistri Profatii Judei Inciliensis (*for* Marsiliensis) editi in Montepessulano a. d. 1293.
THORNDIKE, Isis 51 (1960) p. 205.

11.2 Cambridge Gonville and Caius College 141, 552 seq., saec. XIV.
Quoniam conceditur opus huius instrumenti.
THORNDIKE and KIBRE, col. 1267.

11.3* Cambridge Pembroke College 278, 88v-98r, saec. XIV[1].
Compositio quadrantis magistri Profacii Judaei secundum correctionem Petri de Sancto Audomaro.
Quoniam conceditur opus istius instrumenti.
JAMES, Catalogue pp. 253-54. Now in the University Library.

11.4* Cambridge University Library Gg. 6.3, 273r-284r, saec. XIV.
Ars et operacio novi quadrantis [...] postea a Petro de Sancto Ademaro Parisiis diligenter correcti et perfecti. Accipe ergo tabulam eream in qua poterit scribi.

11.5 Erfurt Bibl. Amplon. 4° 351, 51r-62r, saec. XIV.
Ars et operacio noui quadrantis editi a magistro Profacio Marciliense operis utilitate et faccionis facilitate omnia astronomie instrumenta, ut dicit in prologo, excedentis et postea a Petro de S. Adamaro Parisiensi diligenter correcti et perfecti.
SCHUM, pp. 588-589; ZINNER (1) No 6791; (2) No 50.

11.6 Erfurt Bibl. Amplon. 4° 352, 97r-99v, saec. XIV.
Quoniam conceditur opus huius instrumenti ..... utilitates aptum et paratum. Explicit composicio noui quadrantis correctus a magistro Petro de S. Audomaro.
SCHUM, p. 592; ZINNER (1) No 6789; (2) No 41.

11.7 Erfurt Bibl. Amplon. 4° 361, 135v-140r, saec. XIV.
ZINNER (1) No 6792; (2) No 51.

11.8 Erfurt Bibl. Amplon. 4° 369, 164r-169v, saec. XIV.
Quoniam conceditur opus huius instrumenti ..... parvo quadrante, ideo relinquatur ad presens.
SCHUM, p. 619; ZINNER (1) No 6788.

11.9 Lilienfeld Stiftsbibliothek 144, 49r-59r, saec. XIII.
Quadrans correctus a Petro Dano.
ZINNER (1) No 6787; ZCHIMEK, Verzeichnis, p. 530.

11.10 Manchester Rylands Library 66+67, 242r-254r, A.D. 1474. Incipit nouus quadrans correctus a petro dane (sic) de Sancto Audomaro. - Quoniam conceditur opus huius instrumenti operi astrolabii.

11.11 München Bayer. Staatsbibl. CLM 588, 131r-136v, saec. XIV.
ZINNER (1) No 6793; (2) No 52.

11.12* Oxford Bodleian Library Ashmole 360, 49r-61r, saec. XIV.
Operacio noui quadrantis editi a magistro profacio Marciliensi operis utilitatem et factoris facilitatem omnia astronomie instrumenta ut dicit prologus excedentis, postea a petro de sancto adamaro parisius diligenter correcti et perfecti.

11.13 Oxford University College 41, 40r-47r, saec. XIV.
Quadrans nouus a Petro de S. Audomaro correctus.
COXE I,12; ZINNER (2) No 47.

11.14* Paris Bibl. Nat. Lat. 7416 B, 1r-15v, saec. XIII-XIV.
Incipit nouus quadrans correptus a petro dane (sic) de Sancto Audomaro. - Quoniam conceditur opus huius instrumenti operi astrolabii ..... auxiliante deo huius tractatus finis est apponendus. Explicit noua edicio quadrantis a magistro profacio Judeo montis pessulani continens omnes utilitates quadrantis antiqui et etiam astrolabii.
ZINNER (2) No 44.

11.15 Salamanca Biblioteca Universitaria SAL 1697, 126r-139r, saec. XV.
Quoniam conceditur opus istius instrumenti ..... qui est numerus quartarum totus gradus. Explicit.
BEAUJOUAN, Manuscrits scientifiques, p. 69.

11.16 Salamanca Biblioteca Universitaria SAL 2621, 128r-138r, saec. XV.
Incipit novus quadrans judei Prefatii (sic) de Montepessulano correctus a magistro Petro de Sancto Audomaro. - Quoniam conceditur opus istius instrumenti opere astrolabii prevalere ..... quia scala non est ita particulatim distincta sicut limbus. Sequuntur tabule scale.
BEAUJOUAN, Manuscrits scientifiques, p. 171.

11.17 Stams Stiftsbibliothek 12, 102r-123v, saec. XV.
Attributed to Petrus de Sancto Audomaro.
ZINNER (1) No 6790; (2) No 42.

11.18* Venezia Bibl. Marciana VIII,68 (= 3416), 9r-28r, saec. XIV.
Incipit nouus quadrans multum utilis, correctus a magistro petro de Sancto Audomaro Anno 1309°. - Quoniam conceditur opus huius instrumenti ..... Hiis autem completis auxiliante domino deo huic tractatui finis est apponendus. Deo gracias.
ZINNER (2) No 49.

11.19 Yale University Library, Astron. MS, 167vb-171rb, saec. XIV.
Quoniam conceditur opus huius instrumenti.
THORNDIKE and KIBRE, col. 1267.

In the 13th century the most common astronomical instruments were the astrolabe and the quadrant both of which were described in treatises usually included in the corpus astronomicum[44]. The astrolabe was circular and

44) O. Pedersen, The Corpus Astronomicum and the Traditions of Mediaeval Latin Astronomy, Colloquia Copernicana, vol. III, pp. 57-96, Warszawa, 1975.

provided with a diopter whereas the quadrant was shaped like a quarter circle and had sighting vanes. The so-called 'New Quadrant' was, as it were, a kind of cross between them. It had the shape and vanes of the ordinary or 'Old' quadrant but was provided with many of the circles usually projected upon the astrolabe folded twice over so as to be contained within the narrower compass of the quadrant[45]. The instrument was invented by the Hebrew scientist Jacob ben Mahir of Marseille who during most of his life worked at Montpellier (Mons Pessulanus). He described his invention in a Hebrew treatise dated A. D. 1288[46] which soon became known to the Latin world as the work of Profatius Judaeus. The history of the transmission of the text is still somewhat confused. There was a Latin translation with the incipit Cum (or Quoniam) scientia artis astronomiae non completur absque instrumentis made by one Armengaud Blasius and dated by Thorndike to A. D. 1290[47]. Another translation of a revised version of the text was published by the author himself in A. D. 1301 with the incipit Cum stellarum scientia sine congruis instrumentis[48]. Finally there is the text with which we are here concerned. In several of the titles quoted in the list of MSS above it is presented as a corrected and perfected version of Profatius' work. Because of the statement in 11.18 it is often supposed to date from A. D. 1309. That this is not correct was pointed out by Thorndike[49] who drew attention to the passage quoted above from the Tractatus de Semissis in which the author refers to the Tractatus novi quadrantis as his own work. This is, in fact, borne out by the text of the latter treatise in which the following passage occurs (here quoted from the Paris MSS 11.14, fol. 7ra): Adde igitur 8^{i} hunc motum 8^{e} spere qui in 10 gradu et 14 minuto sensibiliter est repertus in hoc tempore quo computantur anni ab incarnacione christi 1293, et ex hac addicione habebis ipsam augem in 28^{mo} gradu et 4^{to} minuto geminorum. Thus both the Tractatus de Semissis

45) See the figure in R. T. Gunther, Early Science in Oxford, vol. II, Oxford, 1923, p. 163.
46) P. Duhem, Le Système du Monde, vol. III, pp. 298-312, Paris, 1954, cf. G. Sarton, Introduction to the History of Science, vol. II, pp. 850 -853, Baltimore, 1931.
47) L. Thorndike, Date of Peter of St. Omer's Revision of the New Quadrant of Profatius Jadaeus, Isis 51 (1960) 204-206.
48) G. Bofitto and C. Melzi d'Eril, Il quadrante d'Israele, Firenze, 1922; cf. L. Garm, Profatius Judaeus' traktat om kvadranten (unpublished thesis, Aarhus, 1966).
49) L. Thorndike, Date of the translation by Ermengaud Blasius of the work on the quadrant by Profatius Judaeus, Isis 26 (1937) 306-309.

and the Tractatus novi quadrantis were written in the same year 1293 and the latter before the former. That also the quadrant treatise was written in Paris is indicated in 11.5 and 11.12.

The question of who the author was is more intriguing. There is, of course, no doubt whatever, that the two works are by the same author. We have also seen that in two of the nine Semissae-MSS (10.3 and 10.4) he was called Petrus de Sancto Audomaro whereas the seven others were anonymous. The 19 MSS of the quadrant treatise present a more confused picture. On the one hand there is a higher proportion in which Petrus de Sancto Audomaro is said to be the author, viz. the nine MSS 11.3, 4, 5, 6, 12, 13, 16, 17, and 18. On the other hand some of the early MSS clearly identify him with a Danish astronomer who in 11.10 and 11.14 is called Petrus Danus (abl: Dane) de Sancto Audomaro. Moreover, the presumably very early Lilienfeld MS 11.9 simply calls him Petrus Danus. This must be kept in mind when we return later to the problem of the identity of Peter Nightingale.

The text of the Tractatus novi quadrantis falls in two clearly separated parts the first of which deals with the construction of the instrument. In the Paris MS 11.14 this part occupies fols. 1ra to 7va and is divided into seven sections. The first of these begins abruptly with the words <Si> Igitur quadrantem istum componere intendas (1ra) while the other six are provided with the following titles:

(2) De tropicis et equinociali (1va)
(3) De composicione zodiaci (1vb)
(4) De composicione orizontem (sic) (3va)
(5) De composicione scale altimetris (4va)
(6) De stellis fixis ponendis (4vb)
(7) De composicione dorsi (6va)

The second part of the treatise describes the various uses of the instrument. It is obviously modelled on the corresponding sections of the usual treatises on the astrolabe and begins with the words: De secunda parte huius artis, in qua ponuntur canones operacionum et usum huius instrumenti, que distinguitur in 13 capitulis. However, there are no less than 15 chapters of which only the first eight are numbered.

GROUP C: UNCERTAIN ATTRIBUTIONS AND UNIDENTIFIED WORKS

In addition to the eleven tables or treatises listed above a number of other texts have been connected with the names of Petrus de Dacia or Petrus

de Sancto Audomaro. Among them are authentic works which still remain unidentified. Others are fragments of known works which until now have been considered independent treatises. And finally there is a number of texts which have been attributed to Petrus de Dacia on very slender evidence. The following is a brief survey of the material in this category.

First, the author of the Tractatus de Semissis states that he calculated a table of the equation of time - that is, the difference between mean and apparent solar time - because the corresponding table by al-Zarqali was wrong as a result of the motion of the apogee of the orbit of the sun: Et propter hoc auxiliante Deo constitui hanc tabulam equationis dierum et direxi ad nostrum tempus, supponendo locum augis deferentis <solis> esse in 28 gradu geminorum none spere, et discordit ista presens tabula in aliquibus a tabula Azarchelis propter diuersitatem suppositionum locorum augium deferentis solis. Inde in directo 6 gradus geminorum ponuntur plus 20 minuta in tabula Azarchelis quam in presenti tabula (10.9, 85vb).

That such a table is necessary is also stated in the Tractatus eclipsorii (see 7.1, fol. 212ra). However, it has not yet been possible to identify it among the astronomical MSS of the later Middle Ages. It is true that a table of this kind is found among the tables appended to the Eclipsorium in the MSS

Firenze Biblioteca Nazionale II.3.24, fol. 216r
and Napoli " " VII.A.26, fol. 255v

In this table the equation of time is expressed in minutes of time as a function of the longitude of the sun. It has a primary maximum of 32^m at Scorpius 6^o, a secondary maximum of 22^m at Taurus 9^o-16^o, a primary minimum of 0^m at Aquarius 12^o, and a secondary minimum of 12^m at Cancer 28^o. This is sufficient proof that this table is different from the ordinary Toledo Table of the equation[50], but as yet there is no evidence to connect it with Petrus de Sancto Audomaro.

In 1959 L. Thorndike published his discovery of a *Tractatus eclipsium solis et lune secundum Petrum de Sancto Odemaro* (cf. above note 38). It is known in only one MS, viz.

Firenze Biblioteca Nazionale II.3.24, 206rb-208rb, saec. XIV.

The text has the incipit Cum eclipsim lune et eius quantitatem prompte et

50) G. J. Toomer, A Survey of the Toledan Tables, Osiris 15 (1968) 5-174, in particular p. 34.

evidenter scire volueris, and the explicit est impossibilis sicut eclipsis lune. Explicit. A more detailed inspection of the text shows that this is no separate treatise, but only the final chapter of the *Tractatus de Semissis*[51].

L. Thorndike also brought to light another text which must be considered here. It is found in the codex

Darmstadt Hessische Landesbibliothek Hs. 780,245v-246r, saec.XV.

and is a fragment of two pages only, entitled Demonstraciones magistri petri daci super quadrantem, and provided with the incipit Ad demonstrandum rerum altitudines. It explains how to use an ordinary quadrant for measuring the height of a distant object. This is also the subject matter of a particular section of the *Tractatus novi quadrantis* with the heading Sequitur de mensurationibus rerum (cf. 11.14, fol. 12ra). But the two texts are completely different and the Darmstadt fragment is neither an excerpt nor a paraphrase of Peter's treatise on the quadrant. Unless more evidence to the contrary comes to light there is no reason to regard this fragment as part of a work by Petrus de Dacia. It is interesting only in so far as it shows that a 15th century scribe found it natural to connect his name with a text on the use of the quadrant[52].

A text of a very different character is the *Tractatus de nobilitate astronomiae* found in

München Bayer. Staatsbibl. CLM 14 401, 180r-182v, saec. XIV.

It contains a prologue with the incipit In bono quod deus operatur bonitatem largidatoris debemus attendere, followed by four questions

1) Utrum astronomia sit scientia
2) Utrum astronomia sit nobilior quam naturalis scientia vel e contrario
3) Utrum astronomia et astrologia sit eadem scientia vel diverse
4) Utrum coelum sit causa omnium istorum inferiorum

The text is incomplete and breaks off in the middle of question 4. The terms astronomy and astrology are here used in the Medieval and not the modern sense: Per hoc differt astronomia et astrologia, quia astronomia determinat de substantiis et virtutibus essentialibus orbium celestium et de effectibus eorum, astrologia vero determinat de mensuris orbium celesti-

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51) I am indebted to Mr. F. Saaby Pedersen for this observation and for his help in revising my whole typescript of this paper.

52) I wish to express my gratitude to Professor B. Bischoff, München, for his help in solving the problem of the Darmstadt MS.

um (182rb). The treatise uses the scholastic method with questions, objections and answers for a reasoned defense of astrology in the modern sense of the word. The principal authorities are Ptolemy and Campanus of Novara. In Halm and Meyer's catalogue the text is attributed to Petrus de Dacia, apparently for no other reason than that it follows immediately after his commentary on Sacrobosco (1.7). In consequence there is no serious reason for considering it an authentic work of Petrus de Dacia.

Finally there are a few short texts and fragments on phlebotomy and astrological medicine which were attributed to Petrus de Dacia by the late J. W. S. Johnsson (cf. above note 40) who also suggested that the astronomer were the same person as a certain Frater Petrus Inguari studiosus roskildensis mentioned in a MS in Copenhagen (Royal Library, G.k.S. 1810, 4^{o}, 74v). Nothing more is known of this Peter Ingvardsen. The fact that he was a friar also excludes the possibility of his being a canon at Roskilde. We shall not here pursue this idea any further.

CONCLUSION

The principal purpose of this paper has been to survey a number of MSS connected with the names of Petrus de Dacia and Petrus de Sancto Audomaro. It is my hope that this may act as a stimulus to further research resulting in the identification of more MS material which might shed more light upon the problem of the possible identity of the two authors. At present any definite conclusion would be premature. On the other hand it seems natural to finish this survey by drawing attention to some new and perhaps essential points of the argument which have turned up since E. Zinner first suspected the identity of the two Peters. Here we shall only underline a couple of rather striking similarities between the *Tractatus eclipsorii* and the *Tractatus de semissis*.

We have noticed already that the author of the former treatise used the unfamiliar term *buth* in the sense of 'instantaneous velocity'. Precisely the same word is found several times in the latter treatise, for instance in Chapter 10 where a certain procedure in the computation of eclipses is described, ending with the words "... et quod inde proveniet, divide per buth lune in una hora vel minuto hore" (MS 10.9, fol. 91ra; cf. 90vb).

Another similarity appears when the prefaces to the two treatises are compared both as to the vocabulary used and to the fundamental ideas expressed. The opening paragraph of the Tractatus de semissis reads as follows:

> Quoniam non conceditur nobis philosophie studium nec tempus philosophandi, negligimus hanc astrorum scienciam, abhorrentes t e d i o sue difficultatis ac p r o l i x i t a t i s temporis apponende. Sed quod in hac arte est horribilius et difficilius et magis prolixum est opus numerandi et equacio numerorum. Igitur expediens est in operibus huius artis uti aliquo absque magno labore numerorum. Composui ideoque auxiliante deo quoddam instrumentum, per quod f a c i l i t e r invenientur vera loca planetarum sine tabulis equacionum, quarum operaciones in numeris sunt maxime tediose (10.9, fol. 79va).

The *Tractatus eclipsorii* has the following preface: P r o l i x i t a t e m que etiam plurimos in proiectione eclipsium laborantes citra finem affectos t e d i o ab amore artis retrahit intendens prescindere formidinem quoque que non nullos labore prorsus indefessos in pronunciacione earundem preoccupat / excludere quomodolibet modum novum in utraque eclipsi investigandi necessaria, multiplicatione et divisione exclusis, penitus succinte, f a c i l i t e r et sensu palpandum plurimum propono tradere, qui inspiravit altissimo inspirante (7.1, fol. 208rb-208va).

Here key-words such as prolixitas, tedium, and faciliter are found in both texts which also give vent to the same basic line of thought, viz. that astronomy is neglected because astronomical calculations are tedious, a situation that can be remedied by the invention of mechanical computing devices. The correspondence is, in fact, so close that it is impossible to avoid the idea that the two texts - and therefore also the two complete treatises - are related in some significant way. One possibility is that they are by the same author, another that Petrus Dacus modelled the preface to his Tractatus eclipsorii on the preface to the other treatise by Petrus de Sancto Audomaro. Everything considered, the first possibility still seems more plausible than the second. But admittedly the question must remain open until it can be solved through further research. Here the most promising lines of investigation seem to be a more complete knowledge

of all available MS material, a careful analysis of the astronomical contents of the texts in general and of their numerical parameters in particular, and last, but not least, a better understanding of the astronomical activity in Paris during the 1290'ties.

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LIST OF ABBREVIATIONS USED IN THE SURVEY OF MANUSCRIPTS

(Except library catalogues)

BEAUJOUAN = G. Beaujouan, Manuscrits scientifiques médiévaux de l'Université de Salamanque et de ses Colegios mayores. Bordeaux 1962.

CURTZE = Petri Philomeni de Dacia in Algorismum vulgarem Johannis de Sacrobosco Commentarius una cum Algorismo ipso, ed. M. Curtze, Sumptibus Soc. Reg. Scientiarum Danicae, Hauniae 1897.

ENESTRÖM I/(1) = G. Eneström, Anteckningar om matematikern Petrus de Dacia och hans skrifter. Öfversikt av Kungl. Vetenskaps-Akademiens Förhandlingar, 1885 No 3, 15-28.

ENESTRÖM II/(2). Ibid. 1885 No 8, 65-70.

ENESTRÖM III/(3). Ibid. 1886 No 3, 57-60.

LEHMANN = P. Lehmann, Skandinaviens Anteil an der lateinischen Literatur und Wissenschaft des Mittelalters. Sitz.ber. Bayer. Akad.d.Wiss., Phil. -hist.Abt., München 1936, Heft 2.

MONTFAUCON = B. de Montfaucon, Bibliotheca Bibliothecarum Manuscriptorum. Paris 1739.

ZINNER (1) = E. Zinner, Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes. München 1925.

ZINNER (2) = E. Zinner, Petrus de Dacia, en middelalderlig dansk astronom. Nordisk Astronomisk Tidsskrift 13 (1932) 136-146. (Also in: Archeion 18 (1936) 318-329.)

LIST OF MANUSCRIPTS

Bamberg	Staatsbibl.	Math.-Astr. 4	5.2
-	-	Misc. 176	4.1/5.1
Barcelona	Bibl. Centr.	162	5.3*
Basel	Univ. Bibl.	F.I.23	4.2
-	- -	F.III.25	10.1
-	- -	F.V.15	4.3
Bayeux	Cath. Libr.	61	4.4/5.4
Berlin	Staatsbibl.	theol.lat. 8^{o} 109	page 8
Bern	Bibl. Bongars.	524	4.5
-	- -	524A	5.5
Bruges	Bibl. Munic.	523	11.1*
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