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A HISTORY OF MAGIC AND EXPERIMENTAL SCIENCE

VOLUMES III AND IV

FOURTEENTH AND FIFTEENTH CENTURIES

VOLUME III

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FOURTEENTH AND FIFTEENTH CENTURIES

BY

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VOLUME III

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INTRODUCTORY NOTE

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G. S. BRETT
Chairman, Publications Committee

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PREFACE TO VOLUMES III AND IV

The two volumes now published continue through the fourteenth and fifteenth centuries, the *History of Magic and Experimental Science,* of which the first volume covered the eleven centuries of the Roman empire and earlier middle ages, while the second was devoted to the twelfth and thirteenth centuries with their rich flowering of Latin learning. As the title indicates, those volumes emphasized the long historical association between that view of the world and mode of dealing with it, that theory and practice, which may be summed up by the word magic, and the gradual development of what we today call science. More particularly they stressed the outgrowth of scientific experimental method from the experimentation of magic. This viewpoint will continue in the present volumes and seems as justifiable in the fourteenth and fifteenth centuries as before, although in time and various other respects they may be regarded as having a closer connection with modern science. In *Science and Thought in the Fifteenth Century,* Columbia University Press, 1929, I have already published some studies in the mathematics, medicine, and natural philosophy of that period which will not be duplicated here. A few chapters and appendices, however, repeat or further develop articles previously published in periodicals, and I am indebted to the editors of *Isis, Archeion, Speculum, The Philosophical Review, Sudhoffs Archiv für Geschichte der Medizin,* and the *Bibliothèque Thomiste* for permission to weave them into this larger synthesis.

As the second volume of my *History of Magic and Experimental Science* made more use of manuscript materials than the first, so the present volumes are based to a still greater extent upon the manuscripts. Many chapters are primarily or exclusively from them. Even in those cases where our authors are in print, they usually are found only in incunabula or other old, rare, and more or less inaccessible and uncritical editions. Strange as it may seem, there are not only more printed editions but more

recent critical editions for the early medieval period than for the twelfth and thirteenth centuries, and more for the twelfth and thirteenth centuries than for the two following hundred years. For these reasons it has seemed advisable to quote the original Latin in the notes more than in the earlier work and to increase the number of appendices describing the manuscripts or presenting illustrative extracts from them.

In finding my way through the writings of this period I have been much helped by previous historical and bibliographical explorations like those of Pierre Duhem, Karl Sudhoff, G. Hellmann, the *Histoire littéraire de la France,* and the *Catalogue of Latin and Vernacular Manuscripts in Great Britain and Ireland* of Mrs. Waley Singer. If I have sometimes added to or corrected their findings, it is because I have had the advantage, as the old figure goes, of standing upon their shoulders. The reader may refer to the *Verzeichnis* of Zinner for additional manuscripts of the astrological works here treated. The forthcoming catalogue of alchemical manuscripts in the United States of America will show that there are copies in this country of a number of the alchemical works described in these volumes. Of especial interest is a large composite manuscript at Lehigh University, in the main compiled and copied at Naples between 1473 and 1490 by Arnold of Brussels, which will be discussed in detail in *Isis* by Mr. W. J. Wilson of the Library of Congress.

In reading the proofs of these volumes I have been aided by my research assistant, Miss Pearl Kibre, by members of my seminar, Miss Georgene W. Davis and Mr. Benjamin N. Nelson, and by my colleague, Professor Dino Bigongiari, whose broad scholarship has again been generously placed at my disposal. The attempt has been made, at the British Museum and in New York, by Miss Kibre and myself, to verify every reference. As usual, I have made the indices, except that Miss Kibre has been primarily responsible for indexing pp. 413-707 of volume IV.

I would gratefully acknowledge permission to use photograph or rotograph copies of manuscripts or rare editions, or to study personally, in the following European libraries: the public li-

brary of Avignon, the town library of Berne, the university and the communal libraries of Bologna, the public library of Bruges, at Cambridge the university library and those of Corpus Christi and Trinity colleges, the Landesbibliothek at Cassel, the royal library at Copenhagen, the National Library of Scotland at Edinburgh, the Stadtbücherei of Erfurt, the Laurentian, Riccardian, and National libraries at Florence, the university library at Geneva, the episcopal library of Klagenfurt, the library of the Augustinian canons at Klosterneuberg, the library of the Institut für Geschichte der Medizin at Leipzig, the British Museum at London, the John Rylands library of Manchester, the Ambrosiana at Milan, the Bayerische Staats-Bibliothek of Munich, the Biblioteca Nazionale of Naples, the municipal library at Nürnberg, at Oxford the Bodleian and All Souls, Balliol, Corpus Christi, Hertford, St. John's, and Oriel colleges, at Paris the Bibliothèque Nationale, Sainte Geneviève, and Mazarine, the university library of Pavia, at Rome the Vatican, Casanatense, and Vittorio Emanuele, the public library of Tours, the university library at Utrecht, the Marciana at Venice, the national library at Vienna, and the Herzog August Bibliothek of Wolfenbüttel. Other libraries have answered inquiries made by letter, as I have noted in the footnotes in the course of the work. Many libraries in this country have very kindly sent rare volumes to New York for my use or afforded me other facilities, but I will not attempt to list them all here for fear of chance omissions. Acknowledgment has been made in most cases in subsequent footnotes.

The completion of these volumes has been greatly expedited by generous grants for research assistance and for traveling expenses from the Council on Research in the Humanities and by allotments for the purchase of rotographs from the Special Research Fund of Columbia University. The History of Science Society has contributed from its revolving fund from the Carnegie Corporation one thousand dollars towards the cost of printing, and the Columbia University Press has assumed the remaining risk. Such aid to scholarship is most heartening.

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ABBREVIATIONS

Accurti (1930)	Thomas Accurti, *Editiones saeculi XV pleraeque bibliographis ignotae: Annotationes ad opus quod inscribitur, 'Gesamtkatalog der Wiegendrucke,* Voll. I-V,' Florence, 1930, 170 pp.
Archiv	*Archiv für Geschichte der Medizin,* now *Sudhoffs Archiv für Geschichte der Medizin*
Artis auriferae	*Auriferae artis quam chemiam vocant antiquissimi authores,* Basel, 1572; *Artis auriferae quam chemiam vocant, volumen primum,* Basel, 1593; *Artis auriferae quam chemiam vocant, volumen tertium,* Basel, 1610.
Auctarium	*Auctarium Chartularii Universitatis Parisiensis,* sub auspiciis consilii generalis facultatum Parisiensium ediderunt Henricus Denifle et Aemilius Chatelain, Paris, 1894-1897, 2 vols.
Bandini, A. M.	A. M. Bandini, *Catalogus codicum latinorum bibliothecae Medicae Laurentianae,* Florence, 4 vols., 1774-1777.
Berthelot (1893)	P. E. M. Berthelot, *La chimie au moyen âge,* Paris, 1893, 3 vols.
BL	Bodleian Library, Oxford
BM	British Museum, London
BN	Bibliothèque Nationale, Paris
Boncompagni's *Bullettino*	*Bullettino di bibliografia e di storia delle scienze matematiche e fisiche,* Rome, 1868-1887, vols. I-XX.
Brunet	J. C. Brunet, *Manuel du libraire et de l'amateur de livres,* 8 vols. 1860-1880.
BU	University of Bologna library: and see Frati
Bullettino	see Boncompagni's
Carbonelli (1925)	Giovanni Carbonelli, *Sulle fonte storiche della chimica e dell'alchimia in Italia,* Rome, 1925.
CFCB	*Census of Fifteenth Century Books Owned in America,* compiled by a committee of the Bibliographical Society of America, New York, 1919.
Chartularium	Denifle et Chatelain, *Chartularium universitatis Parisiensis,* 4 vols., Paris, 1889-1897.
Chevalier	Ulysse Chevalier, *Répertoire des sources historiques*

	du moyen âge, Bio-Bibliographie, 2 vols., Paris, 1905-1907.
CLM	Codex Latinus Monacensis (Latin MS at Munich)
Codice diplomatico	See Maiocchi
Copinger	W. A. Copinger, *Supplement to Hain's Repertorium bibliographicum,* London, 1895-1902, 2 vols. in 3.
CU	Cambridge University
CUL	Cambridge University Library
Dallari, *Rotuli*	Umberto Dallari, *I Rotuli dei Lettori legisti e artisti dello Studio bolognese dal 1384 al 1799,* 4 vols., Bologna, 1888-1924.
DNB	*Dictionary of National Biography,* London, 1885-1901, 63 vols. etc.
Duhem, I (1906)	Pierre Duhem, *Études sur Léonard de Vinci: ceux qu'il a lus et ceux qui l'ont lu,* Première série, Paris, 1906.
Duhem, II (1909)	*Études sur Léonard de Vinci,* Seconde série, Paris, 1909.
Duhem, III (1913)	*Études sur Léonard de Vinci,* Troisième série, Les précurseurs parisiens de Galilée, Paris, 1913.
Duhem, III (1915)	*Le système du monde,* Tome III, Paris, 1915.
Duhem, IV	*Le système du monde,* Tome IV, Paris, 1916.
Duhem, V	*Le système du monde,* Tome V, Paris, 1917.
DWS	Dorothea Waley Singer, *Catalogue of Latin and Vernacular Manuscripts in Great Britain and Ireland dating from before the XVI Century,* Brussels, 1928 and 1930, vols. I and II. Vol. III, 1931.
Fabricius	J. A. Fabricius, *Bibliotheca latina mediae et infimae aetatis:* I have chiefly used the edition of Hamburg, 1734-1746, 6 vols.
FL	R. Biblioteca Medicea Laurenziana (Laurentian library, Florence).
FN	Biblioteca Nazionale (National library, Florence).
Frati	Ludovico Frati, "Indice dei codici latini conservati nella R. Biblioteca Universitaria di Bologna," *Studi italiani di filologia classica,* Florence, 1908-1909, XVI, 103-432; XVII, 1-171.
Gabotto (1889)	Ferdinando Gabotto, "L'Astrologia nel quattrocento in rapporto colla civiltà," *Rivista di filosofia scientifica,* VIII (1889).
Gloria (1888)	Andrea Gloria, *Monumenti della Università di Padova* (1318-1405), 2 vols., Padua, 1888.

GW	*Gesamtkatalog der Wiegendrucke,* 5 vols., Leipzig, 1925-1932; in process.
Hain	Ludwig Hain, *Repertorium bibliographicum in quo libri omnes ab arte typographica inventa usque ad annum MD typis expressi ordine alphabetico vel simpliciter enumerantur vel adcuratius recensentur,* 4 vols., Stuttgart, 1826-1838.
Hansen (1900)	Joseph Hansen, *Zauberwahn Inquisition und Hexenprozess im Mittelalter,* Munich and Leipzig, 1900.
Hansen, *Quellen*	Joseph Hansen, *Quellen und Untersuchungen zur Geschichte des Hexenwahns und der Hexenverfolgung im Mittelalter,* Bonn, 1901.
Hellmann (1917)	G. Hellmann, *Die Wettervorhersage im ausgehenden Mittelalter,* in *Beiträge z. Gesch. d. Meteorologie,* II, 169-229, Berlin, 1917.
HL	*Histoire littéraire de la France,* Paris, in process.
Klebs (1926)	A. C. Klebs and K. Sudhoff, *Die ersten gedruckten Pestschriften,* Munich, 1926.
Lami (1756)	*Catalogus codicum manuscriptorum qui in bibliotheca Riccardiana Florentiae adservantur,* Leghorn, 1756.
Maiocchi	*Codice diplomatico dell'Università di Pavia,* vol. I, 1361-1400, Pavia, 1905; vol. II, i, 1401-1440, Pavia, 1913; II, ii, 1441-1450, Pavia, 1915.
Manget	J. J. Manget, *Bibliotheca chemica curiosa,* Geneva, 1702, 2 vols.
Mehus (1759)	*Ambrosii Traversarii . . . Latinae epistolae a domno Petro Canneto . . . : adcedit eiusdem Ambrosii Vita in qua historia litteraria Florentina ab anno MCXCII usque ad annum MCCCCXL ex monumentis potissimum nondum editis deducta est a Laurentio Mehus,* Florence, 1759.
MS and MSS	Manuscript and Manuscripts.
Muratori, *Scriptores*	*Rerum Italicarum scriptores ab anno aerae christianae 500 ad 1500,* ed. L. A. Muratori, 1723-1751. New edition in process since 1900.
Pellechet	M. L. C. Pellechet, *Catalogue général des incunables des bibliothèques publiques de France,* 3 vols. (A-Gr), 1897-1909.
Recueil (1929)	*Recueil des plus celebres astrologues et quelques hommes doctes faict par Symon de Phares du temps de Charles VIIIe,* publié d'après le manuscrit unique de

	la Bibliothèque Nationale par le Dr. Ernest Wickersheimer, Paris, 1929.
Renaudet (1916)	A. Renaudet, *Préréforme et humanisme à Paris pendant les premières guerres d'Italie (1494-1517)*, 1916.
Sbaralea	*Supplementum et castigatio ad Scriptores trium ordinum S. Francisci a Waddingo aliisque descriptos*, original edition, 2 vols., Rome, 1806; revised edition, 1908, 1921.
Schum, *Verzeichnis*	Wilhelm Schum, *Beschreibendes Verzeichniss der Amplonianischen Handschriften-Sammlung zu Erfurt*, Berlin, 1887.
Soldati (1906)	B. Soldati, *La poesia astrologica nel quattrocento: richerche e studi*, Florence, 1906.
S. Marco	Biblioteca nazionale di S. Marco in Venezia (St. Mark's library, Venice).
Tiraboschi	Girolamo Tiraboschi, *Storia della letteratura italiana*, Milan, 1823-1826.
Valentinelli	J. Valentinelli, *Bibliotheca manuscripta ad S. Marci Venetiarum*, vols. I-VI, Venice, 1868-1876.
Vatic.	Biblioteca Apostolica Vaticana (Vatican library, Rome).
Verae alchemiae	*Verae alchemiae artisque metallicae citra aenigmata doctrina certusque modus scriptis tum novis tum veteribus nunc primum et fideliter majori ex parte editis comprehensus*, (auctore G. Gratarolo) 2 parts, Basel, 1561.
Zetzner	Lazarus Zetzner, *Theatrum chemicum*, 6 vols. Argentorati (Strasburg), 1659-1661. This is the edition which I have chiefly used, but some use has been made of the earlier edition of 1613, 1622, etc. It was first published in 4 vols. at Ursel, 1602.
Zinner	Ernst Zinner, *Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes*, Munich, 1925.

A HISTORY OF MAGIC AND EXPERIMENTAL SCIENCE

FOURTEENTH AND FIFTEENTH CENTURIES

CHAPTER I

THE OUTLOOK AT THE OPENING OF THE FOURTEENTH CENTURY

In this initial chapter I would introduce the reader to, or reacquaint him with, the historical relationship between magic and experimental science by some excerpts from the thinking of three representative men of the opening fourteenth century. The first, and by far the greatest, produced in scholastic theology and philosophy a new school of thought to rival Thomism. The second, a member of the Augustinian order, had been prominent in ecclesiastical affairs and ideas since he attended the council of Lyons in 1274. The third was a professor lecturing on astronomy to the medical students at Bologna. The scholastic philosopher and theologian will serve to remind us of the high standing of natural science, astrology, and perhaps even alchemy then. The ecclesiastic and the professor will present with varying shades of disapproval and interest the superstitious and occult arts and sciences as they were then envisaged.

Duns Scotus died in 1308, but his writings and philosophy continued influential until 1500 and beyond that date.[1] Although primarily a theologian and commentator on the *Sentences,* he made much use of the works of Aristotle and showed himself *au courant* with other scientific tendencies of his own time. Miss Sharp thinks that he undoubtedly owed to Robert Grosseteste "the strong scientific and mathematical bent that appears in the *De primo principio,*" and elsewhere in his works, "and the regard for experience which is manifested in his hesitation in accepting what others adopt as proofs."[2] He maintained that natural science was a legitimate discipline and refuted Henry of

[1] Our previous meager knowledge of Duns' life has been amplified by recent discoveries of E. Longpré, which are briefly summarized with references to Longpré's articles of 1928-1929 by D. E. Sharp, *Franciscan Philosophy at Oxford in the Thirteenth Century,* Oxford University Press, 1930, p. 279.

[2] *Ibid.,* p. 280.

Ghent's denial of certitude to it. For Scotus, according to the *Histoire littéraire de la France,* knowledge obtained through the senses and by experimental verification of the natural existence of things is the basis and source of all other knowledge.[3] Moreover, in the writings of Duns Scotus or in works which have been attributed to him we find the conception of occult virtue apparently accepted and even given a greater extension than many would then accept, while astrology and alchemy are recognized as reputable sciences.

This attitude to astrology and occult virtue appears in works of whose genuineness there is no doubt, the two commentaries or two versions of one commentary on the *Sentences* known as the *Opus Oxoniense* and the *Reportata Parisiensia.* The question whether the sky acts on these inferiors Scotus answers affirmatively and in almost identical terms in both works.[4] The stars have action on the elements, both in respect to alteration and to generation. When the sun and other hot planets are in the zenith of any region, the superior elements, fire and air, are augmented, and the inferior elements, earth and water, are diminished and converted into air and fire. When the sun recedes and cold stars like Saturn take its place, the opposite occurs. The stars also cause motion of the inferior elements. The moon exerts an attraction on the tides like that of the magnet on iron. The planets further have action on mixed bodies, whether imperfect such as vapors in the air or perfected and inanimate like metals, "which are generated in certain regions by a constellation having respect to that region and not to another, for the earth is not the active cause of this diversity."[5] This is not all. "In the fourth place I say that they act on animate beings, altering mixed bodies to a quality conformable or incompatible with the soul animating such a body, and so they can act towards generation or corruption."[6] They may even by sharpening or disordering the senses

[3] HL XXV, 457-458. For HL and other such abbreviations the reader is referred to the list of abbreviations at the beginning of this volume.

[4] See in either case II *Sent.,* Dist. XIV, Quaestio III, found in the *editio nova,* Paris, 1891-1895, XII, 661-679, and XXIII, 58-62.

[5] *Ibid.,* XII, 671.

[6] *Ibid.,* XII, 672.

affect the intellect, as is evidenced in the insane and lunatics, whose imagination is confused. Even the will may be disordered to some extent thereby. The stars also alter sense appetite and incline men to follow it against the dictates of reason, although the will is not coerced absolutely and may resist them. But were it not for free will, human, angelic, and divine, everything would happen of necessity and nothing would happen contingently. Natural law and freedom of the will: for Scotus these are the sole factors determining action.

If astrologers do not judge exactly as to this necessary causality in purely natural matters such as weather prediction where the possibility of free will does not enter, it is because they do not understand perfectly the qualities and virtues of the heavens and stars. Angels have this perfect understanding. The stars influence disease by producing remission or intension of qualities, "and so it is convenient and necessary that a good physician have knowledge of astronomy," for a medicine which taken at one time might kill, at another time might cure. Those doctors who are ignorant of astronomy kill many patients. Moreover, it frequently happens that astrologers make true predictions as to men's characters or from their nativities, although this does not follow necessarily in those matters which depend on rational will. In the *Reportata Parisiensia* this is put a little differently. We are told that it is rash for "astronomers" to predict war for one conjunction of the planets and peace for another, or to say that persons born under a certain constellation will necessarily be dissolute. But the will is prone to follow the inclination of the sense appetite, so that in many cases it so happens, and someone has said that if you want to be a successful prophet, prophesy all evil.[7] Which, it may be interjected, is advice that the astrologers commonly followed. Scotus then continues in both commentaries on the *Sentences* that, as *Genesis* says, "The thoughts of men are prone to evil," and as *Ecclesiastes* remarks, "The wicked are corrected with difficulty, and the number of fools is infinite." Thus Scotus leaves a large opening for astrological prediction as to hu-

[7] *Ibid.*, XXIII, 61.

man affairs. Weather prediction and astrological medicine, elections, and even nativities and conjunctions to a limited extent are admitted. His position is not unlike that of Aquinas except that he is silent on the subject of astrological images to which Aquinas had expressly denied any natural powers.

Finally we have to note that Scotus attributes the influence of the stars not merely to their movements but to their absolute form, substantial and accidental. If the heavens should stand still, they still would exert influence. This seems equivalent to ascribing to the heavens an occult influence, unless indeed Scotus should limit the substantial and accidental form of the stars to their light and heat or cold. From the exertion of occult influence by the stars would follow the dissemination of like influences in the inferiors acted upon by them. Indeed some persons then who admitted the existence of occult virtues in inferior objects denied occult influence upon inferiors to the stars.

In any case we see Duns Scotus fully as favorable to astrology as Aquinas. Thus that pseudo-science had through our period the qualified approval, at least, of both the Thomist and Scotist schools of philosophy and, as we shall find, of many members of both the Franciscan and the Dominican orders.

The authenticity of the *De rerum principio*, the chief work of natural philosophy ascribed to Duns Scotus, has been recently questioned[8] and it has further been denied that it was generally regarded as his during our period.[9] Whether Scotist or not, it

[8] Especially by Ephrem Longpré, *La philosophie du B. Duns Scot* (Extrait des "Études Franciscaines"), Paris, 1924, 291 pp.: see especially pp. 22-29, 289-291. Miss Sharp, *op. cit.*, p. 286, agrees "that there is absolutely no basis for attributing the *De rerum principio* to Scotus." My opinion in the matter is probably not worth much, but this seems to me too strong a statement. I have the feeling that Longpré's arguments, though seemingly cogent, are one-sided and do not take into consideration everything that should be envisaged in settling the question. Certain sections of the *De rerum principio* which do not especially interest us here have been claimed for Vital du Four who died in 1327: Delorme, "Le cardinal Vital du Four," *Archives d'histoire doctrinale et littéraire du moyen âge*, II (1927), 152-337. *Ibid.*, 89-149, E. Gilson writes on "Avicenna et le point de départ de Duns Scot."

[9] Longpré (1924), p. 19, note 2, quoting Belmond: "Il importe extrêmement aussi de faire remarquer que l'École Scotiste jusqu'à Wadding ne connaît et n'utilise guère ces traités."

at least emanates from about this time. Some would date it about 1282 because of its refutation of a doctrine of Olivi,[10] while others hold that it embodies additions made after Scotus's death. In any case it is not later than the fourteenth century, since the sole known manuscript is of the close of that century or early fifteenth. Indeed, even Longpré grants that there are important points of contact between the *De rerum principio* and the *Opus Oxoniense,* while such recent writers on Duns Scotus as Landry[11] and Harris[12] have accepted it as part and parcel of his philosophy. The statements from it which we are about to note are not among those which have been regarded as inconsistent with the opinions expressed in Scotus's writings of unquestioned authenticity. At any rate, whether his or not, they are interesting to cite as a point of view current shortly before or after our period opened.

The author holds that "the principal virtue moving natural agents is vital virtue, that is, the virtue of the Intelligence which by the mediation of the sky is principal in moving nature." This is consistent enough with Scotus's conception of the heavens and their action. But the author of *De rerum principio* goes further than this. Centuries before Giordano Bruno and Campanella he maintains that stones and metals "live with an imperfect sort of life, although our dull sense does not comprehend that life." The constituent elements are pure and simple and do not possess life or organs or veins, but metals and stones feel and have a great variety of veins which are all signs of a certain degree of life. "Wherefore they say that every compound produced by nature has life, and if the saints or philosophers sometimes speak to the contrary, it is to be understood of that degree of life which is first perceptible to sense, such as exists in plants."[13] This doctrine of vitalism and of sentient nature must be regarded as favorable to natural magic, if not to further occultism such as is found in the Neo-Platonists and early moderns like Bruno.

[10] Longpré (1924), pp. 27, 291.

[11] Bernard Landry, *Duns Scot,* Paris, 1922, 360 pp.

[12] C. R. S. Harris, *Duns Scotus,* Oxford, 1927, 2 vols.

[13] *De rerum principio,* X, iii; *Opera,* Nova edition, IV, 448.

These passages concerning stones and metals as living beings are accompanied by citation of the alchemists[14] as if authoritative in natural matters. An "experiment" of Avicenna "in the book of Greek alchemy" is repeated in which milk resolves of itself into serum which is its phlegm, butter which is its blood, gross substance such as cheese which is its melancholy, "and cholera remains which disappears by boiling." Indeed, the four humors exist even in stones and metals but do not have their proper names as they do in animals. Wherefore the alchemists say that chalk is called melancholy; *aqua vitae,* phlegm; fiery virtue, cholera; subtle air, blood. Others call the heart cholera, the liver blood, the bones melancholy, and the brain phlegm. Others name these humors in metals by the four ages; for they call blood childhood, cholera youth, phlegm middle age, and melancholy old age. "And they say that the childhood and old age of this and that metal harmonize or disagree: and all these things are to be found in various books of the alchemists." A somewhat similar attitude towards the elements, more faintly suggestive of alchemical literature, is displayed in the discussion of the influence of the stars in the *Reportata Parisiensia* where, in connection with the question whether the augmentation and diminution of the elements would produce a vacuum, it is stated that one hundred particles of fire make only one of earth.[15]

In view of such remarks the Scotists, could we accept the *De rerum principio* as of their school of thought, would seem as likely to follow Albertus Magnus towards alchemy and natural magic as to accept with Aquinas the rule of inferiors by superiors. Or we might say that the spirit of Roger Bacon still lived and moved in the thinkers of the Franciscan order. If such a treatise went under the name of John Duns Scotus, it is not surprising that certain alchemical treatises were also ascribed to him, but they are commonly regarded as spurious. Nor can we much blame Duns Scotus, if he recognized astrologers and alchemists as representatives of highly developed departments of science.

[14] *Ibid.*, IV, 444, "Quoad hoc primo possunt induci auctoritates doctorum alchymiae."

[15] *Opera*, Nova editio, XXIII, 50.

There they were, like earth and water, or Aristotle and Averroes, constituting a factor in the world and thought too patent to be ignored. We shall have to reckon with and take cognizance of one or the other or both of them in almost every succeeding chapter.

A brief résumé of intelligent orthodox attitude, theological and scientific, towards various forms of superstition and occult arts at the beginning of the fourteenth century is provided by the treatise of Agostino Trionfo or Augustinus Triumphus of Ancona (1243-1328) to pope Clement V against diviners and dreamers. At the same time it is marked by both more individuality and more force than the general run of such discussions.[16] The first of its twenty-one chapters warns that the apostolic see especially ought not to listen to any diviner or dreamer or pronouncer of things future and occult, no matter how much truth he may utter or how pure a life he may lead or how much he may seem to scorn the things of the world. To discern between divine revelation and diabolic illusion is a gift of the holy spirit. Therefore it is an act of great presumption and temerity to say that nocturnal illusions and visions of dreams are divine revelations, especially since such revelations are no longer vouchsafed. On the other hand, there are many signs by which divination, inspiration, and diabolical fraud may be distinguished by men. Assuredly diabolical is any contention that the doctrine of faith is not by divine revelation but of human invention. But anyone who promises to prove the articles of faith by irrefragable demonstration derogates from the faith. Possibly in this assertion Trionfo has his contemporary, Raymond Lull, in mind,[17] while Arnald of Villanova may be aimed at in the

[16] I have used a late MS, Vatic. Urbinas 528, 16th-17th century, fols. 150-203r (or, 1-54), in which the pope is incorrectly given as Clement IV: "Quoniam sicut tempore retroacto ita et nunc nonnulli insurgunt . . . / . . . est unus deus benedictus in secula seculorum. Amen. Explicit tractatus contra divinatores et somniatores editus a fratre Augustino de Ancona ordinis fratrum minorum sancti Augustini." The work opens with an introduction to the pope, followed at fols. 151v-153v by a table of contents for the twenty-one chapters.

[17] Ch. V. Langlois, *Enseignements, méditations, et controverses*, 1928, p. 349, note 2, citing R. Scholz, *Unbekannte*

affirmation that also to be censured is anyone who tells a king or prince how to live evangelically without having a special mandate and commission from the apostolic see to do so.[18] With the eighth chapter on the definition and modes of divination Triumphus approaches matters of more interest to us but in it he largely repeats the stock definitions and classification. The powers of demons in divination and magic may also be passed over, and the usual ecclesiastical attitude that no one should employ divination by demons no matter how truly they predict or persuade to good deeds.

The interesting feature of the work of Triumphus is its separate treatment of different forms of divination which begins with the twelfth chapter on nigromantic arts. Their methods of invoking, adjuring, and supplicating are suited to demons rather than good angels who are not so addressed and would not lend themselves to the deceit of making such procedure seem efficacious *per se*. It is not, because man cannot produce such effects by mere conceptions and words.

Similarly the notory art of seeking science by inspection of certain figures and forms of words or abstinence from food is not consistent with divine liberality, since God does not dispense his gifts by pacts or bargains. It is not one of the two common ways by which men learn, namely, being taught or finding out for themselves by observation of nature. It is not even from the devil, because he does not possess the power of causing science and illumination in us. Therefore true science is not acquired by that art.[19]

Nor would Augustinus admit the use in medical practice or to preserve health of divinations, experiments, figures, characters

kirchenpolitische Streitschriften aus der Zeit Ludwigs des Bayern, Rome, 1914, p. 484, quotes the following passage from the *Contra divinatores et sompniatores* as a portrait of Lull: "Si videmus aliquos mobiles et fluctuantes in statu eorum ut nunc sint uxorati, nunc continentes; nunc seculares, nunc religiosi; nunc ultra mare, nunc citra; nunc mundum spernentes, nunc approbantes; signum est visiones factas talibus non esse divinas revelationes, sed dyaboli illusiones." He does not state from which chapter or from what MS this passage comes.

[18] Vatic. Urb. 528; cap. 5.

[19] Vatic. Urb. 528, fols. 186v-187v: cap. 13.

written on scrolls, incantations, and the like. "Figures, characters, and other experiments" can have efficacy only from the working of the devil. This use of the word "experiment" for some superstitious procedure is one more testimony to its long association with magic. True medicine in the opinion of Triumphus opposes hot diseases with cold remedies or vice versa and applies active to passive, but artificial forms like characters and figures are not the origin of natural action or passion.[20] But he says nothing of the possibility of occult virtue in natural objects. He goes on to censure severely those clergy who encourage simple men in superstitious and idolatrous practices by selling them figures and scrolls with divine or saintly names to wear about the neck.[21]

In discussing the superstitious observance of days Augustinus is careful to exempt the observing of times according to the natural courses of the stars.[22] Not only is this no sin, but to his mind an astrologer would sin if he allowed a client to sail when the sun was in an unfavorable sign which he believed portended a perilous storm. Similarly a physician would sin who ordered phlebotomy at a time when the moon was unfavorable thereto.[23] Trionfo, indeed, is ready to put under the control of the stars all those events which do not proceed from our free will and he admits that only a few men exercise their liberty to resist the impressions of the celestial bodies. He is also ready to grant that the song of birds and movements of animals may reflect these celestial influences sufficiently to constitute some basis for auguries, and that even the chance casting of points in geomancy is so influenced. But he does not believe that this element of truth in these two arts is sufficient to justify their practice. Such uncertain methods of divination which have some appearance of truth are just those where the devil is apt to interfere and to attempt to mislead men.[24] Dreams may be either influenced by the stars, or by the disposition of the dreamer, or by the strong im-

[20] Vatic. Urb. 528, fols. 188r-189v: cap. 14.
[21] *Ibid.*, cap. 15.
[22] *Ibid.*, fol. 192r *et seq.*
[23] Vatic. Urb. 528, fol. 193r.
[24] Vatic. Urb. 528, fol. 197r.

pression which certain things have made on his imagination, or by divine revelation or diabolic illusion.[25] Lot-casting to foretell the future is illicit.[26]

On July 12, 1318 Thadeus of Parma finished a commentary or course of lectures on the *Theory of the Planets* of Gerard of Cremona for the medical students at the university of Bologna.[27] His work thus provides an illustration of the close connection which prevailed then between astronomy and medicine through the medium of astrology. But the treatise of Thadeus goes further than a mere exposition of astronomical theory as a basis for the practice of astrological medicine. It also includes a long exposition and bibliography—chiefly from the works of Arabic authors —of judicial astrology itself, and a list and classification of various other occult arts which are grouped together and subordinated to or distinguished from one another. This may help to introduce us to the conceptions of magic and its ramifications which were prevalent as the period of the present volume opened. Affò in his work on writers of Parma placed the death of Thadeus sometime before 1341, and ascribed to him another commentary in the form of questions on Aristotle's three books on the soul.[28]

So far as astrology is concerned, Thadeus distinguishes between astronomical and nigromantic images presumably in much the same way as Albertus Magnus had in the *Speculum astronomiae*. He also, like Roger Bacon and other Latin authors of the twelfth and thirteenth centuries, separates from licit mathematics and astronomy a forbidden mathematics. This he divides into *mantice* or *manthica* and *mathesis*. The former he subdivides into the usual four parts—corresponding to the four elements, earth, air, water, and fire—of geomancy, aerimancy, hydromancy, and pyromancy. More novel is his partition of *mathesis* into theurgy and altimancy. Nectanebus is for him the inventor of major theurgy with its three divisions of *cathademonica, agathomantica,* and *cacomantia,* names which seem etymologically to indicate the invocation of evil demons, and

[25] *Ibid.*, fol. 199v: cap. 20.
[26] *Ibid.*, fol. 202v: cap. 21.
[27] For MSS of the work see Appendix 2.
[28] Affò, *Scrittori Parmigiani,* 1789, II, 57: Questiones super tres libros Aristotelis de anima, Bibl. S. Marco, Florence, MS of 14th century, membrane.

good and bad divination. *Cathademonica* has two parts, *heumancia* and nigromancy. For each of these subdivisions Thadeus names an inventor. Avenderich was the inventor of minor theurgy which is concerned with the spirits of the spheres. Of its two subordinate fields, *sceuobathica* or *scenobathica* includes augury, auspices, and *horispicia*—a word which suggests both haruspices and horoscopes, while *aliptica* includes poisoning, witchcraft, sortilege, and sleight of hand (i.e. *veneficium, maleficium, sortilegium* and *prestigium*). As for altimancy, it comprises magic and gyromancy. Under magic are classified incantations and *altigraphia* which covers characters, figures, and necromantic images, and of which Firmicus Maternus is represented as the inventor. Gyromancy is concerned with phenomena in the sky such as comets and falling stars. Its first part, *illemantia* or *yllemantia,* is the conversion of the elements into various colors signifying the future. Its other half, *homosmantia,* embraces the four arts of chiromancy, spatulomancy, polismancy or polisinancy, and physiognomy. Polisinancy or polismancy subdivides into fascination, *salisaliptitas,* and *haustus*—which would seem to refer to magic potions or poisoned draughts. Pliny and Herodotus were its inventors. "These then are the distinct parts of prohibited science which, although they are evil, yet can be good science in the sense of the saying of Aristotle that knowledge of evils is a good thing, because evil cannot be avoided unless it is known."

It cannot be said that Thadeus' classification commands much confidence either from its historical accuracy or its etymological consistency. His attempt to draw a line between *mantice* and *mathesis* instead of identifying them as had commonly been done before is unconvincing. He has introduced a number of strange names, but whether they mean anything to him is another question. At any rate, he has at least attempted a new enumeration and classification, markedly different from that which had been repeated with slight variation since the time of Isidore of Seville. Whence he derived it is problematical. Perhaps from some Greek or Arabic source, perhaps largely from his inner consciousness. Probably it is more elaborate than the

contemporary practice of occult and forbidden arts, and it may even be doubted if there were magic books to be had in all these fields he mentions. But his mere enumeration and classification of them in commenting upon a *Theory of the Planets* to medical students shows, like the nigromantic allusions in Cecco d'Ascoli's commentaries on Alcabitius and the *Sphere* of Sacrobosco, that there was a lively interest concerning such matters among the learned and especially perhaps among young students.

Thadeus' citations, whether of the past literature of permissible mathematics or of books of the forbidden variety, are also of some value. Besides Boethius, he uses the *Arithmetic* of Jordanus Nemorarius (de Nemore, he calls him) and his work on weights, Euclid's book of aspects, Alhazen and Witelo and Roger Bacon on perspective, and the book of the physician Thideus on mirrors which opens, "Scias quod illud quod videt homo in speculo . . ." This last is not a reference to the recent Florentine medical man, Taddeo Alderotti (1223-1295)[29] or Thadeus Florentinus, but to Tideus whom Björnbo and Vogl edited with Euclid and Alkindi.[30] By Euclid our author further cites the *Geometry* and a *Liber datorum* opening, "Superficies et anguli et immediate secundum magnitudinem . . ." Omitting many citations of well known works, we may note that Thadeus of Parma describes the book of Nimrod or Nemroth the giant as addressed to his disciple John instead of to Ioathon, Ioanton, Ionites,[31] or Ionicon.[32] He describes this book as useless and

[29] G. Pinto, *Taddeo da Fiorenza o la medicina in Bologna nel XIII secolo,* 1888, 48 pp., gave 1223-1303 as Taddeo's dates, but I follow Pansier in *Janus* (1904), p. 511, who gives the following epitaph from BN 6064, fol. 129, which MS also contains "Experimenta Thadei:"

Mille nonaginta transactis quinque ducentis
Iove sero primo Iunii sub nocte secunda
Migravit cunctorum Thadeus dux medicorum
Cuius stat musa per singula climata fusa.
Errores stravit, tenebras ut sol radiavit.
Oremus deum, pia mater, sume Thadeum. Amen.

[30] A. A. Björnbo und Seb. Vogl, *Alkindi, Tideus, und Pseudo-Euklid: Drei Optische Werke,* Leipzig, 1911, Heft 26, 3 in *Abhandl. z. Gesch. Math. Wiss.*

[31] C. H. Haskins, *Mediaeval Science,* 1924, pp. 341-344.

[32] *Magic and Experimental Science,* II, 322.

sometimes false. It opens, "Spera celi . . ." John of Seville, on the other hand, is credited with having corrected the motion of Venus and Mercury in his *Flores*—perhaps really a translation of the work of Albumasar by that title, which, however, has been previously cited. Asculeus determined the ascensions of the signs in his book opening, "Si fuerint quotlibet quantitates . . ."[33] Theodosius in his book on habitable places, opening, "Illis quorum habitationis loca . . . ,"[34] determined the accidents affecting diverse parts of the earth from the influence of the sky. Arabic authorities like Alfraganus, Alpetragi, and Messahala are not forgotten. But historical inaccuracy is again manifested in connection with the statement that the science of astronomical tables was first transmitted by Ptolemy in his book of canons opening, "Intellige climatum . . ." This, we are told, was not Ptolemy Philudensis but one of the kings of Egypt, as is shown by the fact that it is based on Egyptian years for the meridian of Alexandria. The next tables were handed down by Mahomet Alkahatun (?) in Persian years for the meridian of Arin, and were transmitted by Abrelliele of Spain in his book beginning, "Scito quod annus lunaris . . ." and by Azarzele (i.e. Arzachel) in his book which is in common use and opens, "Quoniam cuiuslibet actionis . . ." These two books use Arabic years and the meridian of Toledo. "And many have written many books of canons for their own cities using the Christian era, such as the tables of Campanus for the meridian of Novara, and the tables made for midnight at Marseilles, and others for the meridian of Liège (? Leudomanum), and others for the meridian of Toulouse." The only authors of works on rains and weather prediction named are Arabs, for the Latin Christian writings on this theme, of which some of our subsequent chapters will treat, were as yet not in existence. It is remarkable that Guido Bonatti is not men-

[33] MSS of this work are BN 16648, 13th or 14th century, fols. 102r-105r; and Vienna 5392, 15th century, fols. 228-231. Both open as Thadeus indicates, but one ends, ". . . secundum modum quo operati fuimus," and the other, ". . . quadruplam reperit." They spell the author's name "Esculeus."

[34] Nürnberg V, 64, 14th century, fols. 171-172: Theodosius de habitationibus, is a MS.

tioned of astrological authors. Gyes in his book on the significations of the planets in the houses, opening, "Sol cum fuit in ascendente . . ." seems to add another to the many forms of the name of Gergis the astrologer.[35]

Turning to forbidden arts, we find listed geomancies by the Indians in the book, "Estimaverunt Indi . . ."—really by Hugh of Santalla, by brother William of Moerbeke, master Gerard of Cremona, Bartholomew of Parma, brother Albert, "and by many others." I know of no geomancy under the name of Albert, and Thadeus lists no works of pyromancy, but one is attributed to a master Albert of Basel in a manuscript of the middle of the fourteenth century.[36] It opens with an adjuration of the element fire and prayer to God, then lists the future signification of various things seen in the fire including the letters of the alphabet. In another manuscript of the closing fourteenth century in the same library of Amplonius Ratinck who flourished at Erfurt at the beginning of the fifteenth century is a still shorter tract on pyromancy.[37] Names of various spirits are to be written on a candle, and then the spirits are to be conjured to appear in its flame.[38]

Returning to the bibliography of Thadeus of Parma, we note that many of the works on images and nigromancy there listed are identical with titles mentioned in the *Speculum astronomiae* of Albertus Magnus. There are three by Toz Grecus, Solomon's *De arte entonica et ydeica, De figura Almandel,* Razehel's *Liber institutionis* and the *Mors animae.*

Such was the reading in natural, mathematical, and occult science; such was the curiosity, whether pure or prurient, as to forbidden and magical arts; such was the approbation, whether by medical men or theologians, of astrology; and such was the

[35] *Magic and Experimental Science,* II, 718-719.

[36] Erfurt, Amplon. Q. 373, fols. 37v, col. 1-38v, col. 1, opening, "Si quis se regere vult secundum veram artem magistri Alberti Basiliensis in arte pyromantie. . . ."

[37] Erfurt, Amplon. Duod. 17, fol. 38v.

[38] For discussion of a still different type of pyromancy ascribed to Almadel in a Florentine MS of the fifteenth and sixteenth centuries see my note, "Alfodhol and Almadel," *Speculum,* II (1927), 326-331.

prohibition and censure, however sincere or ineffectual it may have been, of most other forms of divination and magic, as it expressed itself on paper or parchment as the fourteenth century opened.[39] In the next chapter we shall see something of the actual situation in practice as it affected and appeared to the supreme arbiter of Christendom.

[39] Treatment of an astrological work by a master of Rome has been relegated to Appendix I, since he may have written before the fourteenth century.

CHAPTER II

JOHN XXII AND THE OCCULT ARTS

John XXII had forced unpleasantly upon his attention almost from the very beginning of his pontificate (1316-1334) the prevalence of magical practices.[1] Already in 1317 came the affair of Hugues Géraud or Géraldy, bishop of Cahors, who was accused of attempting the pope's life by poison and by sorcery with wax images, ashes of spiders and toads, the gall of a pig, and the like substances, and of having caused the death of a cardinal who was furthermore the pope's nephew.[2] After having been interrogated seven times by the pope in person[3] and after having repeatedly admitted his guilt, the aged bishop of Cahors and former favorite of Philip the Fair and creature of Clement V,[4] was tortured and scourged with rods, burned at the stake, and his ashes were thrown into the Rhone. His tragic end may

[1] The long article, "Jacques Duèse, pape sous le nom de Jean XXII," by Noel Valois in *Histoire littéraire de la France*, XXXIV (1914), 391-634, may be regarded for our purposes at least as superseding such briefer earlier treatises as V. Verlaque, *Jean XXII: sa vie et ses oeuvres*, Paris, 1883. Valois is more favorable to John XXII than most previous estimates, especially those by Protestant writers. His inclination to give the pope the benefit of the doubt is on the whole commendable, but sometimes the evidence scarcely seems to point to the conclusion for which Valois argues.

I have been unable to consult L. Esquieu, "Notes historiques: Jean XXII et les sciences occultes," *Bulletin trimestriel de la Société des études littéraires, scientifiques et artistiques du Lot*, XXII (1897), 186-196, and other papers on John XXII by the same author. I presume that *Jean XXII et les sciences occultes*, Cahors, 1890, cited HL 34, 420, is an offprint of the article with the same title.

[2] For fuller accounts of this affair see HL 34, 408-15; E. Albe, *Autour de Jean XXII—Hugues Géraud, évêque de Cahors—L'affaire de poisons et des envoûtements en 1317*, 1904; G. Mollat, "Un évêque supplicié au temps de Jean XXII," *Revue pratique d'apologétique*, IV (1907), 755-61.

[3] Valois, HL 34, 413-14, interprets these repeated interviews as signs of reluctance on John's part to condemn the bishop and as evidence of good faith on the pope's part, but they seem more like repeated torture, mental if not physical—the playing of the cat with its mouse. It was the sort of prolonged agony that a Louis XI might have cruelly enjoyed.

[4] Valois, HL 34, 409, "cette ancienne créature de Clément V, ce favori de Philippe le Bel."

still be seen artistically commemorated in the stained glass of the contemporary church at Salviac.[5]

Of a less serious character were the charges of misconduct preferred against Robert Mauvoison in 1318, which led to his resignation from the archbishopric of Aix, although he might have been acquitted had the trial proceeded.[6] Besides the charges of leading a worldly life and misgoverning his diocese, he was accused of practising forbidden divination (*artem mathematicam dampnatam et interdictam a iure*). While a student at Bologna, he had addressed astrological interrogations to a professor there and later had allowed his palm to be read by an English servant who claimed to be a chiromancer. While archbishop he had addressed further interrogations to a Jewish astrologer named Moses who had also carved some seals on his pastoral rings to avert disease and bring him fortune. Robert admitted these acts but replied either that he had not supposed there was any sin in them or that he had put no real faith in them. Underlying such accusations against Robert seems to have been the suspicion that he was plotting against the pope and eager to advance himself to higher ecclesiastical position. Before he was archbishop, he had asked the professor of astrology at Bologna when a messenger would come from Gascony and what news he would bring, and the astrologer had replied that within the month he would receive the announcement of his promotion to a great office. The same astrologer had warned him that Clement V was in danger of his life, but Robert denied having solicited any such information. When, however, the Jew Moses predicted that within two years Robert would attain yet other offices than that of archbishop of Aix, Robert had asked him how long the pope had to live. But when the Jew remained silent,

[5] Emile Dufour, *La commune de Cahors au moyen-âge*, Cahors, 1846, p. 76: "les vitraux de l'église de Salviac construite vers cette époque en rapellent encore le sanglant souvenir."

[6] For Robert's case I follow Mouan, "Documents inédits sur un procès de magie en Provence," *Mémoires lus à la Sorbonne*, Histoire, philologie et sciences morales, VII (1869), 169-82. He says (p. 179), "La sentence allait être rendue, et il y a lieu de penser que, vu le peu de fondement des divers chefs d'accusation, Robert serait sorti triomphant de l'épreuve à laquelle il venait d'être soumis. . . ."

Robert expressed his approval, quoting to him the biblical prohibition that "it is not for you to know the times and seasons." Robert evidently had dabbled a little in chiromancy, a questionable form of divination, and in interrogations and images, two of the varieties of astrology to which there was most objection. But, judging from Mouan's presentation of the documents, he does not appear to have even been charged with either malicious sorcery or invocation of demons, as some writers have implied,[7] but merely with lot-casting and divination.

It should not be inferred that such suspicions, charges of, and trials for magic originated with the pontificate of John XXII or were more characteristic of church than state. Charges of poisoning and sorcery had been made against the fallen minister, Hubert de Burgh, in England under Henry III.[8] The bishop of Coventry and Lichfield, treasurer under Edward I, had been accused of consulting demons as well as of murder, adultery, and simony.[9] Philip IV had freely employed charges of magic against Boniface VIII and against the Templars in France. Guichard, bishop of Troyes, whose real offense seems to have been that he had dared to support Boniface VIII, was accused of poisoning or trying to bewitch members of the French royal family, and also of having practiced alchemy. An apothecary was said to have poisoned Jeanne de Navarre, the wife of Philip the Fair, for the bishop by a mixture of diamond and blood after a previous preparation of scorpions, toads, spiders, and plums had been eaten by a knight who died during the night. Wax images were also said to have been used to effect the queen's death. Despite his cloth, Guichard was imprisoned in the Louvre for several years but was freed in 1313 when his denouncer, Noffo-Dei, confessed on the scaffold that the charges against Guichard had been unfounded.[10]

[7] HL 34, 418: "On reprochait au prélat, non seulement des pratiques démoniaques. . . ."

[8] *Magic and Experimental Science*, II, 675, note 1.

[9] H. C. Lea, *A History of the Inquisition of the Middle Ages*, New York, 1888, III, 451, citing Rymer, *Foedera*, II, 931-934.

[10] A. Rigault, *Le procès de Guichard, évêque de Troyes*, 1896, 315 pp.; Boissy d'Anglas, in *Mém. de l'académie des inscriptions et belles lettres*, VI (1822), 603-610. See also T. Boutiot, *Histoire de la ville de Troyes*, Paris, 1870-1880, Tome II, p. 9 *et seq.*

In 1314, when the wives of two sons of Philip IV were accused of adultery by their sister-in-law, Isabella, wife of Edward II of England, a Dominican was said to have aided them by philters.[11] After the death of Philip IV, his brother, Charles of Valois, or the feudal opposition got rid of Enguerrand de Marigny, the hated minister of the past king, by charging him with having used wax images against Philip IV and the young king, Louis X. A James who was charged with having fabricated the images for Enguerrand committed suicide in desperation by hanging in prison, while his wife was burned at the stake. Enguerrand persisted in denying the charge of sorcery but was hanged. Charles of Valois, when at death's door in 1325, distributed money to the poor with the accompanying request, "Pray for Enguerrand and for Charles," which was interpreted as a sign of remorse on his part for Enguerrand's execution.[12] It was in this same year 1325, according to Corrozet,[12a] that the Seine was frozen all winter and that there was condemned at Paris the heresy called *Ars notoria,* of which the inventor was a monk of Morigny near d'Estampes whose book was burned. Really, however, the Notory Art was of much older date. A little later, in 1332, Robert III of Artois, accused of having poisoned or bewitched by herbs (*enherbé*) his aunt Mahaut and cousin Jeanne, was judged by the peers of the realm and, when he failed to appear, was condemned for his contumacy with confiscation of all his goods by the crown.[13] Mahaut was hoisted on her own petard if the charges, made in 1317, were true that she had resorted to a philter, compounded by the aid of an Isabelle de Ferières, in an attempt to reconcile her son-in-law, the count of Poitiers, with her daughter Jeanne, and that she had later

[11] Lavisse, *Histoire de France,* III, ii, 213.

[12] Lavisse et Rambaud, *Histoire générale,* III, 56; Lea, *Inquisition of the Middle Ages,* III, 451, citing *Grandes chroniques,* V, 217-220, 291; *Guill. Nangiac. Continuatio,* ann. 1315, 1325; I (1843), 416-418; II, 64-65.

[12a] *Antiquitez de Paris,* 1561, cap. 17: "En ce temps fut à Paris condemnée l'heresie appellée Ars notoria, dont auoit esté inuenteur vn moine de Morigny pres d'Estampes, le liure duquel fut brulé."

[13] A. Chéreau, "Les médecins de six rois de France, 1270-1350," *Union médicale,* NS XXIV (1864), 621. It is not included among the references on the trial of Robert of Artois in Lavisse, *Histoire de France,* IV, i, 6.

poisoned Louis X to open up the throne of France to her own children.[14] It is somewhat startling to find that during these years Mahaut's physician was the master Thomas li Miesiers whose fifty *Questiones Atrebatenses,* put to Raymond Lull at Paris in 1299, with the latter's replies, are extant both in manuscript[15] and print,[16] and who is thought to have served Raymond as editorial secretary (*epitomator, compilator*) of other Lullian works in Latin. In 1315 Thomas extracted teeth and administered medicines at Mahaut's court; in November, 1329, he attended Mahaut herself on her death bed.[17]

Such was the contemporary background of the accusations brought against the bishops of Cahors and Aix under John XXII. Possibly the prominence of such charges at the court of John XXII is a sign of the increasingly secular character and methods of the papal and episcopal courts as well as of the prevalence of magical practices and suspicions in society and thought at large.

Just as our work is not a history of popular witchcraft but of the relations between magic and experimental science, so we cannot turn aside to survey many of the state or ecclesiastical trials in which charges of criminal use made of sorcery and divination figured. Now and then the occasion may present itself to remind the reader of their existence and frequency through the fourteenth and fifteenth centuries, from those mentioned in the present chapter to the stories of the employment of wax images against Charles the Bold or the treason charges against the duke of Clarence of practising necromancy and magic against Edward IV. But we can sketch in only a little of this popular

[14] J. M. Richard, *Mahaut, comtesse d'Artois et de Bourgogne,* Paris, 1887, p. 41, note 2. Text of the proceedings published by Marquis de Godefroy-Menilglaise, *Mémoires de la Soc. des Antiquaires de France,* XXVIII, 181.

[15] BN 15450. This MS belonged to Thomas himself and was willed by him in September, 1336, to the college de Sorbonne: see Langlois, *Enscignements, méditations et controverses,* 1928, pp. 338, 342: L. Delisle, *Le cabinet des manuscrits,* Paris, 1868-1881, 4 vols., II, 177.

[16] *Questiones dubitabiles super quattuor libris sententiarum cum questionibus solutivis magistri Thome Attrabatensis* (sic) (Lyon, 1491), Hain-Copinger 10324, fols. 109-123. The accepted Latin spelling for "of Arras" seems rather to be Atrebatensis.

[17] Richard, *op. cit.,* pp. 155, 157, 378: cited by Langlois, *op. cit.,* p. 338, note 2.

and political background, and the reader must take our treatment as merely illustrative by a few cases and in no sense an attempt to be exhaustive.[18] But we have not yet finished with such cases during the pontificate of John XXII.

In the same year 1318, of which we were speaking, John XXII directed the bishop of Fréjus and two other commissioners to investigate and punish the magical activities at the papal court of several clerics, including a physician and the barber of the archbishop of Lyons. They were reputed to have engaged in nigromancy, geomancy, and other magic arts, of which they possessed books, and to have employed images, mirrors, rings, and incantations to invoke evil spirits, learn the future, and to benefit or injure or even kill other men. They were said to have performed many experiments—a word used more than once in the papal documents on the occult arts—but John XXII pronounced all such practices as they were charged with, diabolical.[19]

In 1319 Bernard Délicieux was condemned to life imprisonment, chiefly because he sympathized with the Spiritual Franciscans and had criticized the procedure of the inquisition. But while he had been acquitted of the charge of having poisoned pope Benedict XI, the fact that a work of nigromancy was found in his possession probably weighed to some extent against him, and further illustrates the frequency of charges of magic in the trials of the time.[20] In the same year, 1319, the pope ordered the bishop of Pamiers to proceed against a priest, a Carmelite, and

[18] For some further material the reader may refer to the chapter, "Johan I y les supersticions," in J. M. Roca, *Johan I d'Aragó,* Barcelona, 1929, pp. 363-415.

[19] "Sed et experimenta quam plurima quandoque fecerunt circa hec et alia per eos demonibus invocatis." For the document see Hansen, *Quellen und Untersuchungen zur Geschichte des Hexenwahns und der Hexenverfolgung im Mittelalter,* Bonn, 1901, pp. 2-4. In his other volume, *Zauberwahn Inquisition und Hexenprozess im Mittelalter,* Munich and Leipzig, 1900, pp. 251-58, Hansen has sketched some of the events of John XXII's pontificate which bear upon his attitude towards magic, but with a different emphasis from that which seems to me best to give. That the pope was unusually credulous as to magic or unusually afraid of it, is an assumption which one is perhaps tempted to make but which can hardly be demonstrated and which it therefore seems better not to press.

[20] B. Hauréau, *Bernard Délicieux et l'inquisition albigeoise,* Paris, 1877.

a woman who were charged with making images and incantations, consulting demons, and engaging in fascination, sorcery, and other superstitious procedure.[21] In 1320 the pope demanded of the seneschal of Carcassonne the delivery of a priest charged with sorcery and his accomplices.[22]

In the same year, 1320, came a story of an attempt by the Visconti family of Milan to kill the pope by sorcery with a wax image. Either the plot or the story seems, however, a clumsy one. A certain Bartholomew Canholati, a cleric of Milan, came to Avignon with the tale that he had been summoned by Matteo Visconti, who showed him a silver human statuette a few inches tall. On it were engraved the name "Jacobus Papa Johannes," the sign of the planet Saturn, and the name of the spirit Amaymom. He was asked to suffumigate it and refused. Underlings of the Visconti, Scotus of San Gemignano and Anthonius Pelacane[23] by name—the latter a physician—asked if he did not have in his possession *zuccum de napello,* a name then used in Italy for aconite.[24] He denied having any of it, since he had been enjoined by a friar as a penance to throw it down the latrine. His questioners then asked if a certain Peter Nani of Verona could perform the suffumigation in his stead, and he assured them that he could. He did not escape so easily, however, for presently he was summoned to court again and asked to take the figure to Peter to be suffumigated. He refused to do this likewise, and Pelacane went to Peter instead. Later, however, Bartholomew was summoned a third time to meet Scotus who asked him to decipher some "experiments for love and hate, and discovering thefts and the like," which were written without vowels which had been replaced by points. Scotus now had the aforesaid image in a coffin, and 'Meroyn' had been written across its back. Scotus

[21] J. M. Vidal, *Bullaire de l'inquisition française au XIV^e siècle et jusqu'à la fin du Grand Schisme,* Paris, 1913, Document 24, pp. 53-54.

[22] *Ibid.,* Document 29, p. 60; more fully in Coulon, *Lettres secrètes et curiales de Jean XXII,* n. 1109.

[23] Possibly a kinsman of the later Biagio Pelacani or Blasius of Parma.

[24] See the *Pliniana defensio* of Pandolphus Collenucius (Hain *5483), n.d. fol. (e 6) verso, "Nullus enim vulgo aconitum nuncupat sed napelli nomen receptum est passim quoque in Italia notum in Bergomatum Brixianorumque montibus in Iuliis alpibus," etc.

intended to conjure it for a certain number of nights and heat it at a fire to consume the contents of the coffin and at the same time the life of the pope.

Bartholomew therewith went off to the papal court and revealed all that had happened. Scotus got wind of his having been to Avignon, imprisoned him for six weeks, and finally tortured him in a vain effort to extract a confession. But he persisted that he had visited the papal court solely in order to cure a man who had been bewitched in his body. When Scotus asked how he had cured him, he said that he had administered certain draughts and used certain prayers. At length he was released at the petition of a number of prominent citizens. Galeazzo Visconti, the son of Matteo, then attempted to worm the truth out of him by pretending to be his friend, expressing his regret at Bartholomew's having been tortured, and assuring him of his protection if he would tell him the truth privately. When he persisted in his previous story, Galeazzo induced him finally to agree, or rather to pretend to agree, to perform the magic operation in which he had before refused to participate and which the Visconti party suspected him of having nullified by counter-magic. That Dante already in his life-time had acquired a reputation as a nigromancer is suggested by Galeazzo's remark that he had summoned master Dante Alighieri from Florence for this affair but that he would prefer to have Bartholomew undertake it. He accordingly obtained some *zuccum de napello* at a high price from an apothecary of Milan, got the silver statuette into his possession, and carried both off to the papal court to prove his previous story, piously asserting that he feared for his soul's safety if he engaged in such magic.[25] His story is probably true to at least this ex-

[25] For the account of this reported plot of the Visconti against the life of John XXII I am indebted in the first instance to K. Eubel, "Vom Zaubereiunwesen Anfangs des 14. Jahrhunderts," *Historisches Jahrbuch* (1897), 608-631, and the Latin text of the two documents from the Vatican therein published. The second and later of the two is dated in September, 1320. HL 34, 416, follows a later monograph: Robert Michel, "Le procès de Matteo et de Galeazzo Visconti," in *Mélanges d'archéologie et d'histoire publiés par l'école française de Rome*, 1909, pp. 277-327, from which I have taken some details.

tent that many prominent persons of the time had the utmost faith in the potency of such a magical operation, if it were properly performed and if no more potent counter magic were brought into play against it. John XXII, however, seems to have felt that a single witness was insufficient in such a matter.[26]

Concerning *zuccum de mapello* or *succum de napello,* as it is more properly spelled, we are given interesting information by Guy de Vigevano in the chapter on poisoning in his treatise of 1335 on the acquisition of the holy land which opens with a section on the preservation of the health of the aged—as Guy calls him—king, Philip VI.[27] Guy must have been well along in life himself since he had been physician to the emperor, Henry VII, before entering the service of Jeanne of Burgundy, queen of France. He was still her physician in 1345, however, when he wrote his *Anatomy.* Guy describes *napellus* (or aconite) as the worst of poisons against which even theriac is of no avail. But Guy had devised an antidote especially for it by means of the following experimentation. Avicenna states that there is a mouse which eats the roots of the *napellus* and is an antidote for it. But Guy could find no such rodent, though he cleared away the earth all about the roots of the plant. He found its leaves, however, covered with worms or slugs which were feeding on them. He collected a supply of both the slugs and leaves, continued to feed the worms on the leaves for a time, made a poison with the juice of the *napellus,* and a medicinal compound of the slugs mixed with theriac of *terra sigillata.* He tested both the poison and antidote on animals and then, finding the latter a success,

[26] HL 34, 416: "Notez qu'à ce moment le saint-siège se trouvait en lutte ouverte avec les Visconti, entamait leur procès et allait les inculper notamment de sorcellerie; mais le prudent pontife jugea le fait d'envoûtement insuffisamment prouvé par un unique témoignage: il n'en fut plus question. Dira-t-on que Jean XXII, dans cette circonstance, s'est montré crédule à l'excès? Reparlera-t-on encore du cauchemar perpétuel dans lequel il vivait, en proie à de folles terreurs?"

[27] BN 11015, fols. 32r, col. 1-54v, "Texaurus regis Francie acquisitionis terre sancte de ultra mare necnon sanitatis corporis eius et vite ipsius prolongationis ac etiam cum custodia propter venenum. Cum anno currente millesimo trecentesimo trigesimoquinto. . . ." The chapter, "De veneno et malo cibo," is the eighth and last of the first part or "Liber conservationis sanitatis senis." The discussion of *napellus* occurs at fol. 40r, col. 1-40v, col. 2.

repeated the perilous experiment upon himself. He ate some of the poison, which he found sweet and pleasant to the taste contrary to the generalization of previous authors that all poisons are bitter, then he waited a quarter of an hour for the symptoms of poisoning to appear. As soon as he felt "all the accidents of poison," he took some of his new theriac which produced a great disturbance in his stomach and vomiting. He took some more and vomited again. When a third dose failed to produce any vomiting he felt safe and free from poison. Guy further states that the poison from *napellus* is black and not easily liquefied and so can be readily detected. It will not spread through a dead body, so that a person who eats food poisoned with it is not injured unless he eats the *napellus* itself. This, however, involves the danger that a servant who tastes dishes beforehand for the king may eat a harmless part of the food and so provide no sure safeguard. Guy writes in a superior tone of the shortcomings of past medical authors on the subject of poisons and does not entertain the possibility that Avicenna may have been mistranslated or a corruption have crept into the Arabian text. Later in the fourteenth century Christopher de Honestis cited Conciliator to the effect that a nut grew on the root of the *napellus* which was a bezoar or antidote for it.[28]

Already before Bartholomew's second flight to Avignon the pope gave the inquisitors of Carcassonne and Toulouse power to deal with those who offered sacrifice or homage to demons, who entered into any pact with them by words, sign, or image, or who baptized images fabricated with invocations of demons, or otherwise used the sacraments and consecrated objects in sorcery and witchcraft.[29] It will be noted that this covers only diabolical magic and sacrilegious use of holy things; many occult arts and

[28] BN 6910, fol. 104r, col. 1. Albertus Magnus, *De vegetabilibus et plantis*, VI, ii, and Sante Ardoini of the fifteenth century in his *De venenis*, Basel, 1562, p. 141, III, i, quote John Damascenus that there is an herb growing with napellus which is an antidote for it and called *napellus Moysi* because Moses is said to have discovered its virtue, as well as the statement of Avicenna that there is a small animal like a mouse that is born and dies in the root and is theriac against the poison.

[29] Hansen, *Quellen* (1901), pp. 4-5: the document is dated August 22, 1320.

magical practices might claim exemption.[30] This point is well illustrated by the only two extracts from processes before the inquisition during the years of John XXII's pontificate which Hansen reproduced in his collection of extracts from the source material.[31] In one case women had cut off some of the hair and nails of a dead man at the request of his widow in order that the house might remain fortunate,[32] but had done this without any adjurations. In the other case a prior and other clergy had caused an image of lead to be made in the persuasion that once a month it would speak, and that they could learn from it how to succeed in the art of alchemy at which they labored or where to find hidden treasure. The likeness of a scorpion was engraved on the image and some letters which seemed to read, "King Solomon," but it failed to work because it had not been cast under the proper constellations. Whether any punishment was dealt out in either case we are not informed.

That many occult arts and practices which we regard today as superstitious might still claim exemption from the inquisition and perhaps any court proceedings is likewise the impression that we receive from a formula for the abjuration of sorcery, divination, and invocation of demons given in the contemporary *Practica inquisitionis* of Bernard Gui.[33] The person in question

[30] Therefore I cannot quite agree with the statement of J. M. Vidal, *Bullaire de l'inquisition française au XIV^e siècle*, Paris, 1913, p. xlix, "Le pontife ne distinguait plus entre superstitions simples et superstitions mêlées d'hérésie." It may be true, as Vidal goes on to say, that "Tous les cas énoncés dans ses lettres étaient considérés comme des attentats contre la foi." But many varieties of superstition are not specified in his letters, and these, we may justly conclude, he did not regard as heretical.

[31] *Quellen* (1901), pp. 446-449.

[32] Hansen (1900), 312, states that the object was to prevent the ghost of the deceased from returning and bringing misfortune to his house, but what the document on which his account is based says is just the opposite, namely, that the object is that he may not recede with the lucky star or good fortune of the house from which he departs. *Quellen*, p. 447, "Domina, ego audivi, quod si homini mortuo, quando mortuus est, auferrentur de pilis et unguibus manuum et pedum, ipse non recederet cum astro vel eufortunio domus, de qua exit." In other words, by retaining some of the departed's hair and nails, it is hoped that the good fortune or favoring astrological influence which attended him during life will remain after his death:—a piece of purely sympathetic magic with no reference either to ghosts or demons.

[33] The formula is reproduced with other extracts from Gui's volume in Hansen's *Quellen*, p. 49.

is to abjure all baptizing of images, all sorcery performed with use of the eucharist, chrism or sacred oil, all divination or invocation of demons, especially with adoration, reverence, homage or sacrifice to them. Also, the art of making images of lead or wax or other material to procure illicit effects. Also the art of St. George, and generally all condemned sorceries, especially those aiming at illicit or harmful results. At first sight this may seem a sufficiently sweeping prohibition; but when analyzed it adds to the diabolical magic and abuse of holy things of the papal instructions only the employment of images and sorcery for evil ends. Good magic is by implication almost approved, as it had been expressly in *Las siete partidas* of Alfonso X of Castile in the previous century.

It is probable that members of the clergy figure so prominently in the magical practices of which John XXII took cognizance, because he felt a special responsibility for, and closer jurisdiction over such cases, and not because clerical practitioners of magic were more numerous than lay offenders. On November first, 1323, we find him dealing with the case of a monk of Figeac who had occupied himself with "the sacrileges of alchemy, nigromancy, auguries, and other profane and prohibited arts," such as sorcery with wax images, and was accused of many other crimes including counterfeiting.[34] Three years later the pope commissioned a cardinal to judge the case of a canon at Agen who was accused of invoking evil spirits to produce hail and thunder storms and to kill men. He possessed various books of forbidden arts and glass, earthen, and wooden vessels with divers powders and fetid liquors. Two accomplices of his, a clerk and a layman, had at night robbed the town gallows of two human heads and an arm of criminals who had been hanged. They had been caught with these by the town guards, and the layman had already been burned, presumably by the town authorities, before the pope concerned himself with the case.[35] In the same year the pope appointed another commission of three cardinals to judge three

[34] Vidal, *Bullaire,* 1913, Document 50, p. 87. [35] *Ibid.,* Document 67, pp. 113-14.

clerks and a prior charged with image magic and incantations and invocations of demons.[36]

Since magical practices gave no sign of falling off, in 1326 or 1327 John XXII issued the bull or constitution, *Super illius specula*. It seems to have been a more general fulmination against magic than his previous action which had concerned only southern France. Possibly, however, this limitation may have been also true of the document which we are about to consider. The *Super illius specula,* as it has come down to us, is addressed to no one in particular;[37] has not been traced back earlier than the work of the inquisitor Eymeric[38] at the close of the fourteenth century; and is not found in the *Extravagantes* of John XXII or the *Extravagantes communes*.[39] It was included, however, by Raynaldus in his continuation of the *Annals of Baronius*[40] and in the *Magnum Bullarium Romanum*.[41] Hauber again published it in 1738,[42] and portions of it are given in Hansen's more recent work.[43]

In this bull the pope grieves to note how many persons are Christians only in name, making a treaty with death and pact with hell, sacrificing to demons, and fabricating images, rings, mirrors, phials and other magic devices to summon spirits and receive responses from them. This pestilential disease now pre-

[36] *Ibid.,* Document 72, pp. 118-19. Vidal in the heading implies that John XXII confided to the three cardinals the process of laymen as well as clergy, but while others than clerics were among those at first arrested, confined in the archiepiscopal prison, and later taken to Paris by royal officials, only the clergy appear to have been sent to the pope by Charles IV: *Ibid.,* p. 119, "ac demum prefati clerici per carissimum in Christo filium nostrum Carolum, regem Francie et Navarre illustrem, ad nos transmissi fuerunt." In a second letter of November 8, 1327, anent the same case (*Ibid.,* 129-30), the pope writes, "et mandamus . . . vos . . . prefatum negotium quoad dictos clericos et priorem diffinire ac decidere. . . ."

[37] Hansen (1900), p. 255, however, calls it "eine für alle Zeiten und für die ganze Kirche bestimmte und mit voller Gesetzeskraft ausgestattete Konstitution."

[38] *Directorium inquisitionis,* II, quaest. 43, n. 8.

[39] According to Thomasius, *De origine ac progressu processus inquisitorii contra sagas.*

[40] Under the year 1327.

[41] Luxemburg, 1742, I, 204; Turin, IV, 316.

[42] E. D. Hauber, *Bibliotheca sive Acta et Scripta Magica: Gründliche Nachrichten und Urtheile von solchen Büchern und Handlungen welche die Macht des Teufels in leiblichen Dingen betreffen,* I (1738), 56-61.

[43] Hansen, *Quellen* (1901), pp. 5-6.

vails through the world more than usual and keeps infecting the flocks of Christ increasingly. To resist it the pope decrees *ipso facto* excommunication against the offenders and the legal penalties for heretics except confiscation of property. No book containing such errors is to be kept in one's possession, but all must be burned within eight days.

In 1330, however, the pope took out of the hands and withdrew from the jurisdiction of the archbishops of Narbonne and Toulouse and the inquisitors of Toulouse and Carcassonne those cases of magic arts which he had entrusted to them a decade before.[44] The pope states that the errors and abominations concerning which he wrote before still flourish, and that he wishes to make fuller provision against them. The next year Philip VI, king of France, complained to the pope that an abbot, a Dominican friar, and other clergy and laity were practicing sorcery against him and persons of his court. John XXII directed the bishop of Paris to deal with the offenders.[45]

From the documents of the year 1337 in the pontificate of the next pope, Benedict XII, we learn that some clergy of Béziers had written to John XXII that William, bishop of Béziers, was plotting against his life with wax images, but had been imprisoned at Béziers for their libellous statements.[46]

So much for John XXII's brushes with the sorcerers, would-be or reputed, of his time. He also gave some attention to those alchemists who pretended to make gold artificially. As we have already seen, the same person was sometimes accused both of sorcery and alchemy. The decretal, *Spondent quas non exhibent . . .* was directed against counterfeiters as much as alchemists. In the *Extravagantes communes*, where it occurs at *lib.* IV, *tit.* vi,[47] it follows in the printed edition the title, "On thefts," (*De*

[44] Hansen, *Quellen*, pp. 6-7, from the Vatican secret archives, Reg. Vatic. 98, Nos. 2-3.

[45] *Ibid.*, pp. 7-8; Reg. Vatic. 98, No. 855.

[46] Hansen, *Quellen*, pp. 11-13.

[47] It is so cited in BM Royal 7-E-X, 14th century, fol. 47v, col. 1, but in the printed edition—*Extravagantes tum viginti Ioannis vicesimi secundi tum communes cum glossis et epitomis assuetis*, Lugduni, Apud Hugonem à Porta et Antonium Vincentium M.D. L III—immediately preceding it one reads, "Quartus liber vacat. Liber quintus." This heading is very likely misplaced, however. There is said to be

furtis) and is itself headed, "On Counterfeiting," (*De criminc falsi*). The decretal, which opens with the epigram that paupers promise wealth which they do not produce, adds that similarly alchemists who think themselves wise fall into the pit which they have dug. Sometimes they go to the length of coining their metal. The pope therefore decrees that all who have been found concerned in any capacity in the production of alchemical gold shall incur infamy and give to the poor in true gold as much as they have made of the false variety. If they cannot pay, they shall incur imprisonment or other penalty suitable to their rank and the circumstances. Those who have coined money from such metal shall suffer confiscation of goods and perpetual imprisonment. If clergy are among the offenders—an admission that this was likely to happen—they are furthermore to be deprived of their benefices and precluded from holding any in the future.

The inquisitor Eymeric, writing against alchemists toward the close of the fourteenth century, states that this papal bull was the outcome of a conference to which John XXII assembled as many natural scientists and alchemists as he could to determine whether the art had any basis in nature. The alchemists answered in the affirmative; the natural scientists in the negative. Since the alchemists were unable to prove their contention, the pope issued this decretal against them.[48]

The interpretation likely to be put upon such a decretal by later alchemists is suggested by a passage from Thomas of Bologna,

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no good edition of the *Extravagantes*. In the manuscript mentioned the bull occurs between two concerned with the Franciscans, following the bull "Ad conditorem" of December 6, 1322, and preceding the bull "Quorundam exigit" of October 7, 1317. Our bull is headed, "Ars arquime prohibetur et puniuntur facientes et etiam procurantes, et si clerici sunt privantur beneficiis et cetera etc." To this corresponds the fuller preliminary summary in the printed edition, p. 238, col. 2: "Alchimiae hic prohibentur et puniuntur facientes et fieri procurantes quoniam tantum de vero auro et argento debent inferre in publicum ut pauperibus erogetur quantum de falso et adulterino posuerunt. Et si eorum facultates non sufficiant poena per iudicis discretionem in aliam commutabitur et infames sunt. Et si sunt clerici beneficiis habitis privantur et ad habenda inhabiles efficiuntur."

Valois, in HL 34 (1914), 420, dates John's bull against alchemy in 1317, but for what reason or on what authority is not apparent.

[48] BN 3171, fol. 56r, in "Contra Alchymistas ad Abbatem de Rosis decretorum doctorem," written in 1396.

surgeon and astrologer and operator with magic images at the court of Charles V the Wise of France (1364-1380). In his letter to Bernard of Treves on the philosophers' stone he remarks,

> And these alchemists are named after king Alchimus who found out how metals are colored only in their accidents and falsely by the lesser minerals, unaware that the fixed color of the nativity of copper has to come from digestion. Wherefore such alchemists are justly prohibited by written law because their experiments are fallacious.[49]

But both Thomas and Bernard went right on with their own alchemy despite the decretal.

It was during John XXII's pontificate, in May, 1323, that a general chapter of the Dominicans at Barcelona pronounced excommunication against all members of the Order who henceforth devoted themselves to alchemy or did not burn their books on that subject within eight days.[50] The natural inference is that the pursuit of the art of transmutation among them had reached a point where sharp legislation against it seemed necessary. Nor is there any decrease in the amount of alchemical manuscripts as we proceed through the fourteenth and fifteenth centuries.

The measures of John XXII against magic show that he believed in the reality of sorcery and the invocation of demons. It may be doubted, however, if in this respect he was unduly credulous for his times or believed in such matters more than most of his contemporaries. The panicky fear for the safety of his own person against such arts which some historians have ascribed to him also is scarcely substantiated by the evidence. On the other hand, his decretal—if it be really his—against transmutation of metals and counterfeiting should not be taken too seriously as an evidence of complete scepticism as to the possibility of transmutation. Indeed, its implication that the alchemists were able to pass off their product as coinage was al-

[49] BN 11201, fols. 10v-11r: "Et hii alchemiste dicuntur ab Alchimo rege qui per minora mineralia invenit metalla accidentaliter et false colorari nescius quod fixus color nativitatis eris ex digestione evenire, quare tales iure scripto merite prohibentur quia experimento fallaces."

[50] HL 34 (1914), 312, citing B. M. Reichert, *Monumenta ordinis fratrum praedicatorum historica*, Rome, 1896-1904, in 14 vols., II, 147.

most an indiscreet admission that they were attaining a measure of success. Still less should the decretal be interpreted as a sweeping condemnation of other activities of the alchemists. In 1330 the pope gave money to his physician, Gaufré Isnard, bishop of Cavaillon, for an alembic to make *aqua ardens* (alcohol) and "for a certain secret work" for himself[51] which sounds very much like an elixir of life, if not an attempt to make gold. But the legend of his having left 29,000,000 ducats at his death is unfounded, and the alchemical tract attributed to him is almost certainly spurious. It contains several passages which are also found in the *Clavicula* ascribed to Raymond Lull and actually composed much later.[52]

A bit of evidence as to the attitude of John XXII towards the conception of occult virtue is provided by a letter from him to Margaret, countess of Foix, thanking her for a knife made of serpent's horn which was said to possess the property of detecting poison. This knife had previously been lent by Gaston I of Foix and IX of Béarn to Clement V, and was returned after that pontiff's death. John XXII used it on his table as a signal to denote the presence of poison until 1331, when he returned it to Gaston II.[53] Thus John XXII shared the common belief of the time in occult virtue. Indeed, treatises on poisons and on sympathetic safeguards against them were quite regularly addressed to popes and monarchs during this period, as we shall see later,[54] while inventories of their possessions show that it was usual for them to employ such amulets against, or indicators of the presence of poison as serpents' horn and tongues or the horns of unicorns.[55] It was perhaps to John XXII that the famous physician, Peter of Abano, had addressed his work

[51] HL 34, 419-420.

[52] HL 29, 284-285.

[53] K. Eubel, *Hist. Jahrbuch,* XVIII (1897), 627; see also L. Esquieu, *Le couteau magique de Jean XXII,* Cahors, 1899; Heinrich Pogatscher, "Von Schlangenhörnern und Schlangenzungen vornehmlich im 14 Jahrhunderte," *Römische Quartalschrift für christliche Alterthumskunde und für Kirchengeschichte,* XII (1898), 162-215.

[54] And as I have already indicated, *Magic and Experimental Science,* II, 935-938.

[55] See the paper of Pogatscher cited in note 53 for many instances. For their employment at the court of Aragon later in the century see J. M. Roca, *Johan I d'Aragó,* 1929, pp. 399-412.

on poisons. Later in the century Chalin de Vinario, papal physician from Montpellier, boasted that he had often driven the poison from carbuncles and external swellings by applying a topaz set in a pontifical ring.[56]

Although John XXII took the measures which we have noted against sorcerers and alchemists, there is no decree extant by him against astrologers. His penitentiary, Walter Cato, is said to have written a treatise against them,[57] but such a work does not seem to be in existence. On the contrary in a manuscript at Oxford dated by Coxe[58] as of the fourteenth century, but which is perhaps rather of the early fifteenth century, there is an astrological geomancy in one hundred and twenty-five chapters by a certain Cato.[59] If such an advocate of astrology as Peter of Abano, after his skirmishes with theologians and being under surveillance by the inquisitors of Lombardy, ventured at the close of his career to dedicate his work on poisons to John XXII, it would seem that that pope had little objection to astrology. Nor is there any indication that the execution in 1327 of Cecco d'Ascoli at Florence as a relapsed heretic bore any relation to John XXII's campaign against sorcerers in southern France through the inquisitors there.

John XXII's immediate successor, Benedict XII (1334-1342), continued to devote considerable attention to magic and related matters.[60] He seems to have been inclined to order that magicians who had been arrested elsewhere be sent to Avignon. Thus he

[56] A. Phillippe, *Histoire de la peste noire (1346-1350) d'après des documents inédits,* Paris, 1853, pp. 282-283.

[57] Wadding, *Scriptores ordinis minorum,* editio novissima, Rome, 1906, p. 102.

[58] *Catalogus codicum MSS qui in collegiis aulisque Oxoniensibus hodie adservantur,* 1852, II, 29.

[59] All Souls College 96, 14th century, fols. 16-41. The preface opens, "Nonnulli sapientes astronomiae eruditi de quarundam celestium figurarum significatione;" the text begins, "In prima operis parte intentio nostra est docere 16 esse figuras. . . ." The work is probably a translation from the Arabic since the author is described (*Ibid.,* fol. 16r) as "Cato vero trabaliensis arabiorum latine nominatur clarissimus philosophus." The preceding treatise in the MS is likewise a geomancy. Coxe's catalogue does not indicate that either tract is a geomancy.

[60] Hansen, *Quellen,* pp. 8-15 (Documents 8-22). Vidal, *Bullaire,* contains some further documents: see Nos. 172, 173, 177.

bade count Gaston of Foix to forward from Béarn several persons who had been accused of sorcery, and ordered the bishop of Paris to send on a nigromancer from England named William Altafex together with the lead plates with which he was said to perform his *maleficia*. This may have been due purely to a desire to keep the direction of ecclesiastical proceedings against magicians under papal control, but one suspects that a certain amount of personal curiosity may have been involved. One of the cases in which Benedict interfered was that of a Cistercian monastery at Bolbona where the monks were accustomed to practice alchemy secretly.[61] A clerk from a neighboring diocese told them that he knew of an enchanted mountain containing hidden treasure guarded by a woman who was also enchanted. But "to perform the said alchemy," and to break the enchantment which bound the treasure, it was necessary to baptize an image of wax and to employ holy chrism. To confuse such breaking of a spell guarding hidden treasure in an actual mountain—for the clerk gave its location—with the art of alchemy seems a grievous error on the part of the pope or papal secretaries. The document dates from 1339, and Benedict wrote a follow-up letter in 1340;[62] the next papal pronouncement noted by Hansen is not until 1374.

We know of others, however, during the intervening years. Under Clement VI (1342-1352) only one case seems known, that of Raymond Gilles, a cleric of Narbonne, imprisoned at Avignon and accused of sorcery and dealings with demons.[63] Under Innocent VI (1352-1362) clergy of the diocese of Rodez, notably monks of Bonnecombe, were publicly rumored to be implicated in magic arts, sorcery, and invocations of demons.[64] This again was the sole instance noted during the decade of his pontificate. No less distinguished a person than Petrarch, however, complained that Innocent VI already as a cardinal and then during most of his pontificate had lent a credulous ear to the charge of another cardinal that Petrarch was given to magic because he

[61] Hansen, *Quellen*, pp. 14-15, "ut possent clandestine alchimiam exercere."

[62] Vidal, *Bullaire*, Document 179.

[63] E. Déprez, *Lettres secrètes et curiales de Clément VI*, Paris, n. 481: cited by Vidal, *Bullaire*, p. 298.

[64] Vidal, *Bullaire*, Documents 218 and 220, pp. 335 and 337.

spent so much time in reading Virgil.[65] Under Urban V (1362-1370) sorcery was one of many crimes charged to the account of seven captains of mercenaries.[66] Gregory XI (1371-1378) in 1374 empowered the inquisitor of France to proceed against those invoking demons, as Hansen recorded,[67] and also took cognizance in 1377 of certain visions of a clerk of Cahors which the inquisition had declared came from the devil.[68] The next recorded case of papal interference was not until the following century, when in 1405 Benedict XIII allowed the inquisitor of Carcassonne to pursue persons guilty of sorcery and divination in the diocese of Puy despite its usual immunity from inquisitorial visits.[69] And in 1409 Alexander V ordered the inquisitor of Avignon, Dauphiné, Provence, and Comtat Venaissin to proceed against several categories of persons, including Jews who practised magic, invokers of demons, and augurs.[70]

This apparent dwindling of papal activity with reference to sorcery, invocation of demons, and alchemy is rather impressive after the numerous cases to which John XXII and Benedict XII gave their attention. The contrast, upon which too much stress should not be laid, may be a matter of accident. On the other hand, it may be more than a mere coincidence that the next pope, Clement VI (1342-1352), should have numerous astrological predictions addressed to him and also a commentary on the *Physiognomy* of Aristotle, yet issue no legislation so far as we know against sorcery or alchemy, and manifest little concern as to magic images or dabbling by members of the clergy in occult arts. One is tempted to conclude that this pope, who interested himself as we shall see in calendar reform, was more scientifically minded than his immediate predecessors. Consequently where they saw diabolical influence or sheer superstition he might be more apt to allow for occult forces of nature. He was perhaps

[65] *Opera*, Basel, 1581, p. 730. *Ep. sen.*, I, 3, for the Latin text; Italian translation in *Lettere senili*, ed. G. Fracassetti, Florence, 1892, vol. I, pp. 27-31 (lib. I, lettera iv). For fuller details see chapter 14.

[66] Vidal, *Bullaire*, Document 240, p. 368.

[67] *Quellen*, p. 15.

[68] Vidal, *Bullaire*, Document 310, pp. 437-440.

[69] *Ibid.*, Document 332, pp. 473-474.

[70] *Ibid.*, Document 338, p. 487; Hansen, *Quellen*, p. 16.

less fearful of vulgar witchcraft than they, and more tolerant of the experiments of alchemists and natural magic of the learned. Instead of forbidding divination, he encouraged astrological prediction which claimed a natural basis. We have, however, no positive evidence that he frowned upon or did anything to prevent trials for sorcery and diabolical magic, or proceedings against alchemists. Moreover, we know that in 1339 Leo Hebraeus addressed an astrological prediction to Benedict XII.[71]

[71] BL Digby 176, fol. 16v, ". . . ut tunc predixímus domino nostro summo pontifici sancte et felicis memorie domino Benedicto pape 12°."

CHAPTER III

ALCHEMY OF THE LATER MIDDLE AGES

It is much easier to write a history of astrological than of alchemical literature in the fourteenth and fifteenth centuries. As a rule no other class of writings are so scrupulously and accurately dated as those in the field of astrology. If the author did not literally keep his eye on the clock, he observed the movements of the heavenly bodies which was just as satisfactory. The alchemist, on the other hand, had no professional concern at all as to what time it was. So intent was he upon his protracted experiments or so immersed in the ancient lore of past alchemists that he scarcely lived in the present or gave time a thought, except perhaps to note the number of days that he left one of his mixtures exposed to the slow heat of a manure heap. It is therefore exceedingly difficult to arrange alchemical writings in any chronological order.

The task is enhanced by another snag, the uncertainty as to the authorship of alchemical treatises. Even when the name of the author is stated, it too often means little or nothing to us. Whereas the authors of astrological predictions or works of astrological medicine were commonly university professors of astronomy or medicine whose names can often be substantiated from the university records of the period, those of the alchemists are more likely to represent persons of less academic standing, if not of less education. Or, to express it another way, alchemists were less likely to write and to be known by books in other fields from their own art than were astrologers. Men of letters appear to have more often composed works of astrology than of alchemy. Medical men of that time might be interested in both astrology and alchemy, but more frequently in the former. When well known names are put forward as authors of alchemical treatises, we are apt to suspect the authenticity of the attribution.

Again, the texts of alchemical literature seem to be more corrupt, or to offer more variant versions, than do those of astrology. This is perhaps truer of the later printed collections of them than it is of the original manuscripts. Even the last named, however, suggest that an alchemical tract was likely to be in its inception a typical and stock performance rather than an original personal contribution, while in its subsequent history it was apt to be treated as common property which anyone could maul over, corrupt, amend, comment upon, or abbreviate to suit his times and fancy. Astrological treatises, to be sure, likewise repeat the same ideas and arguments to satiety. But astrologers had particular predictions to make and changing constellations to grapple with. The alchemists' experiments and processes, at least so far as revealed in their writings, seem to possess less variety and to run more in the same rut.

Moreover, the alchemical writers do not express themselves as clearly, distinctly, and systematically. An astrological treatise is usually orderly, like the movement of the heavens which it follows. An alchemical treatise is apt to be muddled, like the mixtures and tinctures with which the alchemist dealt. Even when an alchemical author had no desire to be enigmatic or mystical, his work is apt to have no more plan than a hymn or a prayer, and to consist of a congeries of familiar phrases and sanctified notions, drawn from the past literature of the subject. Finally, we seem less likely to possess alchemical manuscripts of early date. One reason for this may be that an alchemical laboratory was not a safe place to preserve a manuscript in good condition. Fires, explosions, acids, stains, maybe the wrath of unsuccessful experimenters, would be all too likely to destroy or damage seriously the unoffending or offending codex.

Past students of the history of alchemy have not always accurately dated the manuscripts which they utilized. Thus Berthelot's chief reliance in his *La chimie au moyen âge* was two manuscripts at Paris which he dated of the closing thirteenth century but which seem quite clearly of the fourteenth.[1] It is true that

[1] BN 6514 and 7516. The contents of these MSS have been analyzed fairly fully by Berthelot and hardly concern us here, since they are chiefly works

most of the works contained in them were composed before the fourteenth century, but this means that these manuscripts lack contemporary authority. Moreover, Berthelot based a number of specific inferences upon the late thirteenth century dating which cannot be sustained if the writing is of later date. He also failed to note that one of these manuscripts is really two quite different collections in different hands and with different systems of signatures and originally of different size, with works like the *Emerald Tablet* of Hermes and the *Summa* of Geber appearing in either half.

Apparently towards the close of the thirteenth century there came into existence or circulation in the world of Latin Christendom two publications which were to have a tremendous influence upon the alchemical literature of the fourteenth century. These were the *Turba philosophorum* and the Latin treatises attributed to Geber. Both were apparently unknown to Albertus Magnus, Vincent of Beauvais,[2] and Roger Bacon, interested as those men were in minerals and in gold-making. But almost from the beginning of the fourteenth century they are steadily utilized and cited by the majority of alchemical writers. The *Turba* with its many names of ancient philosophers provided a handy recourse for authorities to cite with high sounding names such as Pythagoras, Socrates, Anaxagoras, Democritus, and Parmenides, or the hitherto less familiar but equally romantic appellations of Bonellus, Locustor, and Pandolfus. The *Summa* and other works ascribed to Geber offered a number of attractive dicta and generalizations for quotation and a considerable amount of new alchemical theory which achieved widespread popularity and adherence. His enumeration of impediments to alchemy and of arguments against transmutation and

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composed before 1300. In Appendix 3, however, will be found a brief résumé of their foliation and signatures, often incorrectly or insufficiently stated by Berthelot, with an indication how far their contents have been discussed by him.

[2] A citation of "Armenides" (*De alchimia et rebus metallicis ex speculo Vincentii*, Basel, 1571, p. 19) is the only one which might seem to refer to the *Turba* and it does not correspond to any utterance of Parmenides in that work but is drawn from Rasis, *De aluminibus et salibus*, ed. R. Steele, *Isis*, XII (1929), 10-44.

their rebuttal as well as some of his more positive suggestions were much repeated or imitated in later writers. But of these influences of both Geber and the *Turba* we shall meet abundant evidence in subsequent chapters.

While Aquinas had accepted the possibility of the transmutation of metals and Albertus Magnus had perhaps written more definitely alchemical tracts than his five books on minerals, it is another question whether they composed all of the works of alchemy found under their names in print and manuscript, and further to what extent such treatises had been ascribed to them or even composed before 1300. Since Aquinas probably wrote no such works at all, it is doubtful if they would be attributed to him immediately after his death. He almost certainly could not have written a commentary on the *Turba philosophorum,*[3] the sort of work more likely to have been produced in the fourteenth century. Nor would he have compiled a treatise for his brother Reynaldus,[4] if by that name is meant, as is usually the case in alchemical treatises, Arnald of Villanova who died in 1311, thirty-nine years after Aquinas. Such an ascription seems to indicate a late forgery. The alchemical writings current under Albert's name command more confidence and are usually of a fairly solid character, the chief perhaps being the *Semita recta.* But it would be difficult to say which, if any, are authentic or to date the others before or after 1300. We shall therefore as a rule not include such works in our survey of alchemy in the fourteenth and fifteenth centuries, although some of them and possibly some of the alchemical tracts ascribed to Roger Bacon

[3] S. Marco VI. 215, 1475 A.D., fols. 1r-10r: Expositio Thome de Aquino super librum turbae et de quatuor speciebus igneis lapidis philosophiae necessariis, opening, "Veritatem meditabitur guttur meum. . . ." At fol. 6r, the *Summa* of a master Peter of Messina is cited.

The work was printed in *Harmoniae chymico-philosophicae,* Frankfurt, 1625, II, 243-278.

Another MS, Berlin 532, fols. 147v-164v, is described by J. Ruska, *Turba philosophorum,* 1931, pp. 93-94. And see Lami (1756), p. 362.

[4] S. Marco fondo antico 323, 15th century, fols. 155r-156r: "Tractatus S. Thome de Aquino quem Reynaldo fratri suo compilavit. Recipe igitur mercurium minerale. . . ." Printed by Lazarus Zetzner, *Theatrum chemicum,* 6 vols., Argentorati (Strasburg), 1659-1661, III, 278-283, with a prohemium lacking in this MS. For another edition and MSS see below, Chapter 7, note 54.

were actually composed in this period. The *De essentiis essentiarum* attributed to Aquinas will be an exception.

Certain other alchemical authors seem almost certainly to belong before 1300 rather than during the period of our present volumes, if only for the reason that they are cited from the start of our period, if not before. Yet so scantily has even the surface of the history of alchemy as yet been tilled or rather scratched that these names will be sought in vain in the indices of such a thorough-going and voluminous work as Sarton's *Introduction to the History of Science* which devotes 653 pages to the thirteenth century alone or of a recent special history of alchemy such as that of von Lippmann.[5] The treatise of Rosinus (probably a corruption of Zosimos) to Euthesia already is found in a manuscript said to be of the thirteenth century,[6] and it appears that Alfidius or Alphidius,[7] whether truly derived from the Arabic or

[5] A little concerning Alfidius and Rudianus will be found in Ruska, *Turba philosophorum,* 1931, pp. 338-341. Von Lippmann notes Rosinus, but not his treatise to Euthesia.

[6] DWS No. 51: Glasgow Univ., Hunterian library 253, fols. 63v-71. Here and in some other MSS the treatise is called *The Second Letter,* and has the incipit, "Inquit Euthesia, Iam Rosine . . .:" Venice, S. Marco fondo antico 324, 15th century, fols. 34v-42v; Rome, Casanatense 1477, fols. 43v-66r, "Incipit tractatus Rosini ad Euthesiam s. tractatus sequens epistolam mathesis secundam. Inquit Euthesia, iam Rosine in doctrina ad prepositum inveni. Expone igitur mihi . . . / . . . nulla tinctura fit umquam nisi per aquam sulphuris mundam. Explicit epistola Rosini secunda ad Euthesiam, deo gratias." The same incipit is also given in the bibliography in Vatic. Barb. 273, fol. 225v, "Rosinus ad Euthesiam." Just why the work should be called an epistle is not clear, since it is in dialogue form.

In Naples XV.F.54, 1462 A.D., fols. 99v-105v, after the rubric "Incipit tractatus Rosini philosophi ad Eustesiam," with a large illuminated initial letter, we have on the next page, fol. 100r, the different incipit, "Tempore quo ferventius in hac arte philosophi desudabant uni eorum quedam mulier Heustesia nomine sic ayt, Scio philosophe Rosine in excelso divine artis magisterio ad propositum pervenisti et opus peragisti. Nunc ergo si placet dicito michi quid est sulfur incombustibile. . . ." In the initial letter of this incipit is a figure of a woman kneeling before a seated philosopher. Alchemical recipes fill out fols. 105v-106r.

For two Riccardian MSS see Lami (1756), p. 344.

[7] DWS Nos. 16, where Alphidius is represented as a Greek, and 143-145, where Alfidius is listed among "Arabic and Arabist" authors. Klagenfurt Bischöfl. Bibl. XXIX.d.24, 1421-1423 A.D., fol. 95v, Prag 1984, 14th century, fols. 55r-60v, BU 143 (110), 16th century, fols. 101r-118r, and Rome, Casanatense 1477, fols. 31r-43r, seem the same as DWS No. 144, the book of Alfidius to his son, but opening with the prologue, "Scito, fili, quod hunc librum tibi scripsi. . . ." The word, *fili,* however, is omitted in Casanatense 1477.

Naples XV.F.54, 1462 A.D., fols. 97r-

not, Rodianus or Rudianus, author of the book of *Three Words*[8] and other treatises,[9] and the much cited Senior,[10] all antedate the fourteenth century. Gratian the alchemist, and not the twelfth

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99r, does not seem to be identifiable with any of the treatises ascribed by DWS to Alfidius or Alphidius. Its rubric is, "Incipiunt sequentia que sunt abstracta ex quadam epistola Alfidii philosophi magis lata;" it opens and closes, "Inquid Alfidius, Scientia nostra honorabilis per quam deus dilexit nos . . . / . . . nec temporum diuturnitas ipsum corrumpet."

Lami (1756), p. 23.

[8] In both BN 6514, 14th century, fols. 131r, col. 2-133r, col. 1, and S. Marco VI, 214 (Valentinelli, XVI, 3), 1472 A.D., fols. 156v-164v, there is a long rubric or titulus which is almost identical in both MSS and may be reproduced as follows: "Incipit liber mundane felicitatis sive operis et complementum elementorum quo nullum maius invenitur opus nec magis naturale ut secreta artis philosophorum datum (dant) a deo fidelibus suis quod Persidiani philosophi invenerunt et exercuerunt(extraxerunt) ex creatione hominis per operationem planetarum et illud ad effectum perduxerunt. Liber Rudiani sive divinitatis et liber trium verborum. Hic liber est summe operationis sue nature secundum creationem humani corporis per 9 menses et 7 dies. Et hec sunt illa tria verba de lapide pretioso qui est aereus et volatilis. Et hic est lapis albissimus et gloriosior (gravior) omnibus lapidibus. Et est rubeus rubicundissimus et citrinus citrinissimus et est viridis viridissimus et omnibus coloribus mixtus." In BN 6514 the text proper opens and ends, "In lapide isto sunt quatuor elementa, primum est aqua . . . / . . . proiece in olleo vitellorum ovorum. Explicit liber iste, Amen. Explicit liber trium verborum edictus per Rudiannum." In S. Marco VI, 214, there are five chapters, of which the first opens, "Liber trium verborum dicitur liber deitatis et trinitatis. Et hec tria verba sunt de. . . ." It closes, ". . . fovarum paludum. Finis. Explicit liber trium verborum."

Vatic. Ottobon. 31, fols. 117r-128v, following a non-alchemical work of Raymond Lull on his art dated at Genoa, 1303: "In dei nomine et eius matris. Opus maior Rodiani qui dicitur trium verborum. Sciendum est quod in lapide philosophorum sunt quatuor elementa. . . ." The work breaks off unfinished, "Unde cum corpus . . ." with the signature, "lapidis nostri," which is not continued on the next page.

BU 139 (105), 14th century according to Frati, pp. 67-83: "Liber Rudiani. Liber divinitatis . . . / . . . valeas imitari."

See also DWS No. 44.

[9] In Vatic. Barberini 273, fols. 1r-38r, is what appears to be a longer and different text from the *Book of Three Words:* "Rudiani philosophi tractatus. Et est quedam Practica nobilissima que multum adheret Practice Rosarii etc. Nunc igitur in Dei nomine et benedictione Practicam reserabo . . . / . . . sed in corporibus tingit quantum sui est. Rudiani philosophi operis sive tractatus finis."

[10] DWS Nos. 136 and 137; Zetzner, V, 193-239. Possibly different from these is the work referred to by Vatic. Barb. 273, fol. 228r, opening, "Senior dixit in eius libro quem composuit . . ." and CLM 23809, 15th century, fols. 132v, col. 1-138v, col. 2, Collecta et experimenta Senioris philosophi magni alchemisti: "Expliciunt verba Senioris philosophi." A book of divisions is attributed to Senior by a Vemaldus who cites its twentieth chapter: Manchester, John Rylands 65, 15th century, fol. 160v. See also Lami, p. 350.

century canonist who compiled the *Decretum,* although he sometimes seems to be confused with him, since he is called "Saint Gratian," perhaps also belongs before 1300, although the attribution to him of a commentary on the *Turba* gives us pause.[11]

The Book Compostella of brother Bonaventura de Iseo of Brescia, the Minorite, which he composed at Venice while residing in the convent of the brothers of St. Mary, is found in manuscripts of the fifteenth century[12] but purports to be of the thirteenth century. Its author professes to have been the friend of Albertus Magnus and Thomas Aquinas and states that Albert had permission from the pope to examine and prove all the arts and sciences, praising the books of truth and damning the books of falsity and error. Wherefore he labored much in completing the works of Aristotle and made new compilations of books concerning many arts of the sciences such as astrology, geomancy, nigromancy, precious stones, and experiments of alchemy.[13] This

[11] Vienna 5510, fols. 283r-302v, (Sanctus) Gratianus super Turbam et quamplurima dicta philosophorum, opening, "Dicit philosophus quod si sulphur . . ." in a better handwriting than the preceding alchemical tracts. A commentary on the *Turba* with this incipit is also ascribed to Gratian in the bibliography of Vatic. Barb. 273, fol. 282v.

"Pythagoras, master of the Turba philosophorum," is cited in the second of two letters printed under Gratian's name in *Harmoniae chymico-philosophicae* . . . Decas II Collecta studio et industria Ioannis Rhenani (whereas Hermannus Condeesyanus was the editor of Decas I), Frankfurt, 1625, pp. 121-129, 129-140, with "Ex Gratiani interprete" at pp. 140-143. The incipit of the first letter, "Hoc quod fuit nostrae intentionis et omnino iam non est . . ." is essentially the same as those of the two following manuscripts.

S. Marco VI, 214 (Valentinelli, XVI, 3), 1472 A.D., fols. 152v-156v: Gratian super lapidem philosophicum componendum, opening, "Hoc quod fuit intentionis nature et omnino iam non est. . . ."

Geneva 82 (151), 16th century, fol. 8v *et seq.,* "Tractatus Graciani sive textus mineralium. Hoc quod fuit naturae intentionis ad omnia iam non est. . . ."

Prag 1984, 14th century, fols. 22r-23v.

[12] CLM 23809, 15th century, double columned folio, 160 leaves: "Liber Compostella multorum experimentorum veritatis fratris Bonaventurae de Ysio de ordine fratrum minorum quem composuit Venetiis existens in conventu fratrum S. Mariae." The following manuscript which I have not examined appears to give generous extracts: Berne B 44, 15th century, paper, fols. 104r-209v, Collecta ex libro Compostella Bonaventure de mineralibus ac arte alchemica. A third MS is Bologna, Bibl. comunale A. 1417.

For other MSS see Lami, pp. 79, 384.

[13] CLM 23809, fol. 3v: "Ego quidem frater Bonaventura de Ysio ordinis minorum fui amicus domesticus fratris Alberti Theutonici et fratris Thome de Aquino ordinis predicatorum. . . ."

passage, however, does more by its tenor to convince us that it was written long after the days of Albert and Aquinas than of its pretended contemporaneity with them. The author further states that in his days he has communicated concerning this science of alchemy with the two patriarchs of Jerusalem and Aquileia, with six bishops and with many abbots.[14] This boast also does not sound very authentic. In a manuscript of the fourteenth century, however, in a list of contemporary owners of books of alchemy, Ortonellus, son of the late Bonaventura de Yseo, is mentioned as having a book of alchemy.[15] If this is the same as our Bonaventura de Iseo, he could not be later than the fourteenth century and might be of the thirteenth. Of two Riccardian manuscripts catalogued by Lami one assigned the work to the time of the doge "Ramiige," presumably Ranieri Zeno (1253-1268).

The title, *Liber Compostella,* is explained on the ground that the work is a composition of various things such as medicinal and alchemical waters, and further of numerous good powders, unguents, oils, and of many medicines for making gold, silver, salts, and colors. It also is *cum,* or with many other books of many other sages, and *post,* or after the death of many of them and after their doctrine. Furthermore, it is *compos,* a word signifying honor and beauty, and *stella,* or star, a lucid noble body of great influence.[16]

The work itself is in large measure a compilation of sober chemical matter. The first book deals with many waters, fewer oils, and fourteen salts. The second book in ninety-nine chapters is mainly occupied with the generation and transmutation of metals but also embodies a second and briefer discussion of salts. The third book opens with a series of twelve waters and includes experiments from the *Perfect Mastery* of Geber and various other extracts from Rasis, Floridius, Roger (Bacon), Albert, Senior, and Hermes.

[14] *Ibid.,* fol. 90v, col. 2.

[15] The list has been reproduced by Berthelot, I (1893), 75-76, from BN 6514 which he was inclined to date at the end of the thirteenth century but which seems definitely of the fourteenth. My reading differs somewhat from his.

[16] CLM 23809, fol. 3v, col. 1.

The book of Plato concerning the thirteen keys of the major wisdom is said to have been translated from Arabic into Latin in 1301 A.D. in the fifteenth century manuscript where it precedes the work of Rosinus to Euthesia and the *Liber quartus* of Plato.[17] But speaking generally it is true that by 1300 the translation of alchemical treatises from Arabic into Latin had been completed or at least was to be carried no further. Wholly aside from such problems as how far the Latin treatises attributed to Geber conform to earlier compositions of Jabir ibn Haiyan or any other writer in Arabic, the fact stands out that Latin alchemy was now left to its own resources, and that when a late medieval writer cites or pretends to cite an Arabic author, he is doing so from a Latin translation or original. Direct Arabic influence practically ceased after 1300; indeed, it is doubtful if there was very much alchemical literature of importance produced in Arabic during the fourteenth and fifteenth centuries.

In Latin, on the other hand, there was a great outburst of alchemical literature in the first half of the fourteenth century, although thereafter there seems to have been something of a falling off. New western authorities took their place beside Rasis and Avicenna or even the *Turba* and Geber. Arnald of Villanova, Ortolanus or Hortulanus, and Rosarius, considerably later Raymond Lull, became the revered masters and much thumbed texts of contemporary alchemists. A different picture of alchemy forms from that to be derived in the thirteenth century from the *Speculum naturale* of Vincent of Beauvais and the *De mineralibus* of Albertus Magnus. It is this new and further development that we shall endeavor to inquire into somewhat in a number of our succeeding chapters. We have made no attempt to exhaust the alchemical writings of the period but merely to pick out a few landmarks and illustrations of its course. Even works which have been examined will sometimes be omitted as difficult to

[17] S. Marco fondo antico 324, fol. 20v, "Incipit liber Platonis de xiii clavibus sapientie maioris translatus de arabico in latinum anno domini 1301." After invocation of the holy Trinity and individual Unity, the text proper opens, "Narraverunt quod in terra Romanorum fuit quidam philosophus qui vocabatur in arabico Platon. . . ."

place and classify and identify or as of slight apparent significance. But what we do cover will be based largely upon direct contact with the manuscripts, and this, despite their often uncertain or late date, will result in the correction of many a hoary error and even some recent misestimates. It will blaze a trail, I hope, which others more qualified to treat of the chemical questions involved may broaden into a high road.

In the preceding chapter on John XXII his attitude towards alchemy has been considered, thereby raising the problem of its legal status. Before in the next chapters we take up the alchemical writings ascribed to Arnald of Villanova and others, we may throw more light upon this legal side by a survey of the opinions of some jurists of the fourteenth century.

John XXII's decretal against the alchemists by no means represented the consensus of contemporary and immediately subsequent legal opinion,[18] which for the most part appears to have been far more lenient, not to say favorable, toward attempts to transmute the baser metals into gold. Oldrado da Ponte seems to have been the initial authority whose utterance on the subject was usually accepted and incorporated in the writings of subsequent lawyers. Born at Lodi, Oldrado was said by Baldus to have studied law under Cino da Pistoia. He taught for a while at Bologna, where in 1302 he was assessor to the *capitano del popolo,* and later at Padua, perhaps about 1310.[19] Since Oldrado died at Avignon, where he had been consistorial advocate in the papal curia, only a year after John XXII, in 1335, his pronunciamento concerning alchemy, which occurs in his *Consilium* on *sortilegia,* may well have antedated the decretal, *Spondent.* Indeed, it seems strange that a pope and a consistorial advocate should have expressed such differing views, but if either utter-

[18] It was summarized by Iohannes Chrysippus Fanianus, *De iure artis alchimiae, hoc est variorum authorum et praesertim Iurisconsultorum iudicia et responsa ad questionem, An alchemia sit ars legitima,* which was published at Basel in 1576, at Montbéliard in 1602, and was reprinted in Manget's *Bibliotheca chemica,* I (1702), 210-216. I have not been able to obtain access to the works of all the past legal authorities whose opinions as to alchemy Fanianus collected but I have verified enough of his references to feel reasonably certain that the others are cited and quoted with equal accuracy.

[19] Girolamo Tiraboschi, *Storia della letteratura italiana,* Milan, V (1823), 432.

ance were to be rejected as spurious, it would seem that there are far better grounds for accepting Oldrado's as authentic. None of our legal authorities on alchemy before 1500 so much as refers to the decretal, *Spondent*. It is mentioned by Thomas Arfoncinus, who holds that it was directed only against those alchemists who made false gold, but he wrote after Cardan and Julius Scaliger.

Proposing the question whether an alchemist sins or the art is prohibited, Oldrado first gives some arguments against the art. The *Canon episcopi* forbids transmutation from one species to another.[20] Nor can one contend that alchemy is a science conducive to piety, as is customarily said of astrology. In the third place, alchemy cannot be carried on without decoction of gold which seems prohibited by written law. (*C. de auri pub. perse.* l. i. lib. X.) On the other hand, it may be contended that those who make gold from viler metals, provided only they do not accomplish this by magic or other illegal arts, are public benefactors like miners of precious metals. Oldrado further points out that they are unjustly accused of claiming to change one species into another. They merely produce one species of metal from another species of metal as silk is produced from worms or glass made out of herbs. For as they themselves aver and is stated in the book, *De proprietatibus rerum,*[21] in its chapter on alchemy, all metals have a like origin from sulphur and quicksilver. And since art imitates nature, continues Oldrado, they seem not to sin if they wish to make silver from tin by means of the virtue which resides in herbs and stones. "For there are many virtues implanted in herbs and stones." Wherewith Oldrado concludes with a quotation from Augustine to the effect that there are occult seminal forces in all things of nature which, when the proper time and cause come, burst forth into the species corresponding to their modes and ends.[22]

John Andrea, the great canon lawyer who died in 1348, repeated without acknowledgment all that Oldrado had said on

[20] Later legal authorities pointed out that the *Canon episcopi* referred only to human and animal transformations and had no bearing upon metallic transmutation.

[21] Presumably the work of that title by Bartholomaeus Anglicus.

[22] J. J. Manget, *Bibliotheca chemica curiosa,* 2 vols., Geneva, 1702, I, 212, col. 1: "Insunt enim (ut dicit B. Augusti-

the subject of alchemy. He then added that Arnald of Villanova, whom he called a great physician and theologian who had been at the papal court in his time and concerning whom he had written his *Consilium* on observance of fasts, was also a great alchemist and had made rods of gold which he willingly subjected to every test.[23] This tale, like Oldrado's arguments pro and con, was much repeated by later legal writers.

It was the opinion of Andrea de Rampinis of Isernia, who died in 1353, in his work on feudal law, that an alchemist should not sell sophistical gold as pure metal or to be coined without the consent of the prince, but that it was not illicit for him to sell pure gold as such.[24] Baldus of Perugia and Fabianus de Monte S. Severini were of the same opinion.

Alberico da Rosciate of Bergamo, where he died in 1354, had studied, as he himself tells us, under Oldrado at Padua. He practiced at the papal court for a time but also helped reform the statutes of his native city, and in 1340 was sent by the Visconti to Avignon to conclude peace with Benedict XII.[25] In his dictionary of civil and canon law under the term, Alchemy, Alberico repeated the utterance of Oldrado. Under the word, Sale (*Emptio*), he echoed Rampinis' thought in different words. It was illicit to sell alchemical gold or silver for true, if it was not pure and did not have the same properties such as gladdening the heart or benefitting certain infirmities in the case of gold. But if by alchemy true gold was made, it was perfectly proper to sell it as such.[26]

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nus) rebus corporeis per omnia elementa quaedam occultae seminariae rationes quibus cum data fuerit opportunitas temporalis et causalis prorumpunt in species debitas suis modis et finibus."

[23] Manget, I, 212, col. 2, Ex Iohan. Andr. in addit. ad Speculat. tit. de crim. falsi: "Plus nostris diebus habuimus magistrum Arnaldum de Villanova in curia romana summum medicum et theologum de quo scripsi de observ. jeju. consilium qui et magnus alchemista virgulas auri quas faciebat consentiebat omni probationi submitti."

[24] Manget, I, 212, col. 2, Quae sunt regalia. I have verified the passage in his *In usus feudorum commentaria*, Naples, 1571, fol. 295v. (incorrectly numbered for fol. 289v).

[25] Tiraboschi, V (1823), 468-469.

[26] Manget, I, 213, which I have verified from Albericus de Rosate Bergomensis, *Dictionarium iuris tam civilis quam canonici*, Venice, 1581.

In the same dictionary Alberico repeats the common belief then that Abraham was skilled in the science of the stars and adds the less trite statement that he instructed Zoroaster, the inventor of the magic art. Abraham is mentioned by Alberico to support the contention that the papal jubilee should be held every fifty years rather than every hundred. "For he knew that the intemperate condition which is produced by the elevation and depression of the planets always returns to a temperate state after fifty years time, and so what he observed in the stars he wished to imitate on earth." Incidentally Alberico informs us in the same article that he attended the jubilee of 1350 with his wife and three sons, and that whereas other pilgrims were required to spend fifteen days in visiting the churches and holy places of Rome to obtain the benefits of the indulgence, he remained in Rome only six days by special permission of the papal legate.[27]

[27] *Dictionarium iuris*, "Iubileus."

CHAPTER IV

ALCHEMICAL WRITINGS ASCRIBED TO ARNALD OF VILLANOVA

The medicine, astrology, and attitude towards magic of Arnald of Villanova have been dealt with in an earlier volume[1] as terminating—with Peter of Abano—the thirteenth century development of those subjects. But he lived a few years into the fourteenth century, and the alchemical literature both genuine and spurious which is connected with his name seems to belong with the fourteenth and fifteenth centuries rather than with that of the twelfth and thirteenth.[2]

Arnald is represented as addressing a number of these alchemical writings to rulers, both ecclesiastical and lay. To pope Boniface VIII there is a letter, a *Practica,* and one or more sets of questions. Once, however, the questions are said to be addressed to an archbishop of Ravenna.[3] The *Novum lumen* (*New Light*) salutes someone as "Father and reverend lord," while *Semita semitae* opens, "Reverend father," and in the printed text is said to have been sent to pope Benedict XI.[4] A reverend father is also addressed in the course of the *Verba commenta-*

[1] *Magic and Experimental Science,* II, chapter 68.

[2] The alchemical treatises attributed to Arnald of Villanova have been listed with some statement of editions and MSS in the *Histoire littéraire de la France,* vol. 28 (henceforth in this chapter to be cited as HL with number of the title), and MSS of them in the British Isles dating before the sixteenth century are catalogued by Mrs. Dorothea Waley Singer, *Catalogue of Latin and Vernacular Manuscripts in Great Britain and Ireland,* vol. I, 1928, Nos. 224 to 243 (henceforth to be cited as DWS with number of the item in question). In Appendix 4 is given some account of continental MSS thereof, while a chart indicates if a work is mentioned in the alchemical bibliography of Vatican Barberini 273 and gives its number in the lists of HL and DWS, if found there. The treatises will be indicated by a brief form of title giving the chief word or words from their longer forms of titles.

[3] Vatic. Barb. 273, fol. 244v, "Questiones accidentales et essentiales de lapide magno ad archiepiscopum Ravenne. Questio prima. Queritur si operatio lapidis. . . ."

[4] Manget, *Bibliotheca chemica,* 1702, I, 702-704.

toria. There is some evidence that the *Rosarius* of Arnald was addressed to cardinal Napoleon Orsini, but perhaps this dedication belongs rather with one of John Dastin's works.

While speaking of alchemical tracts professedly addressed to Boniface VIII, we may mention that one is ascribed to a brother or master Alemanus or Allamanus or Hermanus of Bohemia, who seems to have been identical with the alchemist Alanus.[5] Another is credited to a John who is said to have been a nephew of Boniface VIII, being the son of the pope's sister. It is called a *Practica of Waters of Dew of May*.[6]

There is a letter of Arnald to Robert, king of Naples, though his Christian name is often not given. The *Perfect Mastery* (*Perfectum magisterium*) or *Flower of Flowers* (*Flos florum*) is said to have been sent to the king of Aragon, the dedication to whom is, however, omitted in the editions and in some manuscripts. We also hear of a *Secret to the king of Aragon* which an early modern alchemical bibliography further describes as "A work of Arnaldus Castellanus, or of Villanova, familiarly conversing with the celebrated king of Aragon in these words."[7] But other manuscripts show that this is the dedicatory letter to the king of Aragon. In at least two manuscripts the *Rosa novella* is addressed to the marquis Peter, count of Flanders, but the only such person during Arnald's life-time was named, not Pierre, but Guy de Dampierre (1225-1305), marquis of Namur and count of Flanders. There was a Peter who was brother of the count of Flanders, but otherwise we know nothing of any relations of Arnald with Flanders, whereas he did have relations with Peter of Aragon. We therefore must view the author-

[5] FL Ashburnham Appendix 1916, 16th century, paper, sextodecimo, fols. 1-194, Allamanus magister de Bohemia, Compositio naturalis philosophiae ad Bonifacium papam octavum.

In the alchemical bibliography in Vatic. Barb. 273, fol. 253v, Fratris Alemani (alii dicunt Hermani) de Bohemia de lapide ad Bonifacium octavum pontificem: incipit, "Sanctissimo in christo patri. . . ." See also p. 140 below.

[6] Bologna University Library 168 (180), paper, 15th century, mm. 135 x 190, fols. 5r-11v, Liber de pratiqua aquarum roris madii datum pape Bonifatio VIII a domino Iohanne filio sororis carnalis dicti domini pape, opening, "Cum animadverterem . . ." and closing, ". . . in secula seculorum."

[7] Vatic. Barb. 273, fol. 245v.

ship of this tract with considerable suspicion. On the other hand, since Arnald really was closely associated with several popes and kings of Aragon and Naples, there is verisimilitude in his addressing such works to them, although forgers may have taken advantage of this fact. Nor is there the confusion and anachronism in the names and dates of those addressed which we shall encounter later in the case of alchemical writings ascribed to Raymond Lull. A tract on retarding old age is addressed to a prince or noble named Raymond, but this is scarcely sufficient to identify him, unless Raymond be a mistake for Robert, king of Naples. Another tract is addressed to a master of the Hospitalers, and there is an alchemical recipe which Arnald is said to have given him.

There appears to be no good reason for doubting that Arnald believed in the possibility of transmuting metals and wrote treatises on the subject.[8] It fits in with his hospitable attitude to other forms of occult science and arts, with the citations of him as an alchemist at an early date in the fourteenth century, and with such traditions concerning him as that which already in that same century attributed to him the making rods of gold artificially. The difficulty is rather to determine which of the works of alchemy ascribed to him are really his. Those addressed to Boniface VIII and to the king of Aragon are not attributed to any other author, although it does not follow that on this account they must be accepted as Arnald's. Other writings are contested with him by other authors, or there is some confusion as to which of several works by a given title is Arnald's. There is also the fact that the early editions of Arnald's *Opera* include even medical works of dubious authenticity such as the *Regimen Salernitanum,* the so-called translation from the Greek or Arabic of Costa ben Luca's *Epistle concerning Incantations,* and the remedies against sorcery and witchcraft found also in

[8] On this question see further Paul Diepgen, "Studien zu Arnald von Villanova: III, Arnald und die Alchemie," *Archiv für Geschichte der Medizin,* III (1910), 369-396. He accepts some treatises in whole or part as authentic. Diepgen used only three MSS: CLM 2848, Vienna 5230 and 5509, and discussed only a few of the alchemical treatises ascribed to Arnald.

editions of the much earlier Constantinus Africanus. Therefore we must be equally on our guard against ascriptions to Arnald based on insufficient or contradicted evidence in the case of alchemical works. On the other hand, some treatises which have hitherto been given to other authors we may find some reason for assigning to Arnald. It must also be admitted that we do not have many early manuscripts of the alchemical tracts ascribed to Arnald. There is a good deal of similarity and apparent overlapping of subject matter in the works ascribed to Arnald as we have them. Either he repeated himself in different treatises, or passages copied from his works have been combined under new titles. In either case there is a similarity and connection between the writings which were current in his name.

Many *Rosaries* and other flowery titles cluster about the name of Arnald of Villanova. That which there seems to be the most reason for accepting as his has the incipit, "Iste namque liber vocatur Rosarius. . . . " Another work which opens, "Said the author of the book which is called *The Rosary,* 'I descended into my garden to see the plants,' " might seem to merit the title *Rosarius* more than any other work. But it is sometimes referred to as *The Lesser Rosary* or *Rosarius Minor* or *New Rosary.* The third chief *Rosary,* sometimes called "of the philosophers"—as is Arnald's for that matter—and sometimes "of Toledo," from its supposed author, a philosopher of that town, is even more frequently ascribed to some John and notably to John Dastin, in connection with whom we consider it in another chapter. It is easily identified by its sonorous incipit, "Desiderabile desiderium, impretiabile pretium. . . . "[9] Even the "Iste namque liber vocatur Rosarius" which we are assigning to Arnald is represented as the *Speculum philosophiae* of this John Dastin in certain manuscripts. These three *Rosaries* are found in numerous manuscripts, were later printed, and appear to have been important works in the alchemical history of the later middle ages. Still another *Rosarius philosophorum* which it is necessary to distinguish

[9] It is ascribed to Arnald and said to be addressed by him to king Rupert or Robert in Vienna 5230, 1481 A.D., fols. 380r-389r, and in other MSS.

from Arnald's opens, "Qui desiderant artis philosophicae . . ."[10] It appears to have been written much later than Arnald's time, probably in the fifteenth century. It cites Arnald a great deal, also the alchemist Gratian, the commentary of Hortulanus on the *Emerald Table,* and works of alchemy attributed to Raymond Lull.

The title *Rosarius* was furthermore in at least one manuscript[11] applied to another work attributed to Arnald which we shall designate as the *Mystical Vision* and which was also sometimes called *Flos florum.* Also the *Perfect Mastery* to the king of Aragon bears sometimes the sub-title, *Parvum Rosarium.* Presumably, therefore, it is what a Bernardus de Gravia commented upon.[12] Yet another *Rosarius* may be noted which is not Arnald's nor ascribed to him in the manuscript of the fourteenth or fifteenth century where it occurs.[13] Its opening words are, "Lapis aquile cum sit nature pretiosissime nec sit ei ullus thesaurus comparabilis. . . ." Another anonymous *Rosary* opens, "Dividitur autem tota ista scientia. . . ."[14] There is still another alchemical *Rosary of Montpellier* which is said to date from before 1333, and is perhaps an extract from Arnald's.[15] Finally there are abbreviated rosaries[16] and an English *Rosary* which

[10] It was printed by Manget, II, 87 *et seq.*

[11] Vatic. 5846, fols. 3r-4r.

[12] BU 270 (457), 15th-16th century, XXV, 4; "Commentum magistri Bernardi de Gravia super parvo Rosario magistri Arnaldi de Villanova. Ingenium igitur . . . / . . . docet excitative." See also BU 303 (500), 15th century, fols. 1-62r: Florence Riccard. 386 (Lami N. III. vii).

[13] S. Marco fondo antico 324 (Valentinelli, XVI, 1), fols. 14r-20r. "Rosarii incipit primum capitulum . . . / . . . electis suis in ipsum credentibus cui sit gloria virtus honorque totus, Amen. Explicit Rosarius deo gratias, Amen." Its underlined quotations are chiefly from Hermes, though Bonellus and Pythagoras are also cited. The following rubrics occur in the text: fol. 14r, Quid sit radix operis et ex quibus ipse generatur; fol. 15v, Quomodo contraria permisces et repugnantia facies convenire; fol. 17r, Qualiter ymixtionem facies de contrario in contrarium in preparatione; fol. 18r, Quomodo coagulare debes argentum vivum cum sulphure; fol. 19v, Quedam utilia continentia opus in generali.

[14] Cambrai 920 (819), 15th century, paper, fols. 1-21: "Rozarius super philosophico lapide."

[15] BN nouv. acq. français 4141, fols. 1-25r; see Berthelot, I (1803), 354. Its incipit at fol. 1v is, "Lo primier regimen de la nostra peyra es dissolvre . . ." which corresponds to the second chapter of the second book of Arnald's *Rosarius,* "De primo regimine quod est dissolvere."

[16] Manget, II, 133-134, Rosarium abbreviatum ignoti e manuscripto vetustis-

opens, "Roses flower white as snow and red as blood. . . ."[17]

The *Rosarius* which there seems the most reason for accepting as Arnald's is also the longest of his alchemical treatises. Sometimes it is called *The Treasure of Treasures, Rosary of the Philosophers, and greatest secret of all secrets*. As was common, it is divided into two books of theory and practice containing ten and thirty-one or thirty-two chapters respectively. The epithets, *Rosarius minor* and *Rosarius maior* were sometimes applied to these. Arnald professes at the start in his prohemium to avoid concealment, devious ways, or omission by abbreviation, but he is prepared for an "arcane series of reasoning," and repeats the familiar warning that wide and deep reading is necessary before one can presume to practice the art. Moreover, although professing to have omitted nothing essential, he explains that he has called his work the *Rosary* because he has abbreviated it from the books of the philosophers as best he could. Such a statement is not necessarily, however, an admission that there is nothing new in the book. As the *Histoire littéraire de la France* says, the author believes that he has divined the common secret of Plato, Aristotle, and Pythagoras. As recent an authority as Albertus Magnus is also cited. Whether Arnald's *Rosarius* was the first considerable alchemical treatise to bear that title and passed it on to the other *Rosaries,* is hard to say with certainty. If so, their adoption of that name would be a sign of the diffusion and popularity of the original treatise. The *Histoire littéraire de la France* calls it a very popular book and asserts that manuscripts of it are too numerous to mention, but since it does not mention them,[18] one cannot tell how far they might prove to include other *Rosaries* than that which we have reserved for Arnald. It was printed separately as well as in his collected works, and there were also several translations.

Considering in his first chapters the commonly accepted theory

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simo, opening, "Adverte carissime quod quae sequuntur verissima sunt intelligentibus. . . ."

[17] BU 138 (104), 1476-1477 A.D., fols. 301r-308v, "Rosarius Angli. Florent rose nivee sanguineeque. . . ."

[18] HL No. 48.

of the generation of the metals from quicksilver and sulphur, Arnald lays the emphasis upon the former rather than the latter, a tendency which we shall find is continued by other writers of the century such as John Dastin and Bernard of Treves. Quicksilver is the medicine of metals, extraneous or common sulphur is the cause of their imperfection. Quicksilver alone is the perfection of metals, and it contains its sulphur inherent in itself. This was to be a favorite and prevailing theory of transmutation in the fourteenth and fifteenth centuries, that gold and silver could be made artificially from mercury alone—using perhaps a little gold or silver to initiate the process—and that they could be produced in no other way. This seems the work's chief positive and forward-looking teaching. More trite generalizations are repeated, such as that the philosophers' stone is one—to which, indeed, the interpretation that it is of mercury alone adds new strength. Arnald believes that it is difficult or impossible or at least too long and expensive to reduce the metals to first matter. The elixir must be purer and better than gold and silver, if it is to raise the less perfect metals to their status. But moderns think that they are at the end of their work when they have only begun, and that they have completed the perfect elixir when they have only reached the stage of gold and silver. The result is that when they attempt projection they fail and desist from working where they should have begun.

In the practical section of his treatise Arnald first sets forth a regimen of sublimating, dissolving, and purifying mercury which he says is only for the rich and exalted to venture to undertake. He then takes up three other regimens, but since they involve separation of the four elements, they do not seem much easier or cheaper. Such separation of the elements was, however, to be a familiar feature in many other alchemical treatises of the fourteenth and fifteenth centuries and of other works attributed to Arnald himself.

Another point on which considerable stress is laid is that of relative weights. First we are told that the weight of the ferment

should exceed that of the sulphur[19]—not vulgar sulphur of course. Later it is more definitely stated that for one pound of white sulphur there should be three of ferment. Likewise in recombining the elements after their separation exact proportions must be observed. Thus for producing silver a pound and a half of air should be combined with two pounds of water and three pounds of earth. In the case of gold there should be a pound and a half of fire, two pounds of earth, and three pounds each of water and air. The information is further imparted that the weight of fire is half that of water.[20] Such were the first lurching, ludicrous steps of quantitative chemistry in its infancy. But it was learning to walk. At all stages of the process the alchemist should know the amount of each element present and the relative heat or cold, dryness or moisture. In solution cold and wet are greater, hot and dry are less. In ablution wet and hot exceed cold and dry. With reduction to first matter, hot and cold are less, and dry and moist greater. With fixation cold and dry are greater, hot and wet less, "since in fixation of the stone we oppose to it mercury hot and wet prepared beyond what it had naturally before its solution."[21]

Arnald is sometimes credited with a commentary on his own *Rosary*[22] and also apparently on the *Rosary* opening, "Desiderabile desiderium . . . , " and which is sometimes called *Rosarius Phebi*.[23] In the course of this commentary a reverend father is addressed.

A *Rosa novella* was also current under Arnald's name. In fact, there appear to be two versions of it with different incipits. One version is addressed to the so-called marquis Peter, count

[19] FL Ashburnham 1451 (1374), *Rosarius* II, 20, "Quod pondus fermenti debet excedere pondus sulphuris." BN 7149, fol. 9r, II, 20: "Quomodo pondus fermenti in aqua debet excedere pondus sulphuris in terra."

[20] FL Ashburnham 1451, II, 24, "De ponderibus observandis in fixione." BN 7149, fol. 9v, II, 24, "De ponderibus in fixione."

[21] FL Ashburnham 1451, II, 23, "Quomodo debemus servare quantitatem cuiuscumque rei;" Vienna 5510, fol. 15r. BN 7149, fol. 9r, II, 22; "Quomodo debes observare quantitatem uniuscuiusque."

[22] See Appendix 4, *Verba commentatoria*, and DWS No. 243.

[23] See DWS No. 231.

of Flanders, who has induced Arnald to write it because of their close friendship. Arnald, after remarking that all men must die, speaks of having traveled to many parts of the world,[24] which resembles the incipit of the dedication of the *Perfect Mastery* to the king of Aragon in which he tells of wandering from region to region by the divine will. The philosophers say that there are four masteries of this regimen, dissolution, distillation, contrition, and fixation, to each of which Arnald devotes a chapter. Then there follow four brief books. Such past philosophers are cited as Plato, Rosinus, Lilius, Galen, Democritus, Hippocrates, and Pythagoras.[25] The version with the other incipit does not specify "the most noble man" whom it addresses. It also consists of four very brief "books" but of nothing more.

The idea involved in Arnald's *Rosarius* of a culling from the works of the philosophers likewise characterizes another treatise with a floral title which was ascribed to him, namely, the *Defloratio philosophorum*. It occupies only a page in what is perhaps the sole extant manuscript. But since it assumes to treat of ancient secrets and of "many arduous, varied, and diverse matters according to the opinions of those who preceded the moderns," it may be incomplete as it stands. As it is, it touches especially on the influence of the celestial bodies in alchemy—a hypothesis to which Arnald would have had no objection.

The authenticity of a *Golden Rose* ascribed to Arnald is even more doubtful, although he would very likely have agreed with its precept that "the whole benefit of this art is in gold and in mercury or in mercury and silver," and that a gentle fire should be used and a vase of glass. It makes a less hackneyed observation when it further asserts that no generation and corruption of things takes place except by continuous movement of the air and temperate heat. A notice in an early modern alchemical

[24] BU 164, fol. 126r; "Ego Arnaldus de Villanova multas partes mundi circumivi et in mundo inveni mendicando labores et operando assiduus quod quesivi."

[25] I describe the text as found in BU 164 and am not sure that S. Marco VI, 214 is throughout identical. Its only rubric in the course of the text is, fol. 59v, "De multiplicatione medicinarum."

bibliography admits that some question its attribution to Arnald. The work itself occurs in an alchemical collection of 1472.

The title or sub-title, *Flower of Flowers* (*Flos florum*), is another source of confusion among alchemical writings ascribed to Arnald. Sometimes it appears as an alternate caption for the *Perfect Mastery* (*Perfectum magisterium*), a brief treatise addressed to the king of Aragon. Oronce Finé in the sixteenth century further distinguished or confused it as the *Little Rosary* (*Parvum Rosarium*), upon which, as we have seen, there is a commentary by Bernardus de Gravia. Sometimes, however, another book was ascribed to Arnald under the title, *Flos florum,* opening, "O reverend father, I give thanks to God,"[26] which perhaps may be identified in whole or part with the *Semita semitae.* Neither of these is the same as *The Flower of the King* (*Flos regis*) or epistle sent to the king of Naples. Incidentally it may be noted that *Flos regis* is also employed as an alternative title for the *Stella alchimiae* of John Bumbeles, dated in 1384. The title, *Flos florum,* is further given to a treatise, also known as *The Mystical Vision* (*Visio Mystica*) which opens, "Vidi senem nimia claritate fulgentem. . . . " But this treatise is also ascribed to a John of Gascony or to a John Basto who was buried in Antwerp—names which are possibly corruptions of John Dastin. The title, *Flos florum,* however, seems to be given to it only in those manuscripts which assign it to Arnald of Villanova. He therefore appears to have a strong claim or lien upon this title, although to which of his works it should properly be applied is uncertain. Whether John or Arnald should be ceded the vision of the old man is not a matter of great moment. Any alchemical writer was not unlikely to express himself in this visionary form

[26] Listed in Vatic. Barberini 273, fol. 245v: liber alius sub titulo Flos florum, "O reverende pater gratias deo ago. . . ." This is essentially the incipit of DWS No. 226, "Theorica et Practica magistri Arnaldi de Villanova ad sanctissimum patrem," but the text is there incorrectly identified with Manget, I, 679-683, which is the *Perfectum magisterium* or *Flos florum* to the king of Aragon with a different incipit. However, as we shall see presently, there is not much difference between the *Perfectum magisterium* and the *Semita semitae.*

of allegory. This one details seven operations. There appears, however, to be or to have been yet another *Flos florum* which is described as taken from the books of medical men and the experiments of the philosophers and as the first book of the greater *Mappae clavicula*.[27] No author is mentioned.

While we are on the subject of floral titles of alchemical works we may note a passage from the *Semita recta* ascribed to Albertus Magnus in which he is represented as saying: "Now I have taught you to collect various flowers full of good odors and redolent with health and beauty with the glory of this world. This is the flower of flowers, the rose of roses, and the lily of the valley. Rejoice therefore, youth, in thy adolescence and gather flowers, for I have introduced thee to the gardens of Paradise."[28] As this passage suggests, such floral titles were extended from the rose to the lily. One *Lilium* is much cited as if it were the best known and presumably the oldest. But there seem to be plenty of others.

A *Flower of the Lily* is ascribed to Arnald himself in an alchemical collection made at Vienne in 1476-1477, where it is immediately preceded by his *Rosarius* and letter to the king of Naples and immediately followed by his *Perfect Mastery* to the king of Aragon and *De secretis naturae*. A remarkable feature of this work is that the author, who keeps repeating that he does not lie but is telling the truth, once swears to this effect "by the family of Mahomet."[29] Otherwise the treatise is a turgid mixture of mystic phraseology and practical instructions. In addition to the usual patter concerning soul and spirit and body, male and female, the king and his wife, death and resurrection, sperm and generation, the dragon who never dies except with his brother and wife and sister, and the water with its dried vapor which is called venom, we hear of the boy from the east and the old

[27] I take the description from the bibliography of alchemical works in Vatican Barberini 273, fol. 278v, which further gives the incipit as "Liber floris florum . . ." which also serves to mark it off from the *Flos florum* attributed to Arnald.

[28] BN 7162, fol. 44v.

[29] BU 138 (104), fol. 126r, "veritatem dixi per familiam Machometi."

man from the west, and of our dog, wolf, camel, ship, and narcissus.

Another *Lily* associated with Arnald's name does not profess to be more than a commentary upon his enigmas by Paul Romanus de Vesinis.[30] Another is described as a commentary on the *Turba philosophorum*[31] and is largely composed of citations from that work, although other authorities like Geber are also adduced. It speaks of itself as "torn, as 'twere, from thorns."[32] Sometimes it is called *Lily of the Flower*[33] or *Lilium Paridis*,[34] the last word being the name of a philosopher and not a misspelling for paradise. But we shall hear later in this chapter of a *Flower of Paradise*. One manuscript of the *Lily* suggests the name of Sarne as author;[35] another names brother William of Tunis, provincial of the Dominicans.[36]

A *Lily of Intelligence*, in dialogue form, is variously ascribed

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[30] Vatic. Barb. 273, fol. 296v: Lilium philosophorum editum per Paulum Romanum de Vesinis qui declarat enigmata magistri Arnaldi de Villanova. It opens, "Materia est res una vilis. . . ." In Wolfenbüttel 3282, fol. 126r (old numbering, 96), a treatise with a like incipit, "Materia lapidis est res vilis pretii ubicumque reperibilis . . ." follows two tracts on alchemy by Arnald, but this time neither Arnald nor Romanus de Vesinis is mentioned.

[31] Vatic. Barb. 273, fol. 296r: Lilium super Turbam philosophorum, opening, "Naturam circa lunam et solem. . . ."

It was printed in *Harmoniae chymico-philosophicae*, Frankfurt, 1625, II, 338-371, with the titulus, "Incipit Lilium alchymiae quod composuit Rosarius et potest dici Rosarius Minor."

[32] BL Ashmole 1384, 14th century, fol. 65r: "Huius autem libelli titulus, Lilium utpote de spinis evulsum." BU 747 (1492), 15th century, fols. 1r-15v: "Lilium de spinis evulsum. Naturam circa solem . . . / . . . in omnibus explicavi." BN 7156, 14th century, fols. 148r, col. 1-153r, col. 2.

[33] BU 139 (105), 14th century according to Frati, pp. 341-388: "Incipit liber qui vocatur lilium floris. Natura circa solem . . . / . . . dicitur." BU 303 (500), 15th century, fols. 204r-209v: "Excerpta ex libro qui intitulatur lilium florum." Cues 201, fols. 111-112: "Hec sunt notabilia que secuntur in fine libri qui vocatur Lilium floris."

[34] CU Corpus Christi 99, 15th century, pp. 109-122: "Incipit liber Paridis philosophi capitulum primum. Natura circa solem et lunam. . . ." In the same MS Paridis is associated with Arnald of Villanova in a commentary on the *Rosarius*.

[35] BL Ashmole 1384, fol. 65r: but only in a later hand in the margin. See DWS No. 335 for other MSS of this *Lilium* from the 15th century.

[36] Cues 201, 15th century, fols. 71v-83: "Natura circa solem et lunam . . . / . . . regnat in secula seculorum, Amen. Explicit liber editus a fratre Guillelmo de Tunisio provinciali de ordine predicatorum." Allusion is also made to "huius autem libelli titulus lilium utpote de spinis avulsum."

to a master of the art at Florence, to the philosopher, Sarne, to a Uguictius,[37] to Arnald of Villanova as his *Book of the New Testament*,[38] and even to Raymond Lull.[39] Another lily torn from thorns is attributed to a William of Pavia or Tecenensis who is described as a provincial of the order of friars preachers[40] and of whose name the aforesaid William of Tunis presumably is a corruption. Berthelot dated the work of William of Pavia in the fourteenth century but gave no proofs,[41] while Ruska more recently has followed Ferguson in dating William around 1600.[42] The manuscripts show Berthelot's dating to be more nearly correct. Still different from the foregoing, if we may judge by their incipits, are a *Lily among Thorns*, copied in 1489 from a very corrupt and abbreviated manuscript,[43] and a fragment of a *Blessed Lily among Thorns*,[44] which in another manu-

[37] Vatic. Barb. 273, fols. 39r and 298r: "Lilium intelligentie per modum dialogi magistri artis de Florentia. Ad compositionem huius opusculi. . . ." BU 143 (110), 16th century, fols. 64v-77r: "Sarne philosophus, Lilium intelligentiae philosophorum. Ad compositionem . . . / . . . vitam eternam consequi." For Uguictius see DWS, No. 161, opening, "Ad compositionem uniuscuiusque opusculum . . ." or, "Fili karissime, scias spiritus domini qui ferebatur super aquas. . . ." This latter incipit is sometimes assigned to John of Damascus: Carbonelli (1925), p. 47.

[38] Wolfenbüttel 3076, fols. 45r-51r: "Incipit liber novi testamenti Arnoldi de Villanova."

[39] Wolfenbüttel 3282, late 15th century, fols. 177r-181v: opening, "In nomine domini, Amen. Fili carissime, scias spiritus domini qui supra aquas. . . ." In the top margin of fol. 177r is written, "Raymundus Lullius autor est huius Lilii."

[40] Zetzner, IV (1659), 887-911: "Liber Guilhelmi Tecenensis provincialis de ordine fratrum praedicatorum . . . / . . . Explicit Lilium de spinis evulsum 13 die Februarii anno domini 1557 transcribente Gregorio Macro Szepsio Pannone artium ingenuorum (*sic*) baccalaureo Cracoviae in gratiam eximii D. Georgii Ioachimi Rhetici facultatis medicae et mathematicae doctoris."

The work is attributed to William in Cambrai 919, 14-15th century, fols. 38*bis*-44v, "Lilium floris, utpote de spinis evulsum, in quo primo luna secundano (*sic*) sol ordinatur incipit;" and is anonymous in BU 270 (457), XXXIII, 3, pp. 1-51. In all cases the incipit is practically the same: "Ars ista ceteris longe preferenda est. . . ."

[41] *Berthelot, La chimie au moyen âge*, I (1803), 273.

[42] Ruska, *Turba philosophorum*, 1931, p. 345.

[43] Vienna 5230, fols. 389v-392v, "Lilium inter spinas incipit. Prologus. Lapis rubicundus nigram duxit . . . / . . . Explicit lilium inter spinas de libro multum corrupto et abbreviato quare corrigat qui potest. 1489 in oct. Martini."

[44] Vienna 5500, 15th century, fol. 256r-v: "Incipit Lilium inter spinas benedictum. Tres concipit luces decoquitur luce . . . / . . . et vitam eternam in futuro. Das ist der text der zum buch gehort spina." In BL Canon. Misc. 81, 15th century, fols. 1-25, the incipit is

script is ascribed to Thomas Aquinas.[45] Still another lily from thorns is attributed to the above named Paul Romanus de Vesinis.[46] We hear of yet other alchemical lilies,[47] including one ascribed to Blasius of Parma,[48] probably with little reason, while in a fifteenth century manuscript is an extract "from the book of the Lily of Flowers and it is the book of Galen."[49]

As for floral names in general, it is somewhat of a question whether the alchemists or physicians were the first to adopt them, since, of two medical confrères of Arnald of Villanova, Bernard Gordon began the composition of his *Lilium* in 1305 and John of Gaddesden wrote his *Rosa medicinae* in 1305-1307. Also a surgical work of the early fourteenth century by Bongianus de Orto of Arezzo was called *Spinea rosa* or *Rosea spina.* Such titles as *Rosarius* and *Floretus* were even applied to theological dictionaries and there was a theological *Flos florum.*

The *Rosarius,* as has been said, is the longest of Arnald's alchemical treatises. Indeed, most of the other works which appear to be his are relatively brief expositions of the art or of some particular feature of it and were written in many cases for some individual, whether pope, cardinal, king, or lesser personage. The *Novum lumen* or *New Light* is such a work. That it

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lacking on fol. 1 and apparently is found on fol. 25, where are verses opening, "Tres concipit luces decoquitur terrena . . ." while at fol. 24v is the ending, ". . . et vitam eternam in futuro, Amen. Explicit lilium benedictum inter spinas feliciter." DWS No. 161, v lists fols. 1-24 as Uguictius, Lilium intelligentiae, and fol. 25 under No. 840 as anonymous.

[45] Vienna 5510, fols. 264r-271r. See also Zetzner, IV (1613), 1082-1099, S. Thomae de Aquino opus excellentissimum, Liber Lilii Benedicti.

[46] Vatic. Barb. 273, fol. 297r, Lilium eiusdem de spinis, opening, "Sciendum est autem quod lapis philosophorum ad veram lunam. . . ."

[47] *Ibid.,* fol. 297r, Ex libro Lilii spiritus domini ferebatur super aquas; and fol. 298r, Lilii liber prologus incipit, "Ad compositionem uniuscuiusque opusculi;" cap. 1 incipit, "Nunc igitur qui habet aures audiendi. . . ." But these may be identical with that mentioned in note 37. Klagenfurt Bischöfl. Bibl. XXX.d.6, 15th century, fols. 62r-69r: Dialogus inter magistrum et discipulum de lapide philosophorum, has the same incipit, "Ad compositionem uniuscuiusque opusculi. . . ."

[48] Vatic. Barb. 273, fol. 298v, Lilium magistri Blasii de Parma. No incipit is given.

[49] DWS No. 155. Other Lilies Torn from Thorns in late manuscripts which I have not identified but cite from the catalogue are: CLM 25115, 16th century, fols. 158-171, Lilium e spinis evulsum; CLM 26059, 1507-1508 A.D., fols. 128-139, Lilium ex spinis evulsum.

is apparently addressed to some pope or prelate, who is called at the beginning "Father and reverend lord," and in closing "your paternity,"[50] is favorable to Arnald's authorship. The fact that the writer represents himself as "not assiduous in study," as not a clergyman, yet as inspired by God, may seem not wholly to fit Arnald. For while he was a layman, in the *Rosarius* he urged the importance of reading, and his works show him to have been a voluminous composer. Since, however, the author of the *New Light* cites past writings such as Aristotle, Galen, and the *Turba philosophorum,* his denial of assiduity in study should perhaps be regarded as more modest than strictly accurate. And in fact Arnald in his medical writings speaks of himself as a rural practitioner without literary culture. But the allusions of the author of the *Novum lumen* to his master, who, he says, was the only person he ever saw who employed the right method in transmutation are not paralleled in other alchemical writings of Arnald which I have seen, although his medical *Breviarium practicae* contains like allusions to his master, John Calamida. It is doubtless these allusions to his master which have caused the treatise to be entitled *The New Light of the Young Expert* in Zetzner's edition and in at least two manuscripts of it. It is called the *Practica* of Matthew of Sicily in one manuscript of it[51] and *The Book of Clarity of master Matthew of Sicily* in another. This last named manuscript is a codex of the fifteenth century[52] which seems furthermore to make rather a point of assigning its component treatises to outlandish or otherwise unknown authors such as Vemaldus, Paulus de Tarento, reader of the minorites in Assisi, Lucidius, and Petrus de Zelence. And why should not the writers of alchemical manuscripts sometimes ascribe their treatises to unfamiliar instead of familiar names? They have often been accused of saddling later fabrications on great authors of the past. But we also find

[50] This closing passage is printed in the 1504 edition of Arnald's *Opera,* fol. 394v, and in Manget, I, 679, col. 2, but not in Zetzner, IV, 940.

[51] BM Sloane 3744, 15th century, fols. 72v-76v: DWS, No. 326.

[52] John Rylands 65, fols. 169-172v: DWS, No. 326.

evidence of their having sometimes credited the works of known authors to less well-known and possibly fictitious personages.

The *Turba philosophorum* is so much cited in the *Novum lumen* that the latter may almost be said to be based upon it. After defining the philosophers' stone as quicksilver, not however in its natural state but as artificially produced in alchemy, and as found on the mountain top, the *Novum lumen* proceeds to detail the alchemical process under the headings of purification, decoction in the first, second, and third degree, calcination, and fixation. The discussion of decoction includes instructions as to the furnace and vessels. From black the stone turns to white, but there is an intermediate stage when it is brown outside but still black inside, as the author's master proved by breaking the vase and stone at this juncture and inspecting the latter inside and out. His explanation of its condition was that the exterior was first affected by the heat as being nearer the sides of the vase. Finally, after white in its turn has altered to red, and vessels and fires have been changed, the process results in separation of a red impalpable powder from a black earth which lies at the bottom of the enclosing vase. This, according to our author's master, constituted the perfection of fixation, because the impalpable red powder could be used as an elixir in projection to transmute baser metals on a large scale, while the separation from it of the black earth meant that all impurities impeding the ingress of pure nature had been removed. The only problem remaining was how to fuse this red ash with other substances in order to transmute them. Our author declares against dissolving it in water or resolving it into a water and cryptically remarks that anyone who knows how to make glass will know what to do with it.[53]

[53] I have based this analysis on the printed text in the Lyons, 1504 edition of Arnald's *Opera*, fols. 393r-394v; in Zetzner, IV, 934-940; and in Manget, I, 676-679. Since the edition of 1504 is rather inaccessible and its text seems the basis of all subsequent printed editions, it may be described somewhat further. After the titulus, "Nouum lumen," and the paragraph of address opening, "Pater et domine reuerende licit liberalium existam . . ." comes the heading, "Hic incipit tractatus in quo nominat lapidem philosophorum,"

Although this text was printed in all editions of Arnald's works and elsewhere under his name, Mrs. Waley Singer prefers to follow the two English manuscripts in ascribing it to Matthew of Sicily, since no British manuscript before the sixteenth century gives it under Arnald's name. Neither, so far as I have been able to ascertain, does any continental manuscript before 1500 do so.[54] The *Novum lumen* occurs as the work of the young expert in an alchemical collection made at Vienne on the Rhone in 1476 and 1477 A.D.[55] It is, however, referred to by its incipit as Arnald's in an English manuscript of the fifteenth century which moreover has the title, "Novum lumen secundum Arnaldum de Villanova,"[56] although from Mrs. Singer's placing and description of it this would not seem to be the same text as that found under Matthew of Sicily's name. But at least the author of it regarded Arnald and not Matthew of Sicily as author of the *Novum lumen* which opened, "Father and reverend lord . . . , " and did not regard as the *Novum lumen* of Arnald the text with a different opening which Mrs. Singer accepts as Arnald's[57] and under which—instead of under Matthew of Sicily—she also lists this third, *Novum lumen secundum Arnaldum de Villanova*. Moreover, judging from her description various other titles such as *Gloria mundi, Lux solis, Liber luminum, Liber quinque clavium, Liber divinitatis, Liber secretorum,* would

followed by the text opening, "Intellige ergo dictum philosophi. . . ." The last paragraph, headed, "Conclusio totius epistole," opens, "Ergo pater non miremini . . ." and ends, "Ob paternitatis vestre reuerentiam nouum hoc lumen edidi super ea quoniam inter mundi ceteros vos elegi hac re meo iudicio digniorem et altissimus vos pervenire faciat ad optatum." Finally comes the heading, "Explicit iuuenis experti liber qui dicitur Nouum lumen."

[54] Diepgen, *Archiv. f. Gesch. d. Medizin*, III (1910), 382, dismisses it as apocryphal.

[55] BU 138 (104), fols. 167v-170r. Liber iuvenis experti qui dicitur novum lumen.

[56] BM Sloane 1091, fols. 162-164, "Novum lumen secundum Arnaldum de Villanova. In tractatu qui vocatur Rosarius philosophorum vel ut verum dicam in tractatu qui vocatur Novum lumen qui incipit hoc modo; Pater et domine reverende. . . ." For the explicit see DWS No. 232.

[57] The incipit of the prologue is, "In nomine domini nostri Ihesu Christi et per virtutem eius nominatur liber iste Gloria mundi. . . ." The text proper opens, "Lapis noster quem omnes philosophi querunt. . . ." See DWS No. 232 for further details.

seem to have an equal or better claim to be applied to the work which she accepts as the *Novum lumen* of Arnald. In fact, in continental manuscripts this very treatise is ascribed to a Wymandus de Ruffo Clipeo with the title, *Gloria mundi*.[58] Indeed, it bears his name in one at least of the two English manuscripts of it listed by Mrs. Singer.[59]

The alchemical bibliography in the Barberini manuscript which listed some twenty-one titles under the name of Arnald of Villanova and implied that only fifteen were genuine,[60] did not include even among the twenty-one any *Novum lumen* or other treatise either with the incipit, "Father and reverend lord . . . " or those openings listed by Mrs. Singer. Under the title, *Lumen novum,* it listed two works neither of which seems identifiable with what Mrs. Singer has called the *Novum lumen* of Arnald but one of which has the incipit, "Father and reverend lord." This, it remarks, has been printed with the other works of Arnald of Villanova, but it evidently doubts its authenticity.[61] The other *Lumen novum,* which also appears to have been printed, would seem from its title and incipit and closing words, all of which the bibliography scrupulously reproduces,[62] to have been a different treatise from any of those yet mentioned, suggesting that the problem of the title, *Novum lumen,* which we leave for the time being, still needs a good deal of new light.

In the *Perfect Mastery and Joy* sent to the king of Aragon, a treatise which as we have seen is sometimes called *Flos florum* or *Parvum Rosarium* and which appears in a late manuscript at

[58] Cassel Chem. Folio 10, 15th century, fols. 29v-35r, and Wolfenbüttel 3107, 15th century, fols. 31r-42; both with the same prologue incipit as is given in the preceding note.

[59] BL Ashmole 1450, 15th century, fols. 18r-23v. In the course of the prologue on fol. 18r we read, "Ego Wimandus medicus minimus philosophorum dictus de Rupho clipeo." This indication of authorship is not noted in Black's *Catalogue of the Ashmolean Manuscripts,* 1845.

[60] Vatic. Barb. 273, fols. 243r-245v.

[61] *Ibid.,* fol. 297v, "Lumen novum ab homine experto compositum super lapidem philosophorum. Pater et domine reverende licet liberalium artium . . . / . . . et altissimus nos pervenire facit ad optatum."

[62] *Ibid.,* fol. 297r, "Lumen novum editum ubi multa secreta in opere lapidifico panduntur. Et primo de purgatione et mundificatione lapidis. Fili sume laminas tenuas . . . / . . . ad peiora flagitia perpetranda excedunt."

Naples under the title, *Lumen luminum,* Arnald again as in the *Novum lumen* lays claim to inspiration. The *Histoire littéraire* has already pointed out that the printed text of this work not only lacks the dedicatory letter to the king of Aragon but is so abbreviated and altered in the text proper "that it is no longer the work of Arnald," as we find it in the manuscripts. Arnald tells the king that for a long time he failed to grasp the hidden meaning of the ancient philosophers until the Holy Spirit opened his eyes. The assertion is made that mercury is the sperm of all the metals, and considerable space is given to rehearsal of the errors of other alchemists ("philosophers") who have tried to work with other substances or have not made proper use of quicksilver. On the other hand, there are throughout the treatise numerous quotations from the *Turba* and Morienus. The work divides into a theory and practice. Under the latter four "Words" deal with the separation of the elements.

The *Semita semitae*[63] is in large part textually identical with the *Perfect Mastery.* It, too, affirms that mercury is the sperm of all metals. It has the same division into theory and practice, the same citations of the *Turba* and Morienus, and the same four "Words." It is, however, not addressed to a king of Aragon but to a reverend father who is saluted again twice in the course of the work and who in the printed version is identified with Benedict XI. This does not prevent the author from calling him "son" once as well.[64] This might be thought a slip on the part of someone making over the *Perfect Mastery* into the *Semita semitae* who failed to change a passage in which the king was addressed as "son." Unfortunately for this theory there seems to be no corresponding passage in the *Perfect Mastery.* The *Semita semitae* further diverges from that work in omitting the rehearsal of the errors of other alchemists and in adding, at

[63] Printed as his in *Artis auriferae quam chemiam vocant,* Basel, 1572, I, 468-479; Manget, I, 702-704. Anonymous in the MSS but sometimes with other works ascribed to Arnald.

[64] Vatic. Palat. 1329, fol. 82r; Manget, I, 703, col. 1; "Rogo ergo te, fili, ut practicam meam non vilipendas quia in ea latet totum magisterium." DWS No. 797, Pope Bonifacius IV or Arnaldus Grecus, De quatuor verbis, might seem to involve some confusion with one of Arnald of Villanova's works addressed to a pope, but the incipit is unfamiliar, "Terra stat et est frigida et sicca. . . ."

least in one manuscript version, an alchemical vocabulary and definitions.[65] It may be said that Arnald utilized practically the same material in writing to the king and to the reverend father. Or some imitator may have used the *Perfect Mastery* to concoct the *Semita semitae.*

Partially at least identical with the *Semita semitae* seems a work *To his Friend,* or *Direct Method* ascribed to Raymond, presumably Lull, in another fifteenth century manuscript.[66] It similarly addresses a reverend father and contains the same four "Words."[67]

This *Semita semitae* furthermore appears to be identical in whole or part with one or more of the *Practica's* ascribed to Arnald. What Mrs. Waley Singer has listed under the caption, *Theorica et Practica*[68] seems the same except for an altered order, so that "Venerande pater, gratias deo . . . " forms the incipit instead of occurring near the close. This is perhaps also the origin of the attribution to Arnald of a *Flos florum* with the similar incipit, "O reverende pater, gratias deo ago. . . . "[69] In a Vatican manuscript the work with this incipit is called *The Errors of Alchemy* but includes a *Practica.*[70]

Other *Practica's,* however, have been ascribed to Arnald. That which the *Histoire littéraire*[71] so designates and which was printed by Manget as such, has a different opening address to a pope.[72] That which Zetzner printed as Arnald's *Practica*[73] is regarded by Mrs. Waley Singer as part of a *Tractatus nobilis in*

[65] Vatic. Palat. 1329, fol. 86r *et seq.* Omitted in the printed version.

[66] FL Ashburnham 191 (123), fols. 35r-47v, "Liber Raimundi ad amicum suum. Pater mi clementissime dixi ergo tibi quod oportet prius corpora in primam materiam reducere ad hoc ut fiat multiplicatio in eisdem. Intellige et inclina aurem tuam . . . / . . . Et cum ad hoc perveneris lauda Ihesum Christum creatorem altissimum super omnia que tribuit tibi. Amen. Explicit methodus directus deo gratias."

[67] *Ibid.,* fol. 35v, immediately following the sentence, "Nunc revertamur, pater reverende, ad prius dicta singulariter applicatis super eis verbis philosophorum ut intelligas et ipsos verba protulisse assumas."

[68] DWS No. 226.

[69] Vatic. Barberini 273, fol. 245v, "liber alius sub titulo Flos florum."

[70] Vatic. Palat. 1330, fols. 127r-135r; see Appendix 4.

[71] HL No. 65.

[72] Manget, I, 684, col. 2-687, col. 1: "Practica ad quemdam papam ex libro dicto Breviarius librorum alchemiae, Sanctissimo in Christo patri devotissimo post pedum oscula beatorum. . . ."

[73] Zetzner, III, 137-143.

arte maiori by him.[74] Such treatises will perhaps, if sufficiently examined, be found to be more or less identical with the second book of Arnald's *Rosarius* devoted to practice. A *Practica* in six brief parts, found in a late manuscript, is called an extract from Arnald's *Elucidarium,* but the sole known text of such a work is that in French found in the same manuscript. The *Practica roris madii* may have been suggested by the medical *Recepta electuarii mirabilis praeservantis ab epidemia* ascribed to Arnald and which opens, "Take May dew collected from the purest herbs. . . ."[75]

The questions and replies in Arnald's tract to Boniface VIII are neither spontaneous nor analytical but a mere literary device and are so arranged as to develop the alchemical process in about the usual way. The main idea is that transmutation is to be worked by treating gold and silver and also a certain amount of baser metal with a mineral *aqua vitae,* composed not from lead but quicksilver. When the water is combined with the baser metal, there should be four parts of water to one of the metal. When it is combined with the gold and silver, the ratio should be twelve to one. This might seem a slow and expensive process, but it is expected ultimately to obtain an elixir of which one part by projection will turn one thousand parts of baser metal into gold and silver that will stand every test. The treatise contains an interesting allusion to Montpellier and Spain which tends to support Arnald's authorship. Asked how the true mineral water may be distinguished from water of lead, he replies that at Montpellier skins are brought from Spain sealed with the seal of Spain to prevent false imitations or adulteration and full of the mineral water. "Use it and you will not go wrong."[76]

The letter to pope Boniface repeats features found in other works ascribed to Arnald, notably the separation of the four elements, the division of the text into four "Words," the censure

[74] DWS No. 228.
[75] HL 28, No. 53.
[76] Vatic. Palat. 1320, fol. 94v, Questio viii. I find that Diepgen, *op. cit.,* p. 378, has already noted the passage as it occurs in CLM 2848 in briefer form. He states that it is lacking in Vienna 5230.

of foolish alchemists, and the citation of Rosinus, Morigenes, and various philosophers from the *Turba*. Arnald excuses himself for not coming to the pope in person, as Boniface had requested, on the plea that he is occupied with medical studies "which are difficult for moderns," and sends his letter instead. He advises the pope to take in the name of God one pound of the leavings of coppersmiths which fall from the mouths of their dogs, mix it with four pounds of May dew, grinding it hard with a little salt and vinegar until they are amalgamated. Then put in a good quantity of *aqua vitae* and cook very slowly for one natural day. Allow it to cool and express it through a linen cloth. But this is only the beginning of the process.

There is a text ascribed to Arnald which seems a sort of cross between the *Semita semitae* and the letter to Boniface VIII. It is represented as addressing some pope or prelate and, after verbally kissing his feet and asking him to incline his ears, plunges into practical directions for concocting the stone and separating the elements. Then, as in the *Semita semitae,* the author reverts to the *dicta* of the philosophers[77] and shows how they agree or can be made to agree with what he has said. Much the same text is given again in the same manuscript as a letter to pope Innocent,[78] so that there seems to be considerable confusion—in the last case very likely with Roger Bacon's letter to Innocent IV.

Yet another work with a similar opening but a quite different text is a *Practica roris madii* presented to Boniface VIII. It is not ascribed to Arnald in the only manuscript of it which I have seen, but it there immediately precedes the *Thesaurus secretus* or *De secretis naturae* ascribed to him. It has the resemblance to the letter to Boniface VIII that both deal in May dew.

Secrets of Nature is a common medieval title which goes back to Michael Scot's work on physiognomy at least, and which was

[77] Vienna 5509, fol. 260v, "Nunc dehuc pater revertor ad predicta singulariter applicans eis semper verba philosophorum. . . ."

[78] *Ibid.*, fols. 326-329v, "Epistola ad apostolicum Innocentium. Reverende pater aures vestras ergo inclinate et intelligite. . . ."

applied to more than one alchemical treatise. That ascribed to Arnald of Villanova, which also sometimes bears another title, "The Secret Treasure of Operations of Nature," is readily distinguishable, however, since it takes the form of a dialogue between master and disciple and is divided into six chapters which consider what the stone is, why it is called natural, why it is called animal or blood, why it is called herbal, its preparation, and finally its multiplication. The doctrine is maintained that gold, silver, and mercury are the only proper constituents of the philosophers' stone. "Sun, moon, Azoch are our stones." Since the stone should be incombustible, it is useless to employ salts and alums; one must use mercury. Nature really effects the transmutation of alchemy, and so the stone is called natural. It is called blood because of its color and fluid character, but only fools compose books saying that it is made of blood. At this third chapter in most manuscripts which I have seen is injected matter which seems foreign to its subject, the disciple expressing his readiness to "hear some precepts of this art." The master then states that one must be a philosopher, must have enough money for two years' expenses at least, must on no account put oneself under the power of any prince or magnate, and must be grateful to God whether success or failure attends one's efforts. In some manuscripts he further warns to reveal the secret to no one lest one be called a counterfeiter and evildoer, and admits that he was imprisoned once for a month on such charges, which probably was not true of Arnald of Villanova. In the Neapolitan manuscript the disciple's request is dismissed by the master with the assurance that there is enough on such points in Albertus Magnus, whose genuine work on minerals contains a list of the qualities requisite in an alchemist. The stone is called animal and herbal because it possesses a soul and not because it is made from animal or vegetable substances. The author knew a monk who labored for many years[79] but unscien-

[79] Twelve according to S. Marco fondo antico 324, fol. 12v; twenty in Naples VIII.d.20, fol. 122r.

tifically at this art until he became desperate. But he wrote a book entitled *Flower of Paradise* (*Flos paradisi*) containing innumerable recipes[80] and gave it to others to copy and thereby deceived many including himself, for he was really out of his mind. With this the fourth chapter ends.

The fifth chapter on the preparation of the philosophers' stone is a great secret which the author did not discover himself but derived in part from his brother, in part from a German monk. So far as the Latin goes, the words, *a domino fratre meo,* might refer to a fellow friar as well as a brother in the flesh, but this interpretation would be fatal to Arnald's authorship, since he was a layman. But the analogy between the alchemical process and the crucifixion and resurrection which ensues seems to have been commonly cited as Arnald's by subsequent alchemical writers.[81] It was printed in the Lyons, 1532, edition of his works as a separate tract under the caption, *De preparatione lapidis philosophorum,* and was so cited in Hoefer's history of chemistry.[82] I have also found it in the manuscripts in the form, somewhat abbreviated, of a distinct treatise or letter of Arnald to his own son. The text is roughly the same in all these versions, including the manuscripts and the 1520 edition of the *De secretis naturae.*

Since the passage is a striking one, although shockingly irreverent to modern taste, and seems to have been widely known and quoted, I give the central part of it here in translation as a typical piece of medieval alchemical composition.

"And therefore I say unto you, dearest son, that Father and

[80] "Plusquam quingente" in Naples VIII. d.20; "Plusquam centum milia" in S. Marco fondo antico 324. Vienna 4751 does not give the story of the monk and is further peculiar in stating that the stone is called herbal because, like an herb, it does *not* have a soul. But since according to Aristotle and medieval science herbs possessed the vegetative soul, this reading of Vienna 4751 is almost certainly erroneous.

[81] It is already attributed to Arnald in the *Liber lucis* by, or at least ascribed to, John of Rupescissa who flourished in the middle of the fourteenth century.

[82] Hoefer, *Gesch. d. Chemie,* I (1842), 387.

Son and Holy Spirit are the same yet are three.[83] And so there are three of our stone.[84] Moreover, the world was lost through a woman and hence should be recovered through a woman. Therefore take the pure mother and put her in bed with the sons according to your intention and there let her do strictest penance until she is well cleansed from all sins. And then she will bear a son for certain who will preach to all saying, 'Signs have appeared in sun and moon.' Therefore let him be taken and beaten well and scourged lest by reason of pride he perish. And Geber says that all is made from mercury. And Geber in another chapter says that common sulphur is found in sun and moon, in mercury more easily, and in the bodies (i.e. metals) better. And the same says in another chapter, 'To this end is made tincture of it that it might be ameliorated beyond its natural state.' Therefore take the son after he has been beaten and put him to bed to enjoy himself for a while, and when you feel that he is enjoying himself, then take him pure and extinguish in cold water. And when you have repeated the process, hand him over to the Jews to be crucified. And while he is crucified, sun nor moon will be seen, and then the veil of the temple will be rent, and there will be a great earthquake. So then the fire is to be increased, and thereupon he will give up the ghost. . . . "

Somewhat similar in character is the following allegorical passage which, accompanied by an explanation or commentary, is included in a manuscript now at Munich as *Metaphors* of Arnald of Villanova. The text commented upon runs as follows: "Bind the serf twice and imprison him thrice. Put him once in whitest linen, and if he is inobedient, incarcerate him again Make him receive himself. On the third night give him a white wife. And he will impregnate her. And thus she will give birth to thirty sons who will overcome their genitor."

The account of Arnald of Villanova's works in the *Histoire*

[83] This sentence concerning the Trinity has been crossed out in S. Marco fondo antico 324.

[84] This sentence is omitted in the edition of 1520.

littéraire de la France lists an alchemical book of parables (*Parabolae*) attributed to him but mentions neither any manuscript of it nor incipit. Both its opening and closing words are, however, given in the bibliography of the Barberini manuscript,[85] and the work itself is found in an alchemical collection of 1472 preserved in the library of St. Mark's at Venice, where its title is given as *Examples* or *Exempla* rather than *Parables*. From the opening words, so far as they are given in the Barberini bibliography, one would infer that the treatise attempted to find support for the art of alchemy in the writings of the prophets, but the next words further limit this to their writings and parables concerning the coming of Christ. Since the word *Exempla* precedes *Parabole* in the incipit both in order and in prominence, it would seem that it has the better claim to be the title of the treatise. It also better suggests the correspondence and relationship of our treatise to the medieval collections of *exempla* and the use of natural examples to illustrate spiritual teaching which we see in several medieval works on the nature of things. The main point of the work is an analogy between the passion and the resurrection of Christ and the alchemical process, such as is found in other writings ascribed to Arnald, notably the *De secretis naturae*. But here it is put in a different and more reverent way. Christ is the great example of all things, "and according to the conception and generation and nativity and passion of Christ may be comprehended our elixir and the predictions of the prophets." But although Jeremiah and Isaiah are then taken up, the prophets are rather a side issue, and the main point, as already suggested, is an analogy between the treatment of mercury in the process of transmutation and the passion of Christ. Mercury is led like a lamb to the slaughter to free humanity from pauperism and attendant misery. Its sweat turns to blood like that of Jesus. To the analogies to the scourging and crucifixion found elsewhere ascribed to Arnald are here added others

[85] Vatic. Barb. 273, fol. 243v, Liber parabolarum, "Incipiamus exempla in arte philosophorum in dictis prophetarum . . . / . . . et hoc est elixir verum et perfectum."

to the crown of thorns and the gall and vinegar[86] which complete the four passions. And after three days burial the mercury is found more beautiful, white, and transfigured than ever before. The work as contained in the St. Mark's manuscript then closes with a few alchemical generalities which seem to have no relation either to the prophets or the Passion.

Among alchemical writings ascribed to Arnald the *Histoire littéraire* lists an *Aqua vitae* but mentions no manuscript thereof. I have consulted one of somewhat late date at the Vatican. The work bears a general resemblance to that of John of Rupescissa on the fifth essence, and may be later than it. After discussing the composition and manufacture of this "water of life," the second and much longer part of the work is divided under the twelve signs of the zodiac, for each of which is set forth the application of *aqua vitae* to infirmities of that part of the human body which the sign in question governs. The longest of these sub-sections is the first on Aries and the head, since that involves separate treatment of the hair, brain, eye, ear, face, and mouth. The work is thus quite as astrological as it is alchemical, and more medical than either. It is not included with Arnald's works in the alchemical bibliography of the Barberini manuscript.

Another work on waters is primarily medical, but the waters are all artificial and include a "milk of the Virgin," a "water of rock salt," and a marvelous or mystic water made by soaking metals on successive days in such substances as the urine of a virgin boy, fennel juice, white of egg, and woman's milk, and then distilling it over a slow fire.

To Arnald of Villanova is ascribed in various manuscripts and printed editions[87] a brief alchemical tract on the separation of the elements from human blood in the form of a letter to a master James of Toledo who is saluted as his very dear friend.

[86] S. Marco VI, 214, fol. 168r, ". . . sic de mercurio qui inbibitur et exiccatur."

[87] The work was printed with editions of John of Rupescissa's *De consideratione quintae essentiae*, Basel, 1561, pp. 169-174, and Basel, 1597; and in *Euonymus sive de remediis secretis*, Lyons, 1572, II, 289, attributed to Conrad Gesner, English translation, London, 1576, *The newe jewell of health;* and recently by J. F. Payne, from a fifteenth century manuscript in his possession, *Janus*, VIII (1903), 432-435.

The work was cited as Arnald's *Book of the Distillation of Human Blood* by Sante Ardoini of Pesaro in his big compilation on poisons composed at Venice from 1424 to 1426.[88] There are at least three different versions of this epistle, and unfortunately the printed editions and even most manuscripts do not reproduce the most informing and interesting version.[89] It is found in MS Sloane 3124 of the British Museum which we shall follow with some reference to the other versions. A manuscript at St. Mark's, Venice, differs from the printed editions in another way, since its only allusion to human blood is by the initial letters "s.h." for *sanguis humanus* in its first sentence. It thus represents a third version which simply states the virtues of the elements without revealing how they were extracted. It further diverges from the other versions in comparing the alchemical process to the seven months of the human foetus and in including quotations of leonine verses.

The process is described as a secret discovered under divine favor and the result of many experiments and labors. But now that Arnald is growing old he proposes to set it forth at James' request with the injunction that it be not revealed either to fools or to persons in power. It is essential to use the blood of healthy men of sanguine or choleric temperaments between the ages of twenty-five and thirty and no older.[90] The blood should be extracted in April or May and be pure without spot, red as scarlet or a red rose. It should be suspended for a time in a fine linen

[88] *Santis Ardoyni Pisaurensis medici et philosophi praestantissimi opus de venenis,* Basel, 1562, I, 9, p. 79: "Rainaldus de Villanova, in libro de Distillatione sanguinis humani."

[89] Payne's text and the above mentioned previous editions to which he refers omit a considerable portion of the text given in BM Sloane 3124, instructing how to distill the blood, and so on. Payne's statement (*Janus,* VIII (1903), 435), "The directions given in this letter are like those in many alchemical works left intentionally incomplete," does not hold true of this fuller text in Sloane 3124. DWS No. 230 fails to list Sloane 3124; the four MSS there catalogued all agree substantially with Payne's text, as does Wolfenbüttel 3070, fols. 228r-229r. DWS III, 1142, under "Addenda and Corrigenda," adds Sloane 3124 and 3661, and further states that No. 230 "is a version of 199."

[90] Payne's text, however, sets thirty-six years as the limit, as does Wolfenbüttel 3070, fol. 228v, while the edition of 1572 mentions thirty with no lower limit, and the edition of 1597 extends the span of years to those from twenty to thirty. In Sante Ardoini's quotation the age limit is given as twenty-eight.

bag to let all superfluous wateriness strain out. What remains should be placed in a glass alembic with its outlet well sealed because of the horrible fetor of its contents. Over a slow fire is to be distilled a clear water which is the first element. As soon as the distilled drops begin to turn yellow, this first water is to be removed and sealed up, and another phial is to be attached to the alembic, and the fire quickened. A yellow water will then be distilled which is the second element, air. When red drops begin to come, a third phial is to be used to gather the element fire. The first element is then to be distilled thrice in a new alembic and combined with various juices of fruit and flowers to make a medicinal water of great occult virtue against all diseases whether hot or cold. Similar medicinal virtues including the prolongation of life are stated for the other elements. The author tells of a miracle he saw performed with the element fire extracted from human blood. A certain count, perhaps of Faenza or at Paris,[91] lay as if dead but, when this medicine was administered, recovered sufficiently to make his last confession, dying an hour later. This treatise on human blood might seem inconsistent with Arnald's doctrine in the *Rosarius* that gold and silver are to be produced from mercury alone, and so not by the same author. But while the blood is represented as reduced by an alchemical process to the four elements, only medicinal virtues are claimed for it and not the transmutation of other metals into silver and gold. Nevertheless, there seems to be a real inconsistency between it and the *De secretis naturae,* which declared that only fools composed books representing the stone as made from blood.

A different text from that of Arnald of Villanova on the same theme of the alchemical use of human blood is printed by Zetzner in the appendix to the *Lucidarium* of the fifteenth century alchemist, Christopher of Paris.[92]

[91] In S. Marco VI, 214, fol. 54r, I could not make out the adjective applied to the count but it was scarcely *Parisiensem*. This incident of the count does not occur in Sloane 3124. It is found in Wolfenbüttel 3070, fol. 228v. In the edition of Ardoini we read, "apud dominum comitem Faviensem."

[92] Zetzner, VI, 286-288, opening, "Accipe sufficientem sanguinis humani quantitatem de illis qui sunt sani. . . ."

An alchemical tract which I have not seen elsewhere mentioned or attributed to Arnald is contained in a Vatican manuscript and may be designated by the title, *De opere simplici* or *Opus simplex*. Like other treatises ascribed to Arnald, it describes four "works" or stages of the process of transmutation. Then comes another "short and most noble work to Alexander," which one might be tempted to regard as distinct from the foregoing four, but the copyist of 1463, Henry Walpod, has evidently regarded it as part and parcel of Arnald's work. An *Opus solis* in a Bologna manuscript is perhaps the same work.

More than one alchemical *Testament* is ascribed to Arnald, but none is very long and one is very brief—only nine lines. They probably follow the fashion set by the *Testaments* ascribed to Geber and Raymond Lull, and are unauthentic and written long after Arnald's death. The *Histoire littéraire*[93] was mistaken in thinking that the *New Testament* which opens, "I, Arnald of Villanova, begin this book in the name of Jesus Christ," was first printed by Manget, since it is found in the earlier *Artis auriferae*.[94] There is some confusion between it and the *Lily of Intelligence,* to which we referred above. But the *Lily* is in dialogue form, the printed *Testament* is not. The only manuscript[95] that I have seen entitled the *New Testament* of Arnald of Villanova omitted the introduction in which in the printed version Arnald justifies that title. It resembled the printed text, however, in containing a paragraph stating that it was divided into three parts, on the natural stone, the artificial stone, and the transmutation of two vile metals into silver and gold. But thereafter it was a dialogue between master and son and had the incipit and desinit of the *Lily of Intelligence,* not of the printed text.

Another manuscript[96] presents essentially the same text as the

[93] HL 28, No. 63.

[94] *Artis auriferae quam chemiam vocant volumen tertium,* Basel, 1610, pp. 175-185: "Incipit testamentum magistri Arnaldi de Villanova. Ego Arnaldus de Villanova incipio istum librum in nomine Iesu Christi . . . / . . . de puro sole naturali."

[95] Wolfenbüttel 3076, fols. 45r-51r: see Appendix 4.

[96] CLM 455, fols. 116r-119r: see Appendix 4, and DWS No. 249, where the king of France is called Philip.

printed version, although more briefly, but is anonymous, addressed to a king of France,[97] and is called *The Modern Book of Inferior Astronomy* as well as *The New Testament*. The latter form of title is explained as in the printed edition as given because the author composed the work on what he believed to be his death bed, and because as in the Bible what is expressed under figures and enigmas in the Old Testament is made clearly manifest in the New, so in this work he has declared openly what the ancient philosophers concealed. The stone is cheap and a free gift of God. It is the medium between mercury and metals. Its name is given in mystic characters in the manuscript, but these are lacking in the printed text. There should be nothing in its composition but mercury, silver, and gold. The author does not approve of those who compose it of sulphur sublimate and mercury many times sublimated and, placing these in the vase of precipitation, keep sublimating them until they can ascend no longer but remain in the bottom of the vase. Others place a pound of mercury in a long vessel and leave it in dung to putrefy, then transfer it to a glass vessel in a bath of Mary and apply fire until the quicksilver is distilled like rose water and forms in the bottom of the vessel as a black earth. Its water is then returned to it, and it is distilled until its earth turns white. Again its water is returned to it in a glass vessel with a long neck, and it is placed on a slow fire of ashes for forty days and nights, and so the philosophers' stone is obtained. Others use arsenic sublimate and the juice of an herb called goldenrod which grows around Rome and has a long leaf and yellow flower and sticky juice. At this point the printed text inserts two or three pages which are not paralleled in the manuscript. The author's own process is to fuse lead with crude mercury and purify it, then combine it with a certain proportion of gold and silver, and mix it with mercury again so finely that it will pass through a double thickness of cloth. The mercury should then be evaporated, and

[97] This address does not appear in the printed version which, however, says at p. 175, "Idcirco supplico vos quod librum istum taliter custodiatis quod non publicetis in regno alieno."

the lead put in an earthern pot in the furnace of reverberation and stirred with an iron rod until it becomes red as scarlet and turns to the purest gold.

An *Artis divisio,* which fills only a single page of a manuscript, has nevertheless a preface as well as text and so would hardly seem a mere excerpt from some longer work. It distinguishes seven parts of the art of alchemy or stages in the process of transmutation; namely, conjunction, dissolution, putrefaction, distillation, congelation, fixation, and projection.

We have omitted from consideration in this chapter a number of items which seem to be citations or extracts from Arnald's works rather than distinct treatises and titles, or which occur in too late a manuscript to command much attention.[98] Of an *Elucidarium* as has been stated above, we have only some chapters in Latin but with a fuller French translation. A *Lucidarium* composed in verse is known to me only in a late manuscript of the sixteenth or seventeenth century. A *De origine metallorum,* found only in manuscripts of the sixteenth century and anonymously, is associated on slight grounds with the name of Arnald of Villanova by the *Histoire littéraire.*[99]

The Mirror of Alchemy (*Speculum alchimiae*) which opens, "Ut ad perfectam scientiam," and which was printed several times as Arnald's, in the manuscripts is more often assigned to a Nicolaus Comes or de Comitibus and will be considered in relation to him in a later chapter.[100]

What the *Histoire littéraire* has listed as the *Liber de vita philosophorum* or *Liber vitae* of Arnald, and Mrs. Waley Singer as his *Liber lapidis vitae philosophorum*[101] is the same, with perhaps some later additions, as the *Liber de conservatione iuventutis* attributed to Roger Bacon, which is primarily a medical work.[102] In the manuscript which I examined, where the work

[98] See in Appendix 4 *Fixatio elixiris* and *Quomodo elementa sunt corrigenda.*

[99] HL No. 101.

[100] An alchemical manuscript which I have not examined contains according to the catalogue the somewhat mystifying title, "Dialogus inter speculum et Arnoldum": Berne B 44, 15th century, paper, fols. 89r-99v.

[101] HL 28, 102-103, item No. 79; DWS vol. I, item No. 236.

[102] Printed with Bacon's other medical

is called *Liber vitae philosophorum* and ascribed to Arnald, the text is somewhat more alchemical in character and closes with account of a magic herb.[103] Such an herb, however, is mentioned at the end of another alchemical work which is sometimes ascribed to Roger Bacon.[104]

works by A. G. Little and E. Withington in *Opera hactenus inedita Rogeri Baconi*, Oxford, 1928, pp. 120-143.

[103] BN 7817, fols. 42r-56v: see Appendix 4.

[104] DWS No. 199.

Note. Mr. W. J. Wilson, in a forthcoming catalogue of alchemical MSS in the United States of America published by the Library of Congress, which I have been privileged to examine in manuscript form, points out that the text opening, "Naturam ergo circa solem et lunam," begins in the middle of the first chapter of the text ascribed in Zetzner to Guilhelmus Tecenensis, with which it is thereafter largely identical. It would therefore appear that the two lilies torn from thorns mentioned above at pp. 63-64 with the differing incipits, "Natura circa solem et lunam," and "Ars ista ceteris longe preferenda est," are variations of essentially the same work.

CHAPTER V

JOHN DASTIN, ALCHEMIST

Whether John Dastin and Arnald de Villanova were rivals in alchemy during their lifetimes we do not know, but they seem to have advanced and promoted similar alchemical theories, and to have alike written for popes or other personages at the papal court. Moreover, the works of one have been attributed to the other in a confusing manner since their deaths, so that it is a difficult task to distinguish them today. While Arnald was prominent in the fields of medicine and of other occult science than alchemy, and even ventured into the domains of prophecy, theology, and ecclesiastical reform, Dastin comes down to us as an alchemist and an alchemical writer pure and simple. What are the works which may be assigned to him?

There is a letter which already in a fourteenth century manuscript is described as addressed by John Dastin to pope John XXII,[1] and we possess other alchemical tracts addressed by him to Napoleon Orsini, cardinal deacon of St. Adrian from 1288 to 1342.[2] The evidence for his relation to the papal court

[1] DWS No. 280 catalogues three MSS of the letter quite briefly. The following is a fuller description of the oldest MS: CU Trinity 1122, 14th century, 44 lines to the page, fols. 94v-95v: "Incipit epistola Iohannis Dastine ad episcopum Iohannem XXII transmissa de alkimia. Hoc est secretum secretorum inpretiabile pretium opus verissimum et infallibile de compositione nobilissime materie que secundum traditionem omnium philosophorum tranformat omne corpus metallicum in purissimum aurum et argentum . . . / . . . Hoc ergo magisterium pertinet ad reges et huius mundi altiores quia qui habet ipsum indeficienter habet thesaurum ac predicta scripsi quam brevius potui. Explicit epistola Iohannis Dastine ad papam Iohannem XXII missa."

Besides this MS I have used BL Ashmole 1446, fols. 141r-145v, a neat copy made for Elias Ashmole but not included in DWS, since it is later than 1500.

[2] DWS Nos. 281 and 286: Liber philosophie, with introduction beginning, "Summe venerationis excellentissimo . . .", and text opening, "Scito igitur mi domine quod hec scientia . . ."; Speculum philosophie, with introduction beginning, "Venerabili in Christo patri . . .", and text opening, "Modo dicam modum generationis. . . ." The latter work really is the *Rosarius* of Arnald of Villanova, but the dedication

is thus considerable, nor is there anything inherently improbable in the addressing an alchemical tract to a pope of that period. Roger Bacon wrote to Clement IV more than once on the transmutation of metals. We have credited Arnald of Villanova with a letter and questions to Boniface VIII, who furthermore cherished a magical or astrological seal in the form of a lion which Arnald had made to protect him from the stone, a disease for which he treated him. It is true that John XXII seems to have issued a decretal against alchemists, but Dastin may have addressed him before this, when his mind was still undecided on the subject, or his letter may have been an open one written without the pope's asking or consenting. It might even be the case that failure on Dastin's part to make good his promises and generalities in practice soured the pontiff against his art, whereas Arnald's successful medical treatment of Boniface VIII had induced that pope to look with indulgence upon his theological heterodoxy. But the letter contains no personal allusions either to the pope or the author.

There is a resemblance between the incipit of the letter, "Hoc est secretum secretorum, impretiabile pretium . . . " and that of the *Rosarius* opening, "Desiderabile desiderium, impretiabile pretium . . . " which may either indicate that they are by the same author or serve to explain why they have been so regarded. Once either was ascribed to John Dastin, the other would be likely to be attributed to him as well. In the fourteenth century manuscript of the letter it immediately follows this *Desiderabile desiderium,* which also is contained in both fifteenth century manuscripts of the letter, although not in immediate juxtaposition to it.[3]

The letter extols the virtues of gold above the other metals. Its chief idea is that to make gold or silver one should combine gold or silver with mercury to produce the elixir. Gold or silver is the ferment without which the medicine of the philosophers is

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may belong with some other work by Dastin. DWS No. 284, *Verbum abbreviatum,* is also addressed to the cardinal in BL Ashmole 1416, 15th century, fols. 73v-93r (not 73v-86, as in DWS), although Mrs. Waley Singer does not note this fact in her catalogue.

[3] See DWS Nos. 231 and 280.

employed in vain. The precious metals, properly prepared, are that purest sulphur by which quicksilver is congealed into true silver and gold. Thus is the old conception of the formation of the metals from sulphur and quicksilver refined and glossed over. But while Dastin leaves ordinary sulphur out of account, he does not say, like Arnald of Villanova, that quicksilver contains its own sulphur, but rather that gold and silver are that sulphur or provide that sulphur which congeals mercury. Solution, ablution, conjunction, and fixation are the four chief stages in the alchemical process and successively separate water, air, fire, and earth. "Fire and earth are stony, air and water are aquatic. Moreover, water you extract from a wet substance, air and fire from a dry substance. As for earth, you need not bother from what substance it comes, provided it is fixed."[4] The common boast is made that the elixir will cure a sickness of a month's duration in a day, that of a year's duration in twelve days, and one of long standing in a month.

A *Libellus aureus* ascribed to John Dastin is found in three manuscripts of the fourteenth century and so may well be of his time.[5] It was printed anonymously by Zetzner among a group of "Abbreviated Rosaries" as "Tractatus quartus qui dicitur compendium utile ad credendum meditationum experimentum," a title derived from its opening words, "Testificatur ad credendum meditationum experimentum. . . ."[6] In this edition it immediately precedes the *Desiderabile desiderium,* but they cannot be said to occur together regularly in the manuscripts.[7] The *Libellus aureus* briefly sets forth the same theory and practice

[4] CU Trinity 1122, fol. 95r-v.

[5] I know of no other MSS of the work than the six listed in DWS No. 285, and have used rotographs of two that are said to be of the 14th century: BL Fairfax 22, fols. 29r-30v; and CU Trinity 1122, fols. 36v-38v, opening, "Testatur ad credendum. . . ." In neither of these MSS, which seem written late in the 14th century, is Dastin named as author, and only at the close of Fairfax 22 is the title given as *Libellus aureus:* fol. 30v, "Explicit libellus aureus." In CU Trinity 1122 the work begins without rubric or titulus—that given by DWS and James must come from the table of contents on the fly-leaf of the MS—and closes, "Explicit istud compendium alkimie brevissimum deo altissimo laudes."

[6] Zetzner, *Theatrum chemicum,* III (1659), 659-665. DWS No. 285 does not note that the work has been printed.

[7] Of the six MSS in England containing the *Libellus aureus* two also include the *Desiderabile desiderium.*

of transmutation which was developed in the letter to John XXII: namely, that mercury is the essential spirit of the metals and to form the elixir must be properly combined with gold or silver. But first its volatile character must be overcome. The text of the treatise varies in the manuscripts and printed edition.[8]

The *Rosarius* which opens, "Desiderabile desiderium . . ." is variously ascribed to John Dastin, John Hastiri, John Tyrus, a philosopher of Toledo, and Arnald of Villanova, while in an early modern alchemical bibliography it is attributed to a Franciscus Arnolphinus Lucensis.[9] There are some twenty-two manuscripts of it in England alone dating before 1500.[10] This is a larger number than for any other alchemical work ascribed to Arnald of Villanova, and may be used as an argument for an English author. The resemblance of its incipit to that of the letter to John XXII is another minor argument for preferring Dastin as its author, but the chief reason for doing so is to be found in its leading idea.

For the *Desiderabile desiderium* adheres to the doctrine which was so prominent in both the letter to John XXII and the *Libellus aureus,* that the whole art of transmutation consists simply in combining quicksilver with gold and silver.[11] "Here stay your step, ceasing to search foolishly for any other stone." The art is not executed in a multitude of things, and adding anything extraneous will spoil the entire process.[12] Indeed, either

[8] For example, in addition to small verbal differences, Fairfax 22 omits the second sentence which is found both in Zetzner and Trinity 1122, and in the fourth sentence drops what intervenes between the two *inspissatio*'s. Such minor divergences continue throughout the treatise. Usually Fairfax 22 is less like the printed text than is Trinity 1122, but sometimes Trinity 1122 differs more from Zetzner than the Fairfax MS does.

[9] Vatic. Barberini 273, fol. 278r. Manget, II, 119-133, 309-324, prints it twice in the same volume, first, without any divisions into chapters or even paragraphs, as "per Toletanum philosophum," then, divided into chapters, as by John Dastin.

[10] DWS No. 231: for comment on the two of these utilized and description of two continental MSS see Appendix 5.

[11] CU Trinity 1122, fol. 82v; John Rylands 65, fol. 57v; BN 7168, fol. 4v: "Totum igitur (or, ergo) beneficium huius artis in mercurio et sole et mercurio et luna consistit." Zetzner, III, 668, reads merely: "Totum igitur beneficium huius artis in sole et luna existit."

[12] CU Trinity 1122, fol. 83v; John Rylands 65, fol. 58v; BN 7168, fol. 5v; Zetzner, III, 670.

the letter to John XXII or *Libellus aureus* might well be a brief summary of the main contentions of the *Desiderabile desiderium,* which in the margin of one manuscript is called *Aureum opus.*[13]

The old doctrine of the formation of the metals from sulphur and quicksilver is largely abandoned in favor of this newer theory. Or at least it is held that the sulphur contained in the gold and silver which are employed will be sufficient to transmute the mercury into the elixir.[14] All gold is red sulphur, but not all red sulphur is gold, because there is no sulphuric corruption in gold. In the first operation is obtained white sulphur coagulating the mercury into silver, and when by increased digestion of fire it is cooked to a red hue, it will be the best clear red sulphur converting mercury into gold.[15]

But with this theory that the elixir is to be obtained from gold and silver with mercury there seems to be combined or confused the further doctrine that quicksilver itself can fulfill the functions of both sulphur and mercury and convert the baser metals into silver and gold. In its crude state our quicksilver is called *aqua permanens,* lead, moonspit, copper, and tin. When cooked, it is termed silver, magnesia, and white sulphur. When it becomes red, it is named orpiment, coral, gold, and ferment.[16] Where the printed text affirms that nothing except our sulphur acts on gold,[17] the manuscripts state that nothing except quicksilver acts on gold.[18] And when both texts quote the fourth book of the *Meteorology* that if sulphur is pure, of the best, clear red, and with the force of absolute fieryness which does not burn,

[13] These two words are written in large letters on a scroll drawn in the margin of CU Trinity 1122, fol. 81r.

[14] CU Trinity 1122, fol. 85r; John Rylands 65, fol. 61r; BN 7168, fol. 8r: "Solvimus (or, Solvatur) sane aurum ut in suam priorem reducitur (materiam vel) naturam, hoc est ut vere fiat sulphur et argentum vivum quia tunc possumus optimum (or, optime) argentum inde facere et aurum." There are minor variations in the wording of this sentence in Zetzner, III, 674.

[15] CU Trinity 1122, fol. 83r; BN 7168, fol. 5r-v; John Rylands 65, fol. 58v, with slight variation; while Zetzner, III, 670, inserts an additional sentence not found in these manuscripts.

[16] CU Trinity 1122, fol. 83v; BN 7168, fol. 5v; John Rylands 65, fol. 58v. The passage seems missing in Zetzner, as is a reference back to it which occurs in CU Trinity 1122 at fol. 84r.

[17] Zetzner, III, 676.

[18] CU Trinity 1122, fol. 86r; BN 7168, fol. 9v; John Rylands 65, fol. 62r; adding the clause not in Zetzner, "eo quod est commixtum (commiscibile in BN 7168) et perforatum."

it is the best thing alchemists can find from which to make gold, they both immediately add that this sulphur is quicksilver and converts every imperfect body into gold. "From these things then it is quite evident that it (i.e. quicksilver) alone is our true sulphur white and red."[19] It is more than doubtful, however, if "our quicksilver" is ordinary mercury, just as the pure sulphur, white and red and incombustile, is not vulgar sulphur. For "our quicksilver" resists fire and cannot be elevated in fumes or rarefied, whereas we are told that it is a property of mercury to ascend in fumes.[20] Not improbably we should interpret this fixed mercury as a superior substance evolved from ordinary quicksilver, silver, and gold. In that case the two seemingly conflicting doctrines would become one and the same.

The *Desiderabile desiderium* is written in a rapid and attractive style. After arresting attention by its impressive incipit, it proceeds to say that the works of divine goodness are circular and perfect. Of mixed bodies the sensitive and vegetative upon corruption return downward to earth and water, but the intellect, composed of rarer elements, tends upward to the spheres, and our souls to God. After this combined bit from Plato and Aristotle, the work becomes to a large extent, aside from the central doctrine or doctrines already noted, a medley of well worn alchemical theory, quotation, and patter, joined with a prolonged iteration of directions for the actual alchemical process. Things of diverse parts, like flesh, blood, and bones, are generated from seed and multiply. Glass and metals, on the other hand, are of one homogeneous substance throughout and do not generate anew unless reduced to first matter. As nature of itself does not build houses or compound electuaries, so our stone does not produce the elixir without art.[21] We also meet with the favorite fourteenth century doctrine that contraries can be united only through means. Thus hot and cold will join

[19] CU Trinity 1122, fol. 92r; BN 7168, fol. 17v; John Rylands 65, fols. 70v-71r; Zetzner, III, 691.

[20] CU Trinity 1122, fol. 84r; John Rylands 65, fols. 59v-60r; BN 7168, fol. 7r; but the printed text in Zetzner, III, 672, is different.

[21] For these two passages see Zetzner, III, 664; CU Trinity 1122, fol. 81r; John Rylands 65, fol. 55v; BN 7168, fol. 1v.

only through the medium of dry and moist,[22] while between the two extremes of quicksilver and the complete elixir range the six metallic bodies that elongate under the hammer.[23]

The alchemical process is represented as a simple one, to be performed entirely in one vessel of thick glass so that the operator may see the changing colors, hermetically sealed and poreless so that the gases (*spiritus fugaces*) may not escape. Despite all the refinements and distinctions of the philosophers, we are assured that continued cooking with a gentle fire is all that the metal within the vase requires. We are told further, however, that in solution the fire should be light, in sublimation middling, in coagulation temperate, in dealbation continuous, and in rubification strong.[24] Just what is put in the vase is left obscure. It is often alluded to later as "our copper," but we have been warned that while all gold is copper and red sulphur, not all copper or red sulphur is gold,[25] and the use of ordinary copper would conflict with the mercury, silver, and gold doctrine already set forth. The duration of the process is diversely estimated in our texts, the printed edition speaking of 140 and 40 days where the manuscripts mention 150 and 70.[26] The fire should not be so hot that the vapors condense, adhere, and harden on the cooler top of the vessel, but should be such as to keep them continually ascending and descending, just as continued breathing is essential in animate bodies. There are three reasons for this subtiliation or sublimation: to make the body a spirit of subtle nature, to incorporate and unite this spirit with the body, and to make all white and pure and to diminish "the saltiness of the sulphur, burning up what is combustible."[27]

Meanwhile one manuscript has for some time been interspersed with leonine verses devoted chiefly to analogies between

[22] Zetzner, III, 665 CU Trinity 1122, fol. 81v; John Rylands 65, fol. 56r; BN 7168, fol. 2r.

[23] Zetzner, III, 669; CU Trinity 1122, fol. 83r; John Rylands 65, fol. 58v; BN 7168, fol. 5r.

[24] Zetzner, III, 673; CU Trinity 1122, fol. 84v; John Rylands 65, fol. 60r; BN 7168, fol. 7r.

[25] CU Trinity 1122, fol. 83r; John Rylands 65, fol. 58v; BN 7168, fol. 5r; Zetzner, III, 670.

[26] Zetzner, III, 676; CU Trinity 1122, fol. 86r; John Rylands 65, fol. 61v.

[27] CU Trinity 1122, fol. 87r; John Rylands 65, fol. 63r-v; BN 7168, unnumbered leaf intervening between fol. 10 and fol. 11; Zetzner, III, 679.

human generation and alchemical transmutation. Such have sometimes characterized the prose and printed texts, too, as when the vase, hermetically sealed after it has received the ingredients for the elixir, is compared to the womb which closes after conception.[28] Now the allegorical language multiplies, and we hear of what the vulture flying wingless over the mountain says, or are bade to bind the hands of the wet-nurse behind her back, to place the child whom she bore so that he may suck, since, when the mother is dead, a great toad will spring from the milk and is to be slit through the middle and fed to a cock.[29]

At one point, in connection with instructions to repeat the alchemical process of "eating and drinking" twelve times, it is explained that twelve is the product of three and four, and we are instructed how to convert the quadrangle into the round by dividing it into twelve triangles.[30] The same notion is set forth in similar words in connection with the conversion of one element into another "by rotation in circular path," in another treatise ascribed to John Dastin which we shall call *Verbum abbreviatum*.[31] This rather striking agreement confirms our belief that the *Desiderabile desiderium* is by Dastin.

[28] CU Trinity 1122, fol. 85v; John Rylands 65, fol. 61v; BN 7168, fol. 8v; Zetzner, III, 675.

[29] CU Trinity 1122, fol. 87v; John Rylands 65, fol. 64v; BN 7168, fol. 11r; Zetzner, III, 680-681.

[30] Zetzner, III, 682; CU Trinity 1122, fol. 88r-v; John Rylands 65, fol. 65r-v; BN 7168, fol. 12r: ". . . Et sunt tres salsature primarie quarum quelibet in aliis tribus dividetur salsaturis et erunt duodecim. Verte ergo quadrangulum in rotundum et habes magisterium. Et illud quidem fit si quadrangulus in unaquaque suarum spatularum tres habeat angulos equales. Fac ergo circulum et in medio circuli centrum. Deinde in unaquaque spatula quadranguli fac tres triangulos de circulo centri fit autem linea equalis de primo centro ad ceteros punctos et equalis et una fit omnium ternariorum mensura. Computa ternarios et duodecim invenies desuper quos ducas compassum et invenies quod tanget unumquemque ternarium. Ergo per duodecim triangulos quadrangulus eveniet rotundus."

The Trinity MS illustrates this by a small marginal figure in which a circle is circumscribed about one square and inscribed in another, while twelve triangles proceed from the center to the circumference of the circle. But BN 7168, fol. 12r, has a different figure of a square each of whose right angles is quadrisected by lines, two of which are of course diagonals of the square, while the others form four triangles of which the sides of the square are bases. A circle within the square just touches the tips of these four triangles.

[31] BL Ashmole 1416, fol. 80r, "Converte ergo quadrangulum in rotundum . . ." with use of the word *spatula* as before.

Following such veiling of the alchemical process in allegories and figures come more explicit directions as to successive treatments with chemical waters and subsequent dryings or calcinations. Chemical affinity is not too crudely described in the following sentences: "For this water found in the air follows earth just as iron follows the magnet. Between them there is indeed a union and lusting because of the nearness of their nature.[32] The importance of subjection to the fire continues to be stressed. The more our liquid copper is cooked, the more 'tis dissolved and made a more spiritual water. Secondly, the more 'tis cooked, the thicker it gets and produces a powder of greater whiteness. Third, the more it is cooked, the more colored it grows and becomes a tincture of intense ruddiness.[33] After learning to whiten or make silver, we turn to making red or gold, with occasional analogies such as likening the alchemical process to the four seasons of the year or to human digestion and blood-building. Finally is reached the stage of projection with the elixir, and the closing paragraph deals with its medicinal virtues. This is by no means a full account of the contents of the *Desiderabile desiderium,* but is perhaps enough to suggest its general character.

The *Desiderabile desiderium* resembles the *Rosary* of Arnald of Villanova in that it represents itself as a brief summary from the works of the ancients. The author further states, however, that he has torn his treatise from the books of the philosophers as a rose from thorns. In this he resembles or sets the fashion for other alchemical treatises with such titles as *The Lily Torn from Thorns,* of which we have spoken in the chapter on Arnald.

Different from *Desiderabile desiderium* is another *Rosarius* ascribed to John Dastin in three manuscripts in England which is only a few pages in length.[34] It tells us that *kybrit* (sulphur)

[32] Zetzner, III, 685; CU Trinity 1122, fol. 89v; John Rylands 65, fol. 67r; BN 7168, fol. 14r.

[33] Zetzner, III, 687; CU Trinity 1122, fol. 90r; John Rylands 65, fol. 68r; BN 7168, fol. 15r.

[34] DWS No. 283: I have examined rotographs of BM Harleian. 3528, fols. 171r-175r, and BL Ashmole 1416, fols. 119r-122v. Incipit, "Sciendum itaque quod lapis philosophorum. . . ."

is the father of mercury and of all liquefiable bodies,—a statement scarcely in agreement with the preference for mercury shown in Dastin's other works. The fire employed in the alchemical process should gradually be increased in heat like the sun in its progress through the signs of the zodiac. In springtime the heat of the sun is gentle so that it does not burn up the tender herbs as they begin to grow. But as the sun passes from Aries to Gemini and then to Leo, its heat increases. The multiplication of names for the stone is explained as corresponding to the different colors which it assumes in the alchemical process. The *Emerald Tablet of Hermes* is quoted. Such figurative names as poison and dragon are employed. But in the main this short *Rosarius* consists of practical directions for the process of transmutation. Brief as the text is, there is some indication in the manuscripts that it has been prolonged. After its first paragraph on the process of projection an "Explicit" is inserted in one manuscript, although the text goes on for two more pages. At the same point in the other manuscript which I have used a heading is inserted, "There follows the final complement of this work."[35]

Yet another *Rosarius,* which is further described as "abbreviated," seems to be attributed to Dastin in a manuscript at Geneva. At least it is ascribed to a Iohannes de Dascia Anglicus. Were it not for the Anglicus, we might interpret the Dascia as Dacia, that is, Denmark or Hungary. But since this John is of England, it seems likely that Dascia or Dastia is a corruption of Dastin. The brief tract gives seven "words" or artificial propositions" in which the whole art of alchemy is contained.[36] It

[35] These insertions occur between the paragraph closing, ". . . efficitur pondorosum," and that opening, "Quoniam unaquaque tinctura. . . ." See Harl. 3528, fol. 174r; Ashmole 1416, fol. 121v.

[36] Geneva 82 (151), 16th century, fols. 15v-17v: Ioh. de Dascia Anglicus, Rosarius abbreviatus, "Testis mihi Deus cui non mentior quod in istis septem propositionibus artificialibus tota ars alchemia continetur. . . ." Very likely Cassel Landesbibl. Chem. Folio VIII, "Accurtatio Rosarii per Iohannem Dausten facta," is the same. In the alchemical bibliography in Vatic. Barb. 273 this Rosarius with the incipit, "Testis est mihi deus cui non melior . . ." is attributed at fol. 224v to John of England (Anglicus) but at fols. 292r-293v to Iohannes de Dacia.

might be thought that this work would prove to be identical with the *Libellus aureus* of Dastin, which Zetzner printed among "Abbreviated Rosaries" and which has a somewhat similar incipit. But this does not seem to be the case.

Two other works are ascribed to John Dastin which bear a certain resemblance to the *Desiderabile desiderium,* some of whose sentences they repeat, and a still closer resemblance to each other. Both are addressed to cardinal Napoleon Orsini, but it is difficult to determine their proper titles. Since the longer of the two is referred to in its opening sentence as "An Abbreviated Word most true and approved concerning the transmutation of inferior planets,"[37] we may perhaps call it *Verbum abbreviatum* for short—although this is also the title of an alchemical work by Raymond Gaufridi—rather than *Liber de cognitione,* as it is termed in the explicit of one manuscript,[38] or *De transmutatione metallorum,* as Mrs. Waley Singer has entitled it in her catalogue of alchemical manuscripts,[39] or *Speculum secretum alkimiae,* as it seems to be cited in a fifteenth century fragment which gives its incipit but cites the seventh chapter of a first part,[40] which would seem to apply rather to some such work as the *Rosary* of Arnald of Villanova. For the other work Mrs. Singer gives as title *Sapientum aurinum* or *Liber philosophiae,*[41] but there seems to be authority only for the latter form in those passages from the manuscripts which she reproduces. We shall accordingly refer to these two treatises to cardinal Orsini respectively as *Verbum abbreviatum* and *Liber philosophiae.*

Both these works are devoted more exclusively to theory than

[37] BL Ashmole 1416, 15th century, fols. 73v-93r: "Io. Daustin (in top margin). Cum gaudeant uti (viri in the MS) brevitate moderni verbum abbreviatum verissimum et approbatum de transmutatione inferiorum planetarum quod a cunctis quidem philosophis positum non deponitur nec male depositum fuisse subponitur. Excellentissimo domino suo Neapolitani sacrosancte Romane ecclesie dignissimo cardinali diacono sancti Adriani. . . ."

[38] BL Ashmole 1416, 15th century, fol. 86v. But according to Black's catalogue Dastin's text runs on to fol. 93r, and I shall so treat it.

[39] DWS No. 284.

[40] DWS, I, 265.

[41] DWS No. 281. Its dedication opens, "Summe venerationis excellentissimo patri domino Neapoleoni . . ." and its text, "Scito igitur mi domine quod hec scientia. . . ." Sloane 2476 has *Sapientum aurinum* in a later hand.

was the *Desiderabile desiderium*. Both cite authorities much more frequently. For while the *Desiderabile desiderium* professed to be a rose culled from the thorny bush of ancient philosophers, it but rarely mentioned any particular authority by name, three references to Aristotle and one to Geber being all one can find either in the printed edition of Zetzner or the two manuscripts consulted. In the other two works, however, Aristotle,[42] Plato,[43] and Hermes,[44] Rasis[45] and Avicenna[46] are repeatedly cited. The *Emerald Table* of Hermes is quoted, though not by that title, once being called the *Secret* of Hermes.[47] Both treatises are worried by the "Sciant artifices alchimiae . . ." passage ascribed to Aristotle and endeavor to explain it away,[48] but almost any medieval alchemical treatise did this. Both utilize the *Turba philosophorum*[49] and ascribe to Euclid the assertion that the whole benefit of the alchemical art is in mercury and the sun and mercury and the moon.[50] Calid,[51] or Morienus,[52] and Galen[53] are also alluded to in both works. Not that their stated authorities are entirely identical. *Verbum abbreviatum* quotes Haly, Alfidius,[54] Johannitius,[55] Albertus,[56] and Tullius,[57] whose names seem absent from *Liber philosophiae*, while two of its favorites, "Albemozar"[58] and Arturus,[59] are not noticeable in the *Verbum*

[42] BM Sloane 2476, fols. 40r, 42r, 43r, 44r, 44v, 45r, 46r, 47v; BL Ashmole 1416, fols. 81r, 82r, 85r, 88v. I omit citations of *philosophers* without name but that they too indicate Aristotle is indicated by Ashmole 1416, fol. 87r, "philosophus octavo phisicorum," and 89v, "philosophus in secundo de generatione et corruptione."

[43] Sloane 2476, fols. 44r, 45r; Ashmole 1416, fols. 75v, 85r-v.

[44] Sloane 2476, fols. 45r, 45v, 47v, 48r; Ashmole 1416, fols. 75r, 84r, 86v, 90v.

[45] Sloane 2476, fols. 41r, 42v, 45v; Ashmole 1416, fols. 73v, 78v, 79r, 85r, 86r, 92v.

[46] Sloane 2476, fols. 42v, 44r, 45r-v, 46r, 47v; Ashmole 1416, fols. 74r-v, 80v, 85r, 90r, 91r-v.

[47] Ashmole 1416, fol. 84r.

[48] Sloane 2476, fol. 42r; Ashmole 1416, fols. 76v, 82r.

[49] Sloane 2476, fols. 41r, Empedocles; 44v, Pythagoras, Bonellus; 45v, Socrates; 46r, Pandolphus; Ashmole 1416, fols. 87r, 92r Bonellus, 93r.

[50] Sloane 2476, fol. 45v; Ashmole 1416, fol. 84v.

[51] Sloane 2476, fol. 44v.

[52] Ashmole 1416, fols. 74v, 77r, 85v.

[53] Sloane 2476, fol. 41v, but not as an alchemist; Ashmole 1416, fol. 85r, "Galieni" as an alchemist.

[54] Ashmole 1416, fol. 78r.

[55] Ashmole 1416, fols. 90r, 91r.

[56] Ashmole 1416, fol. 83r.

[57] Ashmole 1416, fol. 91v; presumably the same as Tullius Grecus, to whom two alchemical titles are attributed in the bibliography in Vatic. Barb. 273, fol. 234r-v.

[58] Sloane 2476, fols. 41r, 43v.

[59] Sloane 2476, fols. 42r, 45r. Arturus figures twice in a 13th century MS: FL

abbreviatum. But an impressive common feature of the two works is their frequent citation of Geber or "Jeber,"[60] whose influence upon Dastin's doctrine in these treatises seems great and openly acknowledged, whereas in *Desiderabile desiderium* he was cited only once. It appears, however, that the *Desiderabile desiderium* is really about equally indebted to Geber, the *Turba,* and Hermes. In one manuscript[61] someone has supplied in the margin the references which are wanting in the text. On a rough count there are some ten to "Jeber," fourteen to the *Turba,* and sixteen to Hermes, while Aristotle, Avicenna, Morienus, Senior, and Alfidius receive one or two citations each. Thus it seems that there is at bottom little difference in the use of authorities between these three works of John Dastin.

Both *Verbum abbreviatum* and *Liber philosophiae* subscribe to the doctrine that mercury is the sperm and material of metals and philosophers' stone, and that the elixir may be best prepared from it alone. Such things as hair, blood, and eggs are rejected for this purpose; we are told that minerals cannot be generated from human or animal substances, which also with vegetable matter are too combustible and yielding to fire.[62] Such spirits as arsenic, sal ammoniac, and sulphur are also too inflammable or volatile and are not proper metallic material, although they are of some service in reducing metals to a powder, corrupting their specific form, and in ablution of the stone.[63] Sulphur in the ordinary sense is declared with Geber the source of corruption and imperfection in metals.[64] But those who work with metals alone also fail, as do those who, working with mercury alone, prepare the sperm but not the matrix, or who, in combining mercury with other metallic bodies, fail to supply the soul to join spirit and body.[65] For no transition from the softness of mercury to

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Plut. 30, cod. 29: fol. 51, "Inquit Arturus, duo sunt corpora lucentia . . ."; fol. 73, "Dixit Arturus explicator huius operis. Accepi arsenicum. . . ." The latter text is ascribed to Ricardus de Furnivall (c. 1201-1260) in DWS No. 174.

[60] Sloane 2476, fols. 40v, 42r, 43v-44r, 46r, 47r-v, 48r; Ashmole 1416, fols. 78r, 80v, 81v, 83v, 85r, 87r.

[61] CU Trinity 1122.

[62] Ashmole 1416, fol. 73v: Sloane 2476, fol. 41r.

[63] These last details are found only in the *Verbum abbreviatum,* Ashmole 1416, fols. 74r-v.

[64] Sloane 2476, fol. 48r.

[65] Ashmole 1416, fols. 74v-75v.

the hardness of metal is possible except by souls extracted from (the metallic) bodies, because the soul is more rarified than the body and thicker than spirit.[66] As Aristotle says, nothing is produced from a potential to an actual state except through some existing medium. "But the actual mean between the liquable extensive and quicksilver is the body of the metals liquefied of itself. But quicksilver *per se* has no such medium," and will not give fusion nor extension under the hammer.[67] Mercury is the proper material of the metals but "is not itself our medicine," which, however, can be got better from mercury than from other metals.[68] It must be refined, subtiliated, and reduced to the finest particles.[69] For the medicine must be of subtler substance and more liquid fusion than the known metals or than sulphur and arsenic,[70] and it is fused more rapidly than any metal.[71] Indeed we are even assured that the elixir is absolute and spiritual and occupies no space.

At the same time, a number of hints are given that use is to be made of gold and silver in obtaining the elixir. They have greater conformity to mercury than do other metals.[72] Both they and the elixir unite well with mercury.[73] In the *Verbum abbreviatum* an imaginary dialogue of sun and moon is staged, and we are told that "of their purest mineral substance is made our medicine which perfects the whole mastery,"[74] and that when "the humidity of the sun is joined with the spittle of the moon in one body you will have the whole mastery.[75] And if you require the service of other bodies, you should first convert them to the likeness of the two planets."[76] Both works cite Euclid that the whole benefit of this art is in mercury, gold, and silver, an observation which has been made in like words in the *Desiderabile desiderium*. And the cardinal is told that he should first sublimate mercury and then mix with it the two luminaries in a pure state.[77]

[66] Sloane 2476, fol. 48r.
[67] Sloane 2476, fol. 43r.
[68] Ashmole 1416, fol. 82v.
[69] Ashmole 1416, fol. 77r.
[70] Sloane 2476, fol. 47r.
[71] Sloane 2476, fol. 46v.
[72] Sloane 2476, fols. 46v-47r.
[73] Ashmole 1416, fol. 81v.
[74] Ashmole 1416, fol. 83v.
[75] Ashmole 1416, fol. 84r.
[76] Ashmole 1416, fol. 85v.
[77] Ashmole 1416, fol. 91v.

Such appears to be the main contention and suggestion of these two treatises to cardinal Orsini, although an attempt is made to save the face of the time-honored theory of the composition of metals from sulphur and mercury by, while inveighing against vulgar sulphur, praising the white sulphur which does not burn[78] (and which is presumably extracted from silver) and the best pure clear-red sulphur in which is the force of absolute fire which does not burn[79] (and which is presumably extracted from gold). These phrases, too, we have heard before in *Desiderabile desiderium*. Nor is "our mercury" the common quicksilver,[80] although Dastin assures the cardinal that the total cost of the alchemical experiment should not exceed fifty pieces of silver.[81]

The *Verbum abbreviatum* further lays some stress on the four elements and which of the four qualities predominate in each of them. Like the letter to John XXII, it classifies fire and earth as stones, air and water as aquatic. A little later it suggests that in past alchemical writings one should interpret salts, alums, and sulphurs as names used in place of the four elements. Still later on the conversion of one element into another is discussed. This is easier in the case of those having one quality in common, such as air and fire which are both hot, though one is moist and the other dry, than where both qualities are opposed as in fire and water, one of which is hot and dry, the other wet and cold. Leonine verse ascribed to Merlin is sometimes quoted and in part is identical with that in the manuscripts of the *Desiderabile desiderium*. The analogy between transmutation and generation is overworked in both our present treatises. Both affirm that generation in nature is not from contraries but from things which agree and are like. The *Verbum abbreviatum* argues that the generation of insects or small animals from ordure proves that transmutation is possible.[82] Both treatises assert that the specific form of the individual can be

[78] Sloane 2476, fol. 43v.
[79] Ashmole 1416, fol. 79v.
[80] Ashmole 1416, fol. 83r.
[81] Sloane 2476, fol. 40v.
[82] Ashmole 1416, fol. 76v.

destroyed and that "experiment destroys form."[83] The doctrine of means and extremes also is found in both.

A still briefer alchemical tract of but two pages, attributed to John Dastin,[84] repeats several of the features above mentioned. Geber is cited at the beginning and end; Hermogenes, Maria, and Democritus, in the middle. The stone is called cheap. The analogy is made to human generation and we are told again that no generation is apt except between those agreeing in nature. The doctrine of means and extremes is again invoked. But instead of the soul being represented as the mean between body and spirit, spirit is now made the mean between soul and body.

The *Vision* of John Dastin[85] is a text of from four to six pages which may be summarized as follows. When the seven planets met at nature's bidding to crown their first-born brother (i.e. gold) king, they bemoaned their leprous and scabby condition. The king said that it was expedient that one of them without spot should die for the people, and their mother, Mercury, set forth his perfection. It appeared that the king must be born again, and he said that if this cup could not pass from him, he would drink it. He enjoined upon nine virgins to protect his coming infancy from the poisonous serpent. He then entered his chamber, was absorbed by his spouse who hid him in her vitals from the serpent. She with her maidens ascended into an upper chamber. A son was born who devoured three of the virgins and turned from black to white. The serpent renewed his attacks, but the son ate the other six virgins and was turned to

[83] Ashmole 1416, fols. 77r, 84v; Sloane 2476, fol. 48r.

[84] DWS No. 287: Sloane 2476, fol. 3r-v, "Johannes Dastin super arte alchimistica. Deus igitur gloriosus cui sit laus gloria virtusque . . . / . . . nituntur perficere arte marcasitam."

[85] DWS No. 282. Of the MSS there listed I have examined rotographs of BM Harley 1747, fols. 43r-45v (old numbering, 45-47) and BM Sloane 2476, fols. 1r-2v. The work opens and closes: "Cum omnium in natura constantium certus sit effectus generationis et augmenti . . . / . . . ita quod paupertate exulata de cetero domos proprias inhabitari recusamus unde gratias infinitas Jhesu bono referentes arborem ascendimus pomaque collegimus et Mariam timemus que est beata in secula, Amen." Printed by Manget, II, 324-326, and in *Harmoniae chymico-philosophicae*, Frankfurt, 1625, II, 301-308, with incipit, "Cum omnium natura consistentium. . . ."

earth. After forty days more he donned whitest raiment, but the color of his countenance kept altering. We are told that that whose head is red, feet white, and eyes black is the whole mastery. Finally we reach complete triumph over the poisonous serpent and the last stage of projection in the alchemical process. The use of language from the Gospels concerning the passion and atonement in this *Vision* is in the same vein as the alchemical analogy with the crucifixion attributed to Arnald of Villanova.

In a manuscript at the university of Bologna the *Desiderabile desiderium* is preceded by two other treatises there attributed to John Dastin of England. These are a *Donum dei* which appears to be the same as the work of that title which is sometimes ascribed to Raymond Lull, and a *Secret of Secrets*. The first of these treatises, at least, was transcribed with his own hand by Blasius Maurel Combralliensis from a copy which he had from a citizen of Genoa while he exercised the office of ducal vicar in that city for Louis XII. He finished its transcription on March 10, 1511.[86]

The Gift of God is further ascribed to John of Damascus in a manuscript of 1475 A.D. at Venice. It is in four books which treat of the reduction of the four prepared bodies to the first origin of their sulphur and mercury, of simplifying the elements and converting them by circular rotation, of mixing, and of fermentation. At the end of the treatise it is stated that if you wish men and demons to obey you, you should make a ring of gold and an herb in which you should place the stone white or red, "and you will go securely wherever you go." In the course of the work I noticed citation of Geber, Socrates, Aristotle, Hermes, and Rosinus.[87] There appear, however, to be other

[86] BU 271 (458), 1, "Liber qui Donum Dei dicitur, alias mixtionum tractatus Iohannis Dastini Anglici. Laus sit deo . . . / . . . quicumque volueris;" 2, "Iohannis Dastin Anglici secretum secretorum. In artificialibus . . . / . . . mundi archanum."

[87] S. Marco VI, 215 (Valentinelli, XVI, 4; once Nani 56), 1475 A.D., fols. 26v-64v: "Incipit liber qui dicitur donum dei compositus a Iohanne Damasceno. Laus deo qui gratiis nobis contulit philosophiam reducendi quatuor corpora preparata ad primam originem sui sulphuris et mercurii . . ."; fol. 29v, "Incipit liber secundus ad ministratio-

works of alchemy with the title, *Donum dei,* notably one in twelve chapters rather than four books.[88] The title was, indeed, a common one, being applied to an anonymous work on fevers in the printed edition thereof.[89]

The ascription of a brief fragment concerning the errors of other alchemists to Dastin is dubious, and the text presumably of slight importance in any case.[90] Another brief bit attributed to Dastin is said to be drawn from the *Rosarius* of Arnald of Villanova and the words of Ortolanus, and opens by citing Ortolanus.[91] Aside from the question of dates this does not ring very true, since the views of Dastin and Ortolanus are scarcely in agreement.

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nem. Oportet ergo elementa simplicia facere si circulariter vis ipsa convertere . . ."; fol. 37r, "Incipit liber tertius mixtionis. Actus quidem activorum est in patiente bene disposito . . ."; fol. 49v, "Liber quartus qui appellatur fermentationis. Natura in omnibus rebus semper tendit ad melius . . ."; fol. 62r, ". . . et ibis securus quocumque ieris," which are the closing words in FN II.iii.27, fol. 171r, where the work is ascribed to Raymond Lull and, somewhat corrupted, in BU 271, where it is ascribed to Dastin. In BU 270, VI, 2, however, it is attributed to John of Damascus. But our present MS does not end the work until fol. 64v: " . . . de lapide albo precipitur. Deus laudetur et glorificatur in secula seculorum, Amen. Explicit donum dei compositum a Iohanne Damasceno." The work is also ascribed to John of Damascus in Vatic. Barb. 273, fol. 290v.

[88] And with another incipit: see Wolfenbüttel 3284, 15th century, fols. 130r-138v, "Incipit liber intitulatus preciosissimum donum dei. Qui desiderant nostre philosophice scientie maiorem cognitionem. . . ."

See also Wolfenbüttel 3772, 15th century, fols. 1-14v, where, however, the work with this incipit is called *Speculum alchymie.*

Still different may be Berne 630, 16th century, fols. 4v-33r: "Incipit pretiosum dei donum quod est super omne mundi scientiarum archanum. . . ."

[89] Hain *6948: "In dei nomine, Amen. Incipit tractatus perutilis de febribus universis dictus dei donum. Cum rude nostrum ingenium in re presertim honesta. . . ."

[90] DWS No. 371, listing only BM Sloane 2476, fol. 10v.

[91] DWS No. 288: "Opus de elixir aquarum ad album. Dicit Ortolanus aquas minerales in hoc opere indigemus . . . / . . . Explicit opus Dastyn cuius dicta sunt ex Rosario Arnoldi de Villanova et ex verbis Ortolani per totum."

CHAPTER VI

PERSCRUTATOR: A SELF-CONFIDENT SCIENTIST

Instead of daily weather maps the middle ages put their faith in annual astrological predictions as to the state of the air for the ensuing year. Not being blest with barometers and thermometers, anemometers and hygrometers, they relied on observations made with astrolabe and quadrant or on various weather signs in the air and the behavior of plants and animals. Without atlases of the clouds, and ignorant of electricity and aviation, they had to depend on astronomical tables, such works of Aristotle and Albertus Magnus as the *Liber de passionibus aeris,* and the treatises on rains of Arabic astrologers like Albumasar and Alkindi. With all the resources of modern scientific meteorology, it sometimes seems as if the modern "weather man" in his forecasts does not hit it right much oftener than did the astrologers of old.

While the works of the Arabic astrologers remained authoritative and were largely utilized in discussion of weather prediction in the fourteenth and fifteenth centuries, we find in the first half of the fourteenth century a group of freshly written Latin treatises on the subject which we shall discuss in subsequent chapters. As we go on with the further history of astrological literature in the later fourteenth and the fifteenth century, we shall find further evidence of the considerable part occupied in prediction from the stars by interest in future weather conditions, crops, and floods.

These Latin treatises on weather prediction may serve somewhat to supplement the rather unsatisfactory and incomplete materials for a study of past climatic conditions. Arnold Norlind, who went systematically through a large number of medieval chronicles and annals, found more records of the climate for

the twelfth and thirteenth than for the fourteenth and fifteenth centuries.[1]

The authors of treatises on weather prediction whom we shall consider in this and subsequent chapters have already been noted by Hellmann in his chapter on weather prediction in the closing middle ages.[2] We shall, however, treat of them more fully and from the standpoint of our own investigation. We shall begin with English authors and first with Perscrutator or Robert of York. But we shall find that some of these English meteorologists of the first half of the fourteenth century were also alchemists, and, so to speak, not merely observed the elements but tried to experiment with and transmute them.

In the old literary histories of the Dominican order by Altamura and by Quetif and Echard several titles or works on occult science are attributed to an English friar, named Robert of York, who either flourished or died about 1348, the year of the great pestilence. Altamura ascribed to him a work on ceremonial magic, another on the mysteries of secret things, and a *Corruptorium alchimiae*.[3] Quetif repeated these three titles

[1] Arnold Norlind, "Einige Bemerkungen über das Klima der historischen Zeit nebst einem Verzeichnis mittelalterlicher Witterungserscheinungen," *Acta Universitatis Lundensis,* Nova series, X (1914), 1-53. Norlind also contains references to earlier literature on the subject.

[2] G. Hellmann, *Beiträge zur Geschichte der Meteorologie,* II, Berlin, 1917, "Die Wettervorhersage im ausgehenden Mittelalter (XII bis XV Jahrhundert)," pp. 167-229, especially pp. 181-193. It is perhaps worth remarking that I was not led to study these authors by Hellmann's treatment but had come upon them independently through reading the catalogues of manuscripts and investigating the history of astrology. Also in arranging my materials I had decided to associate these writers together as dealing with weather prediction before I was aware that Hellmann had similarly grouped them. I mention these circumstances not at all to question Hellmann's undoubted precedence in treating these writers but simply as independent support for the naturalness and validity of his choice of authors and grouping. I follow, however, what seems to me a closer approach to chronological order than his in considering the treatises, and shall have occasion to note other works and interests of their authors.

[3] Ambrogio de Altamura, *Bibliothecae Dominicanae incrementum,* 1677, in folio, p. 120. The ascription of a work of magic to Robert of York goes back at least to Agrippa of Nettersheim who, *De incertitudine et vanitate scientiarum,* 1537, cap. 45, "De goetia et necromantia," concludes a list of authors to whom books of goetia are falsely attributed with the words, "et cuiusdam Eboracensis," and then adds that such books have been stupidly utilized by Alfonso X, Robertus Anglicus, Roger Bacon, and Peter of Apono.

except that he altered the last to the more likely expression, *Correctorium alchimyae,* and gave for it the incipit, "Cum omnis rerum emendatio . . ." (Since any emendation of nature . . .).[4] Quetif also quoted a passage from the preface of Jacques Gaffarel to the medical works of Thomas Campanella (Lyons, 1635, quarto edition) to the effect that "Robert of York, English Dominican and theologian, scrutinized the hidden theorems of more secret medicine with such great care that he moved the most learned physicians to heartfelt admiration."[5] This remark would seem to have reference to the *De mysteriis secretorum* (or, *rerum secretarum*). Gaffarel used the Latin word *perscrutatus* in this connection, and Pits, who cites Leland to the effect that Robert was "overzealous in scrutinizing all the inner workings of philosophy," states that he won the title of *Perscrutator.* Quetif derived from Pits the further information that Robert was the author of a *De impressionibus aeris,* opening, "In the year of Christ, 1325, in the city . . ." and of a treatise concerning the wonders of the elements. "But," concludes Quetif, "where all these are now no one tells us."

If Robert of York was a Dominican, he cannot be identified with a Minorite called Robertus Anglicus, also Conton or Cothon, who is said to have flourished about 1340 and to whom a dialogue on formalities between an Occamist and a Scotist is attributed in a manuscript of the fifteenth century now at Venice.[6] It would seem that a dialogue in which an Occamist figures

[4] J. Quetif et J. Echard, *Scriptores ordinis praedicatorum,* Paris, 1719, I, 625-626; this reference also applies to the following information in the text. The word, *Correctorium* or *Corrector,* appears to have been rather a favorite in titles in MSS of the fourteenth century. In Prag 1571, fols. 1-113, is a "Correctorium corruptorii Summae Thomae adversus Guilelmum;" in Prag 1814, 1375-1377 A.D., fols. 113v-119v, "Canonum liber nonus decimus qui vocatur Correctorium;" and in Brunswick CLXXXI, fols. 11v, col. 2-16r, col. 1, a "Liber qui dicitur Corrector" was copied in 1354 and is medical in character.

[5] *Idem,* "Robertus Eboracensis Anglus Dominicanus theologus exacte summaque cum cura abdita secretioris medicinae theoremata ita est perscrutatus ut doctissimis quibusque medicis admirationem moverit singularem."

[6] S. Marco V, 24 (Valentinelli), 15th century, membrane, fols. 2-116, dialogus de formalitatibus inter Ochanistam et Dumsistam, opening, "Quod verbis vituperii satis abundas per tuum responsum experiar evidenter sed queso rationi clare respondeas. . . ."

would be rather later than 1340. Bandini, in his catalogue of the manuscripts of the Medicean-Laurentian library,[7] identifies with the author of the aforesaid work on magic a Robertus Anglicus de Kiliurln to whom notes on the *Prior Analytics* of Aristotle are ascribed in a manuscript of the early fourteenth century.[8] But it is doubtful if there are sufficient grounds for this identification. Indeed, a twelfth century translation by Robert of Chester may be what is referred to, or even more probably, a work by Robert Kilwardby, archbishop of Canterbury from 1272 to 1279.

Some of the treatises listed by Altamura will perhaps never come to light, and it may be that they should not be ascribed to Robert of York, the Dominican. But the *Correctorium alchimiae* may almost certainly be identified with a treatise having the same title and incipit published under the name of Richard of England, who is also often cited as a writer on alchemy, in the printed collections of Zetzner[9] and Manget.[10]

It is also sometimes called *The Corrector of Fools* and ascribed to a master Bernard.[11] Some features of this work, how-

[7] *Catalogus codicum latinorum bibliothecae Laurentianae,* Florence, 1776, III, 10.

[8] FL Plut. 71, cod. 29, early 14th century, membrane, small folio, double columns, illegible, 54 fols., opening, "Quum omnis scientia sit veri inquisitiva . . .;" closing, "et ita non est inconveniens quod dictum est. Expliciunt notulae libri priorum Aristotelis traditae a magistro Roberto Anglico de Kiliurln."

[9] *Theatrum chemicum,* Argentorati, 1659, II, 385-406. In the copy to which I had access pp. 377-386 of the volume, including the first two pages of our treatise, were missing.

[10] *Bibliotheca chemica curiosa,* 1702, II, 266, col. 1-275, col. 2. Manget had already printed the same work in a slightly different form in the same volume, II, 165-171, as an anonymous *Correctio fatuorum.*

[11] David Lagneus, writing in 1611, gives as an alternate title, *Correctio fatuorum:* see Zetzner, IV, 713. This title also appears in the alchemical bibliography in Vatic. Barb. 273, fol. 258r, for the incipit, "Cum omnium rerum emendatio . . .," but the author's name is given as Bernard, presumably of Treves. The treatise itself is so ascribed in a manuscript copied in 1475: Venice, S. Marco VI, 215, fols. 158r-164r, "Incipit liber correctorii fatuorum et modus optimus nature editus a Bernardo magistro reverendo. Cum omnium rerum est mendatio (*sic*) . . . / . . . Explicit correptio fatuorum et modus optimus nature traditum (*sic*) a Bernardo magistro reverendo." Both in this MS and in a fragment of the work in CLM 457, fols. 119r-131v, the text ends differently than in the printed version: Manget, II (1702), 275, col. 2, ". . . sicut spiritus retinet animam cum adiunctione fermenti." S. Marco VI, 215, fol. 164r, ". . . in naturarum conversione" etc.; CLM 457, fol. 131v, ". . . subtiliata in naturarum conver-

ever, such as its statement that Arnald of Villanova cured pope Innocent "from an incurable pest,"[12] seem signs of a later authorship than in Perscrutator's time, when a writer might be expected to remember that there had been no pope named Innocent during Arnald's period of medical activity.

The work is in eighteen chapters. The author argues that art may augment nature, for which he gives the stock illustration in alchemical literature of glass-making, but that art must ever consider and conform to nature. He then sets forth how the metals are formed by nature from quicksilver, while other minerals do not originate from mercury. Sulphur also enters into the composition of the metals, but chiefly as an impediment to their purity and accidentally, while mercury is their essence. Live sulphur is, however, to be distinguished from the combustible variety. Live sulphur which produces gold and silver is nothing but a hot and dry vapor generated from the purest dry earth in which fire predominates in every way. Vulgar sulphur is a very different substance, viscuous and unctuous.[13] The live sulphur is found only in gold and silver and must be obtained from them for use in the process of transmutation. In this doctrine the author seems to be of one mind with John Dastin. It is therefore useless to attempt to obtain the philosophers' stone from such substances as eggs, hair, dung, worms and basilisks, human blood, or from lesser minerals like vulgar sulphur, arsenic, auripigment, and sal ammoniac, or by cleansing lead, or joining tin and copper with mercury.[14] The author also indulges in the usual censure of ignorant alchemists who try to experiment without preliminary study or any grasp of first principles,[15] which may explain why the work is sometimes called *Correctio fatuorum.*

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sione. Explicit correctorium fatuorum et modus nature optimus." A copy made on April 28, 1497, in a large scrawl "per me Petrum Micheller" is Wolfenbüttel 3282, fols. 30-38v: according to an old table of contents on the verso of the second fly leaf, the *Correctorium fatuorum* began at fol. 1 of the original manuscript.

Another MS is Florence Riccard. L. III. XXVIII (Lami, p. 153), now numbered Riccard. 925.

[12] Zetzner, II, 398; cap. 14.

[13] *Correctorium,* cap. 9.

[14] *Correctorium,* caps. 10 and 17.

[15] *Correctorium,* cap. 2.

There is better evidence for assigning a work on weather prediction to Robert of York. What Pits made two works on the weather and on wonders of the elements is really a single treatise which is extant in a number of manuscripts[16] and opens substantially as above stated. Its author is called Perscrutator, if not Robert,[17] in some of the manuscripts, and he writes in the year 1325 from the city of York. Oxford is usually thought of, and correctly, as the chief center of astronomical and astrological activity in England in the fourteenth century, with its school of Merton, but here we have interest shown from another quarter. In this work the author cites another treatise of his, *De elementorum mixtione musica,* which seems not to have been previously noted. The name, *Perscrutator,* is perhaps derived from a passage of our treatise where the author uses the verb, *Perscrutor,*—"Ordinem autem regularum que sunt signa 12 perscrutor."[18] John of Eschenden in his astrological *Summa* composed in the middle of the fourteenth century tells us that a certain brother in the city of York had composed a treatise on the weather and had called himself Perscrutator in the same treatise, which John proceeds to copy at length making clear its identity with our work.[19]

An impressive feature of this work of Perscrutator from York is its claim to originality and novelty, based upon reason and experiment as against the following of old authorities, and the oft expressed desire of its author that his work shall not be tampered with or in any way altered. The more usual attitude of medieval scholars was modestly to represent their treatises as mere compilations, even when they were really more than that, and to invite their readers to correct anything which they found wrong or to add anything which they found missing. This was, however, perhaps more the attitude of the author of a general or encyclopedic work. Perscrutator writes as a specialist

[16] For these see Appendix 6.

[17] In CUL Ii, l. 1, fol. 13r, there is written in the top margin: "ROBERTUS PERSCRUTATOR de Impressionibus Aeris floruit Eboraci 1326," but this is in a later hand.

[18] CUL Ii, l. 1, fol. 14v, col. 2; CLM 275, fol. 145v.

[19] Ioh. Eschuid, *Summa astrologiae iudicialis,* Venice, 1489, fol. 62v, col. 1.

in his field. He begins by begging that "no one easily reject what is said herein but rather believe in what has been experimentally tested and hold to the truth."[20] In the middle of his treatise when he gives some tables, he says that he would rather have another person approve (*lose* in CLM 275) them or dismiss them than alter them. "Let him compose a book of his own to suit himself; this is mine."[21] Finally, in closing his work Perscrutator pleads that "no devotee of the fables of the ancients presume to insert or to subtract anything from this work of mine, but rather, if he does not like mine, let him keep to his own." Perscrutator has "never learned anything from their books or anyone's doctrine except bare tables or rules," and has worked out his own treatise by divine grace through reason and experiment.[22] John of Eschenden, however, although reproducing Perscrutator's work in large part, did not think him "very authentic, nor have I heard much of his great experience in this matter."[23]

In his opening paragraph Perscrutator announced that his treatise would contain eight conclusions, dealing respectively with "the humor of the air" or rain, frost and "when the humor falling is congealed as hail or snow," thunder, earthquakes,

[20] "Obsecro igitur ne quis faciliter dicta reiciat hec sed experimento credat magis et teneat veritatem." The *igitur* occurs in all three manuscripts which I have used but is omitted in Hellmann's quotation from the Berlin manuscript.

[21] CUL Ii, l. 1, fols. 16v-17r; CLM 275, fol. 147v: ". . . sunt itaque eorum tabule sex. Obsecro autem ne quis tabulas immutet sed magis probet (perdet) aut certe dimittat. componet librum sibi ut vult, iste sit noster." The writer of CLM 275 has followed this advice by omitting the tables entirely. In BN 13014, on the other hand, fol. 10v is largely occupied by tables, and in CUL Ii, l. 1, they run from fol. 17r to 17v.

[22] "Obsecro autem ne quis in antiquorum fabulis zelans aliquid operi meo isti inserere presumat aut abradere aliquid ab hoc. Sed potius si nostra contemnat suis adhereat, in hiis que donat dominus gratias agens semper. Neque enim ex libris eorum aliquid neque ex alicuius doctrina didici preter tabulas sive regulas nudas quarum intellectum ratione experimento ministrante deo dante denudavi qui vivit in secula secularum Amen:" CUL Ii, l. 1, fol. 24v, col. 2; CLM 275, fol. 154v. BN 13014, fol. 14r, col. 1, and the Berlin manuscript give the same wording except for slight divergences in order.

[23] *Summa*, Venice, 1489, fol. 62v, col. 1: "Unde et in isto libro intendo recitare regulas quas ipse docet non tamen ad praesens volo ipsas regulas approbare eo quod non puto ipsum multum autenticum nec multum audivi de magna eius experientia in hac materia. . . ." Pico della Mirandola also spoke slightingly of Perscrutator: *Disputationes adversus astrologiam*, Lib. VI, cap. 16.

"stars which are produced in the air," winds, tides, and pestilence.[24] This shows that the work is not confined to the subject of weather prediction. There is also a long discussion, occupying more than a third of the treatise before we come to the eight conclusions at all.[25] Roughly speaking, the text may be said to deal with three chief matters: weather prediction, other judicial astrology, and miscellaneous observations concerning natural phenomena.

The first matter discussed is that of the forces which cause the elements to form compounds.[26] This involves a theory of the elements on Perscrutator's part which is as significant for alchemy as for weather prediction. He identifies the humidity of an element with its flexibility and its dryness with rigidity. Rigidity has four roots: mass and tenuity, contraction and expansion, or perhaps we should translate the Latin terms as grossness and fineness, pressure towards the center and away from the center of the universe.[27] Mass and contraction are always

[24] The wording and order of the Latin varies slightly in Hellmann's quotation from the Berlin manuscript, in BN 13014, fol. 9r, and in the manuscripts which I have used, CUL Ii, l. 1, fol. 13r, col. 1, and CLM 275, fol. 144r, de pestilentia." In the text,—CUL, Ii, l. 1, fol. 18r, col. 2; CLM 275, fol. 148r, —we find, "Prima conclusio de pluvia."

[25] The distribution of space may be thus indicated for the three manuscripts which I have used:

Contents	*BN 13014*	*CLM 275*	*CUL Ii, l. 1*
Introduction,	fols. 9r-11r,	fols. 144r-148r,	fol. 13r-
Prima conclusio,	" 11r-12r,	" 148r-149v,	" 18r, col. 2
Secunda conclusio,	" 12r, col. 1,	" 149v,	" 20v, col. 1
Tertia conclusio,	" 12r, col. 2,	" 150r,	" 21r, col. 1
Quarta conclusio,	" 12r, col. 2,	" 150v,	" 21r, col. 2
Quinta conclusio,	" 12r-13r,	" 150v-152v,	" 21r, col. 2
Sexta conclusio,	" 13r, col. 2,	" 152v,	" 23v, col. 1
Septima conclusio,	" 13r-v,	" 153r-154r,	" 23v, col. 2
Octava conclusio,	" 13v-14r,	" 154r-v,	" 24r, col. 2

which are practically identical. In these last two manuscripts we read, "In hoc itaque libro pono octo conclusiones. Prima erit de humore aeris. Secunda de gelu et quando humor cadens congelatur ut grando et nix. Tertia de tonitruo. Quarta de terremotu. Quinta de stellis que sunt in aere. Sexta de ventis. Septima de motu oceani. Octava

[26] CUL Ii, l. 1, fol. 13r, col. 1; CLM 275, fol. 144r: "Ante tamen ista oportet motores elementorum ad mixtionem cognoscere."

[27] *Idem,* "Rigiditas autem continet rationes quatuor videlicet grossitiem et subtilitatem (*siccitatem* in CUL Ii. l. I is evidently miscopied), impressionem et expressionem."

found together in a simple body such as earth, and so are tenuity and expansion, as in fire. In these combined forces then we have two of the forces or "movers" necessary to mix the four elements into compounds. But to make fire and earth combine we need two more forces, one to adapt earth to fire and the other to adapt fire to earth, for a single force could not be expected simultaneously to perform both functions,[28] but we must have one intermediary, "enlarging and expanding," to conform earth to fire, and another, "refining and contracting," to apply fire to earth.[29] Thus rigidity has four movers. The mover of the element earth must be above that of fire or there will be no mixture, since fire because of its perfection is least inclined to mix with the other elements, while the earth is the most miscible because of its imperfection. Earth's mover must therefore be the stronger of the two, that is, in the superior place.[30] Between them should come the two intermediary movers already mentioned. All four movers of rigidity will come above those of flexibility because, as is apparent to sense and reason, flexible things more readily adhere to external objects. Moisture is readily terminable by other bounds but badly by its own. So to combine the elements the movers of the dry must be stronger than and superior to the movers of the moist.[31] Humidity has only two roots instead of four: flexibility in the place of grossness or fineness, and gyration—like a wheel or electrons in the atom—in place of pres-

[28] CUL Ii, l. 1, fol. 13r, col. 2; CLM 275, fol. 144r: ". . . dare autem unum motorem medium secundum equidistantiam est impossibile, includit enim contradictionem quod aliquis unus simul grosset et imprimat atque subtiliet et exprimat."

[29] CUL Ii, l. 1, fol. 13r, col. 2; CLM 275, fol. 144v: "Unum intermedium erit grossans et exprimens, hoc est terram igni conformans; aliud erit subtilians et imprimens, id est ignem terre applicans."

[30] *Idem,* "Et quidem terre motorem supremum esse necesse est inter siccos, superior enim locus ut alibi dictum est fortior semper est."

[31] CUL Ii, l. 1, fol. 13v, col. 1; CLM 275, col. 144v: "Post hoc quod (quidem in CUL Ii. l. 1) motores rigiditatis erunt super motores flexus patet. Flexibilia enim facilius adherent extrinseco ut sensui apparet et ratio indicat quam rigida. Est enim humidum bene terminabile termino alieno et male proprio. Siccum enim contrariam habet naturam. Unde necesse est motores siccorum ad mixtionem esse fortiores motoribus humidorum secundum distantiam aptitudinis humidorum respectu siccorum ad mixtionem, aut non erit mixtio et per consequens loca eorum superiora erunt."

sure downward or outward. We therefore require one mover for moisture which makes flexible and gyrates, and two movers between it and those of dryness: the one making rigid and gyrating, the other making flexible and directing.[32] Thus there are seven forces in all which produce the mixture of the four inferior elements in the things of nature, and we are not surprised to learn that these "movers" are the seven planets. Our author sums up the matter graphically thus:

1. Saturnus grossat imprimit
2. Iupiter grossat exprimit
3. Mars subtiliat imprimit
4. Sol subtiliat exprimit
5. Venus rigidat girat
6. Mercurius flectit dirigit
7. Luna flectit girat

We may admire Perscrutator's theory of the combination of the elements for its boldness and apparent originality. While it may owe something to such an earlier work as the *Aphorisms* of Urso,[33] it is more elaborate than the hypothesis of the mixture or circulation of the elements according to the degrees of their component first qualities which is set forth in the *Icocedron* of Walter of Odington, although both theories are alike in their ingenuity. If by its hardihood and assurance it reminds us somewhat of the theoretical flight's of Plato's *Timaeus*, or of Descartes in the seventeenth century, it is also an essay of perhaps some significance in the direction of physical chemistry and astro-physics. Or at least it may classify under the heading of astrological chemistry. Later Perscrutator somewhat similarly distinguishes the four inferior elements, adding to the usual distinctions of hot and cold, wet and dry, those of grossness and fineness.[34] He represents each element as divided into three parts thus:

[32] CUL Ii, l. 1, fol. 14r, col. 1; CLM 275, fol. 145r.

[33] Gebhard von Jagow, *Die naturphilosophischen ausführlich kommentierten Aphorismen des Mag. Urso*, Leipzig, 1924, 16 pp. Curt Matthaes, *Urso und seine beiden Schriften De effectibus qualitatum und De effectibus medicinarum*, Leipzig, 1918, 74 pp.

[34] CUL Ii, l. 1, fol. 14v, col. 1; CLM 275, fol. 145v.

Fire	divides into	hot	dry	subtle
Air	divides into	hot	wet	subtle
Water	divides into	cold	wet	gross
Earth	divides into	cold	dry	gross

Here again is suggested the possibility of decomposing and reconstituting elements by chemistry or alchemy. Fire might easily be made from earth and air, we are told, by taking the cold out of earth and the wet out of air. "Hot and dry would remain, which is fire."[35] Here the resemblance to *Icocedron* becomes close.

Figure is another important consideration in the combination of the elements into actual objects. Therefore "there will be necessary another superior body having in itself the figures of all bodies which can give individual character to the workings of the planets by imprinting figurations, and so, since it is of a nobler nature, it will necessarily occupy a higher place."[36] It is clear from experience that this noble body is the sphere of the fixed stars, and according to the varied situation of the planets it imprints diverse forms on inferior matter. Nevertheless within limitations, for seed is commonly disposed only to reproduce its own species and not any form.

After consideration of such astrological fundamentals as the divisions of the zodiac into signs, houses, and *termini*,[37] the subject of weather prediction is at length broached. Because the world needs rain and evaporation for the generation and growth of vegetation and support of animal life, there are certain parts of the zodiac in which the sun elevates waters "now strongly, now more strongly, now most strongly," and others in which the sun either causes no evaporation or scarcely any or but weakly. These six varieties of places are designated by names of as many colors: and are called either lucid, empty, indifferent, black, dark, and shady, or white, yellow, red, black, green, and jacinth,

[35] CUL Ii, l. 1, fol. 14v, col. 2; CLM 275, fol. 145v.

[36] CUL Ii, l. 1, fol. 14r, col. 2; CLM 275, fol. 145r, "Necessario erit aliquid corpus superius figuras omnium corporum in se habens quod figuras imprimendo operationes planetarum specificare possit, et sic, cum nature sit nobilioris, necessario occupabit locum superiorem."

[37] CUL Ii, l. 1, fols. 15r-16r; CLM 275, fols. 146r-v.

—the lighter colors indicating the sun's power of evaporation, and the darker ones its absence. There are also dry, wet, and neutral degrees among the signs. The east is hot and wet; the west, cold and dry; the north, cold and wet; the south, hot and dry. The exaltations of the planets in the signs are also to be taken into account.

In this last connection our author asserts that the figure known as the Dragon is formed by the exaltation of Venus and Mercury in the sign Gemini, which forms the head of the dragon, and the exaltation of Jupiter and Mars in the opposite sign (i.e. Sagittarius) which is the tail of the dragon. He affirms that many have erred in interpreting the head and tail of the dragon as the exaltation of the nodes of the course of the moon, and that their error is manifest.[38] In this he appears to contradict the generally accepted view.

Perscrutator is of the opinion that in every case of contrariety the universe needs tempering, and that the union of contraries by mixture, or what we may call chemical action, is nobler than their separate existence as contraries.[39] Between contrary elements there intervenes a mediating element and between it and each of the others are two more means. Perscrutator refers to another treatise of his on the musical combination of the elements. He seems to have believed that the elements and the means between them could be arranged not only as means and extremes but according to musical proportions in a scale, and that the projection of the rays of the planets, their conjunctions and aspects, might be similarly related. He introduces the consideration in connection with his explanation of conjunction, opposition, and aspect in the introductory portion of the treatise.[40]

At last the way has been cleared for Perscrutator's eight con-

[38] CUL Ii, l. 1, fol. 16v, col. 2; CLM 275, fol. 147v: "Sed propter istam nominationem multi erraverunt putantes per exaltationem capitis et caude intelligere exaltationem nodorum cursus lune imponentes eis naturas novas contrarias, sed manifestum est error eorum. . . ."

[39] CUL Ii, l. 1, fol. 16v, col. 2; CLM 275, fol. 147r.

[40] CUL Ii, l. 1, fol. 18r, cols. 1-2; CLM 275, fols. 147v-148r: "Sed prius ostendi

clusions. The first comprises various rules for predicting rain. For example, "The moon within the rays of Saturn or in conjunction or in any aspect in a *terminus* of Venus signifies great rains."[41] Certain degrees of the signs are called *putei* and there are special rules for them.[42] Nine stars are dubbed *tenebrose* and five are called *nebule*.[43]

Such details of astrological technique, however, are of less interest than the views concerning natural phenomena which are interspersed with them. The surface of the earth is solid, we are told, but its depths are cavernous like mountains or the seashore. Sometimes islands rise above the surface of the sea. Earthquakes are caused by vapor which has been compressed in the bowels of the earth by the action of the celestial bodies.[44] In speaking of "stars that appear in the air" our author seems to avoid the use of the word "comet." Some have tails and some not. He does not, however, really regard them as stars, since he states that they are made of earthly vapor mixed with water

quomodo inter elementa contraria cadit elementum medie nature et inter istud et alterum utrumque duo cadunt corpora media tantum (?). Manifestum autem quoniam sicut in elementis accipitur contrarietas penes distantiam potentiarum, (fol. 148r) ita in proiectione radiorum accipitur contrarietas penes distantiam localem. Oppositorum enim sicut prius patet est contrarietas maxima. Sint ergo corpora que modo elementaria dixi, scilicet extrema et media, nominata litteris sic a.b.c.d.e.f.g., sicut ostendi in libro quem feci de elementorum mixtione musica, a non miscetur b, quia sic nulla esset proportio musica, neque enim miscetur f propter eandem causam. Sed bene miscetur cum c et reliquis similiter secundum proportiones (col. 2) musicas diversas, ergo sic etiam in aspectu radiorum planetarum intelliges et habes coniunctionem," (or, as in CLM 275, "sic erit in aspectu radiorum planetarum intelligere et habes coniunctionem").

[41] CUL Ii, l. 1, fol. 18r, col. 2; CLM 275, fol. 148r.

[42] CUL Ii, l. 1, fol. 19v, col. 2; CLM 275, fol. 140r, "De puteis sunt tales regule." See also fol. 21r, col. 2, and fol. 150v under the fourth conclusio on earthquakes: "Quotiens Saturnus est in eodem gradu cum Iove et Marte et gradus ille est puteus, tunc fit terremotus." Compare the designation of such degrees by colored squares in the work of Andalò di Negro: vide Chapter 12.

[43] CUL Ii, l. 1, fol. 20r, col. 1; CLM 275, fol. 140r.

[44] CUL Ii, l. 1, fol. 21r, col. 2; CLM 275, fol. 150v, "Locus vero est terra in superficie quidem solida, in fundo autem cavernosa ut sunt montes et littora maris et aquarum. Aliquando etiam et fundus aquarum solidus et cavernosus. Unde aliquando de sub mare ascendunt insule super aquas. Materia vero terremotus est vapor reflexus in visceribus terre per opus corporum predictorum."

so that it can glow. He asserts that all water has light in it, which may be proved by stirring water placed in a dark vase at night, whereupon light will appear. Since these stars do not have the appearance of a burning object, those are in error who ascribe the luminosity of such bodies to the heat in the region of upper fire.[45] Winds are composed of dry vapor elevated from the earth by the attractive force of the sun.[46]

Our author holds the common view that one quarter of the earth, shaped like a half-circle, is inhabited,[47] and fails to qualify this dogma as Albertus Magnus, Marco Polo, and Peter of Abano had already done. He regards the place of the sea as near the poles,[48] and in discussing the effect of the moon on tides, makes the influence of the moon greatest in the seventh clime or northernmost part of the habitable world.[49] The rest of the ocean he regards as inobedient to the moon and offering a resistance to the tidal movement.[50] He further notes, in the case of tides in rivers which empty into the sea, that a tide which is manifest in the ocean when the moon is due south will not reach thirty miles up stream until the moon is in the south-west or a little west thereof.[51] He considers that his explanation of the tides reveals the cause of the whirlpools situated in the ocean, one to the east and one to the west, in attempting to explain which many have erred.[52] Since his account of the tides in his

[45] CUL Ii, l. 1, fol. 22r, col. 1; CLM 275, fol. 151r, "Materia harum stellarum est vapor terreus aqua sic immixtus ut possit lucere. . . . Sicut enim bene scimus omnis aqua habet lumen in se quod patet sic: Pone aquam in vase nigro et per noctem agita aquam, statim apparet lux. . . . Cum ergo materia predicta nullam rei combuste figuram habeat, manifestus est error eorum qui (eam) lucere dicunt propter ardorem in confinio ignium superiorum."

[46] CUL Ii, l. 1, fol. 23v, col. 1; CLM 275, fol. 152v.

[47] CUL Ii, l. 1, fol. 23v, col. 2; CLM 275, fol. 153r: "Est enim ut prius patet habitatio hominum quarta pars terre et eius figura est similis medietati circuli."

[48] CUL Ii, l. 1, fol. 14v, col. 2; CLM 275, fol. 145v.

[49] CUL Ii, l. 1, fol. 23v, col. 2; CLM 275, fol. 153v: "lune potestas in climate septimo completur."

[50] *Idem*, "relique maris partes inobedientes." See also CUL Ii, l. 1, fol. 24r, cols. 1-2; CLM 275, fol. 154r: "Liquet ex predictis occeani tantum partes que latera superfluunt climatis septimi dominio lune obedire; reliquum mare rigidum stare rebelle."

[51] The passage precedes by a little those just quoted in note 50.

[52] *Idem:* "Ex preconcessis iam videbitur causa voraginum que sunt in occeano

seventh conclusion seems both rather original and rather obscure, I have reproduced the Latin text of that section of his work in an appendix.[53]

Returning to astrological matters, we may note Perscrutator's faith in great conjunctions. While we have heard him say that a seed can produce only its own species, he qualifies this to the extent that by a conjunction of the three superior planets, or even of only two of them, other figures than those of the proper species may be produced in weak materials.[54] Later in the treatise he again instructs us that a conjunction of Saturn, Jupiter, and Mars, or of Saturn and Jupiter, signifies the greatest things such as the beginnings and downfall of kingdoms and sects, especially in the exaltations of the planets. "Moreover, a conjunction of Jupiter and Mars signifies wars and rebellions."[55] Perscrutator also believes that comets portend war. A star that appeared with a great tail in the latitude of 54 degrees, that of York, in the year 1313[56] and moved from north-east to south-west indicated the defeat of the English by the Scotch, "for Scotland lies north-east of England."[57]

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una in oriente et alia in occidente in cuius rationis investigatione multi oberraverunt."

[53] See Appendix 7.

[54] CUL Ii, l. 1, fol. 14r, col. 2; CLM 275, fol. 145r: "Non omne semen est dispositum ad omnem formam sed tantum ad suam speciem, nisi semen sit fortissime impeditum, ut cum tres planete superiores (*terminus planete superioris* in CUL Ii, l. 1) alicubi coniunguntur vel saltem duo ex ipsis, tunc enim fiunt figure alie a propriis in materiis debilibus secundum formam in qua sit coniunctio." Here the reading "tres planete superiores" in CLM 275 seems clearly correct rather than the "terminus planete superioris" of the Cambridge manuscript.

[55] CUL Ii, l. 1, fol. 23r, col. 1; CLM 275, fol. 152r: "Et scias quod coniunctio saturni iovis et martis vel saturni et iovis significat res maximas in exaltationibus ut initia regnorum et destructiones regnorum et sectarum, et hoc precipue in exaltationibus planetarum. Coniunctio autem iovis et martis significat bella et rebelliones."

[56] Hellmann (1917), p. 182, using a Berlin manuscript, says, "etwas ausführlicher spricht Robertus von einer stella cum cauda multa, also von einem Kometen den er 1323 in York sah." But in CUL Ii, l. 1, fol. 22v, col. 2, and CLM 275, fol. 151v, we read, "anno christi 1313 apparuit stella cum cauda multa et necessario apparuit in loco qui sibi correspondet i.e. sub gradu celi 54 ab equinoctiali qui gradus correspondet Scotie et parti septentrionali Anglie. Civitas enim Eborum est sub gradu 54 ab equinoctiali." In 1313 the comet could signify the battle of Bannockburn.

[57] *Idem,* "Ideo necesse fuit in conflictu scotie devinci anglos. Est enim terra

Such is the brief but remarkable treatise of Perscrutator. Although conforming to the astrological doctrine of its time, it is important in other ways than as a work of weather prediction. While somewhat backward in its notion of the extent of the habitable world, in its bold hypothesis concerning the elements and their combining it seems a forward looking work which entitles its author to his sobriquet of Perscrutator, and constitutes him a not unworthy mean or intermediary—to adopt his own phraseology—between the Conciliator, Peter of Abano, and the Calculator, Richard Suiseth. These were three names that enable the first half of the fourteenth century to hold its head high in the history of medieval Latin science. If the *Icocedron* of which our next chapter treats was written before 1325, Perscrutator may have taken some valuable hints from it. But it does not seem necessary to hold that either treatise was indebted to the other. Robert of York and Walter of Evesham may have been rival contemporaries who worked in the main independently of each other but were influenced by the state of science at the time and the trend of thought in England particularly to launch upon somewhat cognate hypotheses as to the mixture and interaction of the elements in compounds.

That the work of Perscrutator on weather prediction, although not printed, remained known into the sixteenth century is shown by the frequent citations of it by Cornelius Scepper in his work of 1523 against false astrological predictions particularly in connection with the year 1524.[58] It had earlier been translated into German.[59]

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scotie respectu anglie orientalis borealis." It is a bit surprising to find our author using the expression *necesse fuit* in this connection, as it might seem to imply a belief in fatal necessity which astrologers were usually careful to disavow.

[58] III, 7, "Vixit autem Eboraci, dum rerum potiretur in Britannia Eduardus tertius, nisusque est nouum quoddam philosophandi genus ex astris deducere;" III, 8; III, 9; III, 15, "At videamus an Eboracensis perscrutator bene philosophatus sit qui ex putealibus terraemotum deducit." I have not seen the first edition of 1523 but have used that of Cologne, 1548: *Adversus falsos quorundam astrologorum augurationes Cornelii Scepperii Assertio.* Libri sex, which is practically a duplicate.

[59] CGM 597, 1485 A.D., fols. 124v-137: Zinner 11772.

CHAPTER VII

EXAFRENON AND ICOCEDRON

The *Exafrenon pronosticorum temporis,* a work of uncertain date, has commonly been attributed to Richard of Wallingford, the learned abbot of St. Albans, who died in 1336 and was noted for his astronomical instruments, Albion[1] and Rectangulus,[2] his astronomical mechanical clock,[3] and his contributions to trigonometry.[4] Were the *Exafrenon* surely by Richard of Wallingford, it would provide one more striking instance of the acceptance then of astrology by a man of very high ecclesiastical position and mathematical, astronomical, and scientific attainments. We seem, however, to lack convincing evidence as to its authorship, although I shall offer a new suggestion in this regard before the end of the chapter. In any case, the evidence for Richard of Wallingford as its author seems slight. In manuscript Digby 180[5] there appears to be no indication that the treatise is by him. In Digby 194 the same is true of the original writing,[6] but a later hand of the sixteenth century has added "authore Richardo Wallingford et (ut?) ex Baleo colligitur." In the English translation of the work found in Digby 67,[7] the translator states that he has substituted tables of calculations of his own

[1] Robert T. Gunther, *Early Science at Oxford,* II (1923), 349-370,—see also p. 31-32—has printed a part of the treatise on the Albion with illustrations.

[2] Gunther describes it with figures from the MSS, *Ibid.,* pp. 32-34.

[3] *Ibid.,* p. 49. Bilfinger, however, is sceptical concerning it: *Die mittelalterlichen Horen und die modernen Stunden,* 1892, p. 173.

[4] These have been discussed by J. D. Bond in a series of articles in *Isis,* IV (1922), 295-323, 459-465; with the Latin text of his treatise and an English translation of the same, V (1923), 99-115, 339-363.

[5] BL Digby 180, 15th century, fols. 30r-39r: opening, "Ad perfectam notitiam iudiciorum artis astrologie. . . ." A rotograph of this manuscript was very kindly sent to New York for my examination by Dr. William W. Bishop, librarian of the university of Michigan. The work is also anonymous in BM Royal 12. C.XVIII, 14th century, fols. 15v-24.

[6] BL Digby 194, 15th century, fols. 85-95r, "Explicit exafrenon pronosticationum temporis 2^{m}."

[7] BL Digby 67, 15th century, fols. 6-12v.

making. "For the tables of the abbot of sancte Albones (are) made full of erroures."[8] In a manuscript of the fourteenth century in the Cambridge university library,[9] there is written at the head of the page on which our treatise opens: "Rich. Wallingforde de Iudiciis Astronomicis. In fine huius libri Explicit Exaffrenon inquit Scriptor. Unde non duos libros ut Baleus facit, sed unum esse patet." But this is in a sixteenth century hand. Neither at the beginning nor close of the fourteenth century text is there any ascription to Richard of Wallingford.[10] It seems evident that both the above mentioned ascriptions in sixteenth century hands are based on Bale, and that the only earlier suggestion of Richard's authorship is the allusion by the fifteenth century translator to the abbot of St. Albans.

Hellmann, in his account of weather prediction in the later middle ages,[11] notes that our treatise was cited by John of Eschenden in a *Summa* of astrology which he completed in the year of the Black Death, 1348. He was thus close in time to Richard of Wallingford, and they further both appear to have attended Merton College. It would therefore seem almost decisive against Richard's authorship that Eschenden does not attribute the *Exafrenon* to him. In one passage he seems to regard *Linconiensis* (presumably Robert Grosseteste who would be too early) as author but in others he cites *Linconiensis* and *Exafrenon* as two different authorities.[12]

The dates mentioned in the *Exafrenon* are somewhat puzzling.

[8] This statement occurs at fol. 6v.

[9] CUL Ii, l. 1, fols. 25-39, "Explicit exaffrenon."

[10] For this information concerning the Cambridge manuscript I am indebted to the kindness of the university librarian, Mr. A. F. Scholfield. I have since used a rotograph of it and have examined BM Royal 12.C.XVIII. They offer slightly variant readings from those quoted in the following notes from Digby 180.

[11] G. Hellmann, *Beiträge zur Geschichte der Meteorologie,* Berlin, 1917, Nr. 8, "Die Wettervorhersage im ausgehenden Mittelalter (XII bis XV Jahrhundert)," p. 183.

[12] *Summa astrologiae iudicialis,* Venice, 1489: Dist. I, cap. i, fol. 2v, "Dicit enim Linconiensis in sua exafenon (*sic*) de opere primae diei . . .;" but *ibid.,* Dist. II, cap. 10, fols. 61v-62r, the two are repeatedly cited as different authorities. Hellmann fails to note this in his statement that Eschenden names Robert of Lincoln as author of the *Exafrenon* and demonstration that this attribution is impossible. The first passage cited is probably a slip of printer or copyist.

One or two do carry us back to the time of Grosseteste. Thus the sixth and last chapter places two of its specific examples of weather prediction in the year 1249 A.D.[13] Presently the year 1255 is mentioned as an example of the influence of Saturn causing cold weather for five years running. This would seem too late for Grosseteste, who died in 1253, but a rather early example for Richard to cite, at least from personal recollection. Moreover, in the first chapter of the *Exafrenon* on finding the beginning of the year or entry of the sun into the sign Aries there occur two tables which the author says he made for the meridian of London for the year of Christ, 1296.[14] One is a table of months taking that year as its root. The other is a table of years giving under past years every fifth year from 1176 to 1291 and each year from 1292 to 1296 inclusive, while in a parallel column as future time are the years 1296 to 1300 and 1301 to 1416.[15] The year 1296 would be too early a date for Richard of Wallingford to compose such tables, if we accept any time like 1292 as the year of his birth.

But we have not yet done with the conflict of dates in our manuscript. Soon after the beginning of its second chapter we are referred to the tables calculated for the latitude of Oxford by Manduth (also spelled Maudith and Mawdith in manuscript catalogues, if not in the manuscripts themselves)[16] as an example of local astronomical tables.[17] These tables of John Mandith are

[13] BL Digby 180, fol. 38r, col. 1: "Verbi gratia queso locum planetarum anno Arabum 646 conpleto quod est annus Christi 1249 mense quinto die eiusdem mensis 15, hoc est 17 kl. Maii, quo anno erat Iupiter dominus et rector anni. . . ." *Ibid.*, fol. 38v, col. 1: "Verbi gratia anno Christi 1249 fuit Mars dominus anni. . . ."

[14] CUL Ii. 1. 1, fol. 26r, col. 2; BM Royal 12. C.XVIII, fol. 16r, col. 1: "quas feci ad meridiem Londonie pro anno Christi 1296."

[15] Digby 180, fol. 30v; CUL Ii. 1. 1, fols. 26v-27r; BM Royal 12. C.XVIII, fol. 16r, cols. 1-2.

[16] It is, of course, often difficult to say if a letter in a manuscript is n or u. The later English spelling, Mawdith, is unmistakable but might be a mistaken inference from the ambiguous Latin character. Steinschneider in Boncompagni's *Bullettino*, XII (1879), 348, and Duhem, *Système du monde*, IV, 72-73, adopted the spelling Maudith from the Oxford MSS catalogues.

[17] Digby 180, fol. 31r, col. 2: "Verumptamen si habueris tabulas calculatas pro ascensionibus ville tue, cuiusmodi sunt tabule Manduth calculate ad latitudinem Oxonie, certissime poteris scire ascendens hoc modo." And again at fol. 31v we read: "Canonem illius operis inveniendi arcum equinoctialem elevatu

described in a manuscript at Oxford as "made" and "verified" in the year 1310.[18] We also have in manuscript, "The names of fixed stars extracted according to master John Mandith at Oxford for the year 1316."[19] Thus the second chapter of the *Exafrenon* would seem to have been composed after 1310. Towards the close of this second chapter we find in manuscript Digby 180 a confused reference to a past position of the heavenly bodies. First it seems to give the date as the Arabic year 739, which would be 1339 A.D., on a Sunday; but then it gives the number 673, and nine months, five days, ten hours, and 50 minutes.[20] This cannot be the number of Christian years equivalent to 739 Arabic years, as it is 717. Since Richard of Wallingford died in 1336, he could not refer to 1339 as a past date. By that date, too, the Alfonsine Tables should certainly have been known, whereas in the *Exafrenon* they are not mentioned, and the old Tables of Arzachel are still used. This circumstance also militates against Richard of Wallingford being the author, since

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(m?) ab ortu vel occasu solis invenies satis expresse inter canones super tabulas Manduth, ideo eas hic non pono nisi quatenus expedit hic facere de eis mensionem."

[18] BL Laud. Misc. 674, 15th century, membr. quarto minimo, fol. 69, upper margin, "Tabule Mawdith facte in Oxon. 1310"; fol. 72, "Maudith: Tabula ascensionis signorum in circulo obliquo Oxon. cuius latitudo est 51 grad. et 50 min. verificata Oxon. A.D. 1310." In the tables of one John Walter in another Oxford manuscript is a reference to the "subtle and useful tables" which Master John Maudith compiled "de arcu recto et arcubus versis et eorum cordis."—see Digby 97, fol. 50v. This may refer to the "Tabulae aliae . . . scilicet sinuum, chordarum, etc., manu Will. Botoner forsan exaratae," which precede and include the tables definitely ascribed to Mawdith or Maudith in Laud. Misc. 674, beginning at fol. 67. Thus the initial "Tabula augmenti longissimi diei supra diem equinoctii pro omni terra habitabili," would also be his work.

[19] Oxford, Hertford College 4, fol. 157r, "Nomina stellarum fixarum extractarum secundum M. J. Mandith in Oxonie pro anno christi 1316 per additionem 36 grad. 40 m. super stellas almagesti, et fuit motus octave spere 9 g. 23 m. 10 2°." Here there can be no mistake about the name being spelled Mandith since the n is indicated by a straight line over the a in the abbreviated writing of the manuscript.

[20] Digby 180, fol. 32r, col. 1: "Verbi gratia annum (*sic*) perfectus Arabum 739 die dominico 673 9 mensibus 5 diebus 10 horis et 50 minutis hore fuit hec dispositio firmamenti et hec loca planetarum equata pro eodem tempore."

The source of the figure 739 is perhaps seen in CUL. Ii. i. 1, fol. 28v, col. 1, "Verbi gratia annis perfectis arabum die dominico 6739 mensibus 5 diebus 10 horis et 50 minutis horarum," the 673 for years and 9 for months having been run together.

so eminent a mathematician as he should have known of the Alfonsine Tables which were commented upon in Latin by John de Lineriis in 1320 or 1322, and were known to Geoffrey of Meaux in 1320, although he preferred to continue to employ the Tables of Arzachel. If however we disregard the number 739 which is omitted in both fourteenth century manuscripts and take 673 etc. as the number of Arabic years, we get a date about 1275 A.D., which in its turn would not harmonize with the citing of Manduth.

On the other hand the *Exafrenon* should not be thought of as a backward work. It is aware that the solar year is not exactly 365 days and six hours in length, and that the Julian calendar is about eleven days off.[21] Perhaps, however, it is a little backward in speaking of this as the "discovery of wise computists in very recent times,"[22] since Roger Bacon in 1267 had already noted that computists generally recognized this need of calendar reform.[23] But the *Exafrenon* gives signs of being up-to-date in another respect, when in this same connection it reckons time by minutes as well as hours, stating that the fifth part of an hour is twelve minutes.[24] It is true that Roger Bacon spoke of "the fractions used in astronomy: namely, minutes, seconds, thirds, fourths, fifths, and so on to infinity."[25] These sexagesimal frac-

[21] Digby 180, fol. 30v, col. 2: "ut scias operare per istas tabulas ostendam tibi causam illius retrocessionis solsticiorum et equinoctiorum et quantitatem retrocessus quolibet anno. Inventum est per sapientes compotistas in isto novissimo tempore speculantes quod sol non redit ad idem punctum precise in 365 diebus et 6 horis prout supposuerunt kalendare (*fundatores kalendarii* in CUL and Royal MSS) romanorum sed transit ultra per quintam partem unius hore fere et propter hoc solsticia et equinoctia et omnia alia festa que ponuntur fixa in kalendare sub certis kalendis multum sunt oblongata temporibus istis a locis illius temporis in quibus posita fuerunt primitus in kalendario quia fere per 11 dies ut apparet per diem natalis (*sic*) domini. Fuit enim hec dies secundum (scripturas) in solsticio yemali a quo fere istis temporibus per 11 dies elongatur a tempore in quo hoc festum celebratur sicut certissimis machinamentis sapientes arabes greci et latini probant."

[22] See previous note for the Latin wording.

[23] *Opus Maius,* English translation by Robert B. Burke, 1928, I, 290-291.

[24] Digby 180, fol. 30v, col. 2: "Et dixi per quintam partem unius hore fere retrocedit annuatim quia non totaliter recedit per quintam partem quod est 12 minuta unius hore sicut patet per divisionem longissimi temporis a solsticio. . . ."

[25] *Opus Maius,* English translation by Burke, I, 242.

tions (*minutiae phisicae*) had been distinguished from vulgar fractions (*minutiae vulgares*) as early as the *Algorithmus demonstratus,* a treatise of the thirteenth century, which is now ascribed to a Genardus or Gernardus rather than to Jordanus Nemorarius,[26] under whose name it was printed in 1534 by Johann Schoner. Indeed, Sacrobosco in his *Arithmetic* in discussing Halving speaks of resolving unity into sixty minutes.[27] Grosseteste used such fractions in his *Compotus* but for him—as for Ptolemy—a minute was one-sixtieth of a day. Roger Bacon, however, in his *Compotus* noted that astronomers divided the hour into sixty minutes, although *compotistae* used the older system of *punctum, minutum, pars, momentum, ostentum,* and *atom,* in which ten minutes made one hour.[28] The author of the *Exafrenon* regularly employs the newer astronomical division of the hour into minutes.

Possibly the best explanation of the seeming inconsistency of different passages in the *Exafrenon* is that it is a composite work, a collection of or from treatises of varying date and authorship. The title—ἐξ φρῆν ἑνος, six in one, somewhat suggests this possibility, although it can also be explained from the fact that the work consists of six chapters. Unfortunately for this hypothesis we find some of the seeming inconsistencies in the same chapter. Thus in the sixth and last chapter hour and minutes are given in connection with the 1249 date.[29] Moreover, this sixth chapter is represented as clinching those preceding "by due experience." However, there is further support for our hypothesis. In a manuscript at the British Museum is a brief tract on astrological weather prediction,[30] a page and a quarter in length with

[26] See the articles of Eneström and Duhem in *Bibliotheca Mathematica,* V (1904), 9-14; VI (1905), 9-15; VII (1906-1907), 25; VIII (1907-1908), 136.

[27] James O. Halliwell, *Rara Mathematica,* 1841, p. 9: "et scribatur illa unitas exterius in tabula, vel resolvatur illa unitas in sexaginta minuta, et medietas illorum sexaginta abjiciatur et reliqua medietas reservetur exterius in tabula, vel scribatur figura dimidii."

[28] *Opera hactenus inedita Rogeri Baconi,* ed. Robert Steele, Fasc. VI, Compotus Fratris Rogeri etc., Oxford, 1926, pp. 48, 88, 164, 232.

[29] Digby 180, fol. 38v, col. 1, "Cum igitur sol 16 die Iulii hora 13a inequali et 45 minuta ingressus signum leonis . . ."

[30] Sloane 332, 15th century, fol. 16r-v, "Practica Campani de dispositione

examples for the same dates, 1249 and 1255, as the sixth chapter of the *Exafrenon*. But it is here ascribed to Campanus—"Practica Campani de dispositione aeris"—and the dates mentioned would indeed fit nicely into the lifetime of Campanus of Novara, the mathematician and astronomer contemporary with Urban IV (1261-1265) and well known for his *Computus* and *Theory of the Planets*. The opening words of this tract ascribed to Campanus[31] are not the same as those of the sixth chapter of the *Exafrenon*, but we should naturally expect a later compiler to recast the wording somewhat in embodying it in a longer work.

The *Exafrenon* opens by stating those things which are required "for perfect knowledge of judgments of the art of astrology which arise by regulation of nature from the effects of the planets."[32] For various reasons, but especially to predict the revolution of the year, one should know the time of the entry of the sun into the first minute of the sign Aries. It is also important to know the entry of the sun into every degree of the zodiac. Second, one should know how to determine the degree of the ascendent in the east at the time of one's judgment, since from it the twelve houses are measured. Third, one should know the natures or substantial powers of the planets and their dignities, which last are five in number: the house, exaltation, *triplicitas*, *terminus*, and *facies*. Fourth, one must know their accidental powers derived from the diversity of their movements in epicycle, station, progress, and retrograde, their distance from the sun, their rising and setting, their motion of access and recess, and

aeris." Following its explicit on fol. 16v come "Accidentia aeris," then recipes, and on fol. 17r, "De medicinis recipiendis." The lower part of fol. 17r is left blank.

[31] "Cum ergo dispositionem aeris ad certum tempus scire libuerit oportet ad eundem terminum loca planetarum scire, deinde testimonia seu dignitates eorum." On the other hand chapter six of the *Exafrenon* opens (Digby 180, fol. 38r, col. 1), "Capitulum sextum est de doctrina ordinandi in opus omnia capitula precedentia per debite experientie capitula. Cum igitur noveris dominum anni vel mensis et virtutes planetarum in locis suis et domibus et adequabis omnia predicta et volueris pronosticare de aeris serenitate et fructuum ubertate, considerabis aspectus et habitudines eorum et apparebit quicquid futurum est de illis."

[32] Digby 180, fol. 30r, "Ad perfectam notitiam iudiciorum artis astrologie que natura regulante ex effectibus planetarum oriuntur." These words form the incipit of the treatise, and are the same in CUL Ii, 1. 1, fol. 25r.

the effect of their deferents and eccentrics. For all this one must find the true places of the planets and employ canons, tables, and almanach. The planets further have certain accidental properties from their own natures, such as being masculine or feminine, diurnal or nocturnal, bright or dark, fortunate or unlucky. The fifth requirement is to place the planets in their houses and signs and determine their relationships to one another. One is then prepared to prognosticate future happenings "naturally contingent," but if any of these preliminaries has been overlooked or slighted, one must be prepared for error and failure. Our author tries, as we have already seen, to allow for the error in the Julian calendar and the retrocession of the solstices and equinoxes.

In observing what degree of the zodiac is just rising above the horizon at a given moment our author prefers "arithmetical" to "geometrical" instruments as more certain, although the others may be easier and quicker. Instead of direct observation with an astrolabe, he would take the altitude of the sun by day or that of a star by night, and with the aid of tables and a little trigonometry determine how far the day or night has advanced and consequently what degree is just now appearing above the horizon.

Our author places the zodiac in the ninth sphere and affirms that there is not a degree of it but is full of influences, of which those most felt are given in accordance with the doctrine of Albumasar.[83]

It is only in the sixth and last chapter,[84] after devoting the first five chapters to the five requirements above noted, that the *Exafrenon* considers the particular matter of weather prediction and gives concrete examples thereof such as the dates 1249 and 1255 to which we have earlier referred. Some of the instructions as to weather prediction are put in this peculiar form, "When you wish to predict sharp cold . . ." or, "When you wish to pre-

[83] Digby 180, fol. 33r, col. 1 (in Cap. 3), "quarum magis palpabilia ponuntur in presenti tractatu (col. 2) que omnia extrahuntur a maioribus naturalibus Rabi Albumazor." The reference is probably to Albumasar's *Greater Introduction to Astronomy.*

[84] *Ibid.*, fol. 38r, col. 1.

dict abundance of rain. . . . " The author then states those astrological conditions under which such weather may be expected. He warns further that one must not depend solely on the letter of the instructions but on one's own experiments, not merely on the tradition of the philosophers but on one's own experience. The work closes with the tale from Aristotle's *Politics* of Thales cornering the olive crop to demonstrate that the philosophers did not despise riches merely as sour grapes.

Walter of Odington, or Otingdon as it is spelled in a fourteenth century manuscript of one of his works,[35] makes a good representative of the diversified scientific activity prevalent in England in the first part of the fourteenth century. He was a monk of Evesham and compiled a calendar for its abbey for the year 1301 of which a copy is preserved in the Cambridge university library.[36] Another fixed date in his career is about 1316, when he composed his *Declaration of the Movement of the Eighth Sphere* at Oxford.[37] It was therefore later than Peter of Abano's treatment of the same theme in 1310. Fabricius quotes Leland that Walter wrote a book on the movements of the planets, called also *Theory of the Planets* or *Almanach,* in which he followed Profacius Judaeus[38] and which would hardly seem the same as that on the eighth sphere but may be a confusion of it and his calendar. Walter is again associated with Oxford in being mentioned in a Merton College account book about 1330.[39] He wrote on arithmetic,[40] geometry,[41] music, and chronology as

[35] CU Trinity College 1122, fol. 183v, ". . . ego frater Walterus de Otingdon monachus de Evesham." Walter is similarly called both *frater* and *monachus* by his contemporary, John of Eschenden: see note 43.

[36] CU 1705 (Ii, l. 13), fols. 157-177a.

[37] BL Laud. Misc. 674, 15th century, quarto, fols. 75-77, Declaratio motus octave sphere secundum magistrum Walterum Evesham qui fecit considerationes suas Oxon. circa annum Christi 1316. "Explicit abbreviatio declarata de motu octave spere per Walterum Evesham compilata per Willelmum Wyrcestre die Martis 21 Iunii anno Christi 1463 in Norwici civitate in vico de Pokethorp."

[38] Fabricius, *Bibl. med. et inf. lat.,* V (1736), 439.

[39] DNB, 54, 245.

[40] CU 1705 (Ii, l. 13), 14th century, parchment, fols. 48v-52v, Ars metrica Walteri de Evesham: "De proprietatibus numerorum secundum Boetium et Euclidem summa . . . / . . . , 28^{m} qui est aggregatus septenarii, Explicit."

[41] *Ibid.,* fols. 52v-53, Liber quintus Geometrie (Euclidis) per numeros loco quantitatum. "Est prima questio

well as astronomy. His *De speculatione musicae* was printed in 1864 by Coussemaker.[42] A work by Walter of Odynton, monk of Evesham, on the age of the world was twice cited by the astrologer, John of Eschenden, in his *Summa iudicialis de accidentibus mundi* in its first book,[43] completed in 1347, but does not seem to be extant. A work in optics or perspective on the multiplication of species in vision, a title reminiscent of Roger Bacon, is also attributed to Walter.[44] Fabricius further quoted Leland as saying that the physician Bertholetus or Bartheletus or Bartolotti[45] had told him that he had read Walter of Odington *De mutatione aeris*. Perhaps there was a confusion here with the work of that title by Firminus de Bellavalle or with the work of Perscrutator. Not improbably Walter wrote some work of astrology as well as astronomy, even if it has not reached us, but one on alchemy has, and from it we may judge his inclination toward occult arts and science.

If to Perscrutator, or Robert of York, a *Correctory of Alchemy* is ascribed, there is still better reason for attributing an alchemical tract to Walter of Odington, since it is definitely put in his name in the manuscripts, of which at least one is of the fourteenth century. The title, *Correctorium alchimiae*, might not unfittingly be applied to this work, since its opening sentence states that the alchemists of modern times are often deceivers and seek by sophistications to seem wise rather than really to achieve results.[46]

But in fact Walter's work is invariably entitled *Icocedron* or

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quinti; Si fiant . . . / . . . et numerorum quorum proportio 24 ad 8."

[42] Coussemaker, *Scriptores de musica medii aevi*, I (1864), 182-250.

[43] "Capitulum primum de principio mundi": Oxford, Oriel College 23, fol. 3v, "Et frater Walterus de Odynton monachus de Evesham"; fol. 4r, "Et Odynton monachus de Evesham in suo tractatu de etate mundi."

[44] CU 1705 (Ii, l. 13), fols. 41v-48v, Tractatus de multiplicatione specierum in visu secundum omnem modum: "Hic investigantur conditiones et proprietates requisite ad visum . . . / . . . propter egressum medii a temperamento raritatis."

[45] On Giovanni Iacopo Bartolotti of Parma see my "Vatican Latin Manuscripts in the History of Science and Medicine," *Isis*, XIII (1929), 62-63.

[46] "Alkymiste moderni temporis sunt plerique delusores et dum per sophisticationes magis querunt videri sapientes . . ."

Ycocedron,[47] a Greek name referring to its division into twenty chapters, in which respect it reminds us of the similar title, *Exafrenon,* which we meet in the work on weather prediction hitherto ascribed to Richard of Wallingford. Is it possible that *Icocedron* and *Exafrenon pronosticorum temporis* were both works of Walter of Odington, who would thus resemble Perscrutator or Robert of York in combining alchemy and weather prediction? Certainly Walter's other activities would well qualify him for the composition of such a work. In that case Bartolotti would not have wholly misinformed Leland in stating that he had read Walter of Odington *De mutatione aeris*. He would simply have misstated the title.

Although in one manuscript the *Icocedron* is ascribed to Arnald by some later hand, in reality its author appears to write independently and perhaps in ignorance of the Catalan doctor's alchemical works. The *Icocedron* shows little or no trace of the doctrine that gold was to be made from mercury alone which would supply its own sulphur intrinsically, which doctrine was set forth in Arnald's *Rosarius* and became the favorite theory of fourteenth century alchemy. Walter of Odington does not display the repeated hostility to vulgar sulphur, or vulgar magnesia, or the use of other ordinary substances in the alchemical process which we find so marked in many of the alchemical compositions of the closing medieval centuries. Though he agrees with them in criticizing recent alchemists, he himself employs freely such substances as blood, eggs, chalk and vinegar, or the four spirits: quicksilver, sulphur, arsenic, and sal ammoniac. It is true that his chapter on the separation of the elements from human blood bears a rough resemblance to the longer treatise

[47] DWS, vol. I, No. 289, lists two MSS both as of the fourteenth century: CU Trinity College 1122, fols. 177v-183v; and BL Digby 119, fols. 142-147, Tit. Arnaldus. M. R. James's catalogue of the Trinity College MSS ascribed the closing portion of Trinity 1122, which includes the *Ycocedron,* to the fifteenth century. I have used a rotograph of this manuscript. The *Icocedron philosophie* which is listed DWS No. 650 as anonymous is really Walter of Odington's work: see Appendix 8. The word, *Ycocedron,* also appears in another MS at Oxford, All Souls 81, 15th century, fol. 18r, where we have a fragment consisting of most of the nineteenth chapter on congelation from Walter's work. Only the opening lines are lacking.

on that theme ascribed to Arnald, but there is no indication that one discussion depended on the other.

It may further be noted that Walter, although an Englishman, makes no allusion to Raymond Lull or his supposed presence in England and composition of alchemical works there. Geber, however, is cited.

Not that Walter does not share some of the current or perennial traits of alchemical treatises. Not only does he criticize other alchemists as deceivers, he also makes the distinction between bodies which enter as ingredients into the "medicine" or philosophers' stone, and those which merely prepare the way for it. Such are salts, *alumina,* acute waters, fires and vessels. His discussion of the processes of sublimation, calcination, solution, and congelation seems about the usual treatment. He also speaks of the separation of the four elements, but in what seems a slightly novel way, stating that one thing can be so prepared that one part of it will attain the property of fire by calcination, another part that of water by solution, a third that of air by distillation, and a fourth that of earth by coagulation.

The portion of the treatise that enables us to associate Walter most closely with contemporary thought and other writers comes towards the close, in the fifteenth, sixteenth, and last chapters. In the fifteenth chapter it is emphasized that we must know the virtues of things in terms of degrees, and Walter asserts that fire in compounds is hot to the fourth or highest degree and dry to the third, water is cold in the fourth degree and wet in the third, air is wet in the fourth degree and hot in the third, while earth is dry in the fourth degree and cold in the third. In nature the elements circulate and pass their properties on to one another. Fire impresses its heat on the air; the air pours its humidity rarefied by heat into water; water transmits its frigidity to earth, drying it by the heat of the air; and the dried earth sends its dryness, chilled, moistened, and warmed, to fire.[48] Thus fire recovers the heat which it has remitted to each of the other

[48] For this passage I have followed BM Addit. 15549, fol. 16r or 17r, as obviously a correcter reading than CU Trinity 1122, fol. 181v, is.

elements, and air its humidity, and water its frigidity, and earth its dryness. Walter then states the proportions of the elements and the degrees of primal qualities for each of the metals, spirits, and some other substances.

In the sixteenth chapter Walter gives instructions how to obtain the first qualities in a pure state by combinations of the elements in certain proportions, and how to obtain an incorruptible essence from mixture of the elements. For example, reckoning sixty minutes to a degree, fire which is hot in the fourth degree and dry in the end of the third degree is reckoned to have 240 minutes of heat and 180 of dryness, whereas earth, which is dry in the fourth degree and cold in the middle of the third degree, will have 240 minutes of dryness and only 150 of cold. The idea is that by combining or counteracting a certain number of minutes of fire with a certain number of minutes of earth, one can either make fire as dry as it is hot, or can destroy the heat and cold and obtain pure dryness which is common to both elements. The number of degrees stated, however, do not seem to work out properly. I therefore reproduce the Latin of the original in an appendix where the reader may attempt to puzzle it out for himself.

In the closing or twentieth chapter the intention and remission of qualities is broached before Richard Suiseth or Swineshead, the Calculator. And here again we have the four elements related to one another in terms of their qualities much in the style of Perscrutator or Robert of York. Thus fire which is hot and dry is contrary to water which is cold and wet, and earth which is dry and cold is contrary to air which is hot and wet. On the other hand, fire and earth are like elements, as are air and water. Between fire and air, or earth and water, there is a double relationship, two of their qualities in either case augmenting each other, and the other two dulling each other. These relationships are expressed also graphically in a chart. A distinction is made between qualities which are remitted in degree or numerically. Thus the heat in a single spark of fire is as intense as that of its whole sphere. But in contrary qualities Walter

holds that quantity affects degree so that two hot to one cold in the same degree make hot in the first degree: four hot to one cold make hot in the second degree: eight hot to one cold make hot in the third degree, and sixteen hot to one cold make hot in the fourth degree. Walter does not continue to state that sixty-four hot to one cold makes hot to the fifth degree, probably because no such degree was recognized, but his failure to do so seems to show the fallacy of his reckoning. Another table follows in which various combinations of qualities in varying degrees are given. Thus hot to the fourth degree and cold to the fourth degree combined are temperate, while hot to the fourth degree combined with cold to the third degree gives hot in the first degree. But humid in the second degree with hot to the fourth is a temperate combination, as is hot to the second degree and dry to the fourth. Walter then closes in the manner of Perscrutator by invoking divine malediction on anyone who perverts or conceals what he has set forth.

A Walter who is described as sojourning at Paris addressed to the cardinal of Praeneste an alchemical tract which is extant in a fifteenth century manuscript,[49] and we may presently find a further reason for identifying him with Walter of Odington or Evesham. Probably a different person, although apparently contemporary, would be brother Walter or Galvanus della Flamma of the Dominican order who addressed an alchemical epistle to the emperor Henry, presumably Henry VII.[50] But it is a little odd that the work which we have next to mention should have found its way to another library in the same city of Edinburgh.

[49] BL Digby 164, 15th century, fols. 101-106v, "Ars completa ad rubeum data domino cardinali Prenestrium per quemdam philosophum magistrum Walterum commorantem Parisius." The text opens, "Opus primum ad rubeum in opere simplici. Recipe in dei nomine omnipotentis solis foliati. . . ." See DWS, No. 354.

[50] Edinburgh Univ. Library 131, 15th century, fols. 87-88, "Imperatori Henrico frater gualterius ordinis predicatorum della flamma." The text opens, "Recipe vitreoli romani lb. 1, salis nitri lb. 5, cinabrii uncias tres. . . ." For a fuller description see DWS, No. 201. The work is more briefly listed in the alchemical bibliography in Vatican Barberini 273, fol. 282r, Gualterius de Flamma, ordinis praedicatorum, "Recipe ergo vitrioli. . . ."

The treatise which in Mrs. Waley Singer's catalogue of alchemical manuscripts in Great Britain and Ireland is ascribed collectively to masters of Paris is really the work of an anonymous individual who speaks throughout in the first person. On the very first page he remarks, "For I have learned by my own sense," and, "For it is proved in our book on minerals that the generation of the metals is circular." The attribution to Parisian masters has resulted from misreading *Parisius* as *Parisiis* at the end of the treatise, where the colophon should be translated thus. "Here ends the composite of composites abstracted by philosophers and compiled by masters, divulged and authorized at Paris in the year 1331, the month of May. These were written at the close of the same year."[51]

Who was this alchemist writing at Paris in 1331? His self-confidence suggests Perscrutator; his allusion to circular generation of the metals brings to mind Walter of Odington, and we wonder if he and the "magistrum Walterum commorantem Parisius" and our present author can be three in one. We are also somewhat tempted to identify him with the author of the alchemical work beginning, "Studio namque florenti . . . ", who wrote at Paris, and whose treatise is dated in the manuscripts—whether correctly or not—in 1325. Our author's views resemble his not a little. But the professed writer of 1325 cites Ortolanus a great deal; our present author does not cite him at all. Therefore, while we shall treat of the anonymous author of *Studio namque florenti* in a chapter on Ortolanus and his influence, we append here an account of the briefer anonymous treatise of 1331 at Paris, al-

[51] I have used a rotograph of the only MS of the work known to me: Edinburgh, National Library of Scotland (formerly the Advocates' Library) 20, 8.1, 14th century, fols. 6r-40v, listed by DWS No. 290. It is a small MS with only 19 boldly written lines to the page. Above the large initial N which opens what Mrs. Singer has given as the incipit, "Natura autem prout cognovimus in metallorum quacumque procreatione . . .", is written the sentence, "Oportet itaque artificem naturam inspicere et procedere ex his ex quibus procedit natura," which can scarcely be regarded as a titulus and so must vie with the other for the honor of being considered the incipit. The work ends: ". . . donec totius numerus compleatur. Explicit compositum de compositis abstractis a philosophis et compilatis a magistris Parisius divulgatum et auctorisatum anno 1331 mense Maii hec scripta anno eodem revoluto."

though recognizing that it is very likely not by Walter of Odington.

The treatise is straightforward and business-like in tone, free from mysticism and bombast. The author states that gold is more easily made from silver than from any other substance, since the only change needed is one of weight and color, and this should not be difficult, for a more compact substance weighs more. After accepting the usual generalization that sulphur is the father and quicksilver the mother of metals, he asserts that sulphur has three humidities, from the first two of which it should be purged as superfluous. Skilled alchemists employ for this purpose sharp lotions such as vinegar, sour milk, urine of boys, and lye. Quicksilver also has two superfluities, one earthy, the other watery. Arsenic has the same nature as sulphur but greater humidity and recedes from fire more slowly. The spirit hid in sulphur and arsenic and certain oils extracted from parts of animals is called white elixir or water and mercury by the philosophers. Mercury, as Geber says, is nothing else than a middle position of wet to dry and of dry to wet. Rasis is also cited and the second epistle of Rasinus (more commonly spelled, Rosinus) to Euthasia. The best way to purify sulphur is to burn equal weights of it and arsenic together, leaving its fiery virtue, oil, and spirit.

Some persons who do not understand the character of this mastery wish this work to be performed from quicksilver alone, alleging that it possesses soul, spirit, and body, and that it is the material of gold and silver. But our author refutes them and further denies their contention that sulphur is contained in quicksilver. He frankly works with sulphur and arsenic, lead and tin and quicksilver, washing with salt and vinegar, and corrupting or putrefying with sal ammoniac. Having obtained by such means a water, he proceeds to four regimens of division, ablution, reduction, and fixion which take up the greater part of his space and are not very different from other alchemical practice. *Aqua vitae* is obtained and another yellower water called Geber's salt (*sal Iabar*), *sal armoniacus,* water of the Germans or of the

philosophers. Oils and spirits are also obtained. The elements are separated and then combined in such weights as two pounds of earth, three of water, three of air, and one and a half of fire.

In one place considerable use of the letter D is made, which suggests that our treatise shows the influence of the alchemical alphabets ascribed to Raymond Lull. If so, either the works composing the Lullian alchemical collection were already to some extent in existence before 1331, or our treatise was composed or interpolated after that date. But the use of letters instead of words may have been introduced to some extent in other alchemical writings before those attributed to Raymond Lull came into circulation.

Also dated at Paris in 1331 is a dialogue between Ademar, a Carthusian canon, and his brother William concerning an alchemical work of Geber,[52] but it seems a quite different text. The date may be a later invention.

[52] BN 7173, 16th century, fols. 179r-201v: "Incipiunt excerpta summae perfectionis. Fuit vir unus moribus et genere illustris in terra Parisiensi nomine Adomarus. Huic frater carissimus Guilielmus nomine . . . / . . . Anno domini 1331 indictione (a blank space follows instead of the year of the Indiction) completus est liber Parisiis in domo supradicti domini Adomari canonici Contarensis (?) 9 die Martis ubi ego qui istum librum scripsi operatus fui secundum doctrinam eiusdem qui fecit istum tractatum qui erat excellentissimi ingenii et subtilior in theoria philosophiae huiusmodi quam vidi hominem sed in practica parum defecimus (defectivus?) . . . (a word or words which I could not make out) elevatione lapidis quia nullo modo vel ingenio potuimus lapidem elevare. Explicit."

S. Marco VI, 214 (Valentinelli, XVI, 3), formerly Nani 55, 1472 A.D., fols. 26v-39r: "Fuit vir unus moribus illustris." Valentinelli notes that G. Lami, *Cat. cod. mss qui in bibl. Riccardiana Florentiae adservantur,* 1756, p. 16, gave as the title: "Dialogus et glossa Aldemari canonici Carthusiensis super librum qui dicitur Perfecti magisterii principis philosophorum Gebri."

CLM 26059, 1507-1508 A.D., fols. 86-102: "Expositio libri Geberi edita per magistrum Audomarum Parisius."

FN II.iii.25, 15th-16th century, fols. 75r-81r (other numberings, 251-257 and 253-259): "Fuit vir unus moribus illustris. . . ."

Cambrai 920, 15th century, fols. 120-130, also has this incipit.

BU 168, 15th century, fols. 138v-146v: "Incipit expositio Summe Geberi secundum Andomarum philosophum. Fuit vir unus . . . / . . . sic in textu."

BU 270, XIX, 4, 15th-16th century, "Expositio summae Geberi secundum Andomarum philosophum. Fuit vir unus . . . / . . . Et lauda deum."

The following texts are perhaps extracts in which the name of William has been misspelled:

BM Harleian 5403, 15th century, fol. 36r-v (DWS No. 364): "Dixit Gintillus, O mi frater karissime, estne opus maius completum? Respondit

There is a noticeable resemblance between some of the ideas expressed in the *Icocedron* and in the treatise, *On the Essences of Essences,* which has been attributed to Thomas Aquinas, although its own titulus contradicts such an ascription.[53] For the work is addressed to Robert of Anjou, who was not born until three years after the death of Aquinas, by a Dominican named Thomas who calls himself his chaplain. Professedly the work was also written before 1309, since Robert is not yet king but is called the firstborn of the king of Jerusalem and Sicily, duke of Calabria, and vicar general in the kingdom of Sicily. But simply because the dedication of the book to Robert of Naples is inconsistent with the ascription to Aquinas, we should not infer that the former is as true as the latter is false. Both may be equally unreliable and fictitious, and the real author may have written so late and been so poor at historical dates that he saw no impossibility in synchronizing Aquinas and the youth of Robert. We shall encounter similar perversions of chronology in the case of works of alchemy ascribed to Raymond Lull. We therefore cannot with any assurance date our treatise before 1309 and the *Icocedron.*

It is possibly worth remarking that another alchemical tract in eight chapters attributed to Thomas Aquinas addresses itself to a brother Raynaldus or Reinaldus. Although Arnald of Villanova was not a member of a religious order, his name Arnaldus is occasionally perverted to Raynaldus or some similar form in alchemical manuscripts. Since Arnald, who died in 1311, had relations with king Robert of Naples, it is possible that this work too should be ascribed to Thomas the chaplain or pretended chaplain of that monarch. But here again the address to Arnald and

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Adamarus, Magnum completum est . . . / . . . ex libra vitrioli hec medicina convertit senem in iuvenem gaudiosum."

Zetzner, III (1650), 166-172: "Cogis me, frater Ludovice, contra omnium philosophorum praecepta militare . . . / . . . in crucibulo sigillato igne lento rubificant habetur in Alberto."

[53] See Appendix 10 for description of the MSS utilized: Zetzner, V, 806-814, prints only the sixth tractate. A little more had been printed in Zetzner, III (1659), 267-277, and by Brouchvisius, *Secreta alchimiae magnalia D. Thomae Aquinatis,* Cologne, 1579, pp. 11-26, where the sixth tractate begins at p. 14, Caput II.

entire treatise may be a later invention, and if Arnald is meant, the misspelling of his name rather confirms this supposition.[54] Or Reinaldus may be a misspelling for the brother Reginald to whom Aquinas wrote on judgments of the stars.

The Essences of Essences, or at least the part of it which concerns us, divides into nine tractates. The first treats of the divine essence; the second of the being and essence of creatures in general; the third, of spiritual creatures; the fourth, of the being and essence of the celestial bodies. With the fifth tractate we reach the elements and, in its second chapter, the question whether the elements are in the compound. The sixth treatise deals with minerals and with metals both natural and artificial, followed by practical directions for making the philosophers' stone which appear to vary in different manuscripts. The seventh tractate then has six chapters on plants; the eighth discusses animals; and the ninth is concerned with accidents. We are told that this science of essences is easily preeminent above all nine natural sciences—probably the writer has Alfarabi's classification of the sciences in mind—and that after it ranks the science of the influences of essences, "of which I have already treated." The present work is the outcome not only of assiduous consideration but also of laborious experience in many places. Roger Bacon is much cited, especially concerning the multiplication of species and burning glasses. A book of *Influences* and another on *Sense* are attributed to him as well as one on *Burning mirrors.*

In opening his fifth tractate on the elements our author states that he has composed a book especially on the nature of the ele-

[54] The treatise has the incipit, "Tuis rogationibus assiduis, carissime frater. . . ." It is listed in the alchemical bibliography in Vatic. Barb. 273, fol. 233r, and was printed in *Secreta alchimiae magnalia D. Thomae Aquinatis,* Cologne, 1579, pp. 26-34, and by Zetzner, III (1659), 278-283.

MSS are: Wolfenbüttel 3721, 15th century, fols. 212-217v, "Incipit tractatus beati Thome ordinis predicatorum datus fratri Reinaldo pro thesauro secretissimo . . . / . . . 1468 per me Steffanum Hüller de Laugingen auriscriba"; FN Palat. 758, 15th century, fols. 9-14, "Explicit tractatus beati Thome de Aquino de multiplicatione artis"; BN 7172, 16th century, fols. 15v-21v; Venice, S. Marco fondo antico 323, 15th century, fols. 155r-156r, lacks the preface etc. See also Lami, p. 362. Rimini 77, fol. 30; Rovigo 402, fol. 168.

ments and their generation and corruption. Nature has ordained that they communicate their qualities to one another circularly. First earth communicates its dryness to the matter of fire. Fire passes its heat on to the air, which transmutes its moisture to water. Water gives its frigidity to earth which completes the circuit.[55] Our author took sulphur which is of a fiery nature and transmuted it into pure water, and this into air, and the air back into water. There is disagreement among the sages and the herd of philosophers whether the elements are equally mixed and as to their different degrees. Our author affirms that one spark of fire may have more potency than a hundred parts of air, one particle of air more than one hundred parts of water, and one drop of water more than a hundred times as much earth. We do not know in what weights the elements combine in compounds. Our author nevertheless claims to have separated the four elements from certain bodies and to have purified each by itself and to have combined equal weights of the other three elements with one-sixteenth part of fire and to have thus obtained a compound more fiery in its nature than it was aerial or watery or earthy. For it was so active that you would think it to be the first form of all the elements rather than to have any matter in it. And it turned lead to purest gold. Our author classes two elements as active and two as passive, and lets *ab* stand for the active part, *ef* for the passive, and *bd* for that in which *abef* abounds. He also insists that he has learned by experimentation that the elements are actually and not merely virtually present in compounds. He has separated them by art but not, he admits, actually in their own natures. In his book on the generation of the elements he has treated or will treat this matter more fully. He also states in his tractate on animals that he has already sufficiently discussed the five senses in a compilation of the first and second books *De anima,* following in the footsteps of Aristotle and Roger Bacon. It does not seem that these other works of his to which the author alludes are works of Aquinas.

[55] FL Ashburnham 1451, fol. 14r.

The author of *De essentiis* is not a proponent of the mercury alone theory. He has seen stones of marvelous efficacy and virtue made from blood, eggs, hair, and the brain and other parts of animals, and waters extracted from plants.[56] He cites Rasis in the book on the properties of the members of animals on generating a human being by putting an unnamed substance in a vase for three days in horse manure. But if true, he still doubts if such a creature would have a rational soul.[57] He has more faith in the statement of a book on agriculture that a cucumber can be grown within an hour. He has seen the seed planted when he sat down to dinner and eaten the cucumber before he rose from table. The seed, however, had been soaked beforehand in milk and other confections.[58] He has also seen Abel's book of marvelous images which was preserved through the deluge with its names of the intelligences ruling the planets. The images are said to turn other metals to gold and enable one to become a king or prelate. Our author, however, has tested only one of them. Horses going past in the morning to water used to prevent his sleeping. But he made an image according to Abel's directions and buried it before his house, and after that no horse could pass.[59]

Such superstitious credulity is not duplicated in the *Exafrenon* and *Icocedron,* and it seems dubious in any case if a work by Walter of Odington could have been attributed to a Thomas, chaplain of an Angevin prince in southern Italy. Granting that the two works are by different authors, it seems difficult to determine between them the question of priority as to the doctrine of the circularization of the elements. Perhaps it was a current theory which neither originated but to which both gave expression. The prevalence of the idea is of more importance in intellectual history than the problem of individual authorship or origin.

The same conception is suggested by a treatise on the rotation of the elements ascribed to Alanus, to whom *Dicta* concerning

[56] Vatic. Palat. 1329, fol. 147r.
[57] FL Ashburnham 1451, fol. 19v.
[58] *Ibid.*, fol. 18v.
[59] *Ibid.*, fol. 13r.

the philosophers' stone[60] and at least one other alchemical treatise[61] are also ascribed. The *Rotatio elementorum* cites Albertus Magnus and Arnald of Villanova, but the earliest manuscript I know of it is of 1475 A.D., a collection embracing works of very diverse dates.[62]

[60] *Dicta de lapide philosophico,* Lugduni Batavorum, 1599; of this edition I have seen a copy in the John Crerar library, Chicago. Also in Zetzner, III, 722-729, "Dicta Alani philosophi de lapide philosophico e Germanico idiomate Latine reddita per Justum a Balbian Alostanum", opening, "Ad Deum, mi fili, et cor et mentem convertito quam ad artem magis. . . ." A MS is Wolfenbüttel 676, anno 1444, fol. 218, Dicta Alani.

[61] CLM 455, 15th century, fols. 119v-122v, opening, "Cum causa esset veritatis achimi scire magisterium ego Alanus minimus philosophorum et achimistorum. . . ." We also hear of a *Practica* of alchemy or *Composition of natural philosophy* addressed to pope Boniface VIII by Alano or Allamannus of Bohemia: FL Ashburnham Appendix 1916, 16th century, carte 1-194, Allamannus magister de Bohemia, Compositio naturalis philosophiae ad Bonifacium papam octavum; FN Palat. 867, XIV, 15th-17th century, fols. 129r-136r, Alano di Boemia, Practica di alchimia a papa Bonifazio ottavo, volgarizzata, opening, "Spesse uolte in longo tempo ci siamo parlati . . ."; Rimini, Biblioteca comunale 77 (D.IV.19), 15th century, fol. 36, Epistola magistri Alemanni de Boemia ad papam Bonifatium octavum, "Bonifacio octavo . . . / . . . percipere rationem"; fol. 45, Incipit liber de arte alchimiae magistri Alamanni de Boemia, "Scias carissime . . . / . . . ab algoribus liberando." And see p. 53 above.

[62] S. Marco VI, 215 (Valentinelli XVI, 4; Nani 56), 1475 A.D., fols. 192v-197r: Alanus, Rotatio elementorum, opening, "Quoniam grave (this word supplied in the margin) est circa plurimas intentiones diversorum librorum. . . ." The work is also listed in the alchemical bibliography of Vatic. Barb. 273, fol. 242v, with the incipit, "Quoniam est circa plurimas intentiones diversorum . . ."

CHAPTER VIII

WEATHER RECORDS: WILLIAM MERLEE AND EVNO OF WÜRZBURG

William Merle, or Merlee as the name is also spelled in the manuscripts of his works, is from the scientific standpoint the most important writer on meteorology in the first half of the fourteenth century, and the least given to superstitious or occult methods in the matter of weather prediction. He is said to have been a fellow of Merton College, Oxford, a rector in Lincolnshire, and to have died in 1347.[1] It has been suggested that his surname corresponds to the later Morley, and that he may have been of the same family as the much earlier Daniel Merlai, or Daniel of Morley, of the twelfth century.[2] But he appears to have been less given to astrology than Daniel was.

William Merlee seems to have been the first known person to keep a detailed and systematic record of the weather over a considerable period of time. His record is preserved in a single manuscript of the Digby collection in the Bodleian library at Oxford, a codex on membrane of the fourteenth century,[3] which in its present form was constituted by William Rede, bishop of Chichester and himself an astronomer and mathematician of

[1] See the account of him in the English *Dictionary of National Biography* and the work of Symons listed in note 4 below. I hope that his connection with Merton is well attested, but I notice that in BL Digby 176, fol. iv, the words "socium domus de Mercon" have been added by the same late hand which changed the medieval Arabic numeral for seven into our 7. Symons could not find Merle's name among the lists of the Fellows of Merton but adds that "the lists are very incomplete."

[2] Hellmann (1917), p. 185.

[3] Digby 176, a MS of 110 fols. of which William Merlee's weather record occupies only fols. 4-8. The writing is plain and clear.

Mr. Robert Steele calls my attention to notes recording the weather in the margin of planetary tables for the year ending 28 February, 1269-1270, in the left hand margins of BM Royal 7 F VIII, fols. 176v-179v. This earlier record was for seven months, beginning in August with two brief jottings and becoming quite full for the last three months of December, January, and February.

note. A memorandum on the reverse of the first leaf of the manuscript states that he received part of it by gift from his reverend lord, master Nicholas of Sandwich, purchased other parts of it from the executors of Thomas Bradwardine, archbishop of Canterbury and noted mathematician, and from the executors of Richard Camsale, and wrote other parts himself or had them copied for him. Since Bradwardine died after William Merlee in 1349, the component parts of our manuscript appear to have been put together after Merlee's death. William Rede gave the codex to Merton College. Merlee's journal of the weather from January 1337 to January 1344 was printed in facsimile with an English translation some forty years ago,[4] and therefore need not be described in much detail here. We may, however, note a few points.

Merlee's treatise is headed, "The State of the Weather at Oxford for Seven Years" (*Temperies aeris Oxoniae pro septennio*), but, as Symons states,[5] "Careful reading of the MS shows that the observations were made partly at Oxford and partly in the northern portion of Lincolnshire still known as Lindsey—the 'Lyndesay' of Merle." An earthquake of March 28, 1343 which brought down chimneys in Lyndesay was not felt at Oxford.

Merlee's journal is a monthly record of the past weather. With the year 1340 the amount recorded per month becomes much fuller. Generally only bad weather, rain, wind, ice, or unusual weather such as a warm January, is noted. In opening the journal Merlee states that he will begin each day from sunrise, and that, since frost never starts after sunrise but during the preceding night, he has not reckoned the first night during which frost fell among the days to which frost is ascribed.[6] Once he refers back to the year 1331.

[4] *Merle's MS. Consideraciones Temperiei pro 7 annis. . . . The earliest known journal of the weather . . . 1337-1344,* reproduced and translated under the supervision of G. J. Symons, London, 1891, folio. I have also examined the manuscript directly. G. Hellmann, *Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus,* No. 13 (1901), pp. 1-5, printed the Latin text for the years 1337 and 1343 only.

[5] See his introductory remarks, "Concerning Merle himself and his Journal of the Weather."

[6] Digby 176, fol. 4r, "Notandum quod dies quilibet incipit ab ortu solis, et quia gelu numquam incipit ab ortu sed

William Merlee further composed a work on weather prognostication in twelve chapters.[7] The number suggests the signs of the zodiac, and in one manuscript of the treatise it is entitled in the rubric, "A Physical Treatise concerning Favoring Stars."[8] Hellmann has already pointed out that there is little justification for this appellation.[9] For while William lists Ptolemy's *Quadripartitum* as one of his four chief literary authorities along with Aristotle's *Meteorology* and *Problems*, Vergil's *Georgics*, and "Plinius de temporibus,"[10] there is very little judicial astrology in his work, and the Arabic writers on rains like Albumasar and Alkindi do not figure as they do in our other writers on the subject. The appearance of the sun, or less often of the moon and stars, is remarked as a weather sign, but astrological constellations and the positions of the planets in the signs of the zodiac are not emphasized. More stress is laid upon inferior phenomena as weather signs. For example, signs of humidity are if flies bite more painfully than usual, if bells are heard at a greater distance or more clearly, if salt placed in a vase liquifies.[11] Moreover, the work is not exclusively one of weather prediction, but devotes some of its chapters to indications of past humidity or wind and to effects which cold or heat leave behind them. The treatise is therefore a discussion of meteorological phenomena rather than one devoted merely to weather prediction. Merlee's object, as he states at the start, is twofold, to treat of judgments of future weather, and to supply the material requisite for such judgments. The first chapter discusses the relation between different states

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in nocte precedente, non computatur nox prima in qua accidit gelu inter dies quibus ascribitur gelu."

[7] I have read it in BL Digby 147, 14th century, membr., fols. 125-138v: opening, "Opusculum istud est de pronosticatione aeris. In eo determinatur que et qualia huiusmodi pronostica aerea." At the end, "Expletum igitur est opus istud Oxon. (rather than *Exon.*) anno Domini 1340 per magistrum Willielmum Merlee." Hellmann has noted this manuscript but used a later one at Berlin, a copy made in 1466, which he lists as Cod. lat. Berol. Fol. 192, fols. 87v-95v, and which appears to be the same as my note of a Berlin 963, 15th century, fols. 87-95. The work occurs anonymously in Oxford, Corpus Christi 293, fols. 88-94. See Zinner 7277.

[8] "Tractatus phisicus de secundis stellis," in the Berlin MS.

[9] Hellmann (1917), p. 184.

[10] Digby 147, fol. 127r, Cap. 2.

[11] Digby 147, fol. 131r.

of weather; the second, prognostic signs in the air; the third, signs of future humidity; but the fourth deals with signs of past humidity. The fifth gives signs of coming wind, but the sixth deals with the effects produced or marks left by an excessive wind in the past. Similarly the seventh gives signs by which approaching cold may be detected, while the eighth gives indications of past excessive cold. The ninth and tenth chapters do the same for fine and hot weather. The eleventh chapter touches on the mental qualifications and experience needed in making meteorological judgments, and the twelfth and last chapter deals with the causes, precedent and concomitant, of scarcity of crops, especially in certain parts of England.[12] Among other things ten ways are listed in which humidity may produce such a failure of the crops.[13] The work shows very little that can be called superstitious in the signs which it accepts for weather prognostication, and in its attention to past humidity, wind, cold, and heat reminds us of Merlee's record of seven years' weather. The practical and business-like character of the treatise is also to be noted, even a certain economic tinge. Thus among persons who have practical experience of weather changes, in distinction from the literary authorities such as Aristotle and Vergil, Merlee mentions sailors, shepherds, farmers, and whoever loses or makes money by judging of the weather correctly or incorrectly.[14]

This work on weather prognostication was apparently composed at Oxford in 1340,[15] while Merlee was engaged in recording the observations of the weather of which his other work consists, although, as we have seen, there is some doubt how far the other's observations apply to Oxford. The present work is preceded in the manuscript of William Rede which we have already described by a brief treatise or set of rules for prognosticating the future state of the weather by William Merlee

[12] The headings of the twelve chapters have been reproduced by Hellmann (1917), pp. 184-185, from the Berlin manuscript, but differ slightly in some cases from those in Digby 147.

[13] Digby 147, fols. 136v-137v.

[14] Digby 147, fol. 127r, Cap. 2.

[15] The Berlin MS gives the date of composition as 1345, but the statement of the fourteenth century Digby MS seems more to be trusted.

which occupies only a single leaf of the manuscript.[16] This brief text is found again in another manuscript of the Digby collection.[17]

Such seems to be the extent of the literary remains of William Merlee, all dealing with meteorology and all apparently falling within the decade from 1337 to his reported death in 1347. Though brief, they are distinctly creditable to their author and entitle him to a high place in the early annals of that subject. He has a practical mind; he sees the possible scientific value of systematically accumulated experience, and that, if we are to judge of the future, we must know the past. In his humble way he is more truly a scientific specialist than the self-conscious Perscrutator, his fellow countryman of York.

Thus far we have dealt exclusively with English writings in the fields of meteorology and weather prediction, so that we might be tempted to suppose the existence of a local school in that subject. The interest in it was, however, more widespread, as our later chapter on Firminus de Bellavalle will show, and as we may now illustrate by the treatise of a resident of Würzburg named Evno or Eyno or Enno.[18] His *Iudicia de impressionibus quae fiunt in aere* discusses in eighteen chapters the natures and influences of the signs of the zodiac and the planets, the four seasons, the seven climes and their association with the planets, the distribution of geographical regions under the signs of the zodiac, the cause of hot weather, the duration of spells of weather, rain, floods, snow, frost, winds, thunderstorms, the aurora, and

[16] Digby 176, 14th century, fols. 3r-v, "Regule ad futuram aeris temperiem pronosticandam."

[17] Digby 97, early 15th century, fols. 128v-129r. "Notula de futura temperie aeris pronosticanda." As before it opens: "Hec sunt consideranda ad hoc. . . ."

[18] Cod. Norimberg cent V 64, Heft I, fols. 92v-102r: "Felix inquam nimium prior etas in qua tunc temporis exercebantur studiorum ingenia . . . / . . . periti vero considerant et perscrutantur hinc et inde antequam indicunt. Expliciunt Iudicia de impressionibus que fiunt in aere collecta et experimentata a magistro Evnone (?) morantem (*sic*) circa sanctum Burgardum in Herbipoli."

Hellmann does not discuss this work in his *Beiträge zur Geschichte der Meteorologie*. The MS is listed by Björnbo, *Abhandlungen zur Geschichte der mathematischen Wissenschaften*, XXVI (1911), 146. I have used a rotograph procured through the good offices of the Universitätsbibliothek, Erlangen.

crops. Thus Evno's work is primarily a compilation of astrological rules for predicting the weather, based largely on Albumasar, and not, like Merlee's work, merely a record of the weather. But it is also based upon Evno's personal experience at Würzburg, and he regards many of his astrological conclusions as proved by himself.[19] In this connection he records with precise dates[20] and the positions of the planets various meteorological events over the years 1331-1355. An exceptionally hot spell for three weeks during the summer of 1343, rain in September, 1340, cold in December, 1341, a flood of May 24, 1331, which destroyed a number of houses in Berichem, another on February 24, 1343, which broke down the stone bridge at Würzburg and others at Frankfurt, a great flood of July 18, 1345, and a rain in the following year when no one saw the sun for three days, three snowfalls predicted by him in the winter of 1341, another in 1333 on the day of St. Luke the Evangelist, frosts of 1334 in Franconia and others of 1338, 1339, and 1340, great winds on the day of the apostles Simon and Jude in 1335, thunderstorms of 1334 on the day of the martyr Hippolyte and on August 8, 1340, and the price of grain in Franconia in 1355 when Saturn was in Taurus:—such are the meteorological recollections by which Evno supports his astrological rules. His observations extend over a greater number of years than Merlee's record, beginning earlier and continuing thereafter.

[19] See fol. 92v, col. 2, "in hoc opusculo scripsi documenta de impressionibus que longo temporis (inter)vallo didici esse vera"; fol. 94v, col. 2, "in qua civitate continuo exercitio aliquo tempore de impressionibus aliqua per experientiam . . . in hoc libello conscripsi"; fol. 97r, col. 1, "diversis temporibus sepissime probavi"; fol. 97v, "Notabile pulchrum de Marte sepius a me probatum"; fol. 98r, "experientia me docuit causam frigoris"; see also fols. 99r and 101r.

[20] These dates are commonly given in terms of Kalends, Nones, and Ides, but Evno appears to violate the rule that the Nones fall on the fifth of the month except in March, May, July, and October, since he employs such expressions as (fol. 98r) "sextum nonas Decembris," and (fol. 100r) "sexto nonas Decembris."

CHAPTER IX

THE PRECIOUS NEW PEARL OF PETRUS BONUS LOMBARDUS OF FERRARA

The Precious New Pearl (*Pretiosa Margarita Novella*) is an exposition of the arguments for and against alchemy[1] professedly written in the year 1330,[2] in Pola, a city of the province of Istria, by Petrus Bonus, or Pietro Buono, who is also described as a Lombard, of Ferrara, and a *phisicus* or doctor of medicine.[3] Towards the end of the text we are further informed that the author had discussed a like question in 1323 in the city of Traú in Dalmatia.[4] The problem remains who this Petrus Bonus was, and whether the dates 1323 and 1330 can be accepted as marking his period. There seem to be no extant manuscripts of the work which can be dated as early as the fourteenth century. On the other hand, while later historians and bibliographers have sometimes identified this Petrus Bonus with Petrus Bonus Advogarius or Pietro Buono Avogaro,[5] who taught astronomy and astrology

[1] Borsetti, *Historia almi Ferrariae gymnasii*, 1735, in one place (II, 329) refers to it as "Librum Rationum pro Alchimia et contra."

[2] In some MSS and editions the date 1338 or 1339 also is given, but this is probably a mistake in copying. See the explicit in Orléans 289 (243 in Septier, 1820, p. 139), 15th century, paper, and in Zetzner, V, 507-713, and Manget, II, 1-80.

[3] BM Harleian 672, 15th century, fols. 1-169, "Explicit Pretiosa novella margarita edita a magistro bono lombardo de ferraria phizico introducens ad artem alkimie. Composita 1330 in civitate Polle in provincia Ystrie, Deo gratias." DWS (1928), No. 276, p. 260. Orléans 290 (244 in Septier, 1820, p. 139), 16th century, fols. 1-96, "Incipit tractatus magistri Boni de Ferraria physici introductorius ad artem alkimie compositus 1330 anno a nativitate Domini nostri Iesu Christi in civitate Poli de provincia Istrie". The same incipit is found in the editions.

[4] Harleian 672, just before the colophon quoted in our preceding note we read, ". . . scripsimus prius similem questionem in civitate Tragurii in 1323 anno quàm cassamus propter magnam excellentiam eius etc." Some have incorrectly translated "Craguri" (or, "Tragurii") as Cracow.

Tiraboschi, V (1823), 332, quoted from the close of an alchemical manuscript in the Biblioteca Este, "Quaestio . . . per Magistrum Bonum Ferrariensem physicum sub MCCCXXIII anno . . . tunc temporis salariatum in civitate Traguriae de provincia Dalmatiae."

[5] The alchemical work is ascribed to

at Ferrara in the closing third of the fifteenth century, and printed an emendation of Andalò di Negro's work on the astrolabe in 1475,[6] and many annual predictions in the years following that date,[7] the author of the alchemical work never calls himself Advogarius or is so spoken of in the manuscripts. Moreover, it might be argued that had *The Precious New Pearl* been Avogaro's, he would have printed it before 1500 as he did so many of his works, whereas portions of it were first printed some forty years after his death.[8] In the third place, Avogaro in his other works displays no interest in alchemy. The only reasons, therefore, for assigning *The Precious New Pearl* to him are that his name is Petrus Bonus and that he comes from Ferrara. There was, however, at least one earlier person of that name from Ferrara, namely, a doctor of laws who became abbot of the Benedictine monastery of St. Bartholomew in that city and was made bishop of Comacchio from 1396 until his death in 1402.[9] There is no particular reason for regarding him as an alchemist or author of *The Precious New Pearl,* but at least he shows that there was more than one person named Petrus Bonus and connected with Ferrara.

Avogaro in the printed catalogue of the British Museum and by Borsetti, *op. cit.*, II (1735), 320 and 86.

[6] In 1475 is also dated an astrological work by him in Vatic. 5373, fol. 4, on what to do or avoid as the moon is in each sign, with a page-long list of cities arranged under signs and planets. It ends, "Actum ferrarie die ultimo feb. anno a natali christi anno 1475 per me petrum bonum advogharium artium et medicine doctorem." See also Boncompagni's *Bullettino,* VII (1874), 340-342; and my "Vatican Latin Manuscripts in the History of Science and Medicine," *Isis,* XIII (1929), 58-59.

[7] They will be found listed in GW under "Avogaro."

[8] "It was first printed in the form of a condensation with other works by Lacinius in 1546 at Venice, and later impressions were in 1554 at Nürnberg, 1572 at Basel, 1602 at Mömpelgard, 1608 at Strasburg": J. M. Stillman, "Petrus Bonus and Supposed Chemical Forgeries," *Scientific Monthly,* XVII (1923), 318-325. This statement is unfortunately misleading. The edition of Nürnberg, 1554 contained almost nothing of Bonus, although much of Lacinius's other contents. On the other hand, the edition of Basel, 1572 by Michael Toxites and that of 1602 gave the full text practically as contained in Harley 672 and as later reprinted in the alchemical collections of Zetzner and Manget.

[9] Chevalier, *Répertoire,* citing Mazzuchelli, *Scrittori italiani* (1762), II, iii, 1637; and Ughi, *Uomini illus. Ferrar.,* I (1804), 101v. Borsetti, II (1735), 4, citing Ferd. Ughelli, *Italia sacra,* 1717-1722, and Libanori, *Ferrara d'Oro,* etc.

There were three other men of like name but who seem to have been associated with other towns. However, it should be noted that our alchemical author is not always called Petrus Bonus but sometimes simply Bonus Lombardus. Sbaralea mentions a Franciscan of Modena about 1421 named Pietro Bono,[10] while a bachelor of arts and medicine named Petrus Bonus in 1378 was a cleric of the diocese of Clermont.[11] Tiraboschi further mentions a Pietro Buono of Mantua who wrote a work on virtues and vices of which the opening words pictured him as driven from his native city and stripped of all his goods. Tiraboschi therefore suggested that he might have spent his exile in Ferrara and Pola, where he would naturally be spoken of as Lombardus.[12] Whether his dates would coincide with those of *The New Precious Pearl* seems undetermined, however. Tiraboschi further suggested that Petrus Bonus of Ferrara and the alchemist known as brother Ferrarius, under whose name, altered to Efferarius, a work on the philosophers' stone was printed,[13] and who directed his epistle on the subject to the pope, might be identical.[14] But nothing was said to indicate that Petrus Bonus was a friar. We hear not only of a Pietro Buono at Mantua but also of a Petrus Avogadrus of that city in the first half of the thirteenth century. Platina in his history of Mantua describes him as a prominent man of noble family, and friend of Ezzelino, to whom Beatrice,

[10] Sbaralea, *Suppl.* (1806), pp. 588, 732.

[11] Pansier, *Janus,* X (1905), 5.

[12] Tiraboschi, V (1823), 333, note, citing a MS then in the Biblioteca Guarneriana in S. Daniello, Incipit Opusculum de doctrina virtutum et fuga vitiorum editum a Magistro Bono de Mantua, opening, "Cum patria propulsus bonis omnibus exutus. . . ." Apparently this MS is now S. Marco XIII, 18 (Valentinelli), 14th century, fols. 32-43.

[13] In Zetzner, *Theatrum chemicum,* III (1613), 128-137; (1659), 143-151; *Verae alchemiae doctrina,* Basel, 1561, II, 232-237.

[14] BL Digby 164, early 15th century, fol. 17, "Extracta de tractatu fratris Ferrarii super arte alkymie," opening, "Dirigit epistolam suam Papae et primo ponit artis impedimenta et que conveniunt artiste. Secundo narrat illorum rationes qui hanc scientiam impugnant. . . ." This sounds like the first part of *The Precious New Pearl.* It closes, ". . . et candide mulieris desponsare sciverit ipsos in infinitum multiplicabit. Hanc nobis iuxta cor nostrum prestare dignetur. Explicit liber Ferrarius," which does not sound like Petrus Bonus' work. This incipit and explicit do not correspond to the printed texts. Another MS is Cassel, Landesbibliothek, Chem. Folio 3, (Z) pp. 257v-274, Tractatus fratris Ferrarii ad dominum Papam.

the sister of Ezzelino, came in male attire, and who aided her in marrying Sordello and obtaining her brother's consent to the match.[15] It is barely possible that the other Pietro Buono's whom we have mentioned, or most of them, were of this same Avogadrus or Advogarius family, first at Mantua and then at Ferrara. In that case Pietro Buono the alchemist of 1330 might have been an Avogaro as well as the later astronomer of that name.

So far as internal evidence is concerned, it would seem that *The Precious New Pearl* might have been composed in 1330 or thereabouts. In a number of respects it seems to reflect the thought of the fourteenth century. Stillman has argued from its failure to cite Albertus Magnus, Aquinas, Roger Bacon, Arnald of Villanova and Raymond Lull that the works of alchemy incorrectly ascribed to those authors were not yet current in 1330.[16] The weakness of this argument is that Roger Bacon and Arnald of Villanova and perhaps Albert actually wrote alchemical treatises, which therefore must have been current before 1330, whether known to the author of *The Precious New Pearl* or not. Moreover, the incipit of *The Precious New Pearl*, "Entia realia sunt in triplici gradu . . . "[17] bears a suspicious resemblance to "Entia realia stantia in primordialibus . . . " of the *Testament* ascribed to Lull, although of course the *Testament* may have borrowed from the *Pearl* rather than vice versa. The authentic alchemical works by Albert, Bacon, and Arnald were, however, relatively few compared to the whole series or corpus of writings that came to circulate under their names and those of Aquinas and Lull. And we may agree that a writer in the fifteenth century would have been more apt to cite some of this literature than

[15] Platina, *Historiae Mantuae*, liber I, p. 53 in the edition of 1675; or Muratori, *Scriptores*, XX (1731), 684-685.

[16] J. M. Stillman, *Scientific Monthly*, XVII (1923), 321. The date 1330 or thereabouts for our work is also accepted by E. J. Holmyard and D. C. Mandeville, *Avicennae de congelatione et conglutinatione lapidum*, Paris, 1927, p. 4; and by Ruska, *Tabula Smaragdina*, 1926, pp. 192-193.

[17] The *Pretiosa novella margarita* may be said to have three incipits. Its preface opens, "Entia realia sunt in triplici gradu. . . ." Its introduction begins, "Omnis ars et omnis scientia aut est de rebus. . . ." The body of text commences, "Quia consuevit non solum apud antiquos. . . ."

would a writer as early as 1330. Therefore, there is somewhat more reason for placing *The Precious New Pearl* at the early time. We accordingly shall consider it under its traditional date. Against such a date for it, however, might be adduced the circumstance that it seems not to have been cited in other alchemical writings of the fourteenth and fifteenth centuries, so far as these have been examined. It is of some moment that the first editor of *The Precious New Pearl*, Janus Lacinius Therapus,[18] a Franciscan and Calabrian of Psychronea in the Basilicate, seems to have sincerely regarded Petrus Bonus as of approximately the same period as Raymond Lull, Arnald of Villanova, Albertus, and Michael Scot—extracts from whose alchemical writings he published along with his abbreviation or paraphrase of the *Pretiosa Margarita Novella.* Sbaralea believed Janus Lacinius to be a pseudonym for brother John of Croton, there being a promontory in Calabria called Lacinium.[19] Lacinius states that on his return from Lombardy he found at Padua a copy of *The Precious New Pearl.*

In the course of *The Precious New Pearl* Petrus Bonus declares that the whole operation of the alchemical art can be learned and taught in one day, nay in a single hour, by any intelligent or well informed person without investigation and specialized knowledge, which is the case in no other art or science.[20] He himself, however, fails to impart the secret to us within any such limited time as an hour. Instead he beats about the bush for some two hundred finely printed pages only to conclude with the confession that he has not yet penetrated to the secret or experienced the philosophers' stone himself.[21] This unusual can-

[18] Lacinius (Janus), *Pretiosa margarita novella de thesauro ac pretiosissimo philosophorum lapide, artis huius divinae typus et methodus, collectanea ex Arnaldo, Rhaymundo, Rhasi, Alberto et Michaele Scoto,* Venice, Aldine, 1546. Besides the editions listed above in note 8, there was one at Venice, 1557; a German translation by W. G. Stollen, Leipzig, 1714; and a recent English abridgment and paraphrase of what Lacinius had already abridged and paraphrased, by A. E. Waite, *The New Pearl of Great Price,* 1894.

[19] Sbaralea, II (1921), 22.

[20] Zetzner, V (1660), 606.

[21] *Ibid.*, V, 712, "Ad istius ergo arcani mirabilis et divini finem . . . quia adhuc ipsa caremus et operationi dediti fuimus, perducat nos creator omnium deus. . . ."

dor in an alchemical writer rather disarms our criticism, and makes us feel that we have to do with a genuinely first-hand document which reflects the relation of alchemy to the thinking world of a particular past period rather than with the forgery of some quack or romancer who directed his appeal to gullible and unthinking followers of a current fad and delusion. It even makes us more ready to accept 1330 or 1338 as the possible time of writing.

The Precious New Pearl is none the less an exceedingly prolix work, much longer than the average alchemical tract. Our experience of other alchemical texts might incline us to lay this prolixity at the door of the editor of the printed edition, but unfortunately for this hypothesis the text in the Harley manuscript is practically identical. Petrus Bonus seems to have been convinced that fullness of statement is essential to clearness and that frequent repetition has a pedagogical value and persuasive power. But to a person convinced that brevity is the soul of wit Peter's presentation must seem wordy and lumbering. Indeed, as we plough slowly through his reiterated arguments and citations in favor of alchemy and insistence upon the essentials in the process of transmutation, we sometimes are inclined to wonder that he could bear to take so much time from the experimental pursuit of the philosophers' stone itself merely to set forth the theory and rationale of it, or could find readers willing to take this time with him. Doubtless his treatise reflects the age of meticulous and overelaborated scholasticism, of long-spun argumentation and piled-up citations. It seems to show something more: that the philosophers' stone had become a matter of faith as well as—not to say, rather than—a matter of experimentation, something that men were spending a great deal of time preaching about as well as—or shall we say, rather than—practicing. It was almost enshrined in that mystic region of believing where we cannot prove and in that dream world of proving what we cannot put into practice. Petrus Bonus at any rate in *The Precious New Pearl,* although he sometimes speaks of having done something with his own hands and seen it with his

own eyes,[22] approaches the problem of transmutation with a pen in his hand rather than an alembic and with volumes of the past literature of the subject at his side rather than metals and chemicals.

Our author also affects the lingo and method of the scholasticism of the fourteenth century. This begins with the first words of his preface, "Entia realia sunt in triplici gradu. . . . " He has much to say of substantial form,[23] of intrinsic and extrinsic, of *in potentia* and *in actu*,[24] of the beginning of motion and the end or terminus of motion,[25] or even of "opus terminatum termino et tempore terminato."[26]

A prime purpose of Peter in *The Precious New Pearl* is evidently to associate the name and philosophy of Aristotle in a favorable way with alchemy. His citations of the Stagirite are multitudinous and varied, drawn from most of his genuine works and some spurious ones. The reader is given the impression that alchemy is being measured by Peripatetic standards and formulated in Aristotelian terms. The effort is not wholly convincing, since it is with the letter of Aristotelian texts and not with the spirit of the Peripatetic philosophy and scientific method that the art of transmutation is brought into rapport. Peter expressly recognizes that Aristotle in the fourth book of the *Meteorology*[27] denied the truth of alchemy and called it sophistical and fantastic. The passage in question is now regarded as a later addition to the text of the *Meteorology,* and already in Peter's time it was correctly ascribed by some to Avicenna. Although this attribution would have served Peter's purpose, he again displays his candor and sense of fairness by refusing to make any argumentative use of it. He does not believe that the passage can be by Avicenna and feels that it is by Aristotle, because Avicenna in another work on alchemy which Petrus Bonus accepts as genu-

[22] Zetzner, V, 663.
[23] Zetzner, V, 517.
[24] *Ibid.*, V, 545, 677, etc.
[25] *Ibid.*, V, 559, 674, etc.
[26] *Ibid.*, V, 617.
[27] In Zetzner's edition the fourth book of the *Metaphysics* is more often cited for the passage in question, but these seem evident misprints or misreadings of abbreviations in manuscripts. For example, a chapter "De corporibus mineralibus et de atramentis" is cited as "a philosopho in 4 Metaphy.,"—Zetzner, V, 548.

ine cites it as Aristotle's opinion.[28] Peter therefore confines himself to answering as best he can what he regards as Aristotle's five arguments against alchemy in the *Meteorology* and to suggesting that this denial of transmutation was made in Aristotle's youth and that he learned better in later years, as is shown by his affirmation of its validity in the *Secret of Secrets* addressed to Alexander the Great.[29] Peter also accepts the assertion of Haly that Aristotle wrote another alchemical work.[30] Peter knew that the authenticity of Aristotle's epistle to Alexander had been questioned on the ground that the style differed from that of his *Metaphysics* and works on natural philosophy, but he accepted it because he found similar citations in Haly and John Mesue.[31] Evidently Peter's ability to distinguish between spurious and authentic works was much less than his own fairness of statement. Indeed, belief in alchemy and the capacity for textual criticism have seldom been found together in the same person.

Besides the numerous quotations from Aristotle, which, as has been implied, may come from those of his works that have no concern with metals or minerals, such as the *Metaphysics,* logical treatises, *De anima* and *History of Animals,* Petrus Bonus repeatedly gives strings of quotations from alchemical literature. Here his preference is for ancient or supposedly ancient writers and for the Arabs. Geber and Morienus, Senior and *Lilium,* Haly and Rasis, the *Scoliae* and *Stellicae* of Plato,[32] *Alphidius,* Milvescindus, and various proper names from *Turba philosophorum* are typical of his authorities. Not once is a medieval Latin writer on alchemy cited by name, although the "moderns"[33] are mentioned in general in contrast to the ancients and it seems clear

[28] Zetzner, V, 541.
[29] Zetzner, V. 712.
[30] *Idem.*
[31] *Ibid.,* V, 589: "tamen quia fama testatur. . . ."
[32] The *Scoliae* and *Stellicae* of Plato are alternate titles for the *Liber quartus,* an alchemical tract current in medieval manuscripts under Plato's name and printed in Zetzner, V (1622), 114-208; (1660), 101-185. Petrus Bonus cites it many times. See further *Magic and Experimental Science,* II, 782-783.
[33] One or two examples are: Zetzner, V, 527, "Quia consuevit non solum apud antiquos speculatores et inquisitores veritatis arcanorum naturae sed etiam modernos inquiri et disputari"; 680, "sicut quibusdam antiquis et modernis visum est."

that citations of the *Minerals* of Aristotle are drawn from Albertus Magnus' Latin version. Other non-alchemical writings than Aristotle's works are occasionally cited like medical treatises of Galen and Avicenna or the *Introduction* of Albumasar to judicial astrology,[34] and the work on fifteen stars, stones, and herbs ascribed to Hermes.[35] But these too are confined to ancient and Arabic authors and include none of the recent Latin middle ages. Peter believed that many books which did not appear to be concerned with alchemy such as Ovid's *Metamorphoses* dealt metaphorically with the philosophers' stone,[36] and that it had often been prefigured in myth and poetry.[37]

Despite his assertion that the secret of transmutation could be imparted in one hour, Petrus Bonus was ready to admit the extreme difficulty of alchemy. At first it seemed easy to him, but then doubts and difficulties arose, and further study and inquiry only increased their number.[38] Its terminology adds to the difficulty of alchemy, since it is the only art or science to employ words in various meanings and ways—proper, strange, unusual, allegorical, metaphorical, enigmatical, equivocal, with prosopopoeia, hyperbole, and irony.[39] Bonus devotes several chapters to explanation of such terms as ferment, tyriac and poison, coagulum and milk, masculine and feminine. Its mode of exposition is less orderly than that of other arts and sciences.[40] The diversity of existing practice and the contradictions between alchemical writings further attest the difficulty of the art.[41]

Petrus Bonus contends on the one hand that alchemy is comprehended under natural philosophy, while such arts as glassmaking and the production of artificial salts are subordinated to alchemy.[42] An alchemist must know the ways of nature.[43] On the other hand he maintains that natural scientists who are not alchemists are incapable of judging that art rightly.[44] Possibly

[34] Zetzner, V, 586.
[35] Zetzner, V, 605.
[36] Zetzner, V, 593, cap. 9.
[37] Zetzner, V, 614.
[38] Zetzner, V, 515: its difficulty is again dwelt upon at p. 566.
[39] Zetzner, V, 516, 566.
[40] Zetzner, V, 572.
[41] Zetzner, V, 570.
[42] Zetzner, V, 507-8, 512.
[43] Zetzner, V, 554.
[44] Zetzner, V, 528.

there is here some covert reference to that debate before John XXII between natural scientists and alchemists as to the truth of the art of transmutation which Eymeric records.[45]

Alchemy is also compared to the medical art. It has the same relation to the book of minerals, which Peter incorrectly accepts as Aristotle's, as medicine bears to natural philosophy. But while medicine aims to preserve health as well as to cure disease, alchemy's sole aim is to remedy the imperfect state of the baser metals.[46] For alchemy is the science by which imperfect metals are transmuted into pure gold.[47]

After preface, introduction, and other verbose preliminaries have been disposed of, our author's first chapter gives various arguments against alchemy which are none the less forcefully put for the fact that he intends later to answer them. It is urged that alchemists do not know the exact quantity of each element in any compound substance and consequently cannot reproduce such compounds artificially or fathom their specific form. If they do not know how much and what sort of heat is required to generate metals naturally within the earth's surface, how can they regulate furnace and fire in their art? Or how can any alchemist live long enough to fabricate the gold which natural processes evolve only after thousands of years? These processes cannot be hurried, because the metals come from most subtle fumes resolved from quicksilver with the substance of sulphur and require the maintenance of a humidity which an increased application of heat would dissipate. Alchemists cannot duplicate the natural place proper to the generation of metals. We are unable to generate animal life by art, although animals corrupt quickly and hence should be generated in a short time; much less can we produce gold and silver which are so much less easily disintegrated. The alchemists do not understand the natures and movements of the stars which cause all generation and cor-

[45] On the other hand, Eymeric's story is very possibly apocryphal.

[46] Zetzner, V, 564.

[47] Zetzner, V, 563, "Alchimia est scientia qua metallorum principia causae proprietates et passiones omnium radicitus cognoscuntur ut quae imperfecta incompleta mixta et corrupta sunt in verum aurum transmutentur."

ruption on earth, therefore they cannot control the process of generating a compound substance. Were alchemy valid, the ancient philosophers would long since have penetrated to its secret, and had they done so, they would have revealed it without envy as they freely taught all the other sciences. The critics of alchemy further object that opposite or contrary operations are attributed to the philosophers' stone by its devotees. They object to their calling other metals imperfect and representing gold and silver as perfect, when the other metals are as complete in their substantial form. They object that the alchemical process is not the same as the natural formation of metals, and that therefore the gold and silver produced by the alchemists cannot be the same as the precious metals in their natural state. Alchemy, they point out, fails to meet Aristotle's definition of science as concerning itself with that which is necessary and perpetual and incorruptible and which cannot be other than as it is. Indeed they hold that Aristotle expressly denied the truth of alchemy. They contend that alchemists cannot reduce the metals to a formless first matter, that they can merely alter and not transmute. They will not agree that the metals differ only in their accidents and not in species.

Professedly Petrus Bonus does not begin to answer one by one these arguments against alchemy, which had been grouped in his first chapter, until he reaches his sixteenth chapter. But in reality he has partially replied to them before that. In his second chapter he had enumerated various arguments in favor of alchemy of which he was quite proud, affirming that he had never heard or seen such affirmation of the truth of the art before.[48] But many of these affirmative arguments are the contraries of those against alchemy. In brief summary of our author's rebuttal of the contentions against alchemy it may be said that he holds that it is not necessary for the alchemist to know exactly the constituents

[48] Zetzner, V, 561: "Sufficiant igitur nunc hae rationes affirmantes artem Alchemiae esse omnino veram quamvis numquam audiverimus aliquam affirmativam nec in scripturis aliquorum viderimus, quia semper consuetudo fuit facere rationes ad hanc artem destruendum: ad construendum autem nemo consuevit propter difficultatem."

of compounds or the details of the natural process and that it is sufficient to know the *materiam determinatam propinquam*.[49] And we know, Peter insists, the *materiam propinquam et determinatam* of gold and silver, namely, quicksilver coagulated with sulphur, better than we do that of arsenic and sulphur, which is *pinguedo terrae*.[50] The natures of things can be known only from their accidents, and if the alchemists make gold with all the accidents of the precious metal, that is a proof of its genuineness.[51] The regimen of art differs from the natural process in digestion and heat, place and time, and the state and proportion of the miscibles.[52] Therefore the objections that alchemists cannot ascertain or apply the natural process are irrelevant. It appears, however, that the secret of the regimen of art is a divine revelation not otherwise humanly attainable. As for the objection that the metals would lose their essential humidity under the heat of the alchemist's furnace, Bonus retorts that the introduction of the form of gold is accomplished in a moment with conservation of the proper humidity.[53] Nor is it necessary that alchemists understand the workings of the stars, since the celestial influence is a constant factor in the transmutation of metals just as it is in the generation of a worm from putrefying flesh or the production of lime and vitriol. The alchemical process does not require the dominance of some particular constellation as does the art of astronomical images.[54] If the ancients did not reveal the process of transmutation as freely as other sciences, it was because it was divinely revealed. Bonus insists that the baser metals are imperfect and diseased, that they are all ordained by nature to become gold ultimately, and are the means in a series or progression of which quicksilver and sulphur form the one extreme and gold the opposite goal.[55]

It is therefore not necessary to reduce the baser metals to first matter since they, unlike animals, vegetation, and other

[49] Zetzner, V, 554.
[50] Zetzner, V, 551.
[51] Zetzner, V, 646, 676, etc.
[52] Zetzner, V, 558.
[53] Zetzner, V, 653.
[54] Zetzner, V, 656.
[55] Zetzner, V, 550, 558-559, 632, 674, 677-679.

minerals, already are far on the road to becoming gold.[56] Bonus readily admits that art cannot produce gems in imitation of nature because they may not be reduced to liquid form like metals.[57] Nor can the alchemist make the imperfect metals because he does not know the exact amount of sulphur which nature incorporates in each. But in the case of the precious metals, gold and silver, he has no such difficulty, since he knows that he must rid the quicksilver of sulphur entirely.[58] Bonus grants that art must closely follow and parallel the natural processes by which the metals are formed, but he believes that art can greatly hasten the process. Although the preceding dispositions may be successive and the period of preparation considerable, the form of gold is introduced instantaneously.[59] "For this power and virtue of transmutation is not of nature alone since it is not found in the nature of things, nor yet of art alone since it is not artificial form (which is introduced) but the work of nature as it is administered and directed by art and divine will. Bonus indeed regards alchemy as possessing a divine as well as natural character. One cannot give sufficient natural reasons for the philosophers' stone but must believe it like the miracles of Christianity.[60] This is why so many of the ancient sages who operated by natural methods alone failed of full achievement,[61] since the art is a divine secret transcending both natural reason and experience.[62] It also serves to explain why other philosophers dared not reveal it as they would ordinary profane learning.[63]

The doctrine or doctrines as to the nature of the philosophers' stone and of the process of transmutation which are set forth by Petrus Bonus are very similar to the theories which we find in other alchemical authors of the fourteenth century. Contempt is expressed as usual for those who waste their time over vegetable matter and the parts of animals or their superfluities or

[56] Zetzner, V, 682.
[57] Zetzner, V, 555.
[58] Zetzner, V, 553.
[59] Zetzner, V, 657.
[60] Zetzner, V, 580-1, cap. 6.
[61] Zetzner, V, 584, cap. 7.
[62] Zetzner, V, 588, cap. 8.
[63] Zetzner, V, 589.

on other minerals than the metals themselves and sulphur and quicksilver.[64] Moreover, vulgar sulphur and extrinsic sulphur is of no avail. Bonus, like Arnald of Villanova, affirms that quicksilver is the whole material cause and substance of the philosophers' stone. The commonplace of previous alchemical literature that quicksilver is the matter, sulphur the agent to shape and form the philosophers' stone he explains away as follows. In quicksilver is a most subtle intrinsic sulphur which gives it its natural white color but in the alchemical process colors it red as gold. The diversity of other metals comes from the varying admixture of sulphur with quicksilver in them, sulphur being the cause of their imperfection. In gold alone of the metals is quicksilver wholly purified from sulphur.[65] In this insistence upon the supreme and exclusive importance of quicksilver in the alchemical process Bonus represents a marked current in the alchemical literature of the time. Possibly he was more original or unique in explaining that just at the very moment the other metals were purified of sulphur and made white, they received from that sulphur the ruddiness and yellow color and form of gold. "For unless they were purified and whitened, they could not be colored and perfected."

The Precious New Pearl contains some interesting allusions to mines. Alum mines in the neighborhood of Constantinople are mentioned, and the method of extracting this *alum de rocha* or *de alap* is described.[66] In another passage we are told that in certain silver mines of the kingdom of Servia[67] they find the purest gold. On the other hand, silver is found in an imperfect state in parts of Germany and elsewhere. We are also told that the silver miners grieve when they come upon gold, because it is a sign that the vein of silver has run out.[68] And one of the objections made to Bonus's theory that the other metals are on

[64] Zetzner, V, 509.
[65] Zetzner, V, 546.
[66] Zetzner, V, 549: "Similiter scimus quod in partibus Constantinopolis lapides quosdam minerae calcinant, postea in aqua solvunt et docoquunt in vasis donec fiat alumen quod dicitur alumen de alumine de rocha et de alap."
[67] Zetzner, V, 681, "ut in regno Serviae, id est, Rassiae, quod est in Sclavonia."
[68] Zetzner, V, 682.

the way to becoming gold is that no intermediate substance between them and gold is ever found in mines or is left there by the miners to ripen into gold.[69]

Petrus Bonus gives an account of the spirits of metals which he makes seven in number. Four of these are primary, namely, quicksilver, sulphur, auripigment (orpiment or arsenic), and sal armoniacus, while the secondary spirits are marcasite, magnesia, and tutia.[70] Peter seems clearly to be envisaging a gaseous state and distinguishing between gases and solids, when he states that in some things a volatile condition is foremost, such as quicksilver, marcasite, and camphor, while others are manifestly of a stable and permanent nature like gold, antimony, marble, alum, salt, and tartar with their volatile nature concealed. "For in spirits there are bodies potentially, and in bodies spirits exist potentially."[71] All this, however, was a commonplace of the alchemical literature of the time.

Some side-lights are thrown on other scientific views of the period than chemical knowledge or theory. Petrus Bonus is aware that there were opponents of the geocentric theory in Aristotle's time, who, as he says in *De coelo et mundo,* the second

[69] Zetzner, V, 689, cap. 22.

[70] Zetzner, V (1660), 536. ". . . ideo invenimus res quasdam minerales, quae dicuntur spiritus metallorum, ex quibus metalla generata sunt tanquam ex principiis, & ingredi, & sunt argentum vivum & sulphur ex quibus metalla omnia originem contraxerunt, sicut patet ex 4. Meteororum, & per Alchemistas. Sunt etiam auripigmentum, & sal armoniacum spiritus: sed auripigmentum est de natura sulphuris, sal vero armoniacus de natura salis. Et sicut sapor vel sapo metallorum dicitur a quibusdam quamvis non sit de substantia eorum. Sunt autem alii spiritus secundarii, scilicet Marcasita, Magnesia, & Tutia, sed magnesia & marcasita sunt spiritus facti a natura commixti de sulphure & argento vivo: Tutia autem est fumus metallorum subtilis, resolutus ab eis, quae omnia sunt aut principia metallorum, aut ex eisdem principiis praeterquam sal armoniacus. Sunt ergo septem Alchemici spiritus scilicet quatuor principales, videlicet, argentum vivum, & sulphur, auripigmentum, & sal armoniacum, & tres secundarii & compositi, scilicet marcasita, magnesia, & Tutia: sulphur tamen & argentum vivum sunt sicut elementa, & primum obtinent principatum. . . ."

[71] Zetzner, V, 651; ". . . in quibus permanet actu natura volandi prima . . . ut argentum vivum marcasita et camphora. In quibus autem occultata est natura volandi et manifestata natura standi et permanendi, semper permanent secundum naturam suam ut aurum antimonium marmor alumen sal et tartarum. . . . In spiritibus enim sunt corpora in potentia et in corporibus sunt spiritus in potentia."

book, held that the earth moved in a circle, and was one of the stars, while the place of fire was in the center of the universe.[72] Peter used the current belief in spontaneous generation to argue that gold need not always be generated in the same sort of place. He states that nature generates frogs in the clouds or in the dust which has been spattered by rain, and that Avicenna tells of a calf falling from the clouds in a thunderstorm half-alive.[73] Peter also repeats the generally accepted view then that the entire earth would naturally be covered with water except for the need of some dry land to support living beings. So all metals should be gold, but nature has generated others for man's convenience.[74]

[72] Zetzner, V, 642.
[73] Zetzner, V, 647.
[74] Zetzner, V, 680.

CHAPTER X

THE SPECULUM ALCHIMIAE OF NICOLAUS DE COMITIBUS

The *Mirror of Alchemy* or *Speculum alchimiae,* best distinguishable by its incipit, "Ut ad perfectam scientiam . . ." printed under the name of Arnald of Villanova in the alchemical collections of Zetzner[1] and Manget[2] in the seventeenth and eighteenth centuries, is attributed without any special title to a Nicolaus Comes in three manuscripts existing in British libraries.[3] While the ascription of this *Speculum* to Arnald is accepted, or at least stated, by the *Histoire littéraire de la France,*[4] it is to be noted that a bibliography of alchemical works which is preserved in a Barberini manuscript and which was probably compiled in the later sixteenth or the seventeenth century does not include the *Speculum* among some twenty-one titles which it gives under Arnald's name and upon the authenticity of some of which it casts doubt, stating that such works by Arnald are said to be fifteen in number.[5] Perhaps the work has been ascribed to Arnald because its form is something like his *Secrets of Nature.* While the manuscripts in English libraries are in accord in attributing the *Speculum* to Nicolaus Comes, continental copies have other ascriptions. In a codex at Paris it is ascribed to Heila or Hecla,[6] who is hardly to be identified with brother

[1] Zetzner, *Theatrum chemicum,* IV (1659), 515-542.

[2] Manget, *Bibliotheca chemica curiosa,* I (1702), 687-698. The text seems identical with that of Zetzner.

[3] DWS vol. I, No. 355: CU Corpus Christi 00, in a clear bookhand, pp. 21-35; BM Stowe 1070, fols. 11-16r (new numbering 2r-17r, but I shall adhere to the original numbering); BM Sloane 602, fols. 20r-46v. I have used rotographs of all three manuscripts.

[4] HL 28 (1881), 90. See also BU 168 (180), 15th century, fols. 132r-137v: "Incipit Speculum alkimie magistri Arnaldi de Villanova."

[5] Vatic. Barb. 273, fol. 245v, "Que quidem opera vera Arnaldi omnia esse dicunt n° XV."

[6] BN 7173, 16th century, fols. 213-223r: "Incipit Speculum alcimiae compositum a fratre Heila ministro ministrorum et fuit dicatum Benedicto Papae 11mo. Ut ad perfectam scientiam . . . / . . . quia desiderat bibere et coniungi. Explicit practica Benedicti papae XI quae dicitur

Elias, the successor of St. Francis, to whom alchemical practice was imputed and alchemical tracts were assigned, since he is said to have dedicated it to Benedict XI who was only thirteen years old when brother Elias died. In a manuscript of 1524 at Naples the same text is introduced as "the book of the old man of the south entitled Saint Astrop or Senior in alchemy."[7] In fact, in an earlier manuscript of the fifteenth century now in the university library at Bologna, its author is likewise called "Saint Astrop" or Asrob, or "the old man of the south."[8] Astop or Asrop or *Adrop,* as it is variously spelled in other versions, is of course not the author's name but what is referred to repeatedly in the text itself as the Arabic word for the philosophers' stone. In a fifteenth century manuscript formerly in the library of the elector Palatine the work is anonymous and furthermore is not entitled *Speculum* but *Inspiration of Divinity Given Only to the Faithful.*[9] However it is followed in this manuscript by the *Semita Semitae* which is sometimes ascribed to Arnald though here anonymous and later by the *Questiones tam essentiales quam accidentales* with Arnald of Villanova named as author.

Continental manuscripts of the treatise, however, also support the ascription of the *Mirror of Alchemy* to Nicolaus de

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Speculum alchimiae." This is a much briefer text than usual and either totally different or composed of extracts only from the usual text.

[7] Naples Bibl. Naz. VIII.D.20, fols. 92r-108r, "Incipit liber Senis Meridiani intitulatus Sanctus Astrop vel Senior in alkimia." Then come the usual opening words, "Ut ad perfectam scientiam pervenire possimus. . . ."

[8] BU 164 (153), membrane, 15th century, fols. 135v-143v, "Incipit sanctus Astop sive senex meridianus. Ut ad perfectam scientiam pervenire possimus . . . / . . . dat sapientiam sapientibus. Amen. Explicit sanctus asrob sive senex meridianus. Deo gratias Amen." Also in Orléans 290 (Septier, 244), 16th century, fols. 197-206: "Liber sancti Asrob senis meridiani."

[9] Vatic. Palat. 1329, fols. 50v-78v, "Incipit inspiratio divinitatis tantum data fidelibus. In nomine sancte trinitatis et individue unitatis Amen. Ad hoc ut possimus pervenire ad perfectam scientiam primo expedit scire quatuor esse lapides spirituales . . . / . . . quod generantur similes illis. Explicit." It is also anonymous in CLM 455, 15th century, fols. 124r-135r. "In nomine sancte et individue trinitatis, Amen. Ad hoc ut possimus pervenire ad perfectam scientiam . . . / . . . ymo volumus quod ambo maneant in simul etc. etc. deo gratias." Likewise in Wolfenbüttel 3284, fols. 143r-144v: Cues 201, fols. 65-71v.

Comitibus, under whose name it appears with that title in two other codices of the fifteenth century at the university of Bologna, in both of which the author is further described as of the Trevisan march.[10] This might be thought an imitation of or confusion with Bernard Trevisan, but Bernard the alchemist of the late fourteenth century was really of Trier in Germany, and not of the Trevisan march, and is so described in one of these very manuscripts in the titulus to his reply to Thomas of Bologna. The place name, of the Trevisan march, would thus seem to belong by better title to Nicolaus de Comitibus, and he would also seem to have a far better claim than any other person to be regarded as the author of the *Mirror of Alchemy*.

The question arises whether Nicolaus Comes or de Comitibus of the Trevisan march may be identified with Niccolò de Comitibus of Padua, the astrological writer of 1450 and 1466. Since Padua was Venetian after 1405 a Nicolò de Comitibus of Padua who is called of the Trevisan march would presumably be earlier than that date. And while all manuscripts of the work which I have seen are of the fifteenth century, it seems probable that they are copies of earlier originals, and the handwriting of two or three of them would seem earlier in the fifteenth century than 1466 or 1450. The other works with which our treatise is found in the Cambridge manuscript are all of the fourteenth century or earlier, and one is inclined to ascribe it to that century. On the other hand John Dastin appears to be cited in our treatise,[11] which would indicate that it was written later than his period, the first

[10] BU 601 (1115), perg., 15th century, 18 fols., mm. 202 x 150: "Magistri Nicolai de Comitibus de Marchia Trevisana liber qui Speculum alchimie nuncupatur. Ut ad perfectam scientiam . . . / . . . dat sapientiam sapientibus". BU 138 (104), written at Vienne, 1476 A.D., fols. 1-24v, "Magistri Nicolai de Comitibus de Marchia Trevisana liber qui Speculum alchimie nuncupatur. Ut ad perfectam scientiam . . . / . . . et omnino denegatur." BU 303 (500), 15th century, fols. 196r-200v: "Extracta ex speculo Nicholai Comitis. Septem sunt operationes . . . / . . . corpus suum"; BU 270 (457), X, 2, fol. 191v, "Extracta ex Speculo alchimiae magistri Nicolai de Comitibus."

[11] In Zetzner, IV, 525, "Dausis philosophus"; in Stowe 1670, fol. 5 (or, 6) verso, Cambridge Corpus Christi 90, p. 26, and Sloane 602, fol. 28r, Dantinus or Dautinus; in Naples VIII.D.20, fol. 97v, the spelling seems to be "Danem"; in Vatic. Palat. 1320, fol. 65v, "Darinus."

part of the century, and is not by Arnald. In the manuscripts, although not in the printed text, our author inveighs against those who read his books daily yet cannot discern the truth[12] or advises the disciple to read "our books" daily with great diligence.[13] Such passages seem to indicate that he is an alchemical authority of note and productivity but do not serve to identify him further.

The printed and manuscript versions of the *Mirror of Alchemy* have the same incipit, "Ut ad perfectam scientiam pervenire possimus, primo oportet scire . . . ," although to this is prefixed in some at least of the manuscripts the pious phrase, "In dei nomine amen," or, "In nomine sancte trinitatis et individue unitatis, amen."[14] Immediately after this opening, the printed and manuscript texts diverge, the former stating that there are three stones and three salts, "in which consists our entire mastery, namely, mineral, herbal, and animal," while the manuscripts speak only of "spiritual stones with which is constituted and accomplished the entire mastery," and which are quicksilver, sulphur, arsenic, sal ammoniac. The manuscripts further devote some space to the many names that the philosophers have given to the stones to deceive the uninitiated, to the consequent need of not taking them too literally, to invective against unlettered laymen who think they understand alchemical processes and go about deceiving great lords and prelates, and to the author's intention of unmasking such errors, frauds, and *trufatores*, and of revealing the philosopher's true meaning.[15] All this is reduced to general terms in a single sentence of the printed text.

On the whole there seems to be little doubt that the manuscript text, to whomsoever it should be ascribed, is the more genuine, unified, and convincing. It maintains the dialogue form

[12] BM Stowe 1070, fol. 6v (7v); Cambridge Corpus Christi 99, p. 26; etc.

[13] Stowe 1070, fol. 15v (16v).

[14] Vatic. Palat. 1329, fol. 50v.

[15] BM Stowe 1070, fol. 1r-v. Since CU Corpus Christi 99, and BM Sloane 692 usually agree with BM Stowe 1070, I shall generally give specific citations only for the last named, and according to its original foliation, with some reference to manuscripts at Naples and the Vatican which conform in general to the same manuscript tradition, though they display more individual variation than do the three manuscripts in England which are much alike. I also cite the printed text from Zetzner, as Manget is practically identical.

better and in a manner more characteristically medieval. Its argument is more direct and less interrupted by digression. It has less the appearance of being padded by passages and quotations which might fit equally well or better in some other treatise. There is more conversation in the manuscript version and less preaching, more transitional sentences to knit the parts together and fewer digressions and quotations to interrupt and separate them.

The work is in the form of a dialogue between master and disciple who is addressed as usual as "dearest son." It appears that it was intended to divide the treatise into seven Dispositions[16] conforming to the stages of the alchemical process.[17] But this correspondence does not hold entirely true, while the printed text adds an eighth disposition and the manuscripts a ninth chapter without having indicated an eighth. In one manuscript, however, there is no ninth chapter, and the work closes soon after the seventh disposition omitting the last third of the text as found in the three English manuscripts.[18] Thus we have very considerable differences between the manuscripts as well as between them and the printed version. There are also minor variations between those manuscripts which are alike in length and plan. Thus in the Cambridge manuscript the dialogue is a little fuller than in the Stowe and Sloane manuscripts,[19] while the Stowe manuscript refers the reader to another book for a description of a furnace which is given in the Sloane and Cambridge texts.[20]

The disciple speaks first, begging the master to talk more openly and to tell him where the stone is found and whether it is cheap or costly. The master replies that it is found on the

[16] Stowe 1070, fol. 8r (9r): "In sola enim sublimatione sunt septem operationes et nos posuimus septem dispositiones in nostro libro."

[17] In Naples VIII.D.20, fols. 93v-99v, the first seven chapters are successively entitled: "De sublimatione, De calcinatione, De solutione, De ablutione, De ceratione, De congelatione, De fixione."

[18] Vatic. Palat. 1320, 15th century, fols. 50v-78v, ending, ". . . quod generantur similes illis. Explicit."

[19] Compare them near the close of the fifth Dispositio.

[20] Stowe 1070, fol. 7r (8r), ". . . quoniam tota intentio furni est ut habetur in alio libro"; Cambridge Corpus Christi 99, p. 27; Sloane 692, fol. 30r-v.

loftier of two mountains,[21] and that both rich and poor may possess it, nay it is cast into the streets, while anything costly is found deceitful and useless in the work of this art. In the manuscripts the disciple then asks another question, in response to which the master reiterates what had been said earlier that the whole mastery is from mercury alone. But this last question and answer are omitted in the printed version. In both versions the disciple then complains that quicksilver is not found on mountains but in caverns underground, and is told by the master that the quicksilver of the philosophers is not the vulgar variety found in caverns. The two then agree that the stone is magnesia.[22] But in the meantime two whole pages of the printed text with several quotations from Geber have been omitted by the manuscripts. The introductory material has now been completed and the "First Disposition" begins in both versions. It is to be noted that this introductory matter has filled more than twice as much space in the printed text as in the manuscripts.

This ratio continues to hold true for the "First Disposition," where the printed text interpolates nearly two pages of solid lecturing by the master during which the disciple cannot get a word in edgeways. This monologue does not appear in the manuscripts. The two most striking statements which appear in both versions are the enigmatic utterances that the stone is a lifeless, soundless body and is a poison mortifying all bodies and turning them to lead and coagulating Venus by its odor, and that the stone is triangular in being, quadrangular in quality.

For the second Disposition, on the other hand, the manuscript text is somewhat fuller, including a quotation from the *Tabula smaragdina* of Hermes and another sentence which are not in Zetzner's version. In this section we are told that the whole

[21] In Vatic. Palat. 1329 the word *two* is not used, but it is stated that "our stone is found in the mountains," where it is to be found on "the higher (highest?) peak that there is in this world": fol. 53v, "Scito lapidem nostrum invenire est in montibus. Et si perfecte cupis eum invenire, ascendas altiorem montem qui sit in isto mundo quia ibi latet lapis noster." But the use of the comparative *altiorem* instead of *altissimum* seems to point to two mountains.

[22] *Calamita* in Vatic. Palat. 1329, fol. 55r.

regimen is "in the fire and the vase," and that there are seven stages in the alchemical process: namely, sublimation, calcination, solution, ablution, *ceratio*, coagulation, *fixio*. A water is discussed, known by many names, which gives life to dead bodies and leads to perfection but which would injure a human being if taken internally or externally, or even if a finger were dipped in it.

The third Disposition is brief in both versions,[23] being concerned with Adrop or Azoch, for which the manuscripts do not give the list of equivalents in other languages that appears in the edition of Zetzner.

The fourth Disposition, likewise brief and practically the same in both versions, is a process, to be performed in the month of May, for making orpiment, not however the common mineral which is good only for washes and other deceptions. Plato is cited to the effect that unless there is in orpiment the virtue of constricting mercury, "our mastery will never be fulfilled."

The fifth Disposition fills two pages in the manuscripts[24] but only fourteen lines in the printed edition. It instructs how in June to produce a philosophic sulphur far superior to that of the mines. In the manuscripts alone Geber is cited, and those are stigmatized as fools who work with copper, silver, and gold, and are deceived by the white clear color of the copper after fusion.

The sixth Disposition is of fair length in both versions[25] but with a number of differences. It deals with a process to be carried on during the month of July and cautions against allowing the solution to harden or vitrify. Only in the manuscripts does the disciple question how we can know how metals are generated beneath the earth, and the master answer that we do so by experience. The manuscripts further contain a citation of Hermes not found at this juncture in the printed edition, and are fuller on the subject of decoction than the text in Zetzner.

The seventh Disposition is further called the seventh chapter

[23] Zetzner IV, 523; Stowe 1070, fol. 3v.

[24] In CU Corpus Christi 99, pp. 25-26, it occupies only a page, since a page of this particular manuscript is about twice the length of a page in the other two.

[25] Zetzner IV, 525-526; Stowe 1070, fols. 5v-7r.

or seventh book, "which is called the book of Saturn in which is accomplished the whole mastery of this science." It begins with recapitulation of what has already been shown,[26] summarized under four heads: namely, what the thing is which should be perfected, how from it is elicited the purest substance, of decoction with its causes, and of the vase called *leo*. The discussion then turns to sublimation and the dialogue reduces to a monologue. The manuscripts explain that the dictum of Geber that sublimation is the whole process is not to be understood of vulgar sublimation. True sublimation is a complicated process consisting of purification, solution, putrefaction, ablution, coagulation, and calcination. Our author opposes the practice of rejecting the dregs or deposit in each successive sublimation and using only what has ascended. He keeps his vase sealed and each time sublimates everything in it. On this point the manuscripts are fuller than the printed text, and there is variation between the two in their citation of Morienus, Geber or Plato, and Avicenna, as they proceed to enumerate eight or nine stages or modes of the alchemical process.[27]

After a passage relating to the seven metals and planets and a reply of the master to the disciple's objection that the elixir is a composition, whereas the master had previously assured him that everything connected with the stone was one, one manuscript ends, while the divergence of the others from the printed text becomes pronounced.[28] From this point on the printed version consists of a fairly frequent interchange of question and

[26] "Monstrabimus" in the Cambridge and Sloane MSS; "Quare primo volumus ostendere," in Zetzner, IV, 526; "et primo dicemus," in CLM 455, fol. 133v. But as he does not proceed to show anything of the sort, whereas this is a fairly good summary of what he has already shown, the "Primo igitur monstravimus" of Stowe 1070 seems the correct reading.

[27] Eight in Zetzner, IV, 520 and the English MSS; nine in Naples VIII.D.20, fol. 102r and Vatic. Palat. 1329, fol. 74r-v, where, however, they seem to be misnumbered.

[28] Septier has noted a similar divergence in the text of MS Orléans 244 (now 200); 16th century, fols. 107-206, of which he describes the first two-thirds as identical with what he calls the *Rosarius* of Arnald of Villanova, although offering a correcter text than it, while the last third is entirely different. See A. Septier, *Manuscrits de la bibliothèque d'Orléans*, 1820.

answer between the master and disciple which is more in the manner of the manuscript version, yet it does not seem to be duplicated there at all. Instead the last five leaves or so of the manuscripts go off on a tack of their own, including, especially at the first, some questions of the disciple which differ from those in the printed edition. Meanwhile the latter concludes with a two-page "Recapitulation of the whole work" which does not occur in the manuscripts. All this makes the concluding section of the work disproportionately and unduly long, especially in the manuscripts, where it also contains much material of quite a different sort from the first seven dispositions, suggesting, as does the jump from a seventh disposition to a ninth chapter, that unwarrantable additions have been made, or that two different works may have been patched together.

Towards its close the treatise becomes magical and indulges in charms and recipes of the sort that Avicenna objected to in the writings of Geber. The reader is told that if he takes "our blessed stone" and places it in another stone and carries both with him, no arm can withstand him.[29] A white stone appears on the water's surface from sunset to midnight, then begins to sink beneath the surface, and at sunrise reaches the bottom. A red stone on the other hand begins to appear at sunrise and remains until sunset. A dram's weight of the red stone attached to a horse of your army will make all the other horses whinny until it is removed, while the white stone kept on one's tongue during a lawsuit silences one's adversary.[30]

While it would be difficult to determine in detail an authoritative text for the *Speculum alchimiae*, some general observations may be made in conclusion which will apply about equally well to all the variant versions. The citations are chiefly from ancient

[29] Stowe 1070, fol. 15r; Naples VIII.D.20, fol. 108r.

[30] Stowe 1070, fol. 15r. The Naples MS concludes without finishing the discussion of the red and white stones, referring the reader for further details concerning them to the *Secret of Secrets* of the Pseudo-Aristotle: Naples, VIII.D.20, fol. 108r, ". . . et prosequere hoc ut dicit et ponit Aristoteles in epistola ad Alexandrum Regem Macedonie, 'O Alexander'. Explicit liber Sanctus Astrop. Senis Meridiani. Deo gratias. Amen."

and Arabic writers or those who are supposed to be such, like Geber. Recent Latin writers are hardly mentioned. Arab alchemical terms such as *azoc* or *adrop* and *kibrit* are much used. The work is of a practical rather than theoretical character and purports at least to set forth the actual process of transmutation. We are assured again and again that the whole regimen depends on the fire, which should be slow, and the vessel, which must be of glass and hermetically sealed. But the author indulges in occasional mystic or moral generalizations such as that every good is from the supreme good and is less in itself than in that in which it is contained. "Whoever therefore delights in any good other than the supreme good, while he perversely chooses the part, justly loses the whole."[31] Light is to be combined with fire and water in stated proportions in some of the mixtures, and we are assured that the true elixir and ferment is received from light.[32] A religious note is occasionally sounded, as when it is affirmed that "this science is nothing less than perfect inspiration of God," or divine creation of the world is accepted, or Biblical phraseology is employed, or God is praised. Astrological influence is several times recognized, the metals being related to the planets, the philosophers' stone being called microcosm or *minor mundus,* and the signs of the zodiac and correspondence of inferiors to superiors being mentioned.[33]

The various statements made in different parts of the dialogue are seemingly not all consistent with one another, and there are a number of purposely enigmatic or paradoxical utterances. We are told at the beginning that the spiritual stones with which the whole art is constituted and computed are quicksilver, sulphur, arsenic, and sal ammoniac. But soon it is affirmed that the whole mastery is from mercury alone—not, however, that found in mines. Almost immediately we are given the impression that magnesia is of the first importance. At one moment we are told that the philosophers' stone is found on two mountains or in its most perfect state concealed on the higher peak of the two,

[31] Stowe 1070, fol. 14r (15r).
[32] Stowe 1070, fol. 12r (13r).
[33] Stowe 1070, fols. 9v (10v), 14r (15r), 15r (16r).

the next moment we are assured that it is so common and cheap that it is cast into the streets. Everyone has it or may have it. You can see it rise with the winds on running waters and it is born in the Mediterranean Sea. It is found in every place, time, and man. Or it is what everyone knows and no one knows, what everyone has and no one has. In general, the author seems to have swept into his dialogue any or all of the commonplaces of past writers on the philosophers' stone.

Our author has, however, a constant evasion which accompanies his inconsistent confessions. The whole secret is mercury, but not the mercury found in mines. Orpiment "is the key of this science," but he does not mean the mineral orpiment which is good only for bleaching and other deceitful appearances which do not interest him.[34] His sulphur is never found by itself and is not the common sulphur with which by great labor one can tincture red or white.[35] When Geber says that sublimation alone is the entire process, this is not to be understood of vulgar sublimation but of successive purification, solution, putrefaction, ablution or *ceratio,* coagulation, and calcination.[36] When it is said that the elixir or confection should be reduced to water, this of course does not mean to common water but to the first matter of the metals, the viscous water found in the bowels of the earth.[37] Thus an air of unreality pervades the treatise, as it does so much of the alchemical literature of the fourteenth and fifteenth centuries. No doubt the author, like so many of his contemporaries, is striving to penetrate beneath the surface of natural phenomena; is trying to get "beyond the atom," so to speak; is groping after new concepts and substances. But he does not seem to succeed in getting anywhere in particular.

An alchemical epistle to king Philip of France[38]—which one is not stated, but Philip VI is perhaps the most likely to be meant, since the author of the *Lilium* is cited[39]—remarks to-

[34] Stowe 1070, fol. 4r.
[35] *Ibid.,* fols. 4v-5r.
[36] *Ibid.,* fol. 7v.
[37] *Ibid.,* fol. 11v.
[38] S. Marco VI.215, 1475 A.D., fols. 252v-255v: "Incipit epistola missa regi Philippo francorum regi illustrissimo. Domine ut videatis clare et aperte veritatem nostre scientie. . . ."
[39] *Ibid.,* fol. 254r, "Audi verba expressa autoris Lilii. . . . Item Lilium. . . ."

wards its close: "In short I tell you the whole truth consists openly and without parable in that recipe which I have given you composed and tested by Nicolaus."[40] Possibly this is a reference to the author of the *Speculum alchimiae*. An alchemical bibliography in a Barberini manuscript tells us that Gerardus Marionis, a Franciscan friar, in 1327 A.D. sent to Philip, king of France, a work on the generation of gold and silver.[41] It may well have been identical with the alchemical letter just referred to, and again the king in question would appear to be Philip VI whose reign began in 1328. In the chapter on Arnald of Villanova we have already spoken of a *New Testament* addressed to a king of France who is sometimes called Philip.

Another alchemical treatise which is associated with a member of the French royal family is a book entitled *The Stone of the Mountain* and ascribed to Philip I (1346-1361), son of the king of France and duke and count of Burgundy. The title brings to mind the statement of the *Speculum alchimiae* that the stone is found on the top of the loftier of two mountains. In the third and last part of the treatise a certain virgin is depicted in a florid and smiling garden on a mountain top surrounded by philosophers and holding in her hand the mirror of human life. She shows the author a book containing the practical operation of the stone.[42]

There are other *Mirrors of Alchemy* in medieval manuscripts than that which forms the subject of this chapter. For example, in a codex at the university of Bologna an anonymous *Speculum maius*[43] is followed by a *Speculum minus*, here attributed to Simon of Cologne,[44] but later printed as by Roger Bacon and also as-

[40] *Ibid.*, fol. 254v, "Breviter dico tibi totam veritatem consistere aperte et sine parabola in illa recepta quam tibi dedi per Nicolaum composita et experta." At fols. 255v-258v, there follow, "Recepta per Nicolaum composita."

[41] Vatic. Barb. 273, fol. 282r: "De generatione solis et lune. Domino D. Philippo . . . / . . . Predictum opus et eius expositionem extraxi."

[42] Naples V.H. 134, 15th or 16th century, fols. 39v-43r: "Duo sulphura sunt que ex lapide unico sublimantur ad tincturam. . . ."

[43] BU 164 (153), 14th-15th century, fols. 59r-67r: "Incipit speculum maius sacre artis alchymie. Ad laudem beatissime virginis. . . . Et quia necesse est . . . / . . . ac penitus denegatum."

[44] *Ibid.*, fols. 67v-70v: "Multipharie multisque modis olim loquebantur philosophi . . . / . . . hec est figura. Explicit speculum minus editum per fratrem Simonem de Colonia." The text was

cribed to him in some manuscripts.[45] Its seven chapters discuss the definition of alchemy, the natural principles of metals, the related sources from which the elixir is extracted, the alchemical process, the vase and furnace, all the colors that occur, and the method of projection.

published by Sudhoff, "Eine alchemistische Schrift des 13 Jahrhunderts, betitelt *Speculum alkimiae minus*, eines bisher unbekannten Mönches Simeon von Köln," *Archiv für Geschichte der Naturwissenschaften und der Technik*, IX (1922), 53-67, in ignorance of the fact that it had already been printed as Roger Bacon's. See A. Birkenmajer, "Simeon von Köln oder Roger Bacon?" *Franziskanischen Studien*, II (1924), 307.

[45] A. G. Little, *Roger Bacon Essays*, 1914, pp. 411-412, lists editions and MSS, including BM Sloane 1754, 14th century, fols. 62-74, omitted by DWS No. 194, but does not note Cambrai 920 (819), 15th century, fols. 130-136, anonymous, or Rovigo 402, 15th century, fol. 100. Montfaucon, *Bibl. bibliothecarum mss. nova*, Paris, 1739, p. 780, mentioned another MS then at Paris, Bibl. Card. Radulphi, Cas. 22, No. 64.

The first three words of the incipit are identical with those opening the *Multifarium*, an encyclopedia with accompanying table of moralities compiled at Bologna in 1326: see Wolfenbüttel 4504, fol. 1r, col. 1, "Multipharie multisque modis creaturarum conditiones. . . ."

CHAPTER XI

ORTOLANUS AND HIS INFLUENCE

Christopher of Paris, writing in the 1470's in the preface to his *Elucidarius* or *Summa maior,* classed Hortulanus as chief among those recent writers who had restored alchemy after nine hundred years of decline because of the concealment practiced by earlier philosophers. He grouped Hortulanus with Arnald of Villanova, Raymond Lull, Albertus Magnus, and Thomas Aquinas as renovators of alchemy, and mentioned his exposition of the obscure sayings of Hermes (i.e. the *Tabula smaragdina*) as his chief work.[1] William Sedacerius, who appears to have flourished a century earlier than Christopher of Paris, also listed Ortulanus among well known writers on alchemy.[2] Indeed citations of him seem to be found still earlier in the first part of the fourteenth century. Thus we have seen Ortolanus quoted in a work ascribed, although perhaps incorrectly, to John Dastin.[3] For a long time Ortolanus was dated in 1040, because in a Basel, 1560, edition of a *Compendium alchimiae* ascribed to John of Garland it was said to have been written five hundred and twenty years before, a statement based in its turn on Boston of Bury's fifteenth century account of John Garland.[4]

Who was this Hortulanus, Ortulanus, Ortolanus, or Ortholanus? Was there but one person of that name or should more be distinguished? Some would still identify the name Hortulanus with John of Garland, the grammarian and poet of the thirteenth century.[5] But Hauréau showed half a century ago that the two had been confused erroneously, and that no works of alchemy

[1] Zetzner, VI, 196.

[2] FL Gaddi reliq. 181, 15th century, fol. IV.

[3] See the last note in the chapter on Dastin or DWS No. 288.

[4] Ruska, *Tabula Smaragdina,* 1926, p. 180, for the acceptance of the date 1040 by Fabricius and Schmieder; pp. 195-197, for the edition of 1560 and Boston of Bury's "Joannis Garlandii philosophi excellentissimi Vita," in which a dictionary of chemical terms and the commentary of Ortolanus are attributed to Garland.

[5] DWS Nos. 32, 166-169. Ruska, *op. cit.,* is rather vague on this point and does

should be ascribed to John of Garland.[6] The one fixed date associated with the name of Ortholanus has seemed to be 1358, when he is said by an expositor of 1386 to have practiced alchemy or to have completed a *Practica* at Paris.[7] But his name is cited in some alchemical works which seem earlier than that date and we shall presently find some reason for questioning the attribution of this *Practica* or experimentation at Paris to Ortolanus.

The work with which the name Ortolanus or Hortulanus seems especially connected is a commentary upon the *Emerald Tablet* of Hermes,[8] then more often designated as the *Thelesinum* or *Telesim* or *Secret* of Hermes. The author of this commentary alludes to himself either as Martin Ortolanus, or as "Ortolanus ab ortis maritimis nuncupatus," or "Hortulanus dictus ab horto marino."[9] This leaves us in doubt whether Martin is his Christian name, or whether it is a corruption from or copyist's misreading of *maritimis* or *marino,* or whether his name is simply Ortolanus from his native place of some such name as Orte Maritimi or Horto Marino. Tertullian uses the phrase, *hortulani maritimive secessus,*[10] but it is doubtful if there is any connection with or reminiscence of this in our author's name or epithet. On the whole the weight of such manuscripts as I have seen favors Martin without precluding the further explanation

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not cite Hauréau's article, but inclines to date Ortolanus in the middle of the fourteenth century.

[6] B. Hauréau, *Notices et extraits des manuscrits,* XXVII, ii (1879), 35-38.

[7] Zetzner, IV (1659), 912; DWS No. 169: "Hic incipit practica vera alkimica per magistrum Ortholanum Parisiis probata et experta sub anno domini millesimo trecentesimo et quinquagesimo octavo."

[8] Concerning the origin and subsequent history of this text consult Julius Ruska, *Tabula Smaragdina,* Heidelberg, 1926. At pp. 181-186, he reproduces the text of Ortolanus' commentary on it, unfortunately only from an early printed edition without reference to manuscripts.

[9] DWS No. 32, who lists numerous MSS in England, gives the form, "Ego autem dictus Ortulanus a orto Martinus nominatus," which does not make much sense. In the edition of Nürnberg, 1541, p. 364, we have, "Ego dictus Hortulanus ab hortis maritimis nuncupatus." The bibliography in Vatic. Barb. 273, gives at fol. 288r the form "Hortulanus dictus ab horto marino." In CLM 26059, 1507-1508, fol. 165, we have, according to the catalogue, "Hortulanus Marci philosophi et Iacobitae professionis super Hermetem," but *Marci* seems a slip.

[10] *De paenitentia,* II, 3.

of Ortolanus as a place name.[11] In any case he goes on to say that he is "wrapped up in a Jacobin skin," i.e. is a Dominican. But his name does not appear in histories, biographical dictionaries, and biographies of that order. The phrase, "pelle Jacobina involutus," dimly reminds us of Will Langland's "shouldering a shaggy cloak such as shepherds wear," and going forth in "the habit of a hermit, unholy of works." Possibly Ortolanus was of the same family as Guillaume d'Ortolan, prévôt of Apt from 1389 to 1393, bishop of Bazas after January 27, 1395, and of Rodez after May 25 or August 27, 1397, and deceased in 1417. According to some English manuscripts Ortolanus addresses a Iohannes Carimundus,[12] but this personage appears to be otherwise unknown.

There is commonly prefixed to the commentary proper of Ortolanus on Hermes a section on the spirit of the fifth essence. The object is to make an elixir that will congeal quicksilver and another that will conserve human life. The philosopher calls the stone anything from which the elements can be separated. First is obtained a spirit which takes on body in the upper nobler sphere of fire, and is the spirit of the fifth essence. Each element is then in turn separated with this spirit of the fifth essence, and we successively obtain *aqua ardens* which will burn if a linen cloth is dipped in it without consuming the cloth, *aqua ardens rectificata* which will burn the cloth too, rectified human blood, *aqua ignea rectificata,* and finally *aqua vitae rectificata* which fixes all spirits. To make *aqua vitae* for medicinal purposes one employs *aqua ardens rectificata,* but omits the rectified human blood which destroys the virtue of the herbs used and also the fiery water which is too consuming and dangerous. The vessels to be used are then described, and this preliminary section closes with a prayer of Ortolanus for those who go astray in this art. All this is identical with what Manget printed as the first twelve chapters of the *Potestas divitiarum* of Raymond Lull.[13]

[11] For MSS of the commentary on Hermes see Appendix 11; for other MSS see subsequent notes.

[12] DWS No. 32.

[13] Manget, *Bibl. chemica,* I (1702), 866-868.

The text of the *Emerald Tablet* is then given, followed by the commentary proper of Ortolanus upon it. The alchemical process is compared with the creation of the world. The stone has three natures, but they are all found in mercury alone. The stone can be produced from animals, vegetables, or minerals, but mercury is the stone, although other things may assist it or serve to shorten the process. Gold generated artificially is said to excel natural gold in all its properties, whether medicinal or otherwise. The need is stressed of effecting a conjunction of gold and silver in the alchemical process, since when joined they are much more readily fused or liquefied, and it is necessary to have something which flows before the mercury escapes. Following the commentary on Hermes in the same manuscript is a rubric or chapter on putrefaction as the mother of all things which Ortolanus is said to have borrowed from Alphidius.

This commentator on the *Emerald Tablet* of Hermes would naturally seem to be the alchemist of that name who is so much cited in the hermetic literature of the period, and it is reasonable to identify him with the Ortholanus *egregius philosophus* whose views were expounded in 1386 in a *Practica* by John Dombelay of England. It is even more certain that he was the author of a treatise on the philosophers' stone which is likewise ascribed to Martin Ortolanus and which sometimes immediately precedes his commentary on Hermes and possibly should be regarded as forming one work with it,[14] since it too alludes to the

[14] BN 11201, 15th century, fols. 76r-83r (fol. 83v is left blank and on 84r begins the commentary on the *Emerald Tablet*): "Incipit tractatus magistri Martini Ortolani super lapidem qui dicitur philosophorum. Morienus de lapide testitudinis dicit quod tota fortitudo huius magisterii non est nisi post prius (ipsius?) putrefactionem . . . / . . . et in placito victoriam. Similes virtutes reperies in fine libri de quintis essentiis de predictis elementis et vide ibi et concorda omnia."

BN 7156, 14th century, fols. 146r, col. 2-146v and 148r, col. 1 (fol. 147 is misplaced under *Liber trium verborum*): "Tractatus Martini Ortholani (in the margin in a hand like the text). Morienus de opere capillorum loquens dicit sic quod tota fortitudo magisterii non est nisi post ipsorum putrefactionem in fimo calido . . . / . . . aliquando in 8° aliquando in 4° aliquando in una die fit. Explicit Martinus Ortolanus."

Berthelot, *La chimie au moyen âge*, I (1893), 72, dated BN 7156 of the thirteenth century and held that the words, "Tractatus Martini Ortholani," in the margin were in a different hand of the late fourteenth century, and that the closing words, "Explicit Mar-

Hermetic text. Or more precisely, it may be regarded as a variant version of the section on the operation of the elixir which often precedes the commentary on the *Emerald Tablet*. Its opening paragraph, emphasizing the importance of putrefaction, is new, but after that the two texts are almost identical with one another and with the first part of the *Potestas divitiarum* printed by Manget as Raymond Lull's.

It is less certain if Martin Ortolanus can be identified with the author of the *Rosarius minor* or *novus* who depicts himself metaphorically as descending into his garden of roses, some red and some white, and conversing with the gardener or *Hortulanus*.[15] But it is not improbable that this Hortulanus and Ortolanus were confused by subsequent readers and authors, and that for the writer of the *Rosarius minor* Hortulanus was not merely a character in his allegory but the author of the commentary on Hermes. Thus we find in a late manuscript, in a "Composition of a Strong Water which is the Key to the Rose Garden," the following statement: "For Hortulanus took three herbs which he found generated in the rose garden."[16] But the reference to the three herbs is found in the commentary on the *Emerald*

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tinus Ortulanus", were in a still more modern hand. These distinctions did not impress me, when I examined the manuscript, which all seemed to be in writing of the *fourteenth* century. Berthelot was interested to demonstrate that Ortolanus, whom he believed to have lived in 1358, could not be of the same date or earlier than the manuscript itself. But we shall see that the date 1358 does not really apply to Ortolanus, and that therefore this difficulty does not exist. In any case the ascription to Martinus Ortolanus seems justified, since the text in question is a fragment of the alchemical discussion which commonly precedes his commentary on the *Emerald Tablet*.

[15] Zetzner, II (1659), 406-422. The Prefatio opens: "Inquit auctor libri qui Rosarius dicitur, descendi in hortum meum ut viderem plantas. . . ." Soon we read: "Ipse autem Hortulanus rosarum plantas separavit et replantavit augumentavitque duplicando triplicando quadruplicando et sic vicissim multiplicando usque ad albedinem plenam et deinde ad rubedinem perfectam." In FL Ashburnham 1451, 15th century, fol. 45r, the work follows the *Rosarius* of Arnald of Villanova: "Rosarius novus. Descendi in ortum meum ut viderem plantas. . . ." Lami (1756), p. 344, gives the incipit from Riccard. L. III, xxxiv as "Ascendi in hortum meum . . ."

[16] Vatic. Reg. Suev. 1242, fol. 136v, "Compositio aque fortis que est clavis Rosarii. Accepit enim Hortulanus tres herbas quas generatas invenit in loco Rosarii. . . ."

Tablet in the chapter proving that the stone consists of vegetables, as well as in the nineteenth chapter of the *Rosarius minor*. It is, however, in the latter place that we are told that Hortulanus took the herbs. Indeed, he is also spoken of in the third person in the preceding chapter. It therefore sounds as if the author of the *Rosarius minor* were basing his statement as to what Hortulanus did upon the chapter in the commentary on Hermes.[17] It would thus be an earlier work than the *Rosarius minor,* which also seems to have been written later than the *Rosarius* of Arnald of Villanova.

Under the pretty figure of separating and replanting and multiplying his roses to pure whiteness or a perfect red the author of *Rosarius minor* presents the process of transmutation of metals. Otherwise the work is not very different from other alchemical treatises. Some matters, however, he omits on the ground that they are already treated well and truly in other alchemical books. The author professes to set down several methods by which he personally has made silver. He has early expressed a preference for mercury over other materials in effecting transmutation but later recommends various waters and tinctures.

Whether Ortolanus himself composed a *Practica* in 1358 or whether John Dombelay merely compiled a work from Ortolanus's other writings which he entitled *Practica* in 1386 seems an open question. At any rate there appears to be no other *Practica* extant by Ortolanus than Dombelay's version, of which more will be said later. There is a "*Practica* of Hermes and Ortulanus, the disciple of Rasis," but it covers only two leaves and

[17] The chapter in question reads *in toto,* BN 11201, fols. 94v-95r; Naples VIII. D.20, fol. 117r: "Et quod lapis sit vegetabilis scio ego qui loquor quia ex succis 3 herbarum ana simul coniunctarum quarum nomina dicam inferius postquam stetissent in fimo 12 diebus vidi mercurium emanare, et sunt hec mercurialis portulaca marina que lac album facit et celidonia, cuius mercurii sic inventi nulla fuit differentia ad alium mercurium qui venalis invenitur. Ergo lapis ex vegetabilibus est." On the other hand, chapter 19 of the *Rosarius minor* opens (Zetzner, II, 416): "Accepit enim Hortulanus tres herbas quas generatas invenit in loco Rosarii ex eadem terra de qua Rosarius est egressus et erant Chelidonia, Portulaca marina, et Mercurialis."

is probably an extract from the commentary on the *Emerald Tablet.*[18]

Certain names such as John of Florence,[19] or a master Valentinus[20] or an Honorius Philadelphus, "otherwise master general of the art of Florence,"[21] have sometimes been suggested for the author of the alchemical treatise which may best be distinguished by its opening words, "Studio namque florenti . . . , "[22] although near its close we are told that it is called "The Text of Alchemy" (*Textus alkimie*),[23] or "The Text of the Alchemists." But the writer of a gloss or commentary which accompanies this work in a fifteenth century manuscript at Paris informs us that its author's name is unknown. In this manuscript the treatise is given the title, *Book of the Composition of the Great Stone,*[24] which is less distinctive than the incipit

[18] Klagenfurt Bischöfl. Bibl. XXX.d.6, 15th century, paper, fols. 97r-99r: Practica Hermetis et Ortulani discipuli Rasis de separatione aquae cum spiritu, "Si vis ex aqua et spiritu facere lapidem philosophicum . . . / . . . mater eius est luna." Compare BN 11201, fol. 84v: "Operatio elixir de separatione cum spiritu quinte essentie. Si vis inde facere lapidem philosophicum. . . ."

[19] FN, II.iii.25, 15th-16th century, fols. 260-301: Clement VI had a physician of that name in 1346-1348.

[20] Zetzner, IV, 941.

[21] Vatic. Barb. 273, fol. 284r.

[22] Possibly "B. de Florentia liber alchymiae," in Berne B 54, 15th century, paper, fols. 1r-16r, also has reference to this treatise.

[23] BN 7149, fol. 63v.

[24] In BN 7149, fol. 32r, the titulus reads "Incipit liber de magni lapidis compositione in operatione", and the gloss at fol. 34r states the title of the work as, "Incipit liber de magni lapidis compositione." This is the MS which I have chiefly used for the work. Others are BU 138 (104), 1477 A.D., fols. 61r-104r; "Incipit liber florentis de lapide philosophico qui textus alkimistarum nuncupatur. Studio namque florenti quamdam philosophie partem. . . ." Wolfenbüttel 3721, 15th century, fols. 1-91v; FN II.iii.25, already mentioned; and see DWS No. 339 and Lami, p. 320.

The text printed in Zetzner, IV, 941-954, is very different from that of BN 7149. Not only is there no gloss, but the text proper is much briefer, probably not one quarter of the length of the manuscript text. No divisions into parts and books are indicated in Zetzner and very few of the citations of authorities are reproduced. So much is omitted that the text seems disconnected and loses its character. For example, of the operations of the four seasons only the works of spring and autumn are given. All the author's personal allusions and local color go by the board. In short, while there are some identical passages, the form and argument of the work is entirely different, so that it does not do much more than embody certain extracts from the original.

For the headings of the work in BN 7149 see Appendix 12. FN II.iii.25 has a like division into books and parts but also numbers the chapters consecutively throughout. Thus the fourth part of book three begins with chapter 69. But there are confusions and omissions in this numbering in FN II.iii.25.

previously quoted. A *Conversation of Philosophers,* found in a manuscript of 1475 A.D. but very likely itself composed earlier, in listing modern works of alchemy refers to both our treatise and its gloss—"textus alchimie cum suo gloxatore." This indicates that both were well known and that the gloss was probably composed not later than the early fifteenth century.[25] It is evident that the writer of the gloss had before him an earlier copy of the work, since he refers to its rubrics and its passages in black ink. The author gives the year of composing the work as 1325—the same in which Perscrutator wrote at York. Indeed, in some ways the title, *Correctorium alchimiae,* would suit our work admirably, but it seems never to be applied to it in the manuscripts. If the year of its composition has not been miscopied, it provides a valuable clue to some of the problems of the chronology of the alchemical literature. For one thing our author constantly cites Ortholanus[26] who would thus seem to have written before 1325. Yet we have seen that he is said to have practiced alchemy or composed a *Practica* at Paris in 1358. Possibly we might distinguish between Hortulanus and Ortholanus, making the commentator on the *Emerald Tablet* write before 1325, and the author of the *Practica* in 1358. Unfortunately for this suggestion it appears to be the commentary on the *Emerald Tablet* to which our present author refers when he cites Ortholanus. He also, however, cites "Thomas in his second epistle"[27] which seems more likely to be an allusion to Thomas of Bologna than to alchemical works ascribed to Thomas Aquinas. But if our author cites Thomas of Bologna, he must be writing late in the fourteenth century, which would also permit us to retain the date 1358 for Ortolanus. The phraseology of our treatise which includes such expressions as *humidum radicale,*[28] "spirit of the fifth essence,"[29] and *collateralia in abbreviatione operis,* is quite possible for a work written in 1325

[25] A "Compendium abstractum a textu alkimie videlicet studio florenti" is dated 1449 in BN 14008, fols. 104r-123v. It is in five tractates.

[26] BN 7149, fols. 40v, 43r, 44v, 45r, 47v, 48r, 50r-v, 51r, 52v, 53r, 55v, 56r, 57r-v, 61r, 63v.

[27] BN 7149, fol. 43r.

[28] BN 7149, fol. 36r.

[29] BN 7149, fol. 38r.

but seems more probable for one composed later in the fourteenth century. One of the medical works of Arnald of Villanova is entitled *De humido radicali*,[30] but our problem is when the phrase began to be used alchemically.

The work has a prologue in which alchemy is represented as useful to ecclesiastics as well as kings and princes, and personal requirements of the would-be alchemist are detailed. Mere reading is not enough, for the books on the subject are not written to give systematic information like those in other sciences but are obscured by figures and enigmas.

Our author is cognizant of the theory so much in favor in the fourteenth century that the elixir is produced from mercury alone without addition of sulphur, because the mercury has sulphur naturally included in itself.[31] But he himself, while decrying vulgar mercury and sulphur, accepts a natural combination of them[32] and in composing the elixir employs three different sulphurs in addition to mercury, namely, yellow fugitive sulphur, green fixed sulphur which is dark inside although bright to the eye, and fixed white sulphur. With these four "species" or substances are performed the alchemical works known as Winter, Spring, Summer, and Autumn. That these three sulphurs are not contained in mercury is clear from his describing their natural state and giving the prices at which they sell. For instance, green sulphur comes in large pieces and when it is broken has a clear bright green fracture after the manner of glass.[33] He also tells the exact respective amounts of these kinds of sulphur which are to be employed in various operations. A water for whitening which is distilled from them is called "our mercury," and another for reddening is called "our sulphur." In dissolving silver and gold in this and another water our author gives no special directions for first purifying them, since he believes that commercial gold and silver are sufficiently pure.[34] On the other hand, our author

[30] *Opera*, Lyons, 1509, fols. 38v-42v.
[31] BN 7149, fol. 36v.
[32] BN 7149, fol. 36r.
[33] BN 7149, fol. 37r.
[34] BN 7149, fol. 40r; "Non enim facimus in hoc libro nostro responsionem multum specialem de mundatione terre nostre albe vel rubee eo quod satis purificata venalis invenitur et ideo de hoc sub brevitate transeamus."

does not always tell the exact weights to be employed, but leaves it to the judgment of the operator how much "white water" or "red water" he should use.[35]

Our author has always had better success with "bodies" than with "spirits."[36] He admits that Geber in the *Summa perfectionis magisterii* seems to say that the substance which perfects the stone is pure quicksilver. But he has never seen any succeed who tried it. He therefore contends that what Geber really meant by the "quicksilver which has in itself the nature of sulphur" is not common mercury but the water or waters produced from the aforesaid four bodies. The sublimation of common mercury and preparation of other "spirits" our author thinks of little profit in the transmutation of metals.[37] On the other hand, he grants that the alchemical process may be much shortened by using salts and vitriols and alums and certain animal and vegetable waters to dissolve gold and silver for use in the elixir.[38] In view of all this it seems that we may put our author down as a decided opponent of the prevalent mercury-alone doctrine. In fact, he affirms that anything from which the stone is made is named mercury.[39] The gloss enthusiastically supports the author in this stand, holding that anyone who tries to make the stone from mercury alone or the bodies or other spirits instead of following his directions will be, as Morienus puts it, like a man trying to climb a pinnacle without a ladder.

Not only the use of the four seasons for stages in the alchemical process seems an old story at the time of our treatise, but also the separation of the elements and production successively of waters known as water of human blood, human blood rectified, water of fire, water of fire rectified, water of life, and rectified water of life.[40] This suggests that our author was using the work of Ortolanus on these matters and this is the fact, since he definitely quotes it for avoiding human blood or the fiery water in making *aqua vitae* for medicinal purposes. The fact that our

[35] BN 7149, fol. 40v.
[36] BN 7149, fol. 47v.
[37] BN 7149, fol. 48r.
[38] BN 7149, fol. 47v.
[39] BN 7149, fol. 50r.
[40] BN 7149, fols. 51v-52r, 57r.

treatise voices opposition to a favorite alchemical theory of the fourteenth century also makes it somewhat likely that it was composed later in that century than 1325. On the other hand, John of Rupescissa is nowhere cited by our author.

The gloss which accompanies our treatise in the Paris manuscript and which apparently was composed considerably later, when the author of the treatise was unknown, gives us little aid in our effort to date the *Studio namque florenti*. The gloss several times cites "the martyred one,"[41] an authority not named in the text proper. The martyr was presumably Raymond Lull who is said to have been stoned to death by the non-Christian natives of North Africa. The gloss therefore seems to have been composed after the alchemical treatises ascribed to Lull had begun to appear.

The citations in our treatise include not only the *De mineralibus* of Albertus Magnus, Arnald of Villanova,[42] and Ortholanus, but also the *Lilium* and the *Summa perfectionis magisterii* of the pseudo or Latin Geber. The *Lilium* is represented as in its turn citing the *Turba philosophorum* and so should be later than it. The *Summa* of Geber our author is inclined to criticize severely. Once he declares that it is evident to a close examiner that Geber in his *Summa* hid a grain of truth beneath a great heap of erroneous operations.[43] Again he asserts that his operations are superior to those in Geber's *Summa*, because he combines in one hour processes which Geber spread out over different times.[44] The enthusiasm for the works produced in Latin towards the close of the thirteenth century under the name of Geber thus appears to have worn off considerably by our author's time.

Whoever our author may be, he prides himself upon having actually performed the processes of which he speaks. In dis-

[41] BN 7149, fol. 52r, "ut dicit martirizatus"; 54r, "De albificatione istius terre dicit martirizatus": see also fols. 54v, 55v, 57r.

[42] BN 7149, fol. 57r.

[43] BN 7149, fol. 40r: "Sic ergo patet manifeste subtiliter intuenti quod Geber in summa sua granum veritatis in operatione magni lapidis sub magno acervo operationum sophisticarum abscondit."

[44] BN 7149, fol. 50r.

cussing the personal requirements of the would-be alchemist he insists that mere book knowledge is not enough. He is also fond of saying that he has proved this or that with his own fingers. For example, the red sulphur said to be naturally included in quicksilver he has separated from its whiteness with his own hand and seen and touched it.[45] If vinegar distilled in an alembic is projected on a bit of the ferment of the stone, it will turn into purest wine from which *aqua ardens* and *aqua vitae* can be made. "And we have done this and have proved it to be true with our own fingers."[46] He also informs us what the prices of certain minerals were when he began the alchemical art at Paris.[47] Later he mentions the price of a piece of chemical apparatus at Paris as if he were still resident there.[48] He has found it almost impossible to procure a glass vessel which will not break before the completion of the process for making the red stone, i.e. gold.[49] He also warns that certain processes which seem the same are really different. Further he realizes that repeated experiment is apt to be required before one succeeds in getting the right proportions for a water that will dissolve "our red earth," i.e. gold.[50] The alchemist is almost certain to make mistakes, but if he knows the natures of metals and the causes of minerals, he can correct his error in a moment.[51]

Our author faces the question how the addition of a tiny particle of elixir can alter the weight of baser metal to that of silver and gold,[52] but it does not shake his faith in transmutation. He asserts that he has seen the horrible worms which Ortolanus reports are generated in connection with the animal stone, and that when dead they were of a white color mixed with a little yellowness. They were large and short having a lucid fracture. But further than this he has not proved definitely concerning this

[45] BN 7149, fol. 36v.
[46] BN 7149, fol. 53r. See, too, fol. 54r, ". . . has autem maculas cristallinas propriis oculis vidimus."
[47] BN 7149, fol. 37r, ". . . apud Parisius quando incepi artem istam."
[48] BN 7149, fol. 51v, ". . . Cucurbitam eneam enim apud Parisius ad hoc opus faciendum pretio duodecim solidorum."
[49] BN 7149, fol. 46v.
[50] BN 7149, fol. 40r.
[51] BN 7149, fol. 47v.
[52] BN 7149, fol. 45v.

form of stone with his own fingers.[53] He holds that the vegetable and animal stones are not adapted for projection and must first be altered by alchemy to the mineral form.[54] Like Ortolanus, he affirms the importance of putrefaction but adds that, to tell the truth, all imbibition with decoction is called putrefaction.[55] He excuses himself for not having experienced from what animals and vegetables sulphur and arsenic are prepared on the ground that since he began to work at alchemy other business has occupied and impeded him.[56]

Despite this, he feels that no one since the time of Hermes has written so seriatim, distinctly, and openly on the true philosophers' stone as he has in this year of grace 1325 and the twenty-second day of April.[57] This boastful tone combined with the date, 1325, remind us of Perscrutator, and we shall presently find further evidence that there has been some confusion with or borrowing from his work on the elements. In that case the year 1325 would not properly apply to *Studio namque florenti* unless we regarded it, too, as one of Perscrutator's works. But it is improbable that he would write both works in the same year. Our author has known no one who actually succeeded in making gold, and many philosophers have written instructions based on good general principles but which they themselves never carried into execution. On the other hand, some books are deficient both in theory and practice, as an example of which he cites the work of master John called *Vastans Vastum* (John of Gascony?) entitled "Practica by aqua vitae and copper," which he censures as contrary to the principles of the art of alchemy and of nature. He then enumerates some of the errors of contemporary practicing alchemists.[58]

In the year 1386 a certain John Dombelay[59] or Dumbaley[60] or Dumbeler[61] or Dumblerius[62] of England, who should not be

[53] BN 7149, fol. 58v.
[54] BN 7149, fol. 59v.
[55] BN 7149, fols. 60v-61r.
[56] BN 7149, fol. 61v.
[57] BN 7149, fol. 62r.
[58] BN 7149, fol. 62v.
[59] DWS No. 160.
[60] Vatic. Barb. 273, fol. 210v.
[61] Zetzner, IV, 912.
[62] Jacopo Morelli, *Codices manuscripti latini bibliothecae Nanianae*, Venice 1776, description of Nani 55, item ii.

confused with John Dumbleton,[63] the schoolman and author of a *Summa* of logic and natural philosophy of which there are numerous manuscript copies, composed at the order of the archbishop of Trier, Conon or Cuno von Falkensteyn, an alchemical *Practica* which is described as gathered or compiled from the books of Ortolanus. At the same time it is asserted that Ortolanus proved this *Practica* experimentally at Paris in 1358,[64] so that we are left in doubt whether Dombelay has really used several treatises by Ortolanus or merely one.

It is my opinion, however, that Dombelay both used other works by Ortolanus and a *Practica* written at Paris, although perhaps not in 1358 as he says, and that this Parisian work was the "Studio namque florenti. . . ." Its author wrote at Paris and was a practicing alchemist. Dombelay sometimes speaks in the first person and gives his own views or alludes to his other writings. Sometimes he cites Ortolanus by name and also other noted alchemical authorities. But sometimes he alludes to "the present author," or "the present work," or "the author of the present work." In such passages he does not allude to himself, since he employs the first person when he wishes to do so. He is alluding to this *Practica* of 1358 at Paris, and it appears to be identical with *Studio namque florenti.* He adopts its four species of quicksilver and yellow, green, and white sulphur, except that he explains that green sulphur is vitriol and white fixed sulphur is saltpeter. He alludes to its four seasons, and his first set of practical directions seems a condensation of its fuller exposition.[65] Sometimes, however, he seems to ascribe to his "author of the present work" matter foreign to the *Studio namque florenti,* such as the statement of the influences of the seven planets,[66] which

[63] For his career see DNB and Duhem, III (1913), 410.

[64] For several forms of the titulus of Dombelay's *Practica* see Appendix 13. It opens, "Quatuor sunt species quae ad opus elixirii pertinent. . . ." I have used the text printed in Zetzner, IV, 912-932. In earlier printed versions it seems to have been ascribed to Arnald of Villanova instead of John Dombelay: Basel, 1560, and 1571, pp. 23-35, "Arnald de Villanova philosophi celeberrimi in commentarios Hortulani expositio"; cited by Marc Haven, *La vie et les oeuvres d'Arnaud de Villeneuve,* Paris, 1896, p. 184.

[65] Compare Zetzner, IV, 913 with BN 7149, fol. 37 *et seq.*

[66] Zetzner, IV, 918.

is that of Perscrutator. Dombelay appears to be using his sources with a good deal of liberty in any case. It is conceivable either that he was utilizing a version of *Studio namque florenti* which differed considerably from those I have examined, or even that he had before him some other work of Ortolanus upon which the *Studio namque florenti* has drawn more fully than we realize. In any event it seems clear that the connection between Ortolanus, *Studio namque florenti,* and Dombelay is close, and that is the point which at present concerns us. In a subsequent chapter we shall have something further to say of Dombelay's own work. Meanwhile we have shown that the date 1358 is probably more applicable to the Parisian author of *Studio namque florenti* than to Martin Ortolanus of maritime places or marine garden, and is preferable to the date 1325 for that work. As for Ortolanus, his date would seem to be well before 1358 but cannot at present be placed more exactly.

In a fifteenth century collection of alchemical treatises is a commentary by Pratearius of Pisa on the *Rosarius* which opens, "I descended into my garden in order that I might see the plants."[67] Who this Pratearius was, and whether he wrote in the fourteenth or fifteenth century, I have not ascertained.

[67] Rome, Casanatense 1477, parchment, 15th century, fols. 66r-83r: in the margin is written, "Rosam pratearii de pisa." The text opens, "Rosarium. Descendi in ortum meum ut viderem plantas. . . ." At fol. 73r we read, "Ideo mei Rosarii capitulum primum finivi." The work ends, ". . . est digesta et tincta."

CHAPTER XII

ANDALÒ DI NEGRO AND PROFATIUS JUDAEUS[1]

From alchemy we now turn for a time to the studies of the *quadrivium* and to the relation of medicine to astrology. Writers of the Italian peninsula will occupy our attention for the next five chapters; then those beyond the Alps for five more chapters.

The burning at the stake of the hapless Cecco d'Ascoli in 1327 at Florence, whatever may have been the professed or real reasons for it, seems not to have deterred other astrologers from writing books or uttering predictions, although they may have become more careful not to make public incursions into the field of necromancy, whether theoretical or practical. Even this we may in later chapters find reason for doubting. It was probably at just about this time that Andalò di Negro[2] of Genoa composed his *Introduction to Judgments of Astrology*.[3] He was of a

[1] A portion of this chapter is based upon a note published in *Isis*, X (1928), 52-56, "Andalò di Negro, Profacius Judaeus, and the Alphonsine Tables," which I have revised in consequence of helpful suggestions made by Professor Alexander Marx and further study of the manuscripts involved.

[2] On Andalò di Negro see Tiraboschi, *Storia della letteratura italiana*, Milan, 1823-1825, V, 315-317; and B. Boncompagni, "Catalogo de' Lavori di Andalò di Negro," *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, VII (1874), 339-76, who gives a fuller list of editions and MSS of Andalò's various works. The paper by Cornelio De Simoni, "Intorno alla Vita ed ai Lavori di Andalò di Negro," which precedes Boncompagni's bibliography in the same journal (pp. 313-36), adds little of importance to Tiraboschi.

[3] I have read it in BM Additional 23770, 14th century, quarto, illuminated, fols. 1r, col. 1-44r, col. 2: rubric, "Introductorius ad iudicia astrologie compositus ab Andalo de Nigro de Ianua"; incipit, "Çodiacus circulus est circulus signorum cuius circumferentia dividit in 12 partes. . . ." There are full page illuminations of the twelve signs with accompanying astrological charts and smaller illuminations of the planets. Compare the illustrations in F. Boll, *Sphaera*, Leipzig, 1903; F. Saxl, *Verzeichnis astrologischer und mythologischer illustrierter Handschriften des lateinischen Mittelalters;* and Bruno A. Fuchs, *Die Ikonographie der sieben Planeten in der Kunst Italiens*, Munich, 1909. See also C. H. Haskins, *Studies in Medieval Science*, 1924, p. 288.

It also occurs in BN 7272, membrane, double columns, 14th century, fols. 101r, col. 1-170; "Incipit Introductorium valde necessarium ad iudicia astrologie editum a domino andolo de nigro

noble house and in 1314 served as ambassador to Alexius Comnenus, emperor of Trebizond. But he also, as we shall see presently, was well known in Florence, the city where Cecco had met his fate. The only work by him that can be dated seems to have been written in 1323. Another is directed to John de Laxa or Laya, a royal official.

Andalò's introduction to judicial astrology is not very different from other treatises on that theme. It discusses the properties of the signs, planets, houses; the hours of the different planets and what it is good or bad to do in them; the mansions of the moon. Perhaps its most distinguishing feature is its illuminations and graphic charts in color. After taking up such topics as the ascension and descension of the signs; the mean, maxima and minima; the similitude and concord of signs; how they are divided into groups of four; their nature, and the diversity of times; we come to the planets and consider their *triplicitates* and *termini*. This finished, a blue ram initiates a series of full page illustrations of the signs of the zodiac,[4] accompanied by a graphic tabulation of the qualities of the thirty degrees of each sign. By employing squares of different colors Andalò indicates whether each degree is masculine or feminine, light or dark, lucky or unlucky, and so on.[5] These charts are for use especially in elections and interrogations.

Andalò then turns to the question why the judgments of astrology are not necessary but contingent, and to emphasize the well worn doctrine that the disposition of the patient must be considered as well as the action of the agent. Next he takes up the twelve houses and gives lists of questions which pertain to each house in turn. Discussion of the properties of the planets is followed by illuminated figures representing them, Saturn be-

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de nigro (*sic*) de ianua in arte astrologie peritissimo amen. Zodiacus circulus est circulus signorum . . ." following other treatises by Andalò.

[4] In BM Addit. 23770, the series begins with Aries at fol. 8r and ends with Pisces at fol. 21v.

[5] *Ibid.*, fol. 22v, he explains his fivefold distinction of degrees within the signs: 1, masculine or feminine; 2, lucidus, tenebrosus, fumosi or vacui; 3, putei; 4, azamena (like the putei, to be avoided); 5, augmentantes fortunam.

ing depicted by a blue horse tail upward and head on the ground, beside which stands a man with yellow hair and beard wearing a frock and holding a sickle, while Luna seems to be standing in a tub of bluing and wringing out a cloth or handling fish.[6] After treating of the hours of the planets and mansions of the moon, Andalò lists sixteen ways in which the planets work their effects or manifest their significations. Since he gives Arabic as well as Latin names for these modes, they appear to be drawn from some Arabic work on astrology.[7]

Duhem thought that the influence of Peter of Abano upon Andalò could be discerned in this work, particularly in the chapter already mentioned that astrological judgments do not imply fatal necessity, and in the doctrine of the importance astrologically of correspondence or divergence between the mobile zodiac of the eighth sphere and the immobile zodiac of the ninth sphere.[8] As these come together, civilization reaches its height; as they separate again, it gradually declines: such is the gist of the doctrine.

Other titles of astrological treatises ascribed to Andalò di Negro are: *De infusione spermatis, Ratio diversitatis partus, Liber iudiciorum infirmitatum,* and *Canones modernorum astrologorum de infirmitatibus.* A brief commentary on the fifty-first word of Ptolemy's *Centiloquium* is also attributed to him.[9] It may be an extract from some longer work of his, although I know of no commentary by him upon the entire *Centiloquium.* Of the other four titles just mentioned the two former are concerned with the relation of the stars to the process of human generation. The two latter titles appear to apply to what are simply slightly different versions of the same work on astrological medicine.[10]

[6] The figure of Saturn occupies half of fol. 29v in Addit. 23770; that of Luna, two-thirds of fol. 37v. Figures for the other planets intervene.

[7] *Ibid.,* fol. 41v, col. 1. The Latin terms are: accessio, recessio, coniunctio vel reversio, separatio sive distinctio, translatio, congregatio vel collectio, vetatio vel prohibitio, receptio, inreceptio, evacuatio cursus, redditus, pulsatio virtutis, pulsatio dispositionis et nature, virtus vel fortitudo, debilitas, esse lune.

[8] Duhem, IV, 276-278.

[9] Vienna 5503, 1506 A.D., fol. 115r-v, Andeolus de Nigro super verbo 51 centiloquii Ptolomaei.

[10] As I have determined by direct examination of both manuscripts. Bon-

One has a preface addressed to a contemporary noble; the other, not. The bodies of their text also open with different words. The version with the preface has preliminary tables of contents; the other has essentially the same headings scattered through its text. These treatises are extant in two manuscripts at the Vatican, one of which contains all three works, while the other omits the *De ratione partus*.[11] The two tracts on the process of generation are both quite brief and may be mere fragments or chapters from other works of Andalò, or perhaps are to be regarded as supplements to the work on astrological medicine with which they appear. In order to give some more detailed notion of it, the incipits, explicits, and the chapter headings are reproduced in an appendix.[12]

It will be seen from the chapter headings that the two books into which Andalò's work divides are devoted respectively to the departments of astrology known as interrogations and elections —matters which we have already seen emphasized in the graphic charts that accompanied Andalò's introduction to judicial astrology. Thus Andalò sets forth how to tell from the stars whether the patient will die or live, whether he will refuse to see or speak to anyone, what the cause of his infirmity is, whether the physician in attendance is honest and capable or bad and fraudulent, whether the patient will be delirious, and so on. He even assumes to discover such delicate distinctions from the planets and houses as that the doctor will be "evil in his own nature, but good by accident."[13] Or he instructs how to select the best time for bleeding, cauterizing, operating, administrating laxatives, and so forth. A medical discussion of nativities is not included, however. Andalò explains that he does not speak of whether the patient

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compagni, *op. cit.*, p. 367 was mistaken in listing them as separate works.

[11] Vatic. 4085, membr., 14th century, fol. 11, Canones iudiciorum infirmitatum; fol. 28r, Andeolus de infusione spermatis, opening, "Hester Ptolomeus et Hermes dixerunt . . ."; fol. 28v, Ratio diversitatis partus secundum Andeolum de Nigro de Ianua, opening, "Menses embrionis. . . ."

Vatic. 4082, fols. 196r, col. 1-200r, Andeolus de Nigro Ianuens. de iudiciis infirmitatum; fol. 209, eiusdem de infusione spermatis, opening, "Ester Ptolomeus et Hermes dixerunt. . . ."

[12] See Appendix 14.

[13] Vatic. 4082, fol. 204v, col. 1.

will live or die according to his nativity because it is not easy to learn his nativity, and because to speak of this would take up much space and does not seem very useful to him.[14] In general Andalò's text is restricted to an objective exposition of astrological conditions and rules without either citing past authorities or indulging in personal observations or references to his own time. The chief subjective passage is that already noted, in which he goes on to say that he does not know any sure way to determine the time of the patient's death or recovery, since the constellations signifying this indicate years and months in long sicknesses but weeks and days in short diseases. Also the matter is difficult to judge when one does not know the patient's exact nativity.[15]

Despite such astrological compositions, Andalò lived to a green old age and appears to have been universally respected and nowhere more so than in Florence. In 1359[16] Boccaccio in his work on classical mythology praised him in the following passage which has frequently been quoted:

Often have I mentioned the generous and venerable old man, Andalò di Negro of Genoa, once my teacher in the movements of the stars. And you have known, best of kings,[17] how great was his circumspection, how grave his deportment, how vast his knowledge of the stars. Not only by the rules of the ancients did he know the movements of the stars, as we have many a time made proof, but, since he had traversed nearly the whole world, and had profited by experience under every clime and every horizon, he knew as an eye-witness what we learn from hearsay.[18]

[14] Vatic. 4082, fol. 202v, col. 1.

[15] *Idem.*

[16] For the date see L. Geiger, *Renaissance und Humanismus in Italien und Deutschland,* p. 60.

[17] The monarch referred to is Hugh IV of Cyprus (1324-1359).

[18] *De genealogia deorum,* XV, 6: "Induxi saepe generosum atque venerabilem senem Andalo de Nigro Ianuensem, olim in motibus astrorum doctorem meum, cuius quanta fuerit circumspectio, quanta morum gravitas, quanta siderum notitia, nosti tu, rex optime. . . . Non solum regulis veterum ut plurimum facimus astrorum motus agnovit, sed quum universum fere peragrasset orbem, sub quocumque climate sub quocumque orizonte experientia discursuum certior factus visu didicit quod nos discimus auditu." Other passages of *De genealogia deorum* where Andalò is mentioned are I, 6; II, 7.

The briefer notice of Andalò in the vernacular work of Giovanni Battista Fregoso, which de Simoni, *op. cit.,* pp.

Domenico Bandini included Andalò as a representative *astrologus* among "more recent and especially Florentine" men of note in the biographical section of his encyclopedic *De mundi fabrica* or *Fons memorabilium mundi,* a work undertaken by 1374 and finished in the early fifteenth century.[19] Bandini also repeated what Boccaccio had said of Andalò's world wide travels and extensive first-hand knowledge, and cited Andalò's edition of Pliny in proof of this.[20] Later in the same work Bandini repeated Andalò's explanation how the signs of the zodiac received their names.[21]

Not only was Andalò highly esteemed in the fourteenth century; he has been regarded since as a writer of some importance for the history of science. For his compositions were not limited to the field of astrology, but included a number of astronomical works, some of which were printed in 1475. These comprised a treatise on the sphere,[22] another on the composition of an astrolabe,[23] a theory of the planets,[24] a theory of the distances from

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323-324, reproduces from the Latin translation by Camillus Gilinus, *De dictis fatisque memorabilibus,* Milan, 1509, adds nothing to the passage from Boccaccio.

[19] Laurentius Mehus, *Vita Ambrosii Traversari,* 1759, Praefatio, pp. cxxxiv-cxxxv.

[20] Vatican Urbino 300, a thick folio volume of some 313 double-columned leaves (303 numbered, but the numbers 21-30 are repeated), containing the *De claris viris* section of Bandini's encyclopedia as far as the letter P. Fol. 23v (really 33v), col. 1, "Andalo de Nigro eximius astrologus Ianuensis mihi fere contemporaneus peragravit fere universum orbem ut sub quocumque climate sub quocumque orizonte per usualem (visualem?) experimentiam disceret quicquid nos discimus audiendo. Testes meorum dictorum sunt Plinii libri ab eo editi circa talia mirabiles et stupendi."

[21] *Ibid.,* fol. 209v, col. 1.

[22] A manuscript of it not mentioned by Boncompagni is FL Ashburnham 131 (205-137) Fasc.C, 14th century, fols. 65-72v, "Novus spere tractatus" opening, "Quoniam ad habendum intellectum. . . ."

[23] MSS not mentioned by Boncompagni are: FL Ashburnham 131, fols. 73-103, De conpositione astrolabii, opening, "Et primo quid sit astrolabium . . ."; FL Ashburnham 1330 (1263), fols. 47r-60v, "Incipit tractatus Andalo de Nigro de Ianua de compositione astrolabii. Et primo quid sit astrolabium. Deinde imaginationes et considerationes quas habuerunt compositores. Postea vero quomodo et qualiter debeat componi. Astrolabium est pars spere depresse . . ."; Arras 688, 15th century, "Explicit tractatus Astralabii compositus a domno de Nigro de Genua 1458 in vigilia epiphanie, Ferrarie." It opens, however, "Si astralabium facere voluerit, primo et ante omnia fac tabulam."

[24] Manuscripts of it not listed by Boncompagni are BN nouv. acq. 1988, 14th century, 19 fols.; FL Ashburnham 1339 (1263), fols. 11-33v.

the earth of all the spheres and planets and their magnitude, and canons, written apparently in 1323,[25] on the *Almanach* of Profatius Judaeus concerning the equation of the planets.[26] Thus he serves to illustrate the point that the occult arts and sciences were then supported by men of the highest education and learning and not merely by the vulgar and charlatans, and that astronomy and astrology were indistinguishable then. Of the astronomical works by Andalò which have just been listed Duhem remarked, "The goal of all these astronomical studies was, you may be sure, judicial astrology."[27]

Duhem brought a more serious charge against Andalò, representing him as inferior in astronomical ability to Peter of Abano and the astronomers of the thirteenth century at the university of Paris, and characterizing him as "le dernier des ignorants."[28] It seems true that Andalò was a person neither of much originality nor of great perspicacity. One of Duhem's criticisms of him, however, was none too well taken. In his *Canons* on the *Almanach* of Profatius Judaeus, Andalò remarks that some "moderns" have reproached Profatius for basing his *Almanach* upon the Tables of Toledo, which were compiled so long ago. Andalò, on the contrary, affirms that the Tables of Toledo used by Profatius were the recent tables compiled by order of Alfonso X, king of Castile, and completed in 1272, only twenty-eight years before Profatius composed his tables for the meridian of Montpellier and the date March 1, 1300 (1301, new style). Consequently there has been very little time for the positions of the planets to alter and error to accumulate. But perhaps, adds Andalò, when these "moderns" speak of the Tables of Toledo, they mean the old ones—that is, the tables of Al Zarkali drawn up in the eleventh century. Duhem thereupon exclaims that the accumulation of mistakes contained in this short passage is astounding, that Andalò does not know the difference between

[25] Duhem IV, 270, citing the chapter, "De revolutionibus argumenti," for the expression, "in ipso anno 1323 imperfecto": BN 7272, fol. 74r, col. 1.

[26] For the single 1475 edition and MSS of these treatises other than those given in the three preceding notes, see Boncompagni's "Catalogo de' Lavori di Andalò di Negro," *Bullettino*, VII (1874), 339-376.

[27] Duhem, IV, 269.

[28] Duhem, IV, 270.

the Tables of Toledo and the Alfonsine Tables; that he does not know that the Alfonsine Tables use the date 1252, and not 1272, as their point of departure; finally, that he does not know that Profatius in the preamble to his *Almanach* states that he bases it upon the Tables of Toledo.[29]

But Andalò does not say that the Alfonsine Tables use 1272 as their date of reference; he says that the correction of them was completed in that year, wherein he agrees with the recent article of Wegener who holds that the Alfonsine Tables were not drawn up until about 1270,[30] although the opening year of the reign was adopted as their basic year.

In the second place, is Duhem justified in his assumption that when medieval writers speak of the Tables of Toledo they always mean the tables of Al Zarkali and never the Alfonsine Tables, which were also compiled at Toledo and reckoned for its meridian? Filippo Villani, who composed his lives of illustrious citizens of Florence about the year 1400, has a somewhat cryptic passage which may serve to illustrate this point. Speaking of Paolo Dagomari who died about 1365 or 1370, Villani says that this most diligent observer of the stars and movement of the heavens showed that the Toledan Tables were of little or no use in modern times, and those of king Alfonso he demonstrated to vary sensibly in some respects, whence it is made clear that the instrument of the astrolabe measured according to the Toledan Tables which we frequently use is not astronomically accurate and thereby astrologers are deceived who have based

[29] Duhem, IV, 271.

[30] Alfred Wegener, "Die astronomischen Werke Alfons X," *Bibliotheca Mathematica,* 6 (1905), 129-185. See especially pp. 138 and 176. The compilers of the Alfonsine Tables in their introduction speak of themselves as being in the first decade of the fourth century of the second millenium of the era of Caesar, i.e. 1263-1272 of the Christian era. I find that Dr. J. L. E. Dreyer, "On the Original Form of the Alfonsine Tables," *Monthly Notices of the Royal Astronomical Society,* 80 (Jan. 1920), 246, note, has already noted Duhem's failure to observe this. Dr. Dreyer writes: "Andalò di Negro of Genoa (first half of the fourteenth century), who wrote a number of rather worthless tracts on astronomical matters, says that the tables were finished in 1272. Duhem, who records this, is not aware of the light thrown on this question by the *Libros del Saber,* but is surprised at Andalò making such a mistake. (*Le système du monde,* IV, 266.)"

their conclusions upon it.[31] From the first part of this statement it might seem that Villani was distinguishing the Tables of Al Zarkali from the Alfonsine Tables, but we can scarcely credit that in the later fourteenth century after the Alfonsine Tables had been known in Florence for some time astronomers would still use an astrolabe based on the Tables of Al Zarkali. It therefore seems a little uncertain what Villani has in mind when he says "Toledan Tables."

Another illustration is provided by a manuscript[32] in which the same work is called "Commentum super Canones tabularum Toletanarum," and "Canones Ioannis de Saxonia super tabulas regis Alfonsi."

On the other hand, we shall find Geoffrey of Meaux in 1320 still using Arzachel "in the Tables of Toledo" in preference to Alfonso. An anonymous commentator in the fifteenth century on the astronomical tables of Jacobus de Dondis (1298-1359), the celebrated physician, astronomer, and clock-maker who was contemporary with Andalò, clearly distinguishes the Toledan Tables from those of Alfonso, stating that the former had grown inaccurate with age and that Jacobus de Dondis had based his on the Alfonsine, but had made them less intricate and more expeditious to use and had based them upon the meridian of Padua.[33] From a citation by Favaro from three manuscripts in

[31] Edition of 1847, p. 33: "Hinc observator diligentissimus siderum et motus caeli Tolletanas tabulas ostendit modernis temporibus brevis aut nullius esse momenti ipsasque regis Alphonsii monstravit varietate sensibili in aliquo variare, ex quo ostensum est instrumentum Astrolabii secundum Tolletanas tabulas mensuratum quo frequenter utimur ab astronomiae regulis declinare atque astrologos decipi qui deinde artis mutaverint argumenta."

[32] FN II.ii.316, 15th century.

[33] BL Canon. Misc. 436, 15th century, chart., folio, double columns, fol. 13r, col. 1: "Cum plures et varie tabule ad celestes motus composite sint et nonnulle veluti Toletane ob temporis prolixitatem a veritate deficientes dimisse sunt (*sic*) alieque vero ut tabule Alfonsi licet pro veris et correctis habeantur ipse tamen vel prolixe vel intricate sunt vel adeo diminute ut per ipsas totum quod in figura requiritur non habeatur. Idcirco vir in astrologia clarissimus Iacobus de Dondis protinus has tabulas ex Alfonsi tabulis extraxit et leviores et expeditiores illis in operando composuit et etiam melius verificavit et correxit ut et opus perfectum haberetur et operam astrologie dare volentibus fastidium non innascatur. Prius autem quam ad canones accedamus advertendum est quod he tabule ordinate sunt ad meridianum Padue cuius latitudo est 45 g° et 24 m'

Italian libraries it would appear that this anonymous writer of the Canonicus manuscript just cited was no other than Prosdocimo de' Beldomandi who died in 1428.[34]

Andalò, at least, distinguished between old and new tables of Toledo, the latter those of Alfonso, the others evidently those of Al Zarkali. He stated that Alfonso had caused the Tables of Toledo to be newly corrected and rectified with much care and attention in the city and tower of Toledo by his astronomers with many varied instruments over a number of years. This is essentially in agreement with the extant introductory statement made by Jehuda ben Mose and Isaak ibn Sid, the compilers of the Alfonsine Tables.[35]

As for Profatius, Duhem notes[36] that he sharply criticized the Tables of Al Zarkali in the aforesaid preamble, yet at its close stated that he based his new *Almanach* upon the Tables of Toledo. Duhem assumes that by this last expression he means the Tables of Al Zarkali and that he was totally ignorant of the existence of the Alfonsine Tables, though he writes in the extreme south-west of France close to the Spanish peninsula where they had been in existence about thirty years. But this seems a trifle improbable, especially since the Alfonsine Tables were the work of the above-mentioned two Jewish astronomers, of whom Profatius, himself a Jew, might be expected to know. Al

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precise in medio sexti climatis. Et longitudo eius ab occidente habitato est 32 g. et 30 m." At fol. 24v, our MS is dated November 17, 1468: "Finis cum dei laude 1468 17 VIIIIbris."

[34] In the passage as quoted by Favaro (Antonio), "Intorno alla vita ed alle opere di Prosdocimo de' Beldomandi, matematico padovano del secolo XV," *Bullettino di Bibliografia e di storia delle scienze matematiche e fisiche pubblicato da B. Boncompagni,* XII (1879), 199, Prosdocimo, writing in 1424, says: "Et quoniam in motibus planetarum tabule Jacobi de Dondis Paduani ex Alfonsi tabulis extracte leviores et expeditiores sunt in operando quam Alfonsi tabule ac etiam eque et forsitan melius verificate et correcte: pro tanto in hiis tabulis quas ordinare intendo ipsas cum quibusdam aliis aggregabo Alfonsi tabulis dimissis tamquam intricatis. Sed antequam ad canones accedamus primo advertamus quod tabule de motibus planetarum Jacobi supradicti ordinate sunt ad meridianum Padue cuius latitudo est 45 gradus et 24 minuta."

[35] Alfred Wegener, "Die astronomischen Werke Alfons X," *Bibliotheca Mathematica,* 6 (1905), 174-175.

[36] Duhem, III (1915), 303-312, wherein he chiefly follows the article of Ernest Renan on Jewish scholars and translators of southern France around 1300 in the *Histoire littéraire de la France,* XXVII (1877), 599-623.

Zarkali might be good enough for him in 1263, when he assisted John of Brescia at Montpellier in translating into Latin the work of that author on the astronomical instrument known as *Safiha,*[37] a work already introduced to the Latin world in 1231 by William of England.[38] But after the appearance of the Alfonsine Tables in 1272, the situation was likely to alter.

Moreover, Duhem overlooked the fact that in the best Latin manuscripts, which agree more closely with the Hebrew text,[39] Profatius does not state in his prologue that he bases his almanac upon the Tables of Toledo, but declares that he has labored "to break and destroy the tables of the aforesaid"—that is, of

[37] BN 7195, fols. 78r, col. 1-91v, col. 2: rubric, "Liber operationis tabule que nominatur saphea patris Ysaac Arzachelis primum capitulum de nominibus descriptionum positarum in tabula communi"; incipit, "Descriptionum que sunt in facie prima earum est . . ."; colophon, "Explicit liber tabule que nominatur Saphea patris Isaac Arzachelis cum laude Dei et eius adiutorio translatum est hoc opus apud Montem Pessulanum de arabico in latinum in anno domini nostri Ihesu Christi 1263, Profatio gentis Hebreorum vulgarizante et Iohanne Brixiensi in latinum reducente. Amen." In other words Profatius translated it into Provençal and John of Brescia thence into Latin. The reader should not be confused by the association of the word, *tabula,* with the Saphea into thinking that it has to do with astronomical tables such as those of Toledo. The Arabic word *safiha* indicates something flat, so that the instrument or astrolabe in question may be called a table in that sense. The work has 61 chapters.

[38] BN 7195, fols. 74r, col. 2: opening, "Siderei motus et effectus motuum speculator et duplex dux Ptholomeus. . . ." This paraphrase or partial translation is followed at fol. 77v, col. 2, by "De stellis fixis," and at fol. 78r, col. 1, by a "Tabula stellarum fixarum secundum Arzachelem," giving 21 stars for the twelve signs. L. A. Sédillot, *Supplément au traité des instruments astronomiques des arabes,* 1844 (and *not* 1841, as Duhem III, 287 and 306, incorrectly cites it), pp. 185-190, has given excerpts from both William of England's and John of Brescia's versions, but uses another foliation for BN 7195 than that which I found in June, 1929.

[39] I am indebted to Professor Alexander Marx, librarian of the Jewish Theological Seminary of America, for calling my attention to this fact in a letter of March 25, 1929, in response to my note in *Isis* of March, 1928. Moritz Steinschneider, "Prophatii Judaei Montepessulani Massiliensis (a. 1300) Prohemium in Almanach adhuc ineditum e versionibus duabus antiquis (altera quoque interpolata) una cum textu hebraico e manuscriptis primum edidit suamque versionem latinam verbalem adiecit," Boncompagni's *Bullettino,* IX (1876), 595-614, listed such MSS of the Almanach in Hebrew or Latin as he could find, and printed the text of the Prohemium in (1) Hebrew, (2) his own Latin translation of the Hebrew, (3) the literal version of BN 7408A (insufficiently noted by him as 7408) and the paraphrastic version of most Latin manuscripts. The two versions of the prohemium in the Latin MSS are also reproduced in HL 27 (1877), 618-620.

"Armenius" and Al Zarkali—"as being useless and uncertain for modern times," and has composed new tables which have their beginning from 1300 A.D.[40]

Profatius therefore seems to strive to leave the impression, whether justifiable or not, that he is not basing his *Almanach* on the tables of Al Zarkali. On the other hand, he seems nowhere to give any clear indication of having used the Alfonsine Tables. At the close of his *Almanach* in the manuscript already cited is a note of August 20, 1459, by one John Moteti, stating that he has compared the tables of Profatius with the Alfonsine and that it seems to him that these tables and canons are either false or miscopied.[41] It would probably be difficult by a detailed examination of extant astronomical tables to tell whether Profatius has merely revised the tables of Al Zarkali or has based his *Almanach* on the Alfonsine Tables. At any rate neither Duhem nor anyone else appears to have attempted it. There is the difficulty that the Tables of Al Zarkali have never been printed, and that the original Alfonsine Tables are not extant even in manuscript form. The Castilian version seems to have disappeared at an early date, and they are known only through the altered Latin versions of the fourteenth century.[42]

[40] BN 7408A, fol. 2v, col. 2: "Idcirco ego Profatius Iudeus in Monte Pessulano habitans ad honorem illorum qui me de hoc rogaverunt laboravi ad frangendum et destruendum tabulas predictorum tamquam moderno tempore inutiles et incertas et ad faciendum novas que inceptionem habent a computatione Christianorum 1300 anni." Only in *Canons* on the tables of the *Almanach* of Profatius Judeus, which occur in this manuscript after the *Almanach* itself has ended, is it said that the Tables of Toledo have been followed. *Ibid.*, fol. 74r, "Incipiunt canones super tabulas almanach profatii iudei. Istud almanach profatii iudei ordinatum est. . . . In isto autem incipiunt omnes revolutiones planetarum ab anno domini nostri Ihesu Christi 1300 et prima die martii. Sunt autem omnes planete in prima sui revolutione equate secundum veritatem tabularum Toletanarum in quibus non oportet aliquid minui sive addi. In sequentibus vero revolutionibus oportebit addi vel minui secundum quod docebitur infra in canonibus planetarum." From this it would rather seem that the *Canons* are the work of a commentator on the *Almanach* such as Andalò and not of Profatius himself. For some further discussion of the relationship between the Prohemium and *Canons* see Appendix 15.

[41] BN 7408A, fol. 73v, "Videtur michi quod iste tabule et canones vel false sunt vel male scripte."

[42] See Wegener (1905), p. 139: "Das kastilianische Original dieser Alfonsinischen Tafeln ging in der Folgezeit verloren und dürfte während der ganzen

Another reason for doubting if the *Almanach* of Profatius was as backward as Duhem implies is that he appears to have introduced considerable improvements into the astronomical instrument known as the quadrant, and then to have further revised his own work on the subject.[43] Furthermore he is highly praised in Astruc's work on the medical faculty of Montpellier for his observation of the angle of the Sun's greatest declination which he found to be 23 degrees, 32 minutes. "This," says Astruc, "served to fix the theory of the earth's movement and of the inclination of its axis, at least from that time on. Moreover, almost all astronomers vied with one another in citing this observation, for instance Copernicus, Reinhold, Clavius, Justinus."[44] Duhem, who does not seem to have known of this passage from Astruc, refers, however, to the same point. He says:

It does not seem that Profatius has corrected the work of Al Zarkali and his disciples by any new observation. No doubt he no longer gives to the obliquity of the ecliptic any value other than 23 degrees, 32 minutes, but it does not seem that this evaluation was the result of a direct determination, as Copernicus seems to have believed; rather has it been

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Zeit, in welcher die Tafeln eine allgemeine praktische Verwendung fanden, vollkommen unbekannt gewesen sein. Ihre grosse Verbreitung gewannen sie erst in der lateinischen Bearbeitung des Johannes de Saxonia, der nach neueren Forschungen zu Beginn des 14. Jahrhunderts blühte. Was indessen zwischen jener ersten spanischen Redaktion und der lateinischen Ausgabe von Johannes de Saxonia mit den Tafeln geschehen ist, ist gegenwärtig noch in ein undurchdringliches Dunkel gehüllt. Von dem spanischen Original besitzen wir nämlich seit der Herausgabe der *Libros del saber de astronomia* etc. von Rico wenigstens den Text, den Rico bei seinen umfangreichen bibliographischen Arbeiten in einem handschriftlichen Sammelband entdeckte, während allerdings die Tafeln selbst leider nach wie vor fehlen. Dieser Text genügt aber immerhin, um zu beweisen, dass das Original der Tafeln ganz anders gebaut war als diejenigen des Johannes de Saxonia, die uns ziemlich rein in den zahlreichen Druckauflagen des 15. und 16. Jahrhunderts vorliegen." See also the statement at p. 176, "In der Tat unterliegt es keinem Zweifel, dass zur Zeit, wo die lateinischen Ausgaben verbreitet waren, das kastilianische Original völlig unbekannt war."

[43] G. Boffito and C. Melzi d'Eril, *Il quadrante d'Israele di Jacob ben Machir ben Tibbon (Profacio)*, Florence, 1922, list the MSS at pp. 12-15, and edit the text in transcription and facsimile from a Magliabechian codex, pp. 25, 42. A MS they fail to note is BM Arundel 268, fol. 41v.

[44] Jean Astruc, *Mémoires pour servir à l'histoire de la Faculté de Médecine de Montpellier*, Paris, 1767, p. 167 *et seq.*

calculated with the aid of the tables based by Al Zarkali on the theory of access and recess.[45]

But it is difficult to understand why the work of Profatius should be found in so many manuscripts,[46] if it did nothing but continue the old tables of Al Zarkali, making a fresh start from the year 1300 A.D.

Duhem's estimate of both Profatius and Andalò therefore seems somewhat harsh and misinformed. We do not need to regard Andalò as an ignoramus hopelessly out of date in his astronomy and failing to keep up with the recent literature of that subject. His marked interest in astrology consequently cannot be minimized as that of a person of little account.

Finally we may note a short work by Profatius which neither Steinschneider nor the *Histoire littéraire* mentions. It is on the aspects of the moon to the other planets and is said to have been translated in the university of Montpellier from Hebrew into Latin in 1312 A.D.[47] Profatius himself was perhaps then dead, since he is commonly said to have lived from about 1236 to 1303 or 1306. The tract first considers the properties and influences of the planets, and then distinguishes maximum, mean, and minor conjunctions. Next come six lines of prediction for each aspect of the moon with the other planets. Thus the work is primarily astrological. However, it is further stated that the sun has an eccentric and that the sphere of the moon consists of four orbs about the earth.[48] Profatius' work on the new quadrant then follows in the same manuscript.

[45] Duhem, III, 311. William of St. Cloud about 1290 A.D. had determined the obliquity of the ecliptic by direct observation as 23 degrees and 34 minutes.

[46] For example, at Oxford, Digby 114, fol. 37; 149; 228; Ashmole 369, fol. 162; 360, fol. 84; Laud. Misc. 594; at Paris, BN 7286B; 7272; 7408A; at Munich, CLM 83 and 275; at Vienna, MS 2492; and see the Index to Schum's *Verzeichniss* of the Amplonian MSS at Erfurt.

[47] BN nouv. acq. 625, 14th century, fols. 13v-15v, col. 1, "Explicit tractatus Profatii Iudei de aspectibus lune ad alios planetas translatus in preclaro studio montis pessulani de hebraico in latinum anno domini 1312." The work opens, "Sciendum quod planetarum quidam sunt benevoli. . . ."

[48] *Ibid.*, fol. 14r, col. 2, "Quod sol habeat excentricum apparet. . . . Nota quod spera lune ex quatuor orbibus integriter ipsam terram circumeuntibus."

CHAPTER XIII

PAOLO D'ABBACO DAGOMARI: ARITHMETIC AND NATURAL SECRETS

Paolo Dagomari, known also as dell' Abbaco and Astrologo,[1] may be said to have flourished shortly before the middle of the fourteenth century. He was born at Prato about 1281, but there is disagreement as to the date of his death. Filippo Villani, followed by subsequent writers like Libri, put it in 1365, but Mattia Palmieri in his *Liber de temporibus,* dedicated to Piero de' Medici in 1448, spoke of him as still living in 1372. According to Tiraboschi he made his will in 1366 and died in the neighborhood of 1370. Perhaps the dates 1365 and 1366 could be reconciled, however, by taking into account different practices as to the first day of the year.

Paolo was held in high esteem in his own day as a mathematician and astronomer, although it appears that this reputation was largely confined to his fellow Florentines. Libri states that contemporary poets ranked him with Dante and Petrarch in celebrity. Boccaccio noticed the instruments made with Paolo's own hands which marvellously portrayed the movements of the heavens,[2] and Filippo Villani mentioned those which he devised to measure the slow advance of the eighth sphere. Zenone Zenoni praised him in a sonnet as on a par with Eudoxus, Posidonius, and Ptolemy. Filippo Villani at the opening of the fifteenth cen-

[1] Concerning him see L. Mehus, *Vita di Ambrogio Traversari,* 1759, pp. cxciv-cxcv; Tiraboschi, V (1823), 323-328; G. Libri, *Histoire des sciences mathématiques en Italie,* Halle, 1865, II, 205-207; III, 282-288. Filippo Villani's account in the *Liber de civitatis Florentiae famosis civibus,* which Mehus and Tiraboschi used in MSS, was first printed in the Latin original at Florence, 1847. An old Italian translation of it was first printed in 1747, and again at Florence, 1826, and Trieste, 1858.

Enrico Massini has presented some evidence suggesting that Paolo's family name was Ficozzi rather than Dagomari: *Rassegna Nazionale,* XXII (1919), 215-225, "Maestro Paolo dell' Abbaco dei Ficozzi erroneamente creduto dei Dagomari."

[2] *De genealogia deorum,* XV, 6.

tury looked back on Dagomari as a great arithmetician and geometer and as surpassing ancients and moderns alike in astronomical equations. "Had he been equally good in judgments, without doubt he would have surpassed the famous studies of all the ancients." This implication that in order to be a really great and versatile mathematician one must excel in judgments of the future from the stars is an apt illustration of the scientific standing of astrology at that time. Villani's slur upon Paolo's astrological ability does not mean that he neglected the subject, however, for it is asserted that he was the first at Florence to compose a *Tacuinum* and annual prediction of events for the coming year. Villani probably meant that these predictions were not very successful. Coluccio Salutati, on the other hand, in a letter bemoaning Paolo's death, praised highly his astrological advice to the Florentine state and gave him credit for the victory of Cascina in 1364 over the Pisans.[2a]

Libri suggested that there may have been several persons called Paul the astrologer or Paolo dell' Abbaco, but this hypothesis is of not much concern to us here, since we are primarily interested in a single treatise which seems to have been the composition of Paolo Dagomari.

Just what constituted the original text of the *Trattato d'abbaco* of Paolo Dagomari seems a difficult problem. There were apparently various recensions of it, some of which appeared after his death and altered the dates in it to correspond to their time of issue. I have examined three manuscripts which all differed considerably. Two, now in the Ashburnham collection at Florence and which once passed through the hands of Libri, are said to be of the fourteenth century and are limited to arithmetic and geometry.[3] But one contains dates from 1390 to 1393 in its

[2a] *Epistolario di Coluccio Salutati*, ed. Francesco Novati, Roma, 1891, I, 15-20. From three Riccardian MSS containing *Rime* by Paolo dell' Abbaco the specimen quoted by Lami (1756), p. 311, is astrological.

[3] FL Ashburnham 1163 (1092), paper, small octavo with a script page of only about 10 x 6 cm. At fol. 11r the text opens: "Reghole dabaco di M. Paolo." These *reghole* are unnumbered, but after the forty-first by my count at fol. 5r occurs the word, "Finis." Two more rules follow, however, at fol. 5r-v, and then examples begin. I could see little resemblance to the other Ashburn-

examples and is at best late fourteenth century.[4] The contents of these two manuscripts seemed to vary a good deal. A third manuscript of the fifteenth century formerly belonged to prince Boncompagni and is now in the collection of Mr. George A. Plimpton in New York.[5] It bears the longer title, *Trattato d'abbaco, d'astronomia e di segreti naturali e medicinali,* and its content corresponds to this, the work being not merely on arithmetic but also in its later pages a treatise on astronomical chronology and judicial astrology with a collection of recipes and secrets. It is of this version of Paolo's work that we shall here treat. It is tempting to regard the astronomical and medical sections of the Plimpton manuscript as later additions and to limit Paolo's original *Trattato d'abbaco* to the arithmetical portion. But this inference is not wholly acceptable, since in some respects at least

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ham MS until at fol. 61v began a series of examples, each opening with the words; "Dua merchatanni vogliono barattare insieme lana . . ." after which the texts appeared to diverge again. At fol. 86r a geometrical section opens, and at fol. 109v the entire brief work ends.

The other Ashburnham MS is a much fuller text but without the Reghole or Regoluzze: FL Ashburnham 1308 (1233), paper, folio, fols. 1r-152v. "In questo libro tratteremo di piu manere di Ragioni adatte a traffichi di merchatantia tratte de libri darismetricha et ridotte in volgare per lo excellente huomo maestro Pagolo de dagumari daprato. Io voglio in questo libro trattare alquante ragioni. . . ." Passing over various *Trattato's* dealing with multiplication, division, and the like, we may notice the following: fol. 40r, "Trattato del Rechare aundi;" fol. 49r, "Trattato de Baratty"—most of the examples opening, "Duo vogliono barattare di lana"; fol. 63v, "Trattato delle Compagnie"; fol. 74r, "Trattato di menti"; fol. 85r, "Trattato di leghe di monete"; fol. 129r, "Trattato di misura di geometria"; and fol. 143r, another "Trattato di misura di geometria," which deals with triangles rather than with "round and square things" as its predecessor did.

[4] See FL Ashburnham 1308, fols. 40r-42r.

[5] Paper, about 30 x 22 cm, double columns, written in a hand or hands of the 15th century, 135 fols., of which the last two are blank, as are most of 81r, all 81v, most of 92r, 92v-98v inclusive, the lower half of 116v, and most of 120v. Fols. 131v-132r are covered with writing in a different and later hand. The title, "Trattato d'abbaco, d'astronomia e di segreti naturali e medicinali," is written on a flyleaf before the numbering of leaves begins. At fol. 1r is a general summary of the work's contents; at fol. 1v, a table for changing denarii or pence into solidi or shillings and lire or pounds; at fols. 2r-3v, a more detailed table of contents; while fols. 4r-11v are occupied with figures and sums. The MS is illustrated with drawings of ships and walled cities, and with geometrical and astrological diagrams. I am indebted to Mr. Plimpton for permitting this MS to go from his private collection to the Columbia university library so that I might more readily study it.

the Plimpton manuscript seems to preserve the original text as composed in the year 1339. Thus it is to various days in that year that interest is reckoned in a number of examples,[6] whereas in one of the Ashburnham codices it was reckoned for 1380, and 1390, 1391, 1392 and 1393. Nor are such evidences of antiquity limited to the arithmetical part. The year 1339 again is often named in discussing the moon's movements, in one case being followed by reference to the succeeding years from 1340 to 1344 inclusive.[7] Later on, August 29, 1330, is taken as a specimen date.[8] In the very last two or three pages the years 1380 and 1382 are mentioned in a table for applying Meton's cycle,[9] and 1447 is called the present year.[10] But such dates, especially the last, occur in tables which seem to be later additions to the work, while in the case of another astronomical table which came earlier in the text the dates 1394 and 1412 are found not in the text proper but in a marginal note which may well represent a later interpolation.[11]

The work is divided into sections which are sometimes separated by blank spaces. The beginning of each new section is further marked by some pious introductory formula such as, "In the name of God and reverence to his power and the holy Trinity,"[12] or "In the name and honor and reverence of the supreme power of God and of his mother, Madonna holy Mary."[13] It is less evident whether a section breaks off incomplete or is presented in its totality, since a blank space is not always left be-

[6] A "1399" on fol. 101r is probably a slip of the pen for 1339, which occurs repeatedly through the other pages.

[7] *Ibid.*, fols. 106r-109r.

[8] *Ibid.*, fol. 116r.

[9] *Ibid.*, fol. 132v. The year 1080 is also given but perhaps is a slip of the pen.

[10] *Ibid.*, fol. 133v. The year 1448 is also listed.

[11] *Ibid.*, fol. 123v.

[12] *Ibid.*, fol. 1r, "Al nome sia di dio et a reverentia della sua potentia et della santa trinitade. Et della sua madre vergine sempre santa maria. Et del beato sancto Giovanni batista. . . ."

[13] *Ibid.*, fol. 82r, "Al nome et honore et reverentia della somma potentia di deo e della sua madre Madonna santa maria. . . ." See also fol. 99r, "Al nome et a honore di dio et della vergine maria . . .;" fol. 106r, "Al nome et ad honore di dio e della santa trinitade . . .;" fol. 109v, "Al nome di dio amen. Queste sono le proprietadi de pianeti . . .;" fol. 117r, "Al nome di dio amen. Queste sono richordanze notabili de giudici dastrologia . . .;" fol. 124r, "Al nome di dio amen. Questo e uno medichamento generale. . . ."

tween sections or may vary in length from the remainder of the page to seven successive leaves. The sole mention of the author appears to be after the close of the astronomical and astrological section, when there is a reversion to the subject of arithmetic in the form of fifty-two rules[14] which are headed in the text, "Regholuzze del maestro Pagolo astrolago," and are referred to in the preliminary table of contents as, "Regholuze del maestro pagholo delabacho. . . . "

We are less concerned with Paul's arithmetical examples and discussion of exchange, weights, money, and mensuration[15] than with the astrology and natural secrets of the *Trattato d'abbaco.* A paragraph is devoted to the properties and influence of each planet;[16] they are related to the four qualities;[17] the signs of the zodiac are related to the different members of the human body; the signification of the moon in each sign is detailed;[18] such technicalities as the ascendent[19] and *triplicitas,*[20] or lord of the year and exaltations of the planets,[21] or the outlandish names for the angles of the planets,[22] are explained; the rule of the planets in turn over the hours of the day is set forth; the planets are related to the signs.[23] Instructions are given under

[14] They occupy fols. 121r-122r in the Plimpton MS and were printed by G. Libri, *Histoire des sciences mathématiques en Italie,* Halle, 1865, III, 283-288, from a MS in his possession which he dated about 1340 at Florence. *Ibid.,* II, 206-207, he mentions as a MS of the *Regoluzze* at Florence, Magliabech, XI, 85 (formerly Gaddi 149). See also Frizzo, *Le regoluzze di maestro Paolo all'abaco,* Verona, 1883. Libri also had a MS of Paolo's arithmetic without the rules, probably FL Ashburnham 1308 to which we have already referred.

[15] His commercial arithmetic is spoken of rather slightingly by D. E. Smith, *History of Elementary Mathematics,* I (1923), 232.

[16] Plimpton MS, fols. 109v-110r. At fol. 113r-v, are further paragraphs on the properties of the sun, Venus, Mercury, and the moon.

[17] *Ibid.,* fols. 110v-111r.

[18] *Ibid.,* fol. 111v.

[19] *Ibid.,* fol. 112r.

[20] *Ibid.,* fol. 116v.

[21] *Ibid.,* fol. 119v.

[22] *Ibid.,* fol. 118v.

[23] *Ibid.,* fol. 116v. A MS which has not yet been mentioned appears to contain this astronomical and astrological section of the *Trattato d'abbaco.* FN Magl. XI, 121, fols. 155r-165r, opening, "Astronomia e Astrologia. Dispositione de segni con la luna. Aries a natura di fuoco caldo. . . ." At fol. 158v we read: "Questa e illa opera ordinata e composta per lo maestro Paolo dell Abaco il quale fu uno grandissimo maestro di geometria levato e conpilato de uno suo libro fatto nel 1339 e parla del corso de pianeti e delle loro case. E prima comincia coffa-

what constellations to set sail from port[24]—information doubtless as highly valued by the Italian merchants as the commercial arithmetic which Dagomari supplied. Astrological diagrams are interspersed through the text, but in the center of each Paolo is careful to write, "God rules in all things and over all things," or, "Supreme power rests with God."[25]

The medical recipes comprise charms and incantations as well as herbs and laxatives. Sheep's wool and olive oil are to be combined with an incantation which Jesus Christ revealed to three friars who were going to mount Olivet for herbs. Or secret words of God which Arnald of Villanova prescribed for king Hubert are set down: "Charta dia deacha nyfynion chanytry."[26] King "Uberto" must be short for Robert of Naples, but the inaccuracy of such allusions[27] makes us suspicious of their authenticity. The influence of alchemy or chemistry in medicine and pharmacy is seen in a powder of orpiment and other ingredients[28] while more strictly chemical secrets are included such as for making azure, calcining, whitening copper, or dissolving any metal.[29] One such recipe is ascribed to master Berlinghieri,[30] possibly a member of the famous family of Gothic painters. But when the text turns back again to medical recipes and gives some remedies of John of Arezzo for stomachache and other complaints,[31] we suspect that we have to do with John of Arezzo the medical author of the fifteenth century[32] and with late additions to the *Trattato d'ab-*

mente la regola della luna. . . ." Fol. 158r is completely occupied by a table showing what sign the moon will be in for every day of the month. At fol. 161r, "Queste sono le proprietadi de pianeti"; at fol. 163v, "Della signoria de pianeti."

[24] Plimpton MS, fol. 117v, "Quando tu vuoli partire duno porto per andare per mare . . ."

[25] *Ibid.*, fols. 110v, 112v, and 118v.

[26] *Ibid.*, fol. 124r.

[27] There are other citations of "maestro rinaldo davilla nova", and another recipe of his for "re uberto" at fol. 127r.

[28] *Ibid.*, fol. 126r.

[29] *Ibid.*, fols. 127v-128v.

[30] *Ibid.*, fol. 128r, "Persimile di maestro berlinghieri fa lamina di stagno sottili et poi prendi chalcina viva polverizata. . . ."

[31] *Ibid.*, fol. 130v. The section devoted to "natural and medicinal secrets", which began at fol. 124r, closes at the bottom of fol. 131r, ". . . et di una volta equesto fa con sollecitudine e chosi que chessi medicha."

[32] See my *Science and Thought in the Fifteenth Century*, 1929.

baco. Meanwhile we have been told how to find water in a mountain.[33]

In the catalogues of collections of medieval manuscripts one often encounters descriptions of a treatise or treatises "concerning the construction of the cylinder called the Horologe of Travelers."[34] The reference is not, as one might at first think but for the age of the manuscripts, to some time-piece after the order of the modern watch, but to a portable cylindrical form of sun dial, of which the main idea at least appears to go back to the days of Hermann the Lame who died in 1054. So far as I know, there has been no modern treatment of the matter, or examination of the manuscripts to ascertain how far they are identical with one another and whether they are the same treatise as, or a fragment of, the *De utilitatibus astrolabii* of Hermann the Lame.

But a Vatican manuscript contains what at least purports to be a new version, "according to moderns," worked out at Erfurt.[35]

[33] Plimpton MS, fol. 129v.

[34] A few examples of its occurrence in the MSS are: at Oxford, BL Ashmole, 1522, early 14th century, fols. 178-181, "Incipit tractatus Chilindri quod horologium dicitur viatorum. Capitulum primum de formatione corporis chilindri quantum ad hoc quod spectat ad vertitorem. Investigantibus chilindri dispositionem . . ." Digby 167, 14th century, fols. 60-62, incipit, "Investigantibus chilindri composicionem qui dicitur horologium viatorum sumendum est lignum maxime solidum. . . ." Laud. Misc. 644, early 14th century, fols, 219-221, "Investigantibus nature chilindri compositionem qui dicitur Orologium viatorum . . . / . . . et sic terminatur chilindri compositio. Explicit chilindri compositio." University College 41, 14th century, fols. 35-36: De compositione Cylindri, cum tabulis altitudinem solis exhibentibus in civitate Oxon. London. et Exon. Geneva 80, probably 15th century, Tractatus cylindri seu horologium viatorum. BM Arundel 292, 13th century, fol. 106, "Sumendum est lingnum . . . / . . . per umbram scies altitudinem." CLM 14836, 11th century, fols. 1-3, "Cylindrus," opening, "Componitur quoddam simplex et paruulum viatoribus horologicum instrumentum . . ." and closing, "Horologi huius mensuram consumabo," is said to be a fragment from the *De utilitatibus astrolabii* of Hermannus Contractus. At Padua, in MS Antoniana I, 27, of the 9th or 10th century, a "Horologium viatorum" occurs with the *De computo* of Rabanus and other anonymous astronomical treatises.

See further on the subject Ernst Zinner, "Horologium viatorum," *Isis*, XIV (1930), 385-387.

[35] Vatic. Palat. lat. 1340, fols. 15v-17, "Incipio nunc modum compositionis chilindri bona (*sic*) valde et formaliter secundum modernos Erffordie correcta et exornata."

It gives a figure of an upright cylinder with a conical top terminating in a knob by which it might be turned, with a vertical scale to the right of the cylinder and obliquely curving lines across the face of the cylinder which are to trace the sun's shadow. Apparently these instruments were used to determine the latitude as well as to find the hour and the altitude of the sun, or at least they were adapted to determine the hour in different places and latitudes where a traveler might be.

Dagomari has been credited with a cylinder of this general type which was a sort of astrolabe, calendar, and gnomon combined.[36] But the fourteenth century was already familiar with a much more important invention for telling time, that of clockwork and the mechanical clock. Of it we shall have more to say in our chapter on John de Dondis.

[36] C. C. Scaletti, *Epitome gnomonica, proporzionale costruito da Fabrizio Mordente e la Operatio cilindri di Paolo dell' Abbaco,* Florence, 1031. Bologna, 1702; and, more recently, Giuseppe Boffito, *Il primo compasso*

CHAPTER XIV

PETRARCH AND SOME FRIARS

Hardly any class or group of men in the later middle ages were more given to astrology and even to some other occult arts and sciences than the friars. This is a noteworthy point because they also furnished a majority of the theologians of the period and had a practical monopoly of the office of inquisitor. Yet inquisitors and theologians have hitherto been generally regarded as the bitterest and most inveterate foes of astrology and related arts. Our subsequent pages will offer plenty of further evidence from the later fourteenth and fifteenth century of the interest displayed by members of the religious orders in astrology and the like. In the present chapter we mention a few who were contemporaries of Petrarch, whose own attitude towards occult science will also receive some attention with reconsideration of previous estimates of it.

Only three years after the astrologer, Cecco d'Ascoli, perished at the stake, another Italian who was a Dominican friar completed a work of medical astrology "to the praise and glory of the supreme and ineffable Trinity, the utility and advantage of medical men, and the health of the infirm."[1] In two manuscripts of this work, one of the fourteenth,[2] the other of the fifteenth century,[3] this friar's name is given as Niccolò di Paganica; the date of composition is stated as 1330;[4] and the treatise is dedicated to three wise masters and professors of medicine—Roger of Manfredonia, Nucio of Ascoli, and Raynaldus of Adria.[5] In a third

[1] S. Marco fondo antico 538 (Valentinelli, XIV, 23), 14th century, fols. 12r, col. 2-15r, col. 1: "Explicit tractatus medicinalis astrologie per fratrem Nicolaum de Paganica predicatorum ordinis compilatus ad laudem et gloriam summe et ineffabilis Trinitatis ac utilitatem ac profectum medicorum et sanitatem infirmantium."

[2] Described in the previous note.

[3] Bordeaux 531, 15th century, fols. 57r-69v.

[4] "Compendium medicinalis astrologie a fratre Nicolao de Paganica predicatorum ordinis compilatum M° CCC° XXX°. . . ."

[5] "Magne discretionis et sapientie viris magistris Rogerio de Manfredonia, Nu-

manuscript of the fifteenth century, once in the possession of the abbot Canonicus of Venice but now housed in the Bodleian library at Oxford,[6] the author's name is given as Nicolaus de Aquila;[7] the date of composition is not stated; and the treatise is dedicated to Giovanni del Olegio or da Oleggio of the Visconti family of Milan who is further described as defender of the holy Roman church and marquis of the March.[8] In this third manuscript the work of Niccolò is in company which might have been regarded as questionable, not to say superstitious, from a conservative medieval theological standpoint, since it is preceded by the astrological physiognomy and work on poisons of Peter of Abano—whose name has often been coupled with that of Cecco d'Ascoli, although in reality they were scarcely birds of a feather—and is followed by William of England's astrological *De urina non visa,* a work which was condemned to be burned by the faculty of theology of Paris in 1494, by the elaborate *Summa* of judicial astrology of Guido Bonatti, and by a geomancy. Otherwise the two versions are very much alike. Niccolò did not even trouble to write a fresh dedication but simply altered his plurals to the singular.[9]

Other things being equal, it might seem likely that the work was first dedicated to the marquis, and that, when no satisfactory response was evoked from him, Niccolò descended—or ascended?—to the ranks of the medical profession. Were this true, the

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cio (*Nutio* in Bordeaux 531) de Esculo et Raynaldo de Adria medicinalis scientie profexoribus (*professoribus* in Bordeaux 531) amicis in Christo carissimus frater Nicolaus de Paganica ordinis fratrum predicatorum salutem et ex inspectione celestium creatorem ipsorum feliciter contemplari. Quia miserum nimis esse videtur (or, *est videre?*). . . ."

[6] BL Canon. Misc. 46, folio minori, 15th century, fols. 51r-60v.

[7] "V. Cl. fratris Nicolai de Aquila ordinis predicatorum tractatus in astronomia qui medicinalis scientie compendium nuncupatur." This heading is written entirely in capitals in the manuscript.

[8] "Magne discretionis viro et sapientie domino Io. de olegio de vicecomitibus de mediolano sancte ro. ecclesie defensori marchie marchioni suo domino in christo charissimo humilis et devotus in christo frater Nicolaus de Aquila ordinis predicatorum recommendationem et ex inspectione celestium creatorem feliciter contemplari. Quia miserum nimis est videre. . . ." The first chapter opens: "Totius orbis dispositio sive forma in modum pile. . . ."

[9] "Magne discretionis viro et sapientie domino . . ." in place of "Magne discretionis et sapientie viris magistris . . ." and so on.

original of the version sent to Giovanni da Oleggio would have been composed slightly before 1330. But against this is the fact that Giovanni Visconti da Oleggio flourished later in the century, governing Bologna in the decade 1350-1360, when he surrendered it to cardinal Albornoz and became marquis of Fermo. He died in 1366.[10] The version addressed to the three professors therefore seems to be the original, and possibly Niccolò de Aquila is not the same person as Niccolò di Paganica but a later writer who has tried to pass off the other's work as his own.

Simon de Phares at the close of the fifteenth century in his account of past astrologers introduced the name of Nicholas de Paganica between the dates 1369 and 1372 and made him forecast the horoscope of John the Fearless, the future duke of Burgundy at his birth at Dijon on May 26, 1371, in the afternoon. Simon's chronology, however, is often extremely faulty for the fourteenth century, in which he places several men who really lived during the thirteenth, while others who flourished in the first half of the fourteenth century, like John of Murs and Firminus de Bellavalle, are put in its second half. Also the nativity of John the Fearless is usually dated on May 28, 1371. Simon not only represents Niccolò as engaged in nativities as well as astrological medicine, but further indicates that Niccolò did not limit the influence of the stars to the human body by affirming that no murder or theft could be committed without his detecting the criminals, and that he caught several great poisoners by his reading of the stars. But this may be late and groundless rumor which Simon repeats.[11]

Niccolò's treatise upon astrological medicine includes such themes as the configuration of the universe, the signs and planets, their movements and natural properties, the influences of the celestial spheres and bodies upon inferior creation in general, that of the planets upon the human body in particular, what the

[10] See Chevalier, and T. E. Holland's edition of *De bello* of Giovanni da Legnano, 1917, pp. xii, 213-214.

[11] *Recueil des plus celebres astrologues*, edited by E. Wickersheimer, 1929, pp. 229-230.

twelve houses signify, the conjunctions and aspects of the planets, and the particular branches of judicial astrology known as interrogations and elections.[12]

At the close of the treatise in one manuscript[13] occur three figures which seem intended to illustrate its first chapter. Two have not been completed, but apparently one set of circles is to represent the head and tail of the dragon and the epicycle or retrograde movement of a planet. The other is intended to show the spheres of earth and water with different centers, so that some of the earth's surface will appear above the water as habitable land, while the outer spheres of air and fire are concentric. The eccentricity of the spheres of earth and water does not seem, however, to be stated in the text. Rather Niccolò asserts that the sphere of earth is contiguous to that of water, but that by a divine miracle, to maintain the life of animate beings, a fourth part of the earth is higher than the rest and uncovered by water.[14] The third figure also affords more information than is expressly detailed in Niccolò's chapter on the shape of the earth, although he in a sense implies what it shows. Within a circle representing the earth's surface two zones about the north and south poles are marked as uninhabitable because of the cold. In the upper or northern part of the circle then comes the habitable zone with Europe and Africa to the west and Asia to the east. Next, going south, comes the torrid zone, marked as uninhabitable because of the heat; then a Mediterranean Sea, running east and west and separating the northern from the southern hemisphere, which last is perhaps thought of, as it often was then and certainly seems to be by Niccolò in the text, as entirely covered by water. At any rate, it is designated on the figure as "an uninhabitable zone, unknown to us." Niccolò's geographical knowledge thus does not seem to have profited much by the travels of Marco Polo and others, or by the observations anent the Antipodes of such thirteenth century scientists as Albertus

[12] In Appendix 16 are given the headings of the fifteen chapters.

[13] BL Canon. Misc. 46, where the ascription is to Nicolaus de Aquila.

[14] Canon. Misc. 46, fol. 51r, "quamvis solo divino miraculo ad vitam animatorum tuendam discooperta maneat ipsius terrae sublimis quarta pars."

Magnus and Peter of Abano. He appears to give the earth's circumference as only 2040 *miliaria,* but this may be a slip of the copyist's pen for 20400 miles.

In view of the fact that Petrarch's criticisms both of medical men and of astrologers have been taken rather too seriously by some of his modern expositors and biographers, it is interesting to note that this very work of Niccolò di Paganica on astrological medicine was included in Petrarch's celebrated library and was one of the seventeen manuscripts that were brought to light as remnants of that collection when Tomasini in the early seventeenth century made inquiries at Venice as to what had become of the library bequeathed to that city by the father of humanism.[15]

Another Italian Dominican of the fourteenth century who displayed an interest in astronomy and in astrological medicine was Ugo de Castello, Hugo de Civitate Castellis, or Hugh of Città di Castello. In 1337 he produced a commentary upon the *Sphere* of Sacrobosco,[16] and there is also extant a treatise by him on critical days "according to the astrologers, published at Perugia in 1358 by the venerable man, brother Hugo de Civitate Castellis of the order of preachers and bishop marvelously skilled in astrology."[17] The only bishop with a similar name was Hugues de Châtillon, bishop of Comminges in Gascony from 1335 to 1352. He thus could not have written at Perugia in 1358, but possibly this date should read 1338. Ugo began his commentary on Sacrobosco at Paris in response to the demand of the students, but finished it at Florence in 1337.[18] He therefore might well have been in Perugia in 1338.

[15] Tomasini, *Petrarcha redivivus,* 1635, pp. 85-86: cited by Valentinelli, *Bibl. MSS. ad S. Marci Venetiarum,* I (1868), 6. It is the very MS which we have cited above.

[16] Quetif and Echard, *Scriptores ordinis praedicatorum,* 1719, I, 593b.

[17] Vatic. Barb. 178, membrane, 14th century, fols. 105r-106r: "Incipit tractatus de diebus criticis secundum astrologos editus Perusii anno christi 1358 per venerabilem virum dominum fratrem Hugonem de Civitate Castellis ord. praed. et episcopum mire in astrologia peritum." The text opens: "Sicut dicit commentator . . ." and closes, ". . . et vocatur similitudo." A large circular figure occupies much of fol. 105r; fol. 105v is blank.

[18] Quetif and Echard, *ut supra,* quote from a MS: "Explicit scriptum super libro de sphaera mundi a F. Ugone de

Ugo agrees with the sixtieth Verbum of the *Centiloquium* ascribed to Ptolemy that medical men are often deceived in their knowledge of critical days from experience and signs, and that the astrological method is surer and based on the true cause. In three chapters he sets forth how to find the times of the movement of the moon on indicative and critical days, how to find the place of the moon in the zodiac at these junctures, and why the alterations which occur on those days vary so, being sometimes greater, sometimes less, sometimes alleviating and again aggravating the disease, sometimes leading to safety and sometimes to death.[19]

That astrological medicine at this time was not confined to Italy is demonstrated by a treatise on elections of medicine published at Paris in the year 1344, and preserved in two manuscripts written about the middle of the same century.[20] Perhaps John de Muris was the author.

To the schoolman, Robert Holkot—or Holcoth—who died in 1349, besides the usual works in religion, theology, and scholastic philosophy, are ascribed in Dominican bibliographies works suggesting an interest in astrology as well as astronomy: *De umbra stellarum, De amore stellarum,* and *De natura, de motibus, et de effectibus stellarum.*[21] Such works do not appear to be extant. But there is an alchemical tract ascribed to "Holkot."[22] John of Frankfurt, a writer of the next century, cited Holkot several times in support of the usual theological conten-

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Castello ordinis FF. Praedicatorum editum, inchoatum Parisius ad postulationem studentium, sed perfectum Florentiae anno Domini MCCCXXXVII."

[19] Ugo's introduction and table of contents occur on fol. 105r of Vatic. Barb. 178, before the illustrative figure mentioned in a previous note; the text of the three chapters does not quite fill up fol. 106r.

[20] Erfurt, Amplon.Q.386, beginning of second half of 14th century, fols. 19v-20v: "Explicit liber de electionibus medicine Parisius a. 1344 editus." Amplon.Q.371, 1337 A.D. and middle of the 14th century, fols. 43v-44v: De electionibus faciendis, with the same incipit, "Quoniam electiones laudabiles." Also apparently in Amplon.Q.360 with the *Patefit* of John de Muris. Also in BM Royal 12.C.XVII, early 14th century, fol. 212v, which would seem to put it earlier than 1344.

[21] Altamura (1677), pp. 122-123.

[22] DWS No. 300.

tion that demons cannot be coerced by men by means of words, characters, or natural substances.[23]

In a manuscript of the fourteenth century at Paris is a brief *Summa de astrologia* by a Franciscan friar named John.[24] A cursory examination of its text failed to discover any further information as to his identity, date, or provenance. He may have lived and written before the fourteenth century,[25] but at least is an example of the readiness of members of the Franciscan order to write on astronomy and astrology. The work treats of the correspondence between Hebrew, Arabic, and other years, of the disposition and movements of the celestial orbs, of finding the location of the planets and of their effects and influence,[26] including nativities.[27]

If we turn to the Augustinian order, we have the example of Dionysius de Rubertis de Burgo Sancti Sepulchri who died in 1339. He was called by Petrarch a remarkable seer and noble astronomer (*egregium vatem et nobilem astronomum*), and he was summoned to Naples by king Robert on account of his astrological predictions. He also wrote commentaries on Valerius Maximus, Vergil, Ovid's *Metamorphoses,* Seneca's tragedies, Aristotle's *Poetics, Rhetoric,* and *Politics,* and the *Epistle to the Romans.* A fellow Augustinian says of him in a chronicle of the counts of Oldenburg[28] that he gave pleasure and profit to ad-

[23] Hansen, *Quellen* (1901), pp. 71-82.

[24] BN 7293A, fols. 48r-69r: "In nomine domini amen. In hoc tractatu brevi et utili . . . / . . . Quare autem aliqui astrologi distingere docent 28 domos lune et capiti drachonis et caude assignent influentias que vero sunt nisi puncta ymaginabilia nichil habentia probabilitatis. Explicit summa astrologie edita per fratrum Iohannem de ordine Minorum."

[25] In *Magic and Experimental Science,* II, 96, I suggested the faint possibility that he might be Roger Bacon's lad John following in his master's footsteps, both as to becoming a Franciscan and interested in astrology.

[26] The author outlines briefly as follows the three parts into which his work is divided: ". . . primo de concordia et adequatione annorum videlicet et ebreorum et arabum et aliorum. Secundum de dispositione et motibus orbium celestium. Tertio de inventione et adequatione planetarum et locorum suorum et in eodem de effectu et influentia eorum." Each part contains a number of chapters. The second book begins at fol. 52r; the third, at fol. 61v.

[27] BN 7293A, fol. 66v, "Nunc vero agendus de constellationibus nativitatum et fatorum."

[28] H. Meibomius, *Rerum Germanicarum,* Helmstadt, 1688, II, 164.

miring populaces by his reduction of the fables contained in the poets to their tropological sense. Petrarch addressed poems to him, urged him to come to Vaucluse, and mourned his death.[29]

Such details suggest again that the supposed contempt of Petrarch for astrologers and astrology has been somewhat exaggerated by over-enthusiastic advocates of an Italian Renaissance. He might write to Boccaccio on the nonsense of astrologers[30] just as he wrote to him on the audacity and pomp of physicians.[31] He might assure Francesco Bruno that astrologers tell many lies,[32] and he might compose four books of invective against one of the papal physicians.[33] But he numbered among his esteemed correspondents such prominent medical men of the century as Tommaso del Garbo of Florence and John de Dondis of Padua. And his jibes at the medical profession of his day would have more force, had he not expressed such untenable propositions as that fevers are not an affair of the body but of the soul, or accepted such current notions as that contraries are cured by contraries.[34] Similarly his jibes at the astrologers would have more force, had he not displayed considerable anxiety concerning his own safe passage of the grand climacteric, i.e., his sixty-third year;[35] had he not, in writing to Livy, lamented the evil star that gave him birth in the fourteenth century instead of during the heroic days of the ancient Roman republic;[36] or had he not dwelt in a letter to the emperor Charles IV upon the skill of the astrologer who had predicted that he would win the favor of the great rulers of his time.[37] He might agree in

[29] See the notice concerning him given by Mittarelli (1779), in connection with his *Praefatio et commentarius in Valerium Maximum*, formerly MS S. Michael de Muriano Venet. 73, 14th century.

[30] *Ep. senil.*, III, 1. Pio Rajna, *Giornale storico d. lett. ital.*, X (1887), 101 *et seq.*, identified Maino de' Maineri with the learned astrologer at the Visconti court who was Petrarch's friend and elder and who excused himself for some at least of his predictions on the ground of financial necessity—an argument against judicial astrology which we find further developed by later writers like Leonicenus and Hobbes.

[31] *Ep. senil.*, V, 4.

[32] *Ibid.*, I, 6.

[33] *Invectivarum contra medicum quendam libri IV.*

[34] *Ep. fam.*, VII, 17.

[35] *Ep. senil.*, VIII, 8.

[36] *Ep. fam.*, XXIV, 8, "et non cum his extremis furibus, inter quos adverso sidere natus sum, mihi videar aetatem agere."

[37] *Fam.* XXIII, 2. It is strange that James

general with Cicero in *De divinatione* in rejecting augury, *aruspices,* and divination from dreams,[38] and even account for two dreams of his own—one of which recorded a distant death at the exact time, while the other saved a sick friend from burial alive—as mere coincidences.[39] When arguing against Joy and Hope, he might display commendable scepticism as to the powers ascribed to gems;[40] or declare alchemy ruinous alike to health and wealth, eyesight and peace of mind.[41] But when about to be crowned poet laureate by king Robert of Naples, he could extol the laurel "for its magic virtues in causing its wearer to dream true dreams and in protecting him from lightning."[42] Thus his attitude seems to have varied with mood, circumstance, and the person addressed. We may, however, note one more passage in which he censures medical men for "reading everything—Aristotle, Cicero, Seneca, Virgil"; and for devoting too much time to dialectic, rhetoric, poetry, astrology, "and what is worse, alchemy," while they neglect medicine proper.[43]

Thus Petrarch seems to have been more hostile to alchemy than to either medicine or astrology, while he is an early witness to a condition of which we shall encounter more evidence as we proceed, namely, the association of alchemy, as well as astrology, with medicine. But by an irony of fate he was, according to his own statement, accused of magic already during his lifetime. "I myself," he writes to Francesco Nelli about 1352, "than whom

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Harvey Robinson, *Petrarch* (1898), p. 126, should note this passage without observing its inconsistency with the general assertion at p. 42, "The astrologers, so highly esteemed in his day, seemed to him mere charlatans." Yet at p. 126 he says: "This was, as Petrarch complacently points out in a letter to the emperor Charles, but another proof of the skill of the astrologer who had long before predicted that he would be upon terms of intimacy with almost all the great princes of his age."

[38] *Rerum memorand.,* IV, 4, 6, 7.

[39] *Ep. fam.,* V, 7.

[40] *De remediis utriusque fortunae,* I, 37, "De gemmis et margaritis."

[41] *Ibid.,* I, 111. E. v. Lippmann has discussed the passage further in "Petrarca über die Alchemie," *Archiv f. Gesch. d. Naturwiss. u. Technik,* VI (1915), 236-240.

[42] Robinson, *Petrarch,* p. 106.

[43] *Ep. senil.,* XIV, 16: "Qui cum medici dicantur et sint homines literati legunt omnia, Aristotelem, Tullium, Senecam, Virgilium, quin et dialecticae inhiant et rhetoricae et poeticae et astrologiae quodque est peius alchimiae, solam negligunt medicinam. . . ."

no one has ever been more hostile to divination and magic"—it will be noted that he does not say, to astrology and medicine—"have occasionally been pronounced a magician . . . on account of my fondness for Virgil."[44] In another letter, when finally offered a secretaryship by Innocent VI, Petrarch alludes to the fact that at the opening of his pontificate that pope suspected and accused him of magic, and long persisted in this belief.[45] Indeed, already as a cardinal he had believed another member of the sacred college who told him that Petrarch was a magician because he read Virgil. When he became pope, this ceased to be a joke, and Petrarch absented himself from the Curia "lest," as he sarcastically remarks, "my magic do harm to him or his credulity to me."[46]

If Petrarch was accused of magical practices during his lifetime, he was to be credited with astrological predictions after his death. Simon de Phares at the close of the fifteenth century affirmed that Petrarch was so imbued with the science of the stars that he predicted the earthquake in Tuscany and the death of great men in Flanders, France, and Italy.[47] So much for Petrarch's attitude.

From another Augustinian friar, named Augustine of Trent, we have an astrological treatise written in 1340, the year following the death of Dionysius. But it possesses a further characteristic as a pest tractate composed before the Black Death which entitles it to treatment in a separate chapter. Meanwhile it may be observed that members of the friar orders continued their attention to judicial astrology after the Black Death as before.

[44] *Ep. fam.*, XIII, 6: translated by Robinson, *Petrarch*, p. 347.

[45] *Ep. sen.*, I, 3 (in ed. of *Opera*, Basel, 1581; I, 4 in G. Fracassetti, *Lettere senili*, Florence, 1892): "Nam quis quaeso non stupeat simulque non gaudeat si amicus sit vicario Iesu Christi qui me magicum non tantum suspicari sed affirmare soleat. Opinionem hanc de me falso conceptam semperque hactenus contra tuum eloquium ac multorum illam extirpare volentium pertinaciter defensam nunc repente non modo deposuisse sed opinione alia permutasse. . . ."

[46] *Idem.*, "Proinde per id tempus quo ille conscenderat nescio an umquam reversurus inde abiens dum tu me valedicturum ipso etiam volente ducere voluisses abnui ne aut illi mea magica aut mihi molesta credulitas sua esset."

[47] *Recueil des plus celebres astrologues*, ed. E. Wickersheimer, Paris, 1929, p. 204.

In 1359 John de Stendal, of the Dominican convent at Magdeburg, "at the instance of the reverend masters and students of Erfurt," where he himself was "censor," commented, as Cecco d'Ascoli had done, upon the Arabian astrologer Alchabitius.[48] The blessed Thomasucius e Valla Macinaria, of the Third Order of St. Francis, who died in 1377, is said by Iacobilli[49] to have made metrical predictions of the ruin of many Italian cities and of the tribulation of the church before the event which were afterwards fulfilled. Whether he did this before or after the Black Death, and whether by divine prophetic inspiration or astrology or some other mode of divination, Iacobilli does not state, but one is reminded of the predictions of the fate of Italian cities ascribed to Michael Scot in the previous century. Of the prophecies of the Franciscan friar, John of Rupescissa, in the middle of the fourteenth century we shall have something to say in a later chapter devoted to him and his alchemical works.

Alchemical treatises are indeed, often ascribed to friars. For example, in a fourteenth century manuscript is one attributed to brother Osbert de Publeto, while fifteenth century manuscripts present others by brother John of Apulia, brother Philip of the order of preachers, and Paul of Taranto, reader of the friars minor in Assisi.[50] At the close of another anonymous alchemical treatise the owner informs us that he obtained it from a Minorite of Sicily.[51]

[48] Cues 212, 1416-1430 A.D., fols. 170-204: "Explicit scriptum super Alkabicium compilatum per fratrem Johannem de stendal ordinis predicatorum domus magdeburgensis ad instanciam reverendorum magistrorum et studentium Ertfordum se existentem censorem Ertfordum anno domini 1359." See Rashdall (1895), II, 243, for the claim of Erfurt to be considered a university at this time.

[49] *Bibliotheca Umbriae,* Foligno, 1658, p. 261.

[50] DWS Nos. 333, 279, 335A, 338.

[51] Wolfenbüttel 3586, 15th century, fols. 11-44: "Hic finit liber de vera arte alkimie quem habui a fratre . . . de Cicilia ordinis minorum."

CHAPTER XV

AUGUSTINE OF TRENT; A PEST TRACTATE BEFORE THE BLACK DEATH[1]

Augustine of Trent, in addition to being a member of the order of friars Eremites of St. Augustine, was a lecturer at the university of Perugia and chaplain to Nicholas Abrein from Brünn in Moravia, who was bishop of Trent from 1336 to 1347. To this prelate, on July 12, 1340, Augustine directed from Perugia an astrological and medical work discussing especially the sixth house of the figure for that year, "which sixth house is called that of infirmities according to the astrologers." Augustine's treatment is of especial interest because he deals with "the pestilence of infirmities" which occurred in 1340. Both in his astrological explanation of these diseases and his instructions how to guard against them he seems a precursor of the pest tractates which were presently to be called forth in such numbers by the great mortality of 1348 and its many subsequent recurrences. His treatise deals with both past and future, interpreting astrologically what has already occurred in 1340, and making predictions for the remainder of the year. Yet his work is to be distinguished from those almanacs, ephemerides, *tacuina*, and other predictions for particular years based on the astrological doctrine of revolutions which became so common during the later middle ages. Augustine aims not merely to treat of the particular year, 1340, but to set forth general rules which will be useful to medical men and to mankind at large in other years. This was a prophetic instinct on his part, for before a decade had passed the great pestilence of 1348 was to call forth regimens of health similar to his in increasing numbers.

Two manuscripts of Augustine's work are at present known to

[1] The first three paragraphs of this chapter and their accompanying footnotes have previously appeared in *Sudhoffs Archiv*, XXIII (1030), 346-348; the remainder of the chapter is now published for the first time.

me. Both were once the property of Hartman Schedel (1440-1514) who seems to have brought them to Germany where they are now to be found in the library at Munich, where one of them is incorrectly catalogued as a geomancy.[2] Actually they contain the same work, except that the text of CLM 276 leaves off in the second column of folio 91 recto at the end of the *Quintum principale* without giving a promised *figura celi,* whereas CLM 647, which reaches this same point at the bottom of folio 18 recto, continues with astrological figures and accompanying text to folio 20 verso. This second manuscript is a copy in Schedel's own neat handwriting.

The dates of the bishop to whom the work is addressed show that the year 1340, although specified only in Schedel's later copy, cannot be a mistake of a copyist for 1349. This is further rendered out of the question by the fact that the years 1338 and 1339 are distinctly mentioned as preceding the year under consideration. Augustine disagrees with those who had ascribed the prevalent diseases to heavy rains, for the reason that almost continuous rain fell in 1338 and 1339, yet there was no pest of sicknesses as there was in 1340.[3] Moreover, the date 1340 is

[2] CLM 276, 14th century, fols. 87r-91r, double-columns; CLM 647, written about 1477, fols. 1r-20v. The following descriptions are from the *Catalogus codicum manuscriptorum Bibliothecae regiae Monacensis,* Vol. III, pt. 1, 2nd edition, Munich, 1892, pp. 70 and 168.

"276 (fols. 69-74, membr.) 2° miscell. s. XIV, 161 fol. Liber H. Schedelii . . . f. 87 Augustinus de Tridento lector Perusii ord. her. opusculum geomant. de sexta domo. f. 91b Remedia geomantica et alia. . . ." This second item, which has no connection with the preceding work, might better be described as miscellaneous charms and recipes. It contains a few characters but not those of geomancy.

"647. 8°. s. XV. 162 fol. scripsit H. Schedel. Fol. 1 Augustini de Tridento, lectoris Perusii, ord. fr. herem. epistola astrologica ad Nicolaum episc. Tridentinum de anno 1340. f. 23 Johannis de Glogovia accidentia stellarum a. 1476." Really the work of John of Glogau seems to begin at fol. 21r, which is blank except for the heading, "Iudicium anni 1476."

[3] CLM 647, fol. 19v: "Anno domini 1340 die 24 mensis februarii fuit coniunctio solis et lune ante meridiem hora quarta minutis 10.

Per istam figuram et specialiter per 12am domum et coniunctionem factam in ipsa fuit permutatio temporis in vere. Unde quidem (*sic*) medici in variis regionibus et specialiter Perusii iudicaverunt infirmitates istius anni accidisse ex pluvia illa, quod manifeste est falsum. Tum quia in M° CCC° 38 et 39 fuerunt pluvie quasi continue, et tamen non fuit pestis egritudinum ut in isto anno. Tum quia si pluvie fuissent cause, accidissent in regionibus egritudines

mentioned in two connections, as the year of a conjunction of sun and moon on February 24th,[4] and again in an astrological figure where it is written twice in different ways.[5]

Augustine begins with a few general astrological observations and then states his particular theme and purpose. He has been moved to write especially by the ignorance which exists among medical men as to the prevailing epidemic.

For in this pestilence of infirmities physicians of Florence, Perugia, Rome, and other parts of Italy, as was written to me, prescribed one medicine for all humors, not knowing the roots of the infirmities. And this pestiferous error happened to many physicians because of their ignorance of astronomy.[6]

Augustine divides his treatise into six principal parts, of which the first has nine subdivisions. First he shows that the sicknesses of the year 1340 were and will be by reason of an evil constellation—of Mars and the sixth house. Second, he shows of what nature the sicknesses were and will be in that year. Third, he explains whence appear the particular diseases, whether mixed or simple. Fourth, he states what provision to take against these. Fifth, he determines astrologically what persons are susceptible to the diseases of this year. Sixth, he determines what parts of the body will be affected. Seventh, he states how the diseases will terminate, whether for good or ill, and how one should prognosticate. Eighth, he determines astrologically what regions

quando fuerunt pluvie et equaliter, quod est falsum. Tum etiam infirmitates istius anni deberent procedere ut plurimum ex frigiditate et humiditate, quod manifeste est falsum. Ymo sunt ex humoribus calidis et adustis ut experientia docet. Ideo est dicendum quod infirmitates istius anni procedunt ex mala constellatione planetarum regnantium, ut declaravi in primo principali. Et sunt in aliquibus regionibus citius, in aliquibus tardius, infirmitates secundum directionem martis in ascendentibus regionum, ut patet in Florentia."

[4] For the Latin see the first lines of the preceding footnote.

[5] CLM 647, fol. 10r: ". . . istius anni 1340" and ". . . Anno domini M° CCC° 40."

[6] *Ibid.*, fol. 1v: "Determinavi infrascripta in universitate Perusii propter ignorantiam infirmitatis. Nam in ista pestilencia infirmitatum medici Florencie Perusii Rome atque in ceteris regionibus Ytalie tribuebant unam medicinam omnibus humoribus ut scriptum fuit mihi ignorantes radices infirmitatum. Et accidit error iste pestiferus multis medicis propter ignorantiam astronomie."

will be especially affected. These include Florence, Arezzo, Siena, and divers cities of Tuscany and Lombardy. Diseases will abound in Perugia, "but when Mars has reached the ascendent of the city of the Perugians, then there will be coruscation of bodies in an intenser way."[7] Ninth, he takes up the question of the ascendent of the city of Trent in particular in order to determine its relation to the epidemic, but arrives at no very definite conclusion, leaving the matter to those skilled physicians and astrologers, masters Odoric and Jordan. In this connection he states that he was born in Brescia[8] but that he has not been able to discover the date of its foundation or the ascendent at that time.

The influence of the planet Mars and the appearance of two comets are regarded by Augustine as evil astrological influences for 1340, but he also explains the prevalence of disease by the failure of crops and great famine in all Tuscany and Apulia and various sections of Italy.[9] He disagrees with certain medical men, of Perugia especially, who ascribed the diseases to heavy rains, since almost continuous rain prevailed in 1338 and 1339, yet there was no pest of sicknesses as in 1340.[10] Since the planet Saturn is lord of the year, the general character of the diseases is Saturnine, Martial, and mixed. Referring the bishop to the work of the pseudo-Hippocrates on the influence of the moon in the twelve signs[11] for the source of particular diseases, Augustine goes on to recommend hot and moist medicines for the Saturnine diseases, cold and moist remedies for the Martial complaints. Old people will be more subject to the Saturnine ailments; the young, to the Martial.[12] Young people should also be particularly careful because of the comet found in the sign Leo. The influence

[7] "In civitate Perusii vigent infirmitates maxime modo: sed cum pervenerit Mars ad ascendens civitatis Perusinorum tunc forte fiet coruscatio corporum intensiori modo etc": CLM 647, fol. 8r; CLM 276, fol. 88v, col. 2.

[8] CLM 647, fol. 8v; CLM 276, fol. 88v, col. 2.

[9] CLM 647, fols. 2v-3r; CLM 276, fol. 87r, col. 2.

[10] But this discussion occurs later in the treatise (CLM 647, fol. 19v) in another section and connection. See note 3.

[11] He says of it among other things, "Fuit Ypocras magnus astrologus in illo libello": CLM 647, fol. 4r; CLM 276, fol. 87v, col. 1.

[12] CLM 647, fol. 5r; CLM 276, fol. 87v, col. 2.

of Mars will cause the diseases to affect the head especially, while the sixth house rules the head and the neck. According to Ptolemy in the *Introduction* to his son Ariston, third chapter, the root of the ailments is in the liver, but the Saturnine diseases are to be traced rather to the spleen. This suggests a moot point of uroscopy. When the patient's urine is epatic in the night and splenetic in the morning, on which condition is prognostication to be based? Augustine after some discussion leaves the problem to the decision of "the reverend masters of medicine, Odoric and Jordanus, who are experienced in astronomy and in medicine."[13] To predict the outcome of the disease in an individual there may be adopted either of three astrological procedures: from the ascendent of the person's nativity, by astrological interrogation, which method is conjectural according to Haly but is not disapproved by our author, and by the pseudo-Hippocratic method of observing the moon in the signs.

Even the medical method of telling whether a person is alive or dead sometimes fails, which leads Augustine into some remarks on burial alive.[14] As evidence for this he asserts that frequently when corpses are exhumed the limbs are found in a different position from that in which the body was buried. Or the shroud is found torn, although the stone of the sepulcher has not been moved. Physicians say that such persons were buried in a state of suspended animation from apoplexy or epilepsy and recovered their senses underground and tried to get out. Astrologers, however, ascribe such effects to the influence of the planets.[15] Others say that demons have entered such dead bodies and moved them.

In the second principal part of his work Augustine gives twelve instructions to avoid disease when such constellations prevail as in 1340, or indeed at any time.[16] These instructions

[13] CLM 647, fol. 6r; CLM 276, fol. 88r, col. 1: ". . . reverendis medicis magistris Odorico et Iordano qui experti sunt in astronomia et in medicina." At fol. 8v, as above noted, another point is left to them to decide.

[14] CLM 647, fol. 7r-v; CLM 276, fol. 88r, col. 2-fol. 88v, col. 1.

[15] "Astrologi autem ducunt tales effectus in expansionem planetarum." Perhaps the meaning is that the planets have caused the corpse to expand or move.

[16] CLM 647, fols. 8v-9r; CLM 276, fol. 88v, col. 2-fol. 89r, col. 1: "Sequitur

are to abstain from fruit, from raw vegetables like lettuce especially if they are under the domination of the planet Saturn, from irregular movement; to keep the windows closed against winds bringing corrupt vapors, to shun infected and fetid places, to avoid debauchery and baths—or at least not to take them until one's food is digested and to be careful not to remain in the bath long; to beware of eating too much or too varied a menu or unusual dishes; not to drink late or in the daytime; not to sleep at midday; not to breakfast too late or sup too soon, especially in summer and autumn; to eat no leguminous plants and especially not beans; finally to keep away from all regions which are under the rule of the planet Mars. This section of Augustine's work seems so important as a precursor of the pest tractates which were multiplied after the Black Death that I gave the full Latin text in an appendix.

In the third part[17] Augustine turns to diet more particularly, giving the headings of six chapters on what quadrupeds, internal parts of animals, birds, and fish may be eaten, and how mutton and cheese are to be taken. He has compiled these from various authors ancient and modern, arranging the properties of the said eatables by degrees, but he omits the six chapters for the present lest his letter be too prolix and out of respect for masters Odoric and Jordanus whose books treat of such matters sufficiently.

The fourth part[18] has four chapters dealing with phlebotomy, astrological instructions for potions and purging, constipating medicaments, snuffs, gargles and the like, Augustine speaks of bleeding from personal experience: "experientiam vidi oculis meis."

The fifth part[19] determines the lord of the year. The first lord will be Saturn, the second Jupiter, the third Mercury, the fourth,

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Secundum principale Ubi declaratur qualiter persone sane se habeant custodire in isto anno et in aliis annis quando similis constellatio regnaret. Regule istius secundi principalis sunt utiles omni tempore et sunt perpetue. Continet inquit istud principale 12 conclusiones principales."

[17] CLM 647, fol. 14r-v; CLM 276, fol. 90r, col. 2.

[18] It begins at CLM 647, fol. 14v; CLM 276, fol. 90v, col. 1.

[19] It begins at CLM 647, fol. 17r; CLM 276, fol. 91r, col. 1: "Sequitur quintum principale in quo declaratur dominus anni istius. . . ."

Mars. Augustine gives an astrological diagram as a basis for universal judgments for 1340, which is presumably the *figura celi* referred to at the close of the fifth part.[20] Augustine seems to say that he composed this part of his work in February. He leaves particular judgments to the aforesaid Odoric and Jordanus and other physicians. He gives another diagram of a conjunction of sun and moon for February 24th and further treats of a conjunction of the planets in the twelfth house. He then closes, asserting that freedom of the will has been in no way violated by any of his statements from beginning to end.[21] Presumably some of this closing material forms the sixth and last part, but it is not so marked. Its attribution of the diseases of 1340 to hot and burning humors suggests the thought that they may have been precursors of the great mortality or Black Death of 1348.

It is interesting to note to what extent Arabic astrologers are cited by this Augustinian friar. He draws neither racial nor religious lines in selecting his authorities, stating in one place that a certain astrological method is followed by the Arabs, Persians, Babylonians, Indians, Chaldeans, Egyptians, Hebrews, Greeks, and indeed Latins.[22] We may leave out of account his purely medical citations of Hippocrates, Galen, Dioscorides, Avicenna, a work *De regimine sanitatis,* whose author's name he does not know,[23] and Serapion on medicinal simples.[24] An occasional reference to Aristotle, whose *Metaphysics, Logic,* and *Physics* are utilized, was to be expected. But in astrological mat-

[20] CLM 276, fol. 91r, col. 2; CLM 647, fol. 18r: "Quantum ad tercium et (ad) quartum dic ut scribitur in figura celi. Et hoc de quinto principali." Here the treatise ends in CLM 276. The two astrological diagrams which follow in CLM 647 occur at fols. 19r and 20r with accompanying text at 18v, 19v, and 20v which also is not in CLM 276.

[21] CLM 647, fol. 20v; "Ex istis omnibus prelibatis a principio usque ad finem nullus sane mentis concludet quod liberum arbitrium sortiatur constellationibus ut putaverunt priscianisti (meaning the followers of Priscillian, not Priscian), sed magis concludunt oppositum cum principe astrologorum ptolomeo dicente, Sapiens dominatur astris, Unde inquit ptolomeus in centiloquio propositione 10, Anima sapiens ita adiuvabit opus stellarum quemadmodum bonus seminator fortitudines naturales. Datum perusii die 12 mensis Iulii. Finis."

[22] CLM 647, fol. 6v; CLM 276, fol. 88r, col. 2.

[23] The title was too common in the middle ages to make a guess as to the author profitable.

[24] In three passages he cites its 32nd, 94th, and 233rd chapters.

ters Ptolemy is the only ancient author used aside from such spurious works as the *Secret of Secrets* ascribed to Aristotle, Hermes' *Book of the Stars,* and above all the Pseudo-Hippocrates on the influence of the moon in the signs. On the other hand, Albumasar is cited five times, and four different works by him are specified; Alcabitius is cited thrice for as many works; Alkindi and Messahala, twice each; while Abohali, Aomar, Almansor, Accabarus, and Achait are mentioned each once. The Arabic astrologer most frequently cited is Haly, at least a dozen times, including his commentary on Ptolemy's *Quadripartitum* thrice, his book on great judgments thrice, and his treatise on elections twice. It is true that these Arabic and Moslem astrologers are primarily used for astrological medicine rather than more voluntary phases of human life, but our friar uses them also for interrogations and elections.

In one passage, however, a warning note is sounded as to the use by Christians of such books of judicial astrology, but it comes in rather inconsistently and does not have a very sincere ring. After cautioning all those who have Mars in their nativities in the sixth house that they are in peril of disease and death, and advising the reading on the subject of the books of judgments and of nativities, especially the great book of Haly and the books of Aomar and Abohali, "in which books are given the causes why one person is hanged and another decapitated, why one is drowned and another dies in his bed," after this apparent concession to an extreme type of judicial astrology, our author suddenly changes his tone and says: "Remove at this point, good Christian, your mind from the books of judgments of these philosophers and astrologers, because such diversity of death more likely happens because of the sins of men or the gleaming forth of divine justice, as blessed Augustine seems to hold. Believe not, therefore, that such effects come from the constellation, since they can be impeded from the side of matter. It may be that this is difficult, nevertheless it is not impossible, because, as Ptolemy says, the wise man rules the stars."[25]

[25] CLM 647, fol. 13v; CLM 276, fol. 90r, cols. 1-2: "Remove hic, bone christiane, intellectum tuum a libris iudiciorum ipsorum philosophorum et astrologorum,

The effect of this little homily is immediately spoiled by our author's advising medical men to give their attention to what Haly says in the book of great judgments, fifth part, twelfth chapter, and to what Almansor says in the twenty-third chapter of his treatise on nativities: namely, that whoever has Mars and Venus in the sixth house in his nativity will be a wise physician.[26] "Furthermore under Mars according to the astrologers are found warriors, leaders, medical men, etc. So let them look after themselves and others."[27]

Our friar's citations of recent Latin astrological writers are also noteworthy. The Alfonsine Tables are twice mentioned. John of Seville of the twelfth century is cited; a king Robert, possibly the contemporary ruler of Naples, is named as authority for the region about Trent being under the sign Gemini. Even Guido Bonatti's treatise on revolutions is used, despite his attacks on theologians and the Dominican, John of Vicenza. Another thirteenth century astrologer to be quoted is Michael Scot, who is described as "that great astrologer and physician, . . . in his editions to the emperor Frederick."[28]

This pestilence of 1340 was noted by Giovanni Villani in his history of Florence and was connected by him especially with a comet which appeared at the end of March in the sign Virgo and the beginning of Libra. Hardly anyone in Florence who was taken ill escaped; someone died in almost every family; over fifteen thousand corpses or one-sixth of the population were buried.[29]

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quia talis diversitas mortis magis provenit forte propter peccata hominum vel propter relucentiam iustitie divine, ut videtur innuere beatus Augustinus. Noli ergo credere tales effectus procedere ex constellatione, quia talia possint impediri ex parte materie. Et licet hoc sit difficile, non tamen est impossibile, quia sapiens dominatur astris secundum Ptolomeum."

[26] The passage immediately follows that in the preceding note: "Attendant hic medici dicta (dictis) circa istud capitulum quid dicant Haly commentator et Almansor in suis libris. . . ."

[27] CLM 647, fol. 141r; CLM 276, fol. 00r, col. 2: "Ulterius sub Marte secundum astrologos continentur milites duces medici etc. Provideant ergo sibi et aliis."

[28] CLM 647, fol. 101r-v; CLM 276, fol. 80r, col. 2: "conformans me in parte dicto illius magni astrologi et medici Michaelis Scoti. Unde inquit Michael Scotus in editionibus suis ad Fridericum imperatorem dicit: 'O imperator si vivere vis sanus, sit tibi semel in die . . .", and, "Michael Scotus magnus medicus et astrologus."

[29] *Istorie fiorentine*, Milan, 1803, XI, 113.

CHAPTER XVI

GENTILE DA FOLIGNO AND FOURTEENTH CENTURY MEDICINE

Niccolò di Paganica and Augustine of Trent were less outstanding representatives of the medical profession in the first half of the fourteenth century after the deaths of Peter of Abano and Arnald of Villanova, than some others whom we might select. Nor do we wish to restrict our choice of physicians to members of the friar orders and to persons who might seem primarily astrologers. The present chapter will therefore be devoted to one of the best known names in the period immediately following the death of the great Conciliator and ending with the Black Death. We shall consider Gentile da Foligno, sometimes known as Speculator,[1] and his science or superstition. Dino del Garbo of Florence possibly had an equal reputation among contemporaries and was cited about as often by posterity. But such of his works as are accessible are mere commentaries upon previous medical authorities and make dry and featureless reading. Dino, whose reputation was perhaps more the result of a successful medical practice, will therefore be passed over here without further remark. Before turning, however, to some specimens of Gentile's thought and writing, we may briefly notice another physician of the time.

Matthaeus Silvaticus was author of the *Liber pandectarum medicinae,* of which there were many early editions. It is variously stated to have been completed in 1317 or presented to king Robert of Naples in 1337. He is said by Simon de Phares[2] to have also composed an astrological treatise dealing with particular judgments, but of such a work there seems to be no further

[1] Placido Lugano, "Gentilis Fulginas Speculator," *Bollettino della regia deputazione di storia patria per l'Umbria,* XIV (1909), 195-260, of which pp. 216-260 are devoted to "Appendice: Edizioni delle opere di Gentile da Foligno."

[2] *Recueil,* ed. E. Wickersheimer (1929), p. 215.

trace. Still less likely is it that Silvaticus by astrology predicted the supposed poisoning of wells by Jews or lepers about the time of the Black Death. Indeed, recent research has demonstrated that just as the Flagellants preceded rather than followed the outbreak of the great pestilence, so the massacres of Jews and charges against lepers of poisoning wells preceded both these other events. In fact, in France such accusations and persecutions of Jews and lepers date back to 1321.[3] According to Simon de Phares this poisoning of drinking water by lepers and Jews was predicted from the stars by archbishop André de Laubespin who likewise foretold the change in succession from the direct Capetian line to the house of Valois, an earthquake in Guienne, and a depreciation in the value of money.[4] Gentile da Foligno also is claimed by Simon de Phares as a "parfait astrologien" who had written on the sixth house as well as on the pest.[5]

Gentile was a hard worker and a voluminous writer[6] and we shall touch on only a few specimens of his works. At the close of his treatise on fevers which takes the form of a commentary on the first Fen of the fourth book of the *Canon* of Avicenna, Gentile records his activities during the year 1345.[7] In September

[3] See Robert Hoeniger, *Der Schwarze Tod in Deutschland*, Berlin, 1882; Henri Chrétien, *Le prétendu complot des Juifs et des lépreux en 1321*, Châteauroux, 1887; J. N. Vidal, "La poursuite des lépreux," in *Mélanges de litt. et d'hist. relig.*, Montpellier, I (1899), 483-518; E. Wickersheimer, *Les accusations d'empoisonnement portées pendant la première moitié du XIVe siècle contre les lépreux et les Juifs; communication faite au quatrième Congrès International d'histoire de la médecine* (Bruxelles, avril 1923), printed, Antwerp, 1927, 8 pp.

In a certain sense these events were the sequel of a pest, however. Thus Dufour writes of Cahors: "En 1316 c'était la peste et la famine;—en 1320, les Pastoureaux (who massacred the Jews);—en 1321, le sanglant épisode des Lépreux . . ."; Emile Dufour, *La commune de Cahors au moyen-âge*, Cahors, 1846, p. 84.

[4] *Recueil*, ed. E. Wickersheimer (1929), pp. 205-206.

[5] *Recueil* (1929), p. 213.

[6] His writings—commentaries on Avicenna, *Consilia*, and questions—are well represented in medical MSS at the Vatican: see Vatic. 2418, 2474 to 2482 inclusive, and 4455-4459 inclusive.

[7] The passage occurs in the first column of the recto side of the last written folio of Naples VIII.D.42, a double columned paper folio volume with unnumbered leaves, written in 1477, as the following colophon later in the same column informs us: "Ego Macleus Murinus artium studens hunc librum dey auxilio scripsi die XVIII° mensis aprelis (*sic*) X° indictionis sub anno domini

of that year he completed the commentary just mentioned which was the outcome of academic lectures. But his lecture courses in medicine that year had covered far more ground than this. He had lectured on the entire fourth and second books of the *Canon,* the book *De accidenti et morbo,* and Hippocrates' Prognostics with the commentary—presumably that of Galen. He also had written on the *De accidenti* and had composed "an arduous and prolix discussion of degrees," another on tastes or sauces,[8] and a third on mixing medicines. And he began to compose his *Sermo de silva.* He thanks God for having given him the fortitude to accomplish all this in the midst of many worldly adversities. Gentile's opening words in this work on fevers make it evident that he had already composed commentaries on some other parts of the *Canon,* for he begs to be excused from the remarks customary at the beginning of volumes on the ground that they have already been made in connection with his commentary on the beginning of the first book of the *Canon,* and because he prefers to devote himself to what is essential rather than to puerilities.[9] One feature of Gentile's work is the setting forth of the varying

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et salvatoris 1477." Murinus wrote in a very abbreviated and irregular hand. The *De febribus* occupies the entire MS and so is a long commentary. Owing to the fact that the leaves are unnumbered I shall be unable to cite this MS exactly.

Another manifestation of Gentile's literary activity is seen in Wiesbaden 60, 15th century, where the first of four treatises by him is dated 1339. The others seem to be undated and may be of the same year. I have not seen the MS, however, but quote the following descriptions from Zedler's catalogue: fols. 5-23, "Queritur utrum in omni febre . . . / . . . Explicit questio de prolongatione febris et periodicatione secundum Gentilem de Fulgineo anno 39 MCCC"; fols. 24-30r, "Resistentia sine contraoperantia membrorum . . . / . . . ut materia forme sue et sue perfectioni. Explicit tractatus de resistentia secundum Gentilem"; fols. 30v-40va, De reductione medicinarum. "Amice carissime magister Thome de Aretio . . . / . . . viam investigandi veritatem etc."; fols. 40vb-54, "Queritur an corpora lapsa ut in exemplo coliricum corpus debeat conservari per similia vel per contraria."

[8] According as we interpret the words "questionem de saporibus." The contemporary work of Maino de Mayneriis with that title deals with sauces for meat, fowl, fish, and so forth.

[9] Following the catch words from Avicenna, "Febris est calor extraneus . . .," the commentary opens: "Excusati ab hiis que in librorum principiis dici consueverunt quia super principio primi canonis dicuntur et quia non intendimus ad puerilia sed necessaria. . . ."

opinions of previous commentators, including such a recent one as Dinus, presumably Dino del Garbo. Personal remarks and experiences are not absent, as when Gentile illustrates the point that what some past great authority has never seen may nevertheless be true by an account of a hard oval stone which John, son of Julian, of Forlì, had sent him and which had been vomited by a patient suffering from stomachache. In another passage Gentile speaks of having translated a medical work by Maimonides from the Arabic. Finally with reference to this commentary on fevers it may be noted that astrological causes are accepted. This treatise on fevers is a different work from Gentile's commentary on the *De differentiis febrium* of Galen[10] and from various questions by him concerning fevers which precede it in a Vatican manuscript.[11]

Gentile was more than a commentator, however. A short tract on baths by him opens in confident tone, "I intend to instruct modern physicians as briefly as I can concerning the nature of baths."[12] In his brief opusculum on rupture of the abdominal lining[13]—or possibly it is an extract from some longer work of his[14]—he states that no ancient author has treated of the method of cure by caustic medicaments. This gap he has after considerable hesitation decided to attempt to fill.[15] This is not the same treatise as that by Gentile on hernia or rupture.[16]

Another brief treatise by Gentile which sheds some light on his mental make-up and attitude was that of a dozen pages on human birth addressed to the famous jurist, Cino da Pistoia

[10] Vatic. 2418, large double columned folio with 93 lines to a column, fols. 201v, col. 2-209r, col. 2.

[11] *Ibid.*, fols. 193r-200r, col. 1: 201r-v.

[12] Berne A 38, 14-15th century, fols. 68r-69v: "Intendo modernos docere medicos quam brevius potero de naturis balnearum . . . / . . . Explicit tractatus de balneis secundum Gentilem de Fulgineo." Printed with *Consilia Cermisoni* and other works of Gentile at Venice (1490?), fol. 86v.

[13] Naples, Bibl. Naz. VIII.D.35, 15th century, fols. 206r, col. 2-207r, col. 2: Gentilis de Fulgineo de ruptura sifac.

[14] Its introduction, however, sounds like that of an independent treatise.

[15] "Nullus antiquorum auctorum de ruptura sifac et intestinorum desensu in burssam curationis modum per chaustica medicamina conpossuit." This sentence forms the incipit of the treatise.

[16] Its incipit is, "Tua me diu in arte. . . ." MSS are Vatican 2418, fol. 148; 2481, fol. 59, Gentilis de hernia intestinali.

(1270-1336).[17] Three main points are discussed. The first is why the duration of the human foetus in the womb varies, while other animals have a fixed period in the case of each species, such as twelve months for horses, ten months for camels, and two years or a year and a half for elephants. The reasons given are the greater variation in the human species, the more diverse regimen of human life, and the effect of imagination especially in sexual intercourse. The second question is what the time limits are for human delivery. All philosophers are agreed that birth may be as early as the seventh or as late as the tenth month. Hippocrates held that after ten months the nourishment went to the breasts for milk, and that the foetus would die of malnutrition. Certain thinkers, especially Italians, have suggested an arithmetical harmony or progression—which, however, is strictly speaking geometrical. Thus they have argued that if the foetus were formed in thirty-five days, the child would move after double this time or seventy days; and would be born in two hundred and ten days or thrice the last number or seven months. Or if the foetus were formed in forty-five days, it would move in ninety and be born after two hundred and seventy days or nine months. Or a formation in fifty days would result in birth after three hundred days or ten months. But although this arithmetical type of ratiocination appeals strongly to some very subtle intellects, the philosophers reject it because they have found that the foetus may be

[17] Naples, Bibl. Naz. IV.D.13 (formerly Borbonico CLXIII), 16th century, paper, Gentilis Fulginatis libellus ad Cinum Pistoriensem de partu hominis. The opusculum of Gentile is the last of three items in the MS, being preceded by a translation by Georgius Hermonymus of Sparta of a dialogue between the Turkish sultan and the patriarch of Constantinople, Gennadius scolarius, on the Christian religion, and the *Mythology* of Fulgentius. Our treatise opens: "Suo Cyno de Pistorio suus Gentilis de Fulgineo Peripatheticus salutem. Ecce habere quod quaeris, de temporibus partus secundum sententiam philosophorum maiorum ex Graecis, Arabibus, Hispanis, excolis."

A somewhat similar discussion under the caption, "Utrum natus vel partus anticipans 10 diebus a noni mensis complemento sit naturalis. Questio XL," was printed in *Questiones et tractatus extravagantes clarissimi domini Gentilis de Fulgineo noviter cum summo labore collecti et cum magna diligentia emendati ac impressi*, Venice, 16 May 1520, fols. 53r, col. 2-54v, col. 2, but the numerical argument from 35 or 45 days is there ascribed incorrectly to Avicenna 3° Canon. fen 21, 2° cap."

formed in thirty days, and this line of reasoning would then force them to admit the possibility of birth in six months. The reasons why the child born in the eighth month dies are largely astrological and lead Gentile to expound the domination of the planets over successive months of the formation of the foetus. For instance, Mercury governs the sixth month and endows the foetus with a disposition towards knowledge, although according to Peter of Abano its only effect is to dry up the superfluity of the child. Aristotle speaks of a birth in the eleventh month and Avicenna of one in the fourteenth. Gentile regards these cases as exceptional but suggests that an occasional woman of abnormal *complexio* may bear child after ten months. Gentile's third point, whether the natural times for human birth are definitely fixed or have latitude (i.e. leave some leeway) suggests, like his arithmetical scheme, a favorite phase of fourteenth century thinking. Besides such points as have already been noted, it involves the question how fractions of months shall be counted. Thus Egidius Romanus held that six months and a few additional days might be counted as seven months. Legally this is important in cases of adultery, and Gentile in closing advises Cino that competent medical men should be called in to examine the physical constitution or *complexio* of the babe and mother and to judge whether it is born of legitimate wedlock.

Of some questions concerning poisons by Gentile[18] we shall treat only briefly, since a later chapter will be devoted to works on poisons in the second half of the fourteenth century. Gentile considers whether any poison can kill by being placed beneath someone's foot, whether serpent's horn sweats in the presence of poison, whether poison operates by its quality, whether putrefactive poisons increase in strength with age, whether hot poison kills quicker than cold, whether there is any poison that kills by its humidity, whether any human being can be nourished on poison, whether poison can be generated within us, whether comforting the viscera differs from comforting the innate heat, whether great theriac is good in every case of poisoning, whether

[18] Vatic, 2418, fols. 209v, col. 1–211r, col. 2.

bleeding and movements of the bowels help those who are poisoned, whether a prime consideration in dealing with cases of poisoning is to keep the chief parts of the body in motion, whether the person who sucks venom from a wound should do so on a fasting stomach, whether theriac will do any good if put on the place which has been bitten instead of being taken internally, whether a man can contract rabies, whether dogs can be seen in the urine of such a man and whether and why persons bitten by a mad dog are afraid of water. Authority weighs heavily with Gentile in dealing with these questions. He regards Avicenna's as the best of previous treatments of poisons,[19] but concerning the so-called sweating of serpent's horn he cites Gilbert of England and George the German, physician to the duke of Austria.[20] Serapion held that the person sucking poison from a wound should be fasting, but all other authorities—Avicenna, Rabbi Moses (i.e. Maimonides), Haly, and Rasis—held that it was safer to do so on a full stomach. Against the appearance of minute forms or particles like dogs in the urine of one suffering from hydrophobia it is argued that serpents do not so appear when one is stung by a scorpion, and that neither the matter, agent, nor place is favorable for generation. On the other hand, it is pointed out that the dog's nature is more like ours than is that of the serpent or scorpion, and that the slower action of the canine poison gives more opportunity for such an effect. The counter question is then raised whether if such a man bit an-

[19] The table of contents in the front of Vatic. 2418 describes our questions as, "Commentarium super tractatum Mesues de venenis qui est VI^{a} VIII^{t}. In quo comment. sunt infrae questiones." But I failed to see any mention of Mesue in the text.

[20] I think that this must be the same person as a Gregory, physician of Albert, duke of Austria, whose "De evitanda ex venenis morte," opening, "Excellentissime dux . . ." is found in Prag 243 (I-F-11), 15th century, fols. 206r-207v, and perhaps as the Gregorius Teutonicus, author in the fourteenth century of "De eclypsibus solis et lune," mentioned by Quetif and Echard, I, 725. It is less likely that the physician of the duke of Austria can be identified with a Gregory to whose son John, also a physician, is ascribed a tract on the baths of Puteoli which opens, "Non ignorare volumus presentium seu futurorum sagacitatem": Rome, Angelica 1502, membrane, 13th century, fols. 32v-33v, Iohannes medicus Gregorii medici filius, Balnea puteolana, especially if the dating of this MS is correct.

other man, human or canine forms would appear in the second case.

The speculative and scholastic character of much of Gentile's medical writing is further suggested by a "Question concerning equality as to weight subtly disputed by master Gentile da Foligno, the fount of medical science and of natural philosophy," which appears to form a part of one of his commentaries on Avicenna.[21] Problems involved are whether a *complexio*—i.e. the constitution of any composite thing—can be equal or unequal as to weight,[22] whether such equality has latitude[23]—that favorite fourteenth century concept—and whether the human *complexio* is closer to equality in weight than any other generated and corruptible being.[24] I have not gone into the detailed discussion but infer that this equality is between the four elements and the four qualities. A summary under eleven heads is given at the close of the question which throws some light on the concepts concerned.[25]

First is imagined ultimate cold, say water
2 imperfect compounds of a very cold character like snow and ice
3 unequal as to weight through cold
4 equal as to weight
5 unequal as to weight through heat
6 all inanimate composites of the world
7 all animate vegetables
8 all animate rationals
9 the whole human species
10 man temperate *in medio*
11 first intelligence ascending: therefore man is the link and bond between God and the universe.

Later on in the same manuscript some further questions may or may not be by Gentile but at any rate are of interest as showing how such medical and philosophical questions might

[21] Vatic. 4456, fol. 62r, col. 1, "Finitur questio de equali ad pondus disputata subtiliter per magistrum Gentilem de Fulgineo fontem scientie medicine et naturalis philosophie. Deo gratias."

[22] *Ibid.*, fols. 52r and 53v.

[23] *Ibid.*, fol. 54v.

[24] *Ibid.*, fol. 56v, col. 1.

[25] A graphic chart at fol. 62v develops the same arrangement further.

contain suggestions for alchemists. Thus it is queried whether heat acting on moisture blackens, and on what is dry whitens; and conversely, whether cold acting on moist whitens, and on dry blackens.[26]

That Gentile was no slave to authority is seen by his opposing a position taken by Galen in the *Aphorisms*.[27]

A commentary upon the *De secretis mulierum* of Albertus Magnus is attributed to Gentile da Foligno in the catalogue of Vatican manuscripts at that library. There appears to be no mention of Gentile in the treatise itself, however, but later in the manuscript occurs an addition to the work of Mondino on anatomy which addition is sometimes ascribed to Gentile.[28] The commentary on the *De secretis mulierum* is not that usually printed with it.[29] Whoever the commentator may be, he has no doubt that Albertus is the author of *De secretis mulierum*.[30]

Gentile da Foligno's chief *Consilium* concerning the great mortality or Black Death of 1348—for several *Consilia* on the pest are ascribed to him—may serve both to illustrate the astrological tinge to his medical works and as a fair example of the other pest tractates which were called forth by that great pestilence.[31] Gentile's treatise possesses a peculiar interest in that it was one

[26] *Ibid.*, fol. 92r, col. 2.

[27] *Ibid.*, fols. 136v, col. 2-137r, col. 1, "Rationes magistri Gentilis de Fulgineo contra Galienum principem medicorum in quinto afforismi secunde particule."

[28] S. Marco XIV, 43 (Valentinelli), fols. 92-93.

[29] Vatic. 4456, paper, probably early 15th century, fols. 1r, col. 1-25r, col. 1 (and not to fol. 30, as stated in my "Vatican Latin Manuscripts in the History of Science and Medicine", *Isis*, XIII (1929), 57; the leaves to fol. 31 being blank). It opens, "Ista propositio licet de se sit nota tamen potest persuaderi rationibus. Primo sic. Et tamen primo notandum quod mundus summitur multipliciter . . ." and closes, ". . . et sic patet quod longitudo vite et brevitas fit hominibus a natura et constellatione sub qua aliquis nascitur. Ista omnium habet maxime ledere. Et nota quod auctor ut ostendet se Christianum reddit gratias deo cui nunc sit laus et honor in secula seculorum."

[30] Vatic. 4456, fol. 1v, col. 1, "Tamen ponitur quod Albertus hunc librum composuit sufficienter in diversis experimentis mulieribus informatus et maxime a philosopho in libro de animalibus"; col. 2, "Titulus libri talis, Incipiunt secreta mulierum et virorum ab Alberto compilata."

[31] For a more exhaustive treatment of their astrological and other content see Anna Campbell, *The Black Death and Men of Learning*, New York, 1931. I cannot agree with A. Phillippe, *Histoire de la peste noire*, 1853, p. 220, that Gentile "avait secoué le joug des doctrines astrologiques."

of the first of such works, being produced at the request of the university and city of Perugia while the plague was in its early stages, and in that its author himself died the same year six days after he was taken ill on June 12, 1348. Whether he died from the contagion itself or from overwork in faithful attendance upon the sick is not wholly clear,[32] though the fact that he passed away so rapidly is suggestive of the action of the plague. One or two allusions to his previous experience of pestilence at Padua occur in both the manuscript[33] and in the printed edition,[34] but perhaps have reference to some earlier epidemic there rather than to the Black Death or are interpolations by some subsequent transcriber of the work, like Luke Antonio who copied it in 1478 at Colle "in time of war and epidemic." Sudhoff believes that Gentile's treatise was composed before the Black Death and that such allusions support this view.[35] He also objects to calling it a *Consilium,* because it contains more than practical advice for the case in hand. Sudhoff contends that Gentile never gave it this title. Be that as it may, it is a characteristic enough representative of the medical literature of its time, and there seems to be no sufficient reason for doubting Gentile's authorship.

At the time of writing this *Consilium*[36] Gentile did not regard

[32] Some have said that he died at Perugia of the pest; but the statement added by his disciple, Francesco da Foligno, at the close of the Cesena manuscript of his *Consilium* concerning the pest reads: "Et postea Gentilis infirmatus est ex nimia requisitione infirmorum, et hoc fuit 12 die Junii, et vixit sex diebus, et mortuus est, cuius anima requiescat in pace. Hoc fuit MCCCXLVIII. Et ego Franciscus de Fulgineo interfui aegritudini eius, et numquam dimisi eum usque ad mortem, et sepultus fuit Foligni in loco Eremitarum." I quote the Latin indirectly from Tiraboschi, V (1823), 387-9. The Latin in the incunabulum general collection of Gentile's *Consilia,* (s.l.n.d., Hain *7574, Pellechet 5028, perhaps Pavia, Antonio da Carchano, about 1480), fols. g, ii, r-v, and in Sudhoff, *Archiv.,* V (1912), 87, differs only slightly from it. Alidosi was in error in saying that Gentile lived to be eighty, died at Bologna, and was buried in S. Domenico.

[33] FL Plut. 90 supra, cod. 90, fol. 92r: "Immo ego credo quod aliquando ita coelum respiciat unam domum quod licet de illa domo unus vel duo se abstentent nihilominus non evadunt et hoc vidi Padue."

[34] Cap. 3, "Et ego in peste gravissima Padue tempore guerre Venetorum vidi experientiam dicte flebothomie."

[35] *Archiv f. Gesch. d. Medizin,* V (1911), 336.

[36] For the text of this particular *Consilium* I have used a MS at the Laurentian library of Florence, Plut. 90

the pestilence as so fatal as some previous epidemics recorded in medical literature. Far from being panic stricken by the prospect, he retained sufficient professional and academic aplomb to make use of it as a theme for scholastic disputation to exercise the wits of his young students.[37] Of the four parts or chapters into which his tractate divided the first considered the causes of the pestilence; the second, a preservative regimen against it; the third, methods of curing those already afflicted; the fourth and last, seventeen *dubia* or problems anent it to train the minds of youth. In two of the three briefer *consilia* for the pest which are included in the edition of Gentile's *Consilia,* however, he speaks of the plague of 1348 as unheard of and unprecedented. If we accept all the *consilia* concerning the pest which are ascribed to Gentile as genuine,[38] it would seem that these others

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supra, cod. 90, fols. 63r-94r, supplemented by the incunabulum (Rés. Te[30]. 14) edition (Klebs, 51), Colle, Bonus Gallus, 1479 (?), 20 leaves, quarto, contained in the Bibliothèque Nationale, Paris. Klebs (1926), No. 50, notes an earlier edition [Laur. Canozi, Padua, 1473] and has kindly allowed me to examine a rotograph of the copy of the same at Munich. The MS is a late copy made in 1478, as its colophon shows. It opens and closes: "Gentilis Fulginatis medici illustris contra pestilentiam consilium feliciter incipit. Quoniam gloriosus et excelsus deus de largitate sua medicinam produxit . . . / . . . est venenum dormire vel degere sub arbore nucis et in ortis caulium et sub umbra oleandri et sic de aliis. Deo ergo pientissimo ac gloriosissimo qui nos a peste protegat sint laudes infinite. Et sic consilio huic de peste Gentilis fulginatis physici illustris finis impositus est. Liber mei Luce Antonii quem scripsi colle tempore belli et epidemie in anno 1478 die 19 septembris." Sudhoff has given some account of the incunabulum in *Archiv f. Gesch. d. Medizin,* V, 335-336, but does not mention the Laurentian MS. From other MSS and the edition of Gentile's *Consilia* (Pavia, Antonio da Carchano. Hain *7574), Sudhoff (*Archiv,* V, 83, 332, 337) gives other briefer *consilia* as to the pest by, or ascribed to, Gentile. One is addressed to the college of physicians of Genoa.

[37] Largely on this account Sudhoff could not believe that this work of Gentile was composed under the stress of the great mortality of 1348, but held that it was an earlier composition suggested by some previous epidemics such as that at Padua during the Venetian war to which Gentile alludes in it, with a foreword added to bring it into connection with the Black Death: *Archiv,* V (1912), 336. This explanation may be ingenious but seems forced and unnecessary. Other long scholastic treatises were educed in the plague year by the great pest, and there seems no sufficient reason for not accepting that of Gentile at its face value.

[38] Nothing on the pest is found in two manuscript collections of *Consilia* by Gentile which I have examined: Wolfenbüttel 2794, 1432-1433 A.D., fols. 189r, col. 1 (not 204r, col. 1, as stated in Heinemann's catalogue)-229v, col. 1

were written later, after it had reached a more advanced and alarming stage. One addressed to the college of physicians of Genoa is incorrectly dated 1349 in the printed text, which would be subsequent to Gentile's death. A better manuscript text which Sudhoff has reproduced gives the year as 1348, however. The thought and wording used in all cases is similar, the present pest being compared in one way or the other to that mentioned by Zoar,[39] so that it may be we simply have different versions or extracts of one *consilium* by Gentile with such changes or omissions as later redactors thought appropriate. There seem to be two different forms in which it is addressed, however, one to Gentile's own students at Perugia, the other to the college of physicians of Genoa. And in the last of the three briefer *consilia* distinguished in the collected edition of *Consilia* Gentile replies to three questions put by the people (*quibusdam interrogationibus factis a comunitate vulgarium*) instead of the seventeen *dubia* for his students.

Gentile accepted as the remote and initial cause of the plague "dispositions depending from the forms of the sky making necessary that whose advent is unknown to the medical man in so far as he is a medical man." The astrologers ascribe it especially to eclipses of sun and moon and conjunctions of the planets, particularly Saturn and Mars, and when in a human

(not 239v, as Heinemann states): "Dispositio venerabilis patris et domini domini Francisci episcopi Olivensi . . . / . . . Expliciunt consilia eximii medicine monarche magistri Gentilis de Fulgineo"; Bruges 473, end of 15th century, fols. 244r-285r, col. 2: "Syrupus pro fratre Angelo de Quateralis . . . / . . . Expliciunt concilia M. Gentilis de Fulgineo etc. Deo gratias."

[39] FL Plut. 90 supra, cod. 90, fol. 63r, ". . . Pro tanto ego Gentilis physicorum minimus contra hanc pestem que dietim pullulare videtur multum verenda licet adhuc non sit tante malitie quante pestis civitatis Craton de qua narrat Zoar in libro thoisir vel quam tellurides ut scripsit Gal." Sudhoff, *Archiv*, V (1912), 332, ". . . haec pestilentia sive epidimia sive quo nomine nominetur est multum verenda nec audita nec visa in libris, ita quod pestilentia quam narrat zoar in thesir non fuit tantae malitiae. . . ." *Consilia* (Pavia, Antonio da Carchano, 1480?), fol. g, verso, col. 1: "Consilium gentilis in epidemia magna que accidit perusii anno MCCCXLVIII nulla videtur precessise temporibus memorialibus pestilentia quam mirabilis sicut pestilentia que nunc est . . . famosa enim pestilentia civitatis craton vel quam scripsit tolurides vel gal. vel zoar non videtur comparabilis in malitia. . . ."

sign of the zodiac or the house of life. These produce corruption of the air which in turn engenders poisonous matter about the heart and lungs. It is not explicable merely from excess of the primary qualities in degree, but comes from the property or occult virtue of poisonousness communicated by vapors and the air we breathe, and so is contagious and spreading from man to man and land to land. We will not detail Gentile's counsels as to hygiene, diet, exercise, and the like, or his eleven special medicines against the plague. They run to long compounds, with a different size of dose for the infected and those not yet infected. An order in which they may be taken is also stated. Just as the poisonous matter of the pest was not explainable in terms of the ordinary first qualities, so Gentile lists seven herbs which do not derive their specific virtue of freeing from venom and contagion from an elementary *complexio* of hot, cold, dry, and moist, but are endowed therewith straight from the stars. These are *Ipericon, Vincetosicum, Enula, Rafanus,* Ditanny, *Aristologia,* and *Lactucella.* Thus Gentile upholds the conception of occult virtue as well as the influence of the stars and astrological medicine. One of his cures for the pest is drinking potable gold.

Finally we may note some of his seventeen problems and their answers. The first *Dubium* is why tyriac and Mithridatic are used against pestilence, although they are hot, and heat is said to be bad in case of plague. The answer is that tyriac helps more by its property, specific form, and occult virtue, and by its drying up of putridity than it hurts by its heating power. The third problem is how air can be corrupted when it is a simple element and corruption is a function of mixed bodies. The explanation is that air does not putrefy in its own sphere or simple state but when mixed with terrestrial and watery vapors. It is then asked, if corrupt air is the cause, why is the pest at its height at the close of summer and beginning of autumn, when the air is cold and dry? The reply is that the heat of the previous summer has rendered the air susceptible to terrestrial and watery vapors, which putrefy the more readily as the heat ceases and are disseminated widely by winds in the autumn. During that season, too, men eat too much

fruit. That some persons are more susceptible to the pest than others is because their bodies are more prepared to receive it or because their mode of life is unwise. It is asked why during a plague some birds accustomed to fly high descend and others rise to unusual heights. The response is that where the air is first contaminated from the sky, birds descend to escape the corruption, whereas if this is caused by inferior bodies, they soar away from these. That some animals seem immune is ascribed to a singular property of the air, which at another time might prove fatal to them and leave mankind unscathed. Monks and prisoners die less from pest because they are less exposed to the air, but if one of them is infected, they usually all are because of their similar mode of life and close contact. Or perhaps it may be due to the ascendent or particular astrological aspect of a given monastery or prison or street in a town. Gentile even suggests that sometimes the heavens may decree doom for a particular house, so that even if one or two of its inmates stay away they nevertheless do not escape. "And this I saw at Padua." Those who have the gout rarely die of the plague because their systems are free from superfluities, which have already descended into their feet and given them the gout.

Gentile's *Consilium* on the pest owes a good deal to earlier medical authors, including the Greeks and Arabs. But the author to whose works he seems the most directly indebted is the recent Latin writer, Peter of Abano, whose great influence already in the first half of the fourteenth century immediately after his death is thereby attested.

So much for Gentile's particular *consilia* on the pest. We may add a word concerning the general collection of his *consilia*. Although the order of the particular *consilia* varies slightly in the incunabulum edition and the two manuscripts which I have examined, it in the main observes the top to toe sequence customary in medieval medical books. First come cases of brain disease, such as melancholy, debility of brain and nerves, epilepsy, apoplexy, insanity from excessive joy, timorousness, and fancies or imaginations. An apparent violation of this classification is

the case of father Franciscus, bishop of Olenus(?),[40] which opens the collection in one manuscript and is the third *consilium* in the other and in the incunabulum. Since he was disposed to dropsy, ethic fever, "and many other diseases because of the bad hot and dry state of his liver and other nutritive members," his case would seem to belong elsewhere. Cases of cold of the head and frigidity of the nerves have a somewhat closer relation to the brain. In one manuscript cases of paralysis come next, in the other two versions they are preceded by *consilia* for persons afflicted with eye and ear troubles. These follow the cases of paralysis in the manuscript first mentioned. It then considers skin diseases of nose and face, while the other versions turn to gout, arthritis, the stone, excessive thinness, and hunchbacks. Catarrh, spitting blood, consumption, pleurisy, and other throat and lung diseases form the next large group of *consilia* in all three texts. We then pass on to the heart and after that to stomach troubles. Dropsy, diseases of the spleen, intestines, and bladder follow in the order named. The next section is on diseases of women. The printed edition then gives some cases of skin diseases, the pest *consilia,* and a final *consilium* for asp bite. In place of this, one manuscript has only a concluding series of unguents and other remedies, while the other manuscript only now takes up the case of a hunchback. It soon comes to the case of asp bite but then turns to fevers and skin diseases and closes with unguents and divers medicaments and recipes.

After the manner of medieval medical writers Gentile does not hesitate to give the names of the patients concerned. Besides the bishop already mentioned, they include a brother Angelo, a citizen of Perugia as to whose name there is no agreement among our three texts, Frederick of Siena, a doctor of decretals, Frederick of Florence, chaplain of Cardinal Giovanni da Colonna, Jacopo Savelli, Giovanni da Vico or Vizo, prefect of the city —presumably Perugia—Ubertino da Carrara, despot of Padua,

[40] The MSS read *Olivensis* and *Olmensis.* If this is meant for *Olenensis,* a Franciscus was bishop of Olenus in Achaia from March 18, 1333, until his death on March 30, 1349: Eubel, *Hierarchia,* I, 375.

and his sister, the count of Urbino, a Bartholomew of Verona, brother Iachomo, prior of St. Augustine, a lady Nucarella or Micarella whose *consilium* is dated in the Abruzzi on October 17, 1346,[41] the wife of lord Maurus. My impression is that such names occur somewhat less frequently in the printed edition than in the manuscripts, and of course as time went on they would mean less to the reader. Usually only prominent persons are so named. Only the age or sex or native place, such as Todi or Trent or Viterbo, is specified for many patients.

The collected *Consilia*[42] of Gentile also illustrate the retention of magic in the medicine of the time. The work is largely composed of recipes which indicate the elaborate compound medicines then employed, although commonly the *consilium* begins with a brief history or diagnosis of the case, and contains other recommendations for the patient than the swallowing of doses, such as air, diet, bathing, and mental attitude. Gentile varies his prescriptions with different seasons of the year, ordering this confection for the end of April and that syrup for the first of October. It seems odd that he should prescribe a syrup for one who

[41] Bruges 473, fol. 279r, col. 1. The date in the MS reads, "millesimo IIII^{c} xlvi^{o} die 17 octobris," but evidently this is a slip for 1346. Not too much reliance should be placed on such dates, however, since the MSS sometimes disagree. Thus the case of Franciscus of Florence is dated in March, 1345, in Wolfenbüttel 2794, fol. 197r, col. 1, but in March, 1347, in Bruges 473, fol. 248r, col. 2.

[42] I have used a rotograph of the incunabulum, double columns (Hain *7574, Pellechet 5028), of about 1480 which was very kindly sent to New York for my use from the College of Physicians library in Philadelphia. "Incipiunt consilia peregregia clarissimi et toto orbe medici Celebratissimi gentilis de fulgineo. Primum consilium pro uno melancolico. Sirupus pro fratre angelo de quatruellis. . . ." Sudhoff, as we have already said, names as the printer Antonio da Carchano of Pavia. For the two manuscripts which I have used in addition see note 38. Another MS is Wiesbaden 61, fols. 55-105r: "Incipiunt quedam consilia . . . / . . . et sic est finis consiliorum reverendi et eximii doctoris magistri Gentilis de Fulgineo . . . finitum anno domini MCCCC^{o} primo ipso die sancti Panthalionis." Yet others are Klagenfurt Bischöfl. Bibl. XXX d 25, paper, 1463 A.D., fols. 53r-113v: "Incipiunt quedam consilia Gentilis de Fulgineo doctoris eximii a capite. Primum est ad debilitatem cerebri . . . / . . . premittendo digitum, Amen." Vendôme 245, fols. 76-124: "Per me Nicolaum de Rubeis die xvi Decembris Papie 1440 . . ." and with the note, "Ex libris Theodori Guaynerii de Papia et amicorum." Univ. Cracow 782 (DD. I. 35), 1451 A.D., paper, fols. 281-323: "Explicit (*sic*) consilia et recepta Gentilis de Fulgineo." For three Riccardian MSS See Lami (1756), p. 208.

had become infatuated from excessive joy, and other medicinal concoctions for a patient suffering from fear and melancholy. Gentile makes little use of parts of animals in his compounds, confining himself chiefly to varied permutations and combinations of herbs, spices, and common drugs. Like Galen, however, he still employs river crabs and once two turtles. Or he advises washing the scalp with a boy's urine for ringworm;[43] or mixes goat-dung with rosemary, cinnamon, wormwood, flour, and honey, in a plaster for gout according to the Neapolitans.[44]

Gentile was obsessed by the humoral physiology and tells one patient that the cause of his weak sight is the ascent of many vapors from the joints to the head. In another case of ringing of the ears Gentile, after prolonged study of the patient's disposition of which he had been fully informed by correspondence, decided that it was caused by gross evaporation of melancholic and phlegmatic humors from the lower parts of the heart and the great veins of the back which in this case affected the ears, although in another patient they might have made themselves felt rather in some other part of the body. Cogitation and imagination and the use of violent medicines had weakened his spirits.[45]

In desperate cases of fracture of the skull where surgical remedies are unavailing Gentile resorts to an empirical treatment, taken from the surgical work of a bishop of Cremona or possibly from Theodoric of Cervia. The prescription involves sprinkling a powder with three fingers in the form of a cross and repeating this prayer,

> In the name of the Father and individual Trinity the Lord's right hand wrought virtue, the Lord's right hand exalted me, the Lord's right hand effected that I should not die but live, and I will tell the works of the Lord. Chastising the Lord chastened me and did not give me over unto death.[46]

How many of these *Consilia* are actually by Gentile may be doubted, since they include miscellaneous material such as

[43] *Ibid.*, fol. (b.v.), verso, col. 2.
[44] *Ibid.*, fol. b. iii, recto, col. 2.
[45] *Ibid.*, fol. (a.9), recto.
[46] *Ibid.*, fol. (b.vi), verso, cols. 1-2.

recipes for dyeing hair a blond color and others which are taken from earlier authors, although of course Gentile may have himself included such in his collection. They close with or are followed by in the printed version a treatise on hernia which appears to be addressed by Gentile to his son, Brisciamnus.[47]

Two different and almost opposite instances of Gentile's attitude to the occult or supernatural are provided by two brief tracts ascribed to him in a manuscript at Wolfenbüttel and written in the same hand.[48] The one, on the subject of incubus,[49] discusses it as a purely physiological and psychological matter which affects the brain and stops up the channels of the motive and sensitive spirits, producing a feeling of suffocation and loss of voice, and often making the patient think that there is a phantasm on his breast. Sometimes this sensation may be due to a bad cold in the head. Its relations to epilepsy, apoplexy, and mania are discussed. Epilepsy is a variety of spasm and affects the anterior part of the brain. Incubus is not a spasm and affects the posterior part of the brain. Apoplexy affects all parts of the brain. The cure of incubus is then taken up. Thus the subject is discussed entirely from the medical standpoint as a diseased condition, and no account is taken of incubi and succubi in the demoniacal sense. Immaterial incubus is spoken of, it is true, but the distinction between it and ordinary incubus is merely that it is caused by cold and not by heavy vapors.

From this treatise alone, then, we should form a conception of Gentile as a medical man who limited himself strictly to bodily complaints and their mental concomitants, and who took no cognizance of the supernatural. But we receive a very different

[47] The treatise extends from fol. g. ii. verso, col. 1 to (g.v.) recto, col. 2. At the beginning Gentile says, ". . . quum me solide tibi vigor paternitatis et amicitie coniunxit," and near the close remarks, "Hoc autem est, Brisciamne, quid tibi largiri volui. . . ." I have not investigated what relation this treatise bears to the *consilium ad herniam intestinalem* included in the *Consilia* in Wolfenbüttel 2794, fols. 223r, col. 1-224r, col. 2.

[48] Wolfenbüttel 2794 (81.4 Aug. 2°).

[49] *Ibid.*, fols. 279v, col. 2-281v, col. 2, "Incipit determinatio gentilis ad preces cuiusdam de incubo. Ad rem igitur veniens incubi materiam pertractare intendens . . . / . . . nisi hec que antescripte sunt cause me molestassent. vale et vive etc." The person to whom the treatise is written is addressed near its close as "doctor preclarissime."

notion of him from the other tract on the question whether words, incantations, and suspensions from the neck are able to cure diseases.[50] This title would seem to have been suggested by the much earlier *Epistle* of Costa ben Luca in the ninth century concerning incantations, adjurations, and suspensions from the neck.[51] At first Gentile engages chiefly in citation from such authorities as Kiranides, Walter on epilepsy, and Gilbert of England. Especially does he rehearse the discussion of incantations by Peter of Abano and Avicenna. The latter gave seven reasons why they might cure or ways in which they would cure: first, the power of mind over matter as set forth in the *locus classicus* from the *Sextus naturalium;* second, by faith; third, by divine aid; fourth, by the assistance of good angels; fifth, by the aid of bad angels or demons; sixth, because of the celestial aspect under which they were put forth; last, by accident or coincidence.

Therewith Gentile diverts his attention to the question whether there are demons or not, a point upon which the Peripatetics and Platonists take opposite sides. Gentile is inclined to agree with the latter, advancing the customary instance of illiterate persons who suddenly become literate or speak languages unknown to them. The followers of Aristotle ascribe this, however, to melancholic humor and accept no separate substances other than God, the intelligences that move the spheres, and the human soul. But Gentile can see no reason why there should not be a genus of more perfect beings above the intellectual soul and below the intelligences that move the orbs. As between the numbers eight and twenty-seven may be inserted the means, twelve and eighteen, so between the two extremes of brute animals and separate substances, he would insert the two means of men and demons. To this adducing of the favorite current theory of proportion

[50] *Ibid.*, fols. 290r, col. 1-291r, col. 1: "Utrum verba et incantationes et colli suspensiones valeant ad curam egritudinum. Et videatur primo quod sic . . . / . . . habeantur pro non dictis. Explicit questio gentilis de demonibus."

The question was printed in *Questiones et tractatus extravagantes clarissimi domini Gentilis de Fulgineo noviter cum summo labore collecti et cum magna diligentia emendati ac impressi,* Venice, 16 May 1520, Questio LV, fol. 108r, col. 1-108v, col. 2.

[51] For an account of it see *Magic and Experimental Science,* I, 652-657.

someone might retort, however, that the extremes are the brutes and God, leaving room for only the human soul and the intelligences that move the orbs as means in the cosmic proportion. To this Gentile replies in kind that one must not confuse sensitive and intellectual extremes. The true intellectual extremes are man and God, with demons and the intelligences that move the orbs as intellectual means. "And as the angels that move the sky comprehend their perfection in moving, so those demons comprehend their perfection in understanding."

Not very cheering news is this intimation that our own age is not the first to rank rotarians above the intelligentsia, or to put those who are always moving heaven and earth above those who quietly try to understand things. The tendency to stigmatize unusual intelligence as diabolical is indeed of long standing, but it is a little discouraging to find it in a medical man like Gentile. He refuses definitely to commit himself as to whether "these demons" are moved by incantations and characters—which would seem no great proof of their intelligence—but he remarks that it seems to be generally admitted,[52] and that if so, it solves all the difficulties in the way of the action of incantations.

In the sixteenth century Simon Portius, in his treatise on pain, ascribed to Gentile without citing any specific work by him the view that one would see the magnitude before the color of a distant object. This view Simon rejected, calling Gentile "little learned in philosophy," and he also disagreed with Gentile's discussion of pain.[53] Other instances might be given of the continued influence of Gentile's writings beyond 1500.

[52] "Utrum autem isti demones moveantur incantationibus et karacteribus est res de qua nichil dico tamen famosum videtur quod sic."

[53] *De dolore Simonis Portii Neapolitani liber*, Florence, 1551, pp. 23, 37.

CHAPTER XVII

JOHN OF SAXONY AND JOHN DE LINERIIS

There seems to be no real difficulty in distinguishing the works of John Danko or Dancowe of Saxony from those of his master, John de Lineriis of Picardy, or in separating the identity and dates of these two from those of other Johns who composed astronomical tables or canons. Considerable confusion, it is true, has been created by *literati* who depended on the catalogues of manuscript collections without examining the manuscripts themselves, or who failed to compare incipits and other sure means of identification.[1] Towards the same end has worked the habit which has gained too much currency among scholars of trying to make two persons out of one famous name for no sufficient reason, and the perverse, pseudo-patriotic impulse which has moved French *savants* to question the foreign origin of medieval men of learning said to be from England or Germany, like Bartholomaeus Anglicus and John of Saxony, or which has induced German scholars to argue that Honorius of Autun really came from Austria. Thus even as able a historian as Duhem, while he clearly distinguishes three chief works of John de Lineriis, attempts to make out John Danko a different person from John of Saxony, and, upon the questionable evidence of the dubious spelling of a single word in a single manuscript, to make John of Saxony a native of Connaught in Ireland.[2] Some investiga-

[1] The series of notes by G. Bigourdan on "Les MSS des oeuvres de Jean de Lignières," *Comptes rendus de l'Académie des Sciences,* 161 (1915), 713-717, 753-758; 162 (1916), 18-23, 61-67; suffered from these faults. He included the work of John of Saxony opening, "Tempus est mensura motus . . ." among those of John de Lineriis.

[2] Duhem, IV, 77-78, 578-81. There is the greater difficulty, to which Duhem, citing Curtze, adverts, that in a manuscript at Erfurt, Amplon.Q.365, fols. 132-139, notes of John Danko or John of Saxony on *compotus,* opening, "Sicut dicit Ptholomeus in Almagesti . . .", are described as "extracted from writings of his completed in 1297 A.D." One might regard this date as a slip of a copyist for 1397 or 1357, but we find the 1297 repeated in another manuscript at Florence which Duhem did not note. According to Bandini's catalogue of the Laurentian library, MS Plut. 30,

tors of manuscripts, like certain anthropologists and archaeologists, seem to think that they attain a higher degree of scholarship, if they propound some novel and improbable theory and adduce a certain amount of evidence for it. This is hardly the direct or rapid method of attaining historical truth.

In the present case our intention is to disregard such quibbles and to set forth briefly what seem the chief dates and facts. There are numerous manuscripts to demonstrate that John Danko or Dancowe of Saxony[3] was a pupil of John de Lineriis, and that between them they did much to introduce the use of the Alfonsine Tables at Paris. Probably in 1320 John de Lineriis addressed to Robert (de Bardis) of Florence, dean of Glasgow, *Canones super tabulas magnas . . . compilati ex tabulis Alfonsii,* a work which opens, "Multiplicis philosophie variis radiis. . . ." In 1322 he composed *Canones tabularum Alfoncii* which differed from those addressed to Robert of Florence. According to Duhem and Latin manuscript 7281 of the Bibliothèque Nationale, Paris, which he followed, these *Canons* of 1322 were in three books. The first opened, "Quia ad inveniendum loca planetarum. . . ."

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cod. 24, contains at fol. 76, Magistri Ioannis de Saxonia Novus Compotus qui distinguitur per xviii capitula, quorum praecedunt argumenta, which opens, "Omissis preternecessariis quum intentionis sit in hoc epilogo . . .", while at fol. 84 comes the same author's *Commentarius super novum computum,* opening, "Sicut dicit Ptolemaeus in Almagesti. . . ." At its close we read: "Explicit scriptum super novum computum magistri Iohannis de Saxonia compositum ab eodem Iohanne anno domini 1297."

This work and date may be left out of our consideration in the present chapter, however, since we are primarily interested, not in the computus, but only in the astronomical and astrological works of John of Saxony, the disciple of John de Lineriis. It would seem either that there is some mistake in the date 1297, or that the treatise on computus should not be ascribed to John Danko of Saxony, the disciple of John de Lineriis.

[3] It should perhaps be remarked that he is more commonly called John of Saxony than Danko. Schum in cataloguing Erfurt, Amplon.F.386 has given a rather false impression in this regard, introducing the words "a Dankone" and "Dankonis" into tituli once or twice where they are not found in the manuscript. However, Danko and John of Saxony were already identified by Amplonius himself in his catalogue of 1412: see Schum, *op. cit.*, p. 804, col. 1, "Egregium almanach Dankonis, scilicet Iohannis de Saxonia." Also an astrological prediction of 1349 already cites John Danko's commentary on Alcabitius: BM Addit. 24145, fol. 7v, "ut patet in alkabitio de naturis signorum et per iohannem danico super eodem."

The second began, "Cuiuslibet arcus propositi sinum rectum per tabulas invenire. . . ." The first words of the third were, "Priores astrologi motus corporum celestium. . . ."[4] These three books or sections sometimes occur separately in the manuscripts;[5] in fact, they often seem to be regarded as distinct treatises. Simon de Phares at the end of the fifteenth century listed under the name Jehan de Linières and the year 1334 all three sections with their respective incipits, but as if they were separate treatises.[6] Thus for the *Canons* to calculate by the Alfonsine Tables he gave the incipit, "Quia ad inveniendum loca populorum . . .";[7] for those on the primum mobile, "Cuiuslibet arcus propositi . . . "; and for "autres tables en canons" the opening words, "Priores astronomi motus corporum. . . ." But between the two last he interspersed another work on the theory of the planets.

We have a more original source and contemporary corroboration than this. John of Saxony himself explained, in a treatise written about 1355,[8] that the whole work of astronomical tables

[4] BN 7281, fols. 175, 178v, 186v. Maximilian Curtze, in *Bibliotheca mathematica,* I (1900), 390-413, published only the second book, "Canones tabularum primi mobilis," opening, "Cuiuslibet arcus propositi sinum rectum invenire."

[5] In BN 7405 I am not sure if the other parts or only the opening pages follow the incipit, "Quia ad inveniendum loca planetarum. . . ." In FL Ashburnham 131 (205-137), 14th century, double columns, fols. 41v-50v, Iohannis de Lineriis Canones tabularum primi mobilis, opening, "Cuiuslibet arcus propositi synum rectum invenire. . . ." In Cues 210, 14th century, fols. 90-137, Iohannes Pychardus de Lyneriis De motibus corporum celestium, opening, "Priores astrologi motus corporum . . ." with tables filling fols. 102-137v. In BM Arundel 88, 15th century, fols. 39v-46v, Canones primi mobilis Johannis de Lineriis, "Cuiuslibet arcus propositi. . . ."

[6] *Recueil* (1929), p. 214. At p. 227 Simon gives "Cuiuslibet arcus propositi" as the incipit of an astrological work of 1361 by a master Gerard du Bois whom he further describes as a "sovereign judge of urines and great healer of diseases."

[7] Apparently either the editor of the printed edition or an earlier copyist has misread an abbreviation for *planetarum.*

[8] It occurs in the same MS as the *Canons* of 1322 by John de Lineriis: BN 7281, fols. 222r-232r, "Canones cum exactis partibus ad longum. Non fuit mortuus qui scientiam vivificavit . . . ponuntur exempla in omnibus canonibus super radicem anni Christi 1355 completi et super Parisius. Exempla Io. de Saxonia super tabulas primi mobilis et canones Io. de Lineriis. Quia plures astrologorum diversos libros fecerunt de operationibus tabularum quas canones appellarunt. . . ."

In Amplon.F.386, which Schum dated about 1359 A.D., the treatise begins at fol. 26r, col. 1, with the last sentence just quoted, while in the top margin is the titulus, "Expositiones Canonum primi mobilis per M. Io. de

could be divided in a general way into three parts: namely, tables of the primum mobile, of equations of the planets, and of equations of eclipses. He proceeded to say that his master, John de Lineriis, had treated those three parts completely in his *Canons*. That in the first part he put canons or equations of the primum mobile, and that this part began, "Cuiuslibet arcus. . . ." That the second part on equations of the planets opened, "Priores astrologi. . . ." And that of the third section or *Canons of Eclipses* the first words were, "Diversitatem aspectus . . ." It will be seen that John of Saxony describes as the first and second parts what Duhem and at least one manuscript call the second and third books, that he says nothing of the incipit,

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Lineriis et M. Io. de Saxonia." After the introductory paragraph by John of Saxony comes the opening paragraph of John de Lineriis' canons on the primum mobile, and then John of Saxony's first exemplum of this canon. The work breaks off unfinished in the middle of col. 1, fol. 32r. Rather oddly in this MS the quotation from the *Almagest*, "Non fuit mortuus qui scientiam vivificavit . . ." forms the incipit of the next treatise beginning at fol. 34r, "Declaratio theorice planetarum." Schum incorrectly applied the second title in the top margin of the same leaf, "Item canonum Alfonsi practica per Hermannum intitulatur quadripartitum practice motuum erraticarum et fixarum," to the treatise beginning there, whereas it belongs with a second treatise or part which begins at fol. 38r, col. 2. Schum further incorrectly gives "Non fuit mortuus . . ." etc. as the incipit on fol. 38r. The text of the *Declaratio theorice planetarum*, fols. 34r, col. 1-38r, col. 1, deals with the motion of sun and moon, the head and tail of the dragon, and the three superior planets. In its introduction judicial astrology and astronomical tables are closely associated. The text of the *Practica*, fols. 38r, col. 2-48r, col. 1, opens, "Numerum annorum mensium et dierum a principio alicuius ere . . ." and gives 1355 as the year of reckoning.

Perhaps the Hermann to whom this *Practica* is ascribed is the same who is mentioned with John de Lineriis in another MS: Cambrai 950, 15th century, Tabula Hermanni de solis equatione; Tabula Hermanni et de Lineriis de medio motu solis; Tabula Oxonie de vero loco solis. It might seem likely that the Theory and Practice are by the same author, were not a different name suggested for either. In the table of contents on the fly leaf of the MS only the *Practica* is listed, but in the description of our MS (De mathematica, 39) in the catalogue of Amplonius about 1412, the Theory is listed separately and ascribed to Danko, "Declaracio theorice planetarum Dankonis." Hermann is not mentioned as author of the *Practica* either on the fly leaf, where we read, "Practica canonum alphonsi et fixarum stellarum," nor in the 1412 catalogue which says, "Practica canonum Alfoncii et potest appellari quadripartitum practice motuum erraticarum et fixarum stellarum." Perhaps both Theory and Practice are sections of the work of 1355 of John of Saxony.

"Quia ad inveniendum loca planetarum . . .", and that he introduces a new incipit, "Diversitatem aspectus . . ." which is noted neither by Duhem and his manuscript nor by Simon de Phares. Probably the section introduced by the words, "Quia ad inveniendum . . ." may be regarded as a general introduction to the other three parts of which John of Saxony speaks. It is much shorter than they, covering only some three leaves where they extend to eight and fifteen.

Whether it be the first or second part, John of Saxony, Simon de Phares, and the Ashburnham manuscript of the fourteenth century which is now at Florence, all agree that it is the *Canons on the Primum Mobile* which opens, "Cuiuslibet arcus propositi . . ." It is this section or treatise which in a manuscript of the Amplonian collection at Erfurt is said not only to have been completed at Paris in 1322 by the Picard, John de Lineriis, but also to have been written at Paris by the hand of John de Danecowe in 1323 on the day of the See of Peter.[9] Schum dated the writing in that year, so that it is presumably in the hand of John of Saxony. At least it shows that in 1323 he had already become the student of John de Lineriis, and took pride in making a copy of the master's work.

Within a few years John of Saxony was to compose canons of his own on the Alfonsine Tables which, if we may judge by the frequency with which they are encountered in the extant manuscripts and the fact that they were published with the first edition of the Tables in 1483, were to have as great or greater currency than those of his master. These were published in 1327 and are identifiable by the sententious incipit, taken from Aristotle, "Time is the measure of motion. . . ."[10] The work included

[9] Erfurt, Amplon.F.377, 1323 A.D., fols. 22-35, Expliciunt canones tabularum astronomie ordinati per magistrum Iohannem Pychardum de Lyneriis et completi Parisius anno ab incarnatione Christi filii Dei 1322, scripte Parisius per manum Iohannis de Danecowe, A.D. MCCCXXIII in die cathedra Petri.

[10] "Tempus est mensura motus, ut vult Aristoteles 4° Phisicorum. . . ." In a MS of the Biblioteca Nazionale at Florence (II, 316, 15th century) the title, "Canones Ioannis de Saxonia super tabulas regis Alfonsi," is applied to a work with the different incipit, "Inter cetera veritatis phisice documenta. . . ." But the work is also given another title, "Commentum super Canones tabularum Toletanarum."

canons of eclipses, and closed with a graceful acknowledgment of indebtedness to John de Lineriis, "from whom I have my science."

In 1331 John of Saxony composed a commentary upon Alcabitius of which we shall speak presently. But his master, too, was still active, for a theory of the planets by John de Lineriis is dated in 1335. It opens, "Spera concentrica vel circulus dicitur . . ." Simon de Phares mentions it but without incipit or date.[11] Although certain manuscripts name John de Lineriis as co-author with Firminus de Bellavalle of the treatise on calendar reform addressed to pope Clement VI in 1345, we shall see in the following chapter that it was to John de Murs and Firminus that the pope sent his request for such a work. Just when John de Lineriis died does not appear,[12] but a work by John of Saxony in 1355 makes it evident that his master was no longer living. At least, one assumes that the work was written in 1355, since that year is taken as the starting point or root for all its examples of operations made with astronomical tables, while Paris is the place of reference. The then familiar sentence from Gerard of Cremona's translation of the *Almagest*, "He is not dead who has made science live," quoted in the titulus, is probably meant to apply to John de Lineriis. John of Saxony goes on to say that whereas many astronomers have composed various books which they call *Canons* concerning the use of tables, some did not cover

[11] *Recueil* (1929), p. 214.

[12] Bigourdan (see the citations in note 1 of this chapter) and Duhem, *Le Système du monde*, IV, 578-581, state that John de Lineriis in 1350 compiled a catalogue of fixed stars, giving their positions for the vernal equinox of that year. But this attribution and dating rests upon the tenuous evidence of a letter of Wendelin to Gassendi. Moreover, Wendelin knew of this catalogue by John de Lineriis only through a commentary upon the *Almanach* of John de Lineriis by a John of Speyer, who added positions for 1364, but gave the positions for 1350 for only fifteen of the forty-eight stars which John de Lineriis had listed, and miscopied these. In view of the slight knowledge of medieval authors and manuscripts possessed by the seventeenth century, the indirectness of the evidence, and the bad condition of the manuscript treatise of John of Speyer, we can hardly accept this as convincing proof that John de Lineriis was alive in 1350. This date might easily have been miscopied too, and what Wendelin took for an erroneous reproduction of positions for 1350 may have really been observations meant for some other date. Or there may have been some mistake about names.

all possible operations, while others wrote in a difficult and obscure way. But his master, John de Lineriis, drew up canons complete and sufficient for every undertaking which is customarily performed by tables and in his writings used an easy style and clear arrangement, putting first what ought to come first and last what should be last. "Therefore to the praise of glorious God, the honor of my master, and the profit of scholars who wish to learn the workings of astronomical tables, I, John of Saxony, with God's aid intend to give examples of all the operations which are commonly performed with tables so that there may be no one henceforth who will shrink from the use and employment of tables of the stars because of the difficulty of working them."[13] After describing the threefold division of the *Canons* of John de Lineriis in the manner we have already indicated, John of Saxony proceeds to go through them like a commentator, giving an example for each canon, the paragraphs being numbered in the margin up to forty-four. The manuscript of those examples which I have used stopped at the close of the first part on the primum mobile, but its copyist explained in a note that it remained to treat of operations of the other two parts.[14]

Such was the way in which overlapped the productive literary and scientific careers of these two Johns, master and disciple, coming to Paris the one from Picardy, the other from Saxony, in the cosmopolitan amity of Greco-Arabic-Spanish-Latin learning, without any such concepts as France and Germany in their minds, but with enthusiasm for the astronomical tables of a foreign monarch, Alfonso X of Castile. What difference did a little thing like the inquisition make in heart-free days of intellectual cooperation and fellowship such as those? The Hundred Years War began in 1337, and Edward III had continental allies against Philip VI. But John of Saxony remained as loyal to his teacher in 1355 as he had been in 1323 or 1327. Interna-

[13] In Erfurt, Amplon.F.386, about 1359 A.D., fol. 26r, col. 1, "Expositiones canonum primi mobilis per M. Io. de Lineriis et M. Io. Saxonia," the paragraph ends at this point, and there follows the incipit of the canons on the primum mobile, "Cuiuslibet arcus. . . ."

[14] BN 7281, fol. 232r.

tional intellectual relations at that time and the way in which a work in manuscript circulated before the invention of printing are further illustrated by a note at the close of what seems to be one of John de Lineriis' canons on astronomical tables. The note states that this Canon on the Table of master John, made at Paris, was brought to Milan by Marsiglio of Padua—no other than the famous author of the *Defensor pacis*—and there communicated by him to master Simon de Moronis on November 17, 1327, then communicated to brother Augustine exactly a decade later on November 17, 1337, again communicated to someone, apparently of the Este family, on March 27, 1343, and finally "communicated to me, Bonius (or, "at Bologna"), on Thursday, March 18, 1344."[15]

We are not especially concerned with John de Lineriis apart from John of Saxony. Only works of an astronomical and mathematical nature seem to be extant by him; if he wrote astrological treatises, I have not found them. A *Saphea* or *Canon saphee* concerning the astrolabe or quadrant, found in two fourteenth century manuscripts at Erfurt, is ascribed to him at the close of one of them.[16] Simon de Phares says that he composed "ung directoire" with the incipit, "Accipe tabulam planam rotundam cuius. . . ."[17] John of Saxony has a reference to such an instrument, but does not connect the name of his master with it. In his opinion this instrument must be large enough to record minutes to be satisfactory; mere division into degrees would be insufficient.[18] In a Digby manuscript at Oxford there occurs anony-

[15] I have not seen the MS itself but quote Frati's catalogue: BU 1369 (2614), membrane, 15th century, mm. 240 x 175, fols. 1-8 <Tabulae astronomicae>, "Ad signum arietis."—Explicit canon super tabula magistri Iohannis acta Parisius anno Christi 1321 et comunicata Mediolan. per magistrum Marxilium de Padua magistro Symoni de Moronis 1327 die 17° novembris deinde comunicata fratri Augustino 1337 die 17 novembris deinde comunicata de este 1343 die 27 martii deinde comunicata mihi Bonio. 1344 die iovis 18 martii." The remainder of the MS is a moral tract which was printed in 1505.

[16] Amplon.Q.355, fols. 73-81v. and Q. 366, fols. 40-49: see Schum's descriptions.

[17] *Recueil* (1929), p. 214.

[18] The passage occurs in John of Saxony's commentary on Alcabitius: BL Digby 97, fol. 230v, "Nota tamen quod secundum modum dictum diriguntur significatores quando non habent latitudinem. Quando autem significatores habent latitudinem difficilior est modus. Et

mously, with the same incipit as that given by Phares (except that *rotundam* becomes *mundam*), a short tract "Concerning the construction and use of an instrument for directing signators."[19] In another Digby manuscript an *Equatorium planetarum,* or abbreviation of the *Equatorium* of Campanus, here called John Campanus, is ascribed to "John of Lyners."[20] In a third Digby manuscript a brief work on the utilities of the equatorium of the planets appears under John de Lineriis' name.[21] These last two manuscripts have different incipits, however, and neither resembles that of the anonymous work on the *directorium.* There is also an *Equatorium* attributed to John de Lineriis in a manuscript at the Vatican, with the same incipit as in the last named Digby codex.[22] The same manuscript further ascribes to John de Lineriis works on the instrument known as the armillary and on fractions.[23] The last work is very commonly listed as his in

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propter hoc factum fuit instrumentum ad dirigendum planetas habentes latitudines. Et illud instrumentum vocatur directorium. Videbatur enim compositori seu inventori illius instrumenti quod significator habens latitudinem non posset dirigi per tabulas ascensionum vel non sine magna difficultate.

Ego autem dico quod instrumentum non est sufficiens nisi sit maxime quantitatis ita quod possit recipere minuta. Tale autem vix posset fieri. In directionibus enim ut plurimum accipitur pro quolibet gradu unus annus. Modo si instrumentum non sit divisum nisi per gradum vix invenitur in eo certitudo usque ad annum. Adhuc si instrumentum sit bene factum ita quod non sit error in dividendo hoc autem non sufficit."

[19] BL Digby 48, 15th century, fols. 91v-94, De constructione et usu instrumenti cuiusdam ad dirigendum signatores. Incipit: "Accipe tabulam planam mundam. . . ."

[20] BL Digby 168, membrane, 14th century, fols. 64v-66, opening, "Quia nobilissima scientia astronomie. . . ." A leaf is missing according to the old numbering. Possibly the text indicated in the next note would fill the gap, but it is not the same copy.

[21] BL Digby 228, 14th century, fols. 53v, col. 1-54v, col. 1: "Descriptiones que sunt in equatorio planetarum notificare . . . / . . . arcus zodiaci seu equantis usque ad principium. Explicit ars utendi equatorio planetarum magistri Iohannis de Lineriis."

[22] Vatic. Urb. 1399, membrane, 48 fols., fols. 16r, col. 1-21r, col. 2, "Descriptiones eorum que sunt in equatorio planetarum notificare. Primo linea recta que est in medio regule . . . / . . . et deinde comprimetur super arcum zodiaci. Et in hoc terminetur compositio equatorium planetarum."

[23] *Ibid.,* fol. 1v. Within an illuminated circle is written in twelve lines, alternately blue and red, the following table of contents: "In hoc codice continentur instrumentum armillare Iohannis de Lineriis equatorium eiusdem de minutiis numerorum eiusdem utilitates astrolabii imagines stellarum fixarum." Boncompagni, *Bullettino,* XII (1879), 376, so read this as to ascribe the *Utilitates astrolabii* to John de Lineriis

manuscripts,[24] although Duhem has raised some question whether it is not by John of Sicily,[25] while John de Lineriis would be credited only with a *Compendium de minutiis,* drawn from his longer work on astronomical tables. In any case the instrument known as *directorium* appears to have antedated John de Lineriis. Duhem has noted that William of St. Cloud in his *Calendar for the Queen,* written in 1296, tells us that he had constructed a *directorium* and had explained its use elsewhere.[26] Simon de Phares, writing at the close of the fifteenth century, ascribed the invention of this instrument to a Peter of Saxony, whom, however, he dated as late as 1338-1339,[27] and perhaps has confused with John of Saxony.

Like Cecco d'Ascoli, whose recent fate again failed to act as a deterrent, John of Saxony wrote a commentary on that standard medieval Arabic introduction to the art of astrology, the *Ysagogicus* of Alcabitius, which is, John says, of books introductory to astrology the one "favored by moderns."[28] Strange, is it not, that these medieval and scholastic centuries which were ever seeking after something up-to-date, should have been stigmatized as benighted and behind the times by subsequent historians, while the humanist reaction that followed, with its turning back to Rome and Greece, should have been hailed as the

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instead of the *Instrumentum armillare,* but at the close of the latter is written, fol. 15r, col. 2, "Explicit a Io. de Lineriis."

[24] Bruges 530, 14th century, fols. 9r-15r, "Expliciunt canones minutiarum magistri Iohannis de Lineriis"; FL Ashburnham 132 (206-138), 15th-16th century, fols. 6-10v: CLM 11067, 14684, 14908; Bernard 6768 and Appendix 820; also others at Erfurt. Its incipit is, "Modum representationis minutiarum vulgarium. . . ."

[25] Duhem, IV (1916), 63-64.

[26] Duhem, IV, 18. Yet another manuscript of a treatise on the *directorium* which I have not seen and so can only describe briefly after the catalogue is Douai 715, 14th century, Utilitates instrumenti quod dicitur Directorium. One wonders if this might be the work in which William of St. Cloud explained the use of the instrument.

[27] *Recueil* etc., ed. Wickersheimer, 1929, p. 216: "Petrus de Saxonia, homme très cler astrologien. Cestui fut moult aprecié en son temps, fist le directoire des planetes de nouvelle invencion, qui est moult singullier et très utille. Cestui fist plusieurs jugemens sur toutes les parties de astrologie qui sont assez communs."

[28] Erfurt, Amplon.Q.354, fol. 7r; BL Digby 97, fol. 169v: "Sed inter alios libros introductorios liber Alkabitii est magis approbatus apud modernos. Ideo dimissis aliis de ipso ad presens intendimus."

first beginning of the modern mind and times! The modern mind, we fear, is little more constant than fashions or the weather. In the first half of the fourteenth century the modern mind preferred Alcabitius. John of Saxony completed his commentary upon the *Ysagogicus* in 1331, only four years after Cecco's execution. In it he alludes to 1330 as the current year. Whereas the commentary of Cecco upon Alcabitius was not printed until 1905, that by John of Saxony ran through at least eleven early editions.[29]

Although he writes as a commentator on Alcabitius, John does not hesitate to speak in the first person occasionally[30] and to vent his own views, or to discuss something which he has not seen set forth in any book.[31] He supplements Alcabitius by material based on the more recent Alfonsine tables[32] or by his own experience based upon observation with instruments. Indeed he describes the science of the movements of the stars as twofold, by using instruments and by using tables.[33] His dis-

[29] It was printed at Venice, 1485, 1491, 1502, 1503, 1512, 1513, and twice in 1521 by Petrus Liechtenstein and on June 18 by Melchior Sassa and Petrus de Ravanis; at Lyons (1506?) by Huyon; at Paris, 1520 or 1521 (S. de Colines, July 2, 1521). Some MSS of it are: BL Digby 48, 15th century, fols. 243r-302v; Digby 71, 14th-15th century, membrane, fols. 3-27; Digby 93, 1384 A.D., fols. 94-172; Digby 97, 15th century, membrane, fols. 165-240v; FL Ashburnham 132 (206-138), fols. 88v-125v; Vatic. 2880, fols. 1-51; Vatic. 4084, fol. 43; Erfurt Amplon. Q.354, 14th century, fols. 4r-59. BN 7324, fols. 59r-68v, is an excerpt: "Incipit glosa facta per magistrum Iohannes de Sosoxonia super quartam differentiam alkabitii et posito quod actor iste fecisset lecturam supra totum librum, ego non curavi translatare nisi supra differentiam quartam quia videatur mihi gravior omnibus aliis differentiis." Dijon 449, 15th century, fols. 63-97, contains extracts in French. The incipit of the full commentary is: "Vir sapiens dominabitur astris: Ptolomeus in sapientiis Almagesti. . . ."

[30] Examples of this are: Digby 97, fol. 218v, "pono . . . equabo"; fol. 229v, "Videtur michi modus quem posui certior . . ."; fol. 238v, "Ego credo quod tunc debet accipi ab eo qui soli fuerit propinquior."

[31] Digby 97, fol. 230v, "Et ego dico tibi quod significator habens latitudinem potest dirigi ad locum etiam habentem latitudinem per tabulas ascensionum, et non vidi modum expositum in aliquo libro." Amplon.Q.354, fol. 15v, ". . . hunc modum non vidi positum nec expositum in aliquo libro ut pateat planius quod dixi ponam in hoc exemplum."

[32] Digby 97, fol. 239v, "Dico quod Parisius secundum veritatem tabularum Alfoncii in hora coniunctionis solis et lune precedentis introitum solis in ariete erit ascendens primus gradus Cancri . . ." (i.e. in 1331 A.D.).

[33] Digby 97, fol. 169r.

cussion of the instrument called *Directorium* in this work has already been noticed.[34] With regard to Ptolemy's three requirements of the astronomer: stability of intention, humility of disposition, and abdication of earthly possessions, John observes that the third condition "is displeasing to many and to me."[35] He adds another requirement, that a man should be by nature disposed towards it. "For I have seen good scholars in logic and general philosophy who could make no headway in astronomy and arithmetic."[36]

John repeats Albumasar's division of the opponents of astrology into ten sects: namely, those who assert that the planets have no significance over sub-lunar being; those who say that they signify only in universal and not in particular; those who say that they signify only over what is necessary and not over what is possible; those who would limit their significance to the weather; those who object that the principles of astrology could not have been learned experimentally, since thousands of years pass before the same positions of the planets recur; those who object that there is no agreement as to the true places of the planets; those who have tried to be astrologers themselves and made a failure of it; those who boast of their medical science and think that they can do without astrology; the vulgar crowd; and finally those who have become disgusted by the mistakes of inept astrologers or the pretended astrology of geomancers and lot-casters.[37] To these "sects" John would add an eleventh consisting of those who declare that astrology is contrary to the Christian faith, a charge which he denies, pointing out that many astrologers have affirmed the creation of the world, "which is the first fundamental of the Faith."[38]

John is delighted to find confirmation in one of the works of Abraham Avenezra of a conclusion which he had reached as the result of repeated experience, that when the moon entered an

[34] See note 18.

[35] Amplon.Q.354, fol. 5r, ". . . non placet multis nec et mihi."

[36] *Ibid.*, fol. 4v: "Vidi enim bonos clericos in logica et universali philosophia qui nullo modo poterant aliud capere de astronymo nec algorismo."

[37] Amplon.Q.354, fols. 5v-6v; Digby 97, fols. 166-168.

[38] Amplon.Q.354, fol. 7r; Digby 97, 169r.

aquatic sign of the zodiac under certain circumstances, it would begin to rain and continue to rain so long as the moon remained in that sign.[39] He also accepts the rule that all things which we wish to have fixed we should begin while the moon is in a fixed sign, while what we want changed soon should be begun in a mobile sign. He holds that the stars are of simple substance and not composed of different elements.[40]

Whether John was aware of Cecco's fate or not, he is rather careful to make no statements that might be religiously objectionable. Thus, quoting Alcabitius on the twelve *horae combustae,* John notes that his author states that he who declares war during the first four of these hours is in danger of losing his soul. But John hastens to add that this merely means peril of losing his life and not perdition of the soul after death and its separation from the body in the sense of its being carried off to hell by devils, which is a matter that concerns theologians and not astrologers.[41] After discussing matters bearing upon the astrological doctrine of the relation of the rise of religions to great conjunctions, John says,

> But it is not expedient to speak much of this matter, for it is a thing which does not agree with our faith. But if anyone delights in these things and wishes to reduce the changes that take place in religions to the motion of the superior bodies, let him read the work of Albumasar on great conjunctions. . . .[42]

John of Saxony, or John Danko of Saxony, as this time he clearly calls himself in the introductory paragraph, composed an *Almanach*[43] or Tables for the forty-five years from 1336 to

[39] Amplon.Q.354, fol. 12r; Digby 97, fol. 176r.

[40] Amplon.Q.354, fol. 34v.

[41] Digby 97, fol. 235v.

[42] Amplon.Q.354, fol. 49r-v, "Sed de hac materia non expeditur multum loqui, est enim res que non concordat cum fide nostra. Sed si quis delectetur in hiis et voluerit reducere mutaciones que fuerint in legibus ad motus superiorum corporum, legat libros de magnis coniunctionibus ibi inveniet." The same passage occurs in Digby 48, fol. 292; Digby 97, fol. 226v; Digby 93, fol. 155v; except that all three read "librum Albumazar" in place of "libros."

[43] BL Rawlinson D 1227, membr., 14th century, fols. 3r-32, John Dancowe, dictus de Saxonia, Almanach temporale: ". . . Unde ego Iohannes dancowe dictus de Saxonia quoddam opus feci almanach scilicet temporale." Also in Amplon.F.387, mid 14th century; Amplon.F.389, etc. The tables

1380 inclusive,[44] based upon the Alfonsine Tables as adapted to the meridian of Paris.[45] There are only two pages of text preceding the tables, but in these pages John takes occasion to say that he has composed the work because he had noticed that many masters and scholars at Paris and elsewhere were abandoning astronomy on account of the trouble of equating the planets by the common method of operating by tables.[46] By means of his handier *Temporal Almanach* John hopes to revive somewhat the science of judgments of the stars which long since has been slumbering as it were in the university of Paris.[47] In view of what we know of the astrological activities of Firminus de Bellavalle, Geoffrey of Meaux, and John de Murs at this time, John of Saxony's statement is a bit surprising. The number of almost contemporary manuscript copies preserved in the library of Amplonius Ratinck who spent his life at German schools and universities and catalogued his collection in 1412 indicates, however, that the *Almanach* met a widespread need and had a broad circulation.[48]

In connection with the division of the hour into sixty minutes of sixty seconds each, it is to be noted that John of Saxony, in his *Canons* on the Alfonsine Tables, published in 1327, and opening, "Time is the measure of motion," divided the day rather than the hour into sixty equal parts of sixty seconds each.[49] This

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are very clearly and neatly written in Amplon.F.386, about 1359 A.D., fols. 62r-109r. Here we read, fol. 62r, col. 1, "Ego Iohannes de danocowe de saxonia."

[44] In the description of our MS in Black's catalogue of the Rawlinson collection we read, "Sequuntur tabulae motuum planetarum ab anno 1340 usque ad 1380," but in the MS itself, fol. 3r, we read, "Durabit autem hoc opus usque ad annos domini 1380 completos. Restat igitur de opere a principio 1336 45 anni completi."

[45] *Idem.*, "Feci autem secundum veritatem tabularum illustris principis Alfonsii olim regis Castelle supra meridiem Parisius."

[46] *Idem.*, "Cum animadverterem quam plurimos magistros et scolares in studio Parisiensi et in pluribus aliis locis relinquentes astronomiam et ab ea declinare propter tedium et laborem equandi planetas secundum communem modum per tabulas. . . ." This passage also forms the incipit of the treatise.

[47] *Idem.*, ". . . maxime ut scientia iudiciorum astrorum que dudum in studio Parisiensi quasi sopita dormitavit ad aliqualem hominum memoriam revocaretur."

[48] See note 43 and Schum's *Verzeichnis*.

[49] BN 7281, fol. 213r, ". . . quas voca-

was also the method of the Tables themselves, at least in their Latin versions. However, as we shall see in the case of the treatise of 1317 on finding Easter ascribed to John de Murs, a person at this time might use minutes as sexagesimal divisions of the day and of the hour simultaneously.

One further possible bit of evidence of John of Saxony's occupation with astrological judgments is a nativity for some one born three degrees east of Paris at 1.30 P.M. on March 10, 1333.[50] This seems to form a part of John's *Canons* on the Alfonsine Tables and *Canons of Eclipses* in one manuscript[51] but follows its explicit in another.[52]

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mus minuta dierum et quodlibet minutum in 60 secunda, et sic semper procedendo."

[50] Oxford, Hertford College 4, fol. 126r: "et fuit natus anno domini 1333° incompleto 10 die martis post meridiem per unam horam cum dimidio." It will be noted that John here says, "one hour and a half," and does not employ the division of the hour into minutes.

[51] BL Digby 97, fol. 286v, "Investigationis gradus ascendentis nativitatis hominis duplex est modus. . . ." The Canons do not end until fol. 290v.

[52] In Hertford College 4. the *Canones* end at fol. 124v and the *Nativity* opens (as in Digby 97) at fol. 126r. The astrological figure for the nativity occurs in Digby 97 at fol. 288v; in Hertford 4, at fol. 129r. Another figure follows in the latter MS at fol. 131r.

CHAPTER XVIII

FIRMINUS DE BELLAVALLE: THE POPE AND THE CALENDAR

To Firminus de Bellavalle or Firmin de Beauval in the diocese of Amiens three works have been attributed:[1] a prognostication from the conjunction of the three superior planets in 1345, a letter to pope Clement VI in the same year on correction of the calendar in which he appears as a joint author either with John de Lineriis or John de Muris, and the work on weather prediction which is our primary concern in the present chapter.

Since there are two predictions on the conjunction of 1345 by Firminus and by John de Murs, and it is difficult to say surely which is by which, we may leave the consideration of them until our chapter upon John de Murs, when they may be associated with other predictions of the same sort. But the treatise of the same year upon calendar reform, in which the part of Firminus at least is undisputed, may be noticed briefly here.

On September 25, 1344, pope Clement VI addressed letters to Firminus de Bellavalle, otherwise called of Amiens, and to John de Murs, canon of the church of Meziéres in the diocese of Bourges, to betake themselves to the Apostolic See at Avignon as soon as might be, in order to treat of or correct certain difficulties and defects touching the golden number in the calendar. The bishops of Amiens and Paris were instructed to defray their expenses.[2] These papal letters seem to indicate beyond a doubt that the treatise on calendar reform addressed to the pope, which in some manuscripts is ascribed to Firminus and John de Line-

[1] Concerning Firminus the two chief accounts hitherto are in Duhem, *Système du monde*, IV (1916), 38-60; and G. Hellmann, *Beiträge zur Geschichte der Meteorologie*, II (1917), 189-193.

[2] Eugène Déprez referred to the document in his article, "Une tentative de reforme du calendrier sous Clément VI," *École française de Rome, Mélanges d'archéologie et d'histoire*, XIX (1899), 131-143, page 136. He has since published the text in his *Clément VI (1342-1352) lettres closes, patentes et curiales*, Tome I, deuxième fascicule, Paris, 1925, col. 209, doct. 1134.

riis,[3] who was also of the diocese of Amiens, should be ascribed to Firminus and John de Murs—unless we should attempt to maintain the hitherto unheard of thesis that John de Lineriis and John de Murs were one and the same! Sometimes in a carelessly written manuscript the two words, Lineriis and Muris, look a little alike, which may serve to explain why John de Lineriis has been named as co-author in certain manuscripts.

The work on the correction of the calendar opens with a short letter of presentation to the pope[4] in which the authors state

[3] Duhem IV (1916), 52, note 2, states that in BN 15104, fol. 50v, the copyist wrote—in the heading in the top margin—"Johannem de Lineriis de Muris" and then indicated by the usual device of a row of dots under the words, "de Lineriis," that they were to be omitted, yet below in the third line of the text wrote "Johannes de Lineriis" rather than "Johannes de Muris." This is roughly true but contains some inaccuracies. The letter on calendar reform begins at fol. 208v rather than fol. 50v of BN 15104, as I learned by painful experience after ordering a rotograph of the leaves indicated by Duhem. In the heading is written "Iohannem de Lineriis Muris" without Duhem's second "de", and the underdotting for omission occurs only beneath "Lineriis", not "de Lineriis." The heading in the top margin, "Incipit epistola super reformatione antiqui kalendarii directa domino pape Clementi VI° per venerabiles et solemnes astrologos et magistros Iohannem de Lineriis Muris et Firminum de Bellavalle anno domini 1345°," resembles the writing below, which opens, "Sanctissimo in Christo patri ac domino nostro domino Clementi sexto sacrosancte Romane ac universalis ecclesie summo pontifici nos humiles et devoti filii I. de Lineriis et F. de bellavalle ad beatorum pedum oscula prostrati presentamus hunc libellum," but might be by another person than the copyist of the text, or at least some other hand might have underdotted "Lineriis" for omission.

Duhem states further that "the numerous manuscripts of Vienna, cited by Kaltenbrunner" in *Die Vorgeschichte der Gregorianischen Kalenderreform, Vienna Sitzungsberichte*, 82 (1876), 316, as containing this treatise, "all attribute it to John de Muris and to Firminus de Bellavalle, and none of them to John de Lineriis." But it should be said that Kaltenbrunner lists only four manuscripts, of which two are of the sixteenth century.

In yet another manuscript which I have used at Oxford and which was not listed by Kaltenbrunner or Duhem, John de Lineriis and Firminus are again named as authors: BL Canon. Misc. 248, very neat and firm hand, fols. 23r-27r, with the same opening of the text as in BN 15104, but without the heading of the latter.

[4] Duhem, IV, 52-53, has given a French translation of the Latin text in BN 15104 of the *Epistola* and of the statement of the fourfold division of the work which follows it. The Latin of Canon. Misc. 248 appears to correspond. Following the salutation given in a previous note, the text proper of the *Epistola* opens, Canon. Misc. 248, fol. 23r, col. 1, "O quantum gaudium nos oves dominum (*Deum* in BN 15104) celebrare debemus cum ecclesia dei tantum pastorem regere percipimus!"

that the treatise was undertaken in response to a papal mandate and under the direction of the cardinal of Rodez. They were called on only to correct the lunar calendar and rectify the golden number used by the church to determine the date of Easter and other moveable feasts, and to this end the last three tractates of their work are devoted. But in the first tractate they venture to suggest how much the solar calendar is off, basing their estimate upon the Alfonsine Tables, "which we believe in this matter are more accurate than others and have been tested by many actual experiments at Paris and elsewhere." Duhem has noted that on this point the Alfonsine Tables happened to be much more correct than on some others, and that the reform made in 1582 by Gregory XIII might have been as accurately instituted by Clement VI in 1345. Our authors, however, apparently aware that the pope was then not especially interested in the reform of the solar calendar, although they point out that the fixed feasts are becoming farther and farther removed from the true solstices and equinoxes, profess that correction of the lunar calendar is more necessary, and that there may be considerations of expediency which forbid alteration of the solar calendar, such as the criticisms which would be made by schismatic sects whose Christmas had hitherto occurred on the same day as that celebrated by the Roman church. This illustrates that the treatise is not a purely astronomical and scientific discussion but takes ecclesiastical considerations to some extent into account. This is further brought out in the argument that if the lunar calendar is not reformed, the eclipse of the sun at the time of Christ's passion will no longer appear as plainly miraculous and naturally impossible at that date, because on a seemingly corresponding day of the year a natural eclipse will be possible. In this connection our authors repeat the usual reasons for regarding the darkness at the time of the crucifixion as miraculous and not a natural eclipse. Among other things it lasted too long, three hours, and it occurred at the time of the full moon when a natural solar eclipse is impossible.

If Firminus thus adopted the orthodox attitude that the dark-

ening of the sun at the time of the crucifixion was a divine miracle and not a natural astrological sign or accompaniment of a great event—which last tenet indeed even so pronounced an astrologer as Cecco d'Ascoli had not ventured to affirm but had explicitly controverted[5]—he (Firminus) none the less held that natural eclipses might form the basis for astrological judgments. This is seen in his best known and most widely circulated work, *De mutatione aeris* or *De impressionibus aeris* (*On Atmospheric Change*).[6] It divides into seven sections.

[5] *History of Magic and Experimental Science*, II, 961.

[6] It was printed in 1485 and again at Paris, 1539. I have used the following MSS: BN 7482, fols. 34r-156r, Rubric, "Incipit tractatus firmini de mutatione aeris dictus Colliget astrologie continens sex (*sic*) partes aut capitula"; Incipit: "Quia in multis voluminibus sapientes antiqui de mutationibus aeris multa scripta fecerunt et diversimode de hac materia tractaverunt. . . ." BL Laud. Misc. 535, fols. 68r-136r, written in a clear Italian hand of the fifteenth century, with the same incipit. Coxe, in his catalogue of the Laud MSS in the Bodleian, failed to identify our treatise as by Firminus, suggesting that it, as well as the work on the same theme preceding it in this MS, was perhaps by Nicolaus de Comitibus of Padua in the fifteenth century. Vatic. Palat. 1340, fols. 209v, col. 1-242r, col. 1: "Incipit prologus in Firminium (*sic*) de impressionibus et mutationibus aeris. Quia in multis voluminibus sapientes antiqui . . . / . . . infinita prestigia apparebunt. hoc in eodem libro de prestigiis usque ad finem. Explicit Firminus de impressionibus aeris." In other manuscripts the ending is somewhat different. Laud. Misc. 535, fol. 136r, closes, ". . . Item in sole et in cordis et partibus corporis et sensibus presagia apparebunt multa. Item pecora exultantia etc. In eodem libro usque ad finem etc. deo gratias Amen. Finis." Thus it gives merely the opening and closing words of the final paragraph in Vatic. Palat. 1340, while the sentence preceding these is not that found in the Vatican manuscript before its final paragraph. But the *prestigia* of the Vatican manuscript is a copyist's mistake for *presagia*. Vatic. Palat. 1340 is further peculiar in that on fols. 230v-240v, instead of being divided into two columns the text is separated by oblique or curving inner margins which are probably intended to give it a mystic and bizarre air. In Vatic. Palat. 1435, 15th century, fols. 145r-161r [older foliation, 133-149], the text seems broken and incomplete. "Verminius in tractatus de dispositione lucis," but then the correct incipit, "Quia in multis voluminibus. . . ." At fol. 158v (146), "Secunda pars libri de iudiciis mutationum aeris per coniunctiones magnas et eclipses ac introitum solis . . . etc." Most of fols. 148r, 150r, 154v to 156r, are left blank.

Other MSS, in which the work is anonymous, are: Berne 488, 14th century, fols. 76r-104v: "Cum in multis voluminibus sapientes antiqui de mutationibus aeris multa scripta fecerunt . . . / . . . Repertorium de mutatione aeris finit." Vienna 5463, paper, 15th century, fols. 183r-222r, Tractatus de tempestatum iudiciis et aeris mutationibus: "Quia in multis voluminibus sapientes . . . / . . . in eodem libro usque ad finem." Erfurt, Amplon.F.395, 14th century, fols. 75-98.

The first, which is the longest, is in the nature of a general introduction concerning the natures of the parts of the sky and of the stars, also of the four seasons and the climates and provinces of the earth.[7] The second part deals with universal judgments of atmospheric change from great conjunctions, eclipses, and the entries of the sun in the equinoxes and solstices and other determined places in the zodiac.[8] The third part deals with universal judgments from conjunctions and oppositions of sun and moon.[9] In the fourth part we come to particular judgments, not only from conjunctions and oppositions of sun and moon, but from other particular figures.[10] The fifth treats of judgments based upon the conjunctions and aspects of the moon with other stars and of the stars with one another and upon the relation of the moon and stars to the sun in certain places of the zodiac.[11] The sixth part deals with "the hour of rain, and where and when it will be stronger or weaker, and what places are in line for it, and of its duration."[12] The last section treats of single superior phenomena indicating a change of weather which are known through the science of meteorology and of certain other signs

[7] BN 7482, fol. 35r, "Prima pars est quasi introductoria sequentium partium et est de naturis partium celi et stellarum, quatuor etiam temporum anni et climatum atque provinciarum terre." Laud. Misc. 535, fol. 68v, "Introductio . . . de naturis partium celi et stellarum quatuor temporum anni atque provinciarum terre." For a Latin table of contents of the seven parts see also Hellmann (1917), p. 190, who does not state, however, whether he takes it from a manuscript or one of the printed editions. Vatic. Palat. 1340, and BN 7482 give the chapter headings together at the beginning of the work and repeat them later at the beginnings of the respective chapters.

[8] In Vatic. Palat. 1340 it occupies fols. 220v, col. 1-226v, col. 1. Laud. Misc. 535, fol. 85v, "Secunda pars libri de iudiciis mutationum aeris per coniunctiones magnas eclipsis ac introitus solis in punctis equinoctialibus et solstitiis et (de) aliis locis determinatis in zodiaco signorum." BN 7482, fols. 35r, "2a pars est de iudiciis universalibus mutationum aeris per coniunctiones magnas et eclipses et per introitum solis in punctis equinoctialibus et solstitibus et locis aliis determinatis in zodiaco sequentibus" (*signorum* in Vatic. Palat. 1340, fol. 220v, col. 1, and also in the table of contents at fol. 209v, col. 2).

[9] "De iudiciis universalibus mutationum aeris per coniunctiones et oppositiones luminarium." It extends over fols. 226v, col. 2-232v in Vatic. Palat. 1340.

[10] Vatic. Palat. 1340, fol. 232v.

[11] *Ibid.*, fol. 236v.

[12] The tables of contents in Vatic. Palat. 1340, fol. 209v, col. 2, and BN 7482, fol. 35v, agree closely with the wording Hellmann gives: "6ta pars de hora pluvie et ubi et quando fortior aut debilior fuerit et que sunt loca apta ad hoc et de duratione eiusdem." But in the text of Laud. Misc. 535, fol.

which have popular approval,[13] such as the behavior of dolphins, cranes, and cattle.

Firminus's work is largely a compilation made for purposes of convenient reference from the many volumes, often inaccessible, of past writers on weather prediction, of whom Hellmann reckons that he cites twenty-three. Of these Alkindi, Ptolemy, and Albumasar are each cited a score of times or more and Haly seventeen times.[14] "Abraham de seculo," which occurs seven times but which Hellmann was unable to identify, is one of the astrological writings of Abraham ibn Ezra, *De mundo vel seculo,* translated into Latin in 1281 by Henri Bate. Of Latin medieval authors Albertus Magnus and the treatises or translations of John of Seville and Hermann of Carinthia[15] are used frequently. A *Liber de presagiis tempestatum* is cited several times,[16] but its author is not named. Manuscripts of such a work are in existence, however,[17] and it turns out to be identical with Pliny, *Natural History*, XVIII, 35 or 78-90, except that it omits Pliny's opening paragraph.

128v, the wording is somewhat different: "de hora pluvie et ubique fortior et debilior fuerint et que sunt loca apta ad hoc et de duratione earundem."

[13] Vatic. Palat. 1340, fol. 239v, "Incipit pars septima de mutatione aeris per singula superiora que per methaurorum scientiam habet cognosci et quedam alia singularia vulgariter approbata."

[14] Duhem, IV, 41, was therefore slightly inaccurate in describing Alkindi and "Leopold, son of the duchy of Austria," as "ses auteurs préférés." According to Hellmann's count, Leopold is cited only four times, a number exceeded by eleven other authors.

[15] He is the author or translator of the *Liber de pluviis* or *Liber ymbrium,* which opens, "Cum multa et varia. . . ." For manuscripts see Haskins (1924), p. 49.

[16] Laud. Misc. 535, fol. 132v, "Hoc in libro de presagiis tempestatum"; fol. 133r, "Hoc in libro de presagiis"; Vatic. Palat. 1340, fol. 240v, "hoc in libro de presagiis tempestatum," "hoc totum in libro de presagiis"; fol. 241r, col. 1, "hoc in libro de presagiis," and "hoc totum in libro de prestigiis" (*sic*) —an incorrect spelling in which the copyist persists on fols. 241v and 242r.

[17] Vatic. Ottob. 1870, fols. 107r-109r, opening, "De tempestatum presagiis tractaturi a sole sumamus exordium. Purus oriens atque non fervens serenum diem nuntiat . . ."; BL Laud. Misc. 594, 14th-15th century, membrane, fols. 115-116v, opening, "Predictis difficultatibus transire convenit . . . / . . . Explicit de pronostationibus futurorum." The treatise contained in the Ottobonian collection seems clearly to be that which Firminus cited. After signs from the sun, it takes up those from clouds, moon, and stars, rainbows, winds, the sea, fish, birds, and cattle. It terminates, ". . . sudorem suppositoriis relinquentia duras tempestates prenuntiant. Explicit." Bruges 523 opens like Vatic. Ottob. 1870. For the text in these manuscripts see Appendix 18.

If the opinions of Firminus's authorities seem discordant, he has tried to reconcile them. He also suggests that it is advisable to observe how far the rules or opinions of the past agree with the present time and clime, or were once true but are to be held no longer. A table is given for the twelve signs showing the general nature of each, the effects on the weather of its three parts or sections of ten degrees, and of its northern and southern halves, according to the positions of the fixed stars in them in Ptolemy's time.[18] The reader is warned, however, that these positions have altered since. The mansions of the moon are also discussed,[19] and a table is given with their Latin and Arabic names and relations to the signs.[20] The planets are next considered with their dignities, qualities, operations, and their influence upon the weather in each of the signs. Turning to the fixed stars, Firminus gives a table covering four pages of the disposition of the stars which are near the path of the sun.[21] The first part of the work then ends with some consideration of the four seasons and the different climates of different regions.

The *De mutatione aeris* has been dated in 1320 by Duhem,[22] because Firminus states in one place that sixty-eight solar years have been completed "between the time of the Alfonsine Tables and the root of these tables,"[23] referring to some tables just included by him. He gives the time of Alfonso as 1252 and the time when the other tables were rectified as 1320.[24] But is it cer-

[18] At fol. 210r in Vatic. Palat. 1340.

[19] Beginning at fol. 211r, col. 1 in Vatic. Palat. 1340.

[20] The table comes at fol. 212r in Vatic. Palat. 1340.

[21] Vatic. Palat. 1340, fols. 217v-219r, "Tabula dispositionis stellarum que sunt prope viam solis."

[22] Duhem, IV, 42.

[23] BN 7482, fol. 70r, "Tempus inter Alphonsium et radicem istarum tabularum 68 anni solares completi," quoted by Duhem, IV, 42. The edition of 1539 gives the number of solar years between the two as 86, but this is corrected to 68 by a note. In Vatic. Palat. 1340, fol. 219v, col. 1, the figure is 60. It may be noted that 86 added to 1252 would give 1338, which we find in another passage given as the current year. Sixty-eight added to 1270, a year, which is approximately the date when the Alfonsine Tables were actually completed, would give 1338, but of course their year of reference is 1252.

[24] Edition of Paris, 1539, fol. 24v, "Id est illo tempore erant rectificatae 1319, mense 5. Item tempus Alfonsi incepit 1251 anno Christi et 5 mense." This passage does not occur in BN 7482, fols. 69v-71r, nor in Vatic. Palat. 1340.

tain that the later tables were contemporary with the composition of his work? Moreover, the 1539 edition speaks of a period from the observations of king Alfonso "to the end of the year of Christ 1368,"[25] and again states that "from the place of any fixed star in the time of Alfonso until the year of Christ 1424, the stars moved through one degree, 59 minutes, and twenty seconds."[26] These are probably later additions, not in Firminus's original work.[27] But in at least two manuscripts of it we find in another passage 1338 mentioned as the present year.[28] This would be closer in time to his treatise on calendar reform in 1345 and prognostication from the conjunction of that year than 1320 is. If Firminus had composed the *De mutatione aeris* in 1320, it might well have been cited by Perscrutator, writing in 1325. This is not the case, unless the covert and uncomplimentary appellation, "a devotee of the fables of the ancients," was meant for Firminus. If Firminus wrote in 1338, he might well have mentioned Perscrutator among his numerous authorities, but does not do so. Neither of these arguments, however, is at all conclusive, since either author might have been ignorant of the other's recent work or for some reason have not cared or forgotten to mention it. Another more conclusive reason for preferring 1338 to 1320 as the date of composition is that John of Saxony is cited,[29] and his chief known works date from 1327 to about 1355. The weight of evidence therefore seems to favor 1338 as the date of Firminus's work.

We may revert for a moment to the passage in which the present year is given as 1338, because it contains an interesting ap-

[25] *Ibid.*, fol. 24r, "Et a consideratione Alfonsi regis usque ad finem anni Christi 1368." This passage also is lacking in BN 7482 and Vatic. Palat. 1340.

[26] Ed. of 1539, fol. 24v, "Item a loco cuiuslibet stellae fixae tempore Alfonsi usque ad annos Christi 1424 motae sunt stellae per unum gradum 59 minuta 20 secunda." This passage does not occur in BN 7482 or Vatic. Palat. 1340.

[27] See the preceding notes.

[28] BL Laud. Misc. 535, fol. 70r; Vatic. Palat. 1340, fol. 211r, col. 1: Firminus states that the same stars which in Ptolemy's time were in the beginning of a given sign "are now, namely in the year of the lord 1338, beyond the middle of the same sign" (sunt modo scilicet anno domini 1338 ultra—*ultima* in the MS—medium eiusdem signi). "Sunt scilicet anno domini 1338 ultra medietatem illius signi," is the reading of Vatic. Palat. 1340.

[29] BN 7482, fol. 105v.

plication of the doctrine, so prevalent in later medieval thought, of the latitude of forms and intension and remission of forms. It is first stated that, owing to the displacement of the fixed stars in the signs since Ptolemy's time, we do not have the same experiences of the virtue of the sun through the signs as Ptolemy, because of a different combination of the fixed stars with the virtue of the sun now and then.

Nevertheless it should be understood that the virtue which is attributed to each of the signs has great latitude, so that it grows intense or falls off according to the nature of the fixed stars, yet is not entirely corrupted, so that the opinion of Ptolemy remains useful.[30]

Duhem held that the *De mutatione aeris* won Firminus great renown in the middle ages, and that it was placed in the same rank with the *Colliget medicinae* of Averroes, because it was spoken of as the *Colliget astrologiae*.[31] He does not show that it was called by this title except in one manuscript, however, nor that it was cited by other writers under that title at all, to say nothing of being mentioned with any such frequency as the *Colliget* of Averroes. I know of one instance, however, where the work is so cited, namely, by Simon de Phares at the end of the fifteenth century in his account of celebrated astrologers. He states that "Fremini, a native of Picardy," composed the *Colliget* concerning the mutation of the air which opens: "Quia in multis voluminibus antiqui. . . ."[32] Simon might have derived this information from the very manuscript which Duhem cited. In the edition of 1485[33] not only was it not called *Colliget astrologiae*, but not

[30] Vatic. Palat. 1340, fol. 211r, col. 1; BL Laud. Misc. 535, fol. 70r: "Intelligendum est tamen quod virtus que attribuitur alicui signo habet magnam latitudinem ita quod secundum naturas stellarum fixarum intenditur et remittitur, non tamen (omnino) corrumpitur, et sic remanet sententia Ptholomei utilis valde."

[31] *Le système du monde*, IV, 41.

[32] *Recueil des plus celebres astrologues*, etc. ed. E. Wickersheimer, 1929, p. 231.

[33] Its title in this first printed edition is: "Opusculum repertorii pronosticon in mutationes aeris tam via astrologica quam metheorologica uti sapientes experientia comperientes voluerunt perquam utilissime ordinatum incipit sidere felici et primo prohemium." At fols. 45v-49r follows: "Hyppocratis libellus de medicorum astrologia incipit." At the close: "Impressus est arte ac diligentia mira Erhardi Ratdolt de Augusta Imperante inclyto Iohanne Moceniceno duce Venetorum anno salutifere incarnationis, 1485, Venetiis."

even the name of the author was given. Duhem's inference from a phrase therefore seems unwarranted. The subsequent history of Firminus's work, however, contains not a little of interest and indicates that it had a considerable influence. Duhem has pointed out that the library of Charles VI of France contained a copy,[34] and that another copy was "written for king Charles VIII" and given by him to his physician, Jean Michel, and is today Latin MS 7482 of the Bibliothèque Nationale, Paris.[35] What Duhem's source is for saying that the manuscript was written for Charles VIII does not appear, however. What we read upon the flyleaf of the manuscript itself is that

> Lord John Michel, master in medicine at Paris, pensioner of this college, physician in ordinary of the most Christian king Charles VIII and his first-born, donated this book by royal gift to this college in the year of the Lord 1498, the 17th day of July.[36]

But this fact is very interesting news when read in connection with events of the immediately preceding years, to which we turn in the next paragraph.

A few years before, the library of the astrologer, Simon de Phares, had been seized by the archbishop of Lyons. When Simon appealed to the Parlement of Paris, his books were sent to Paris for examination by the faculty of theology there.[37] The library included both manuscripts and incunabula. Among the printed

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Hain, 13393. Brunet, IV, 903. Duhem, IV, 42. Hellmann (1917), p. 192.

[34] Duhem, IV, 41, citing *Inventaire de la bibliothèque du roi Charles VI fait au Louvre en 1423 par ordre du Régent, duc de Bedford,* published for La Société des Bibliophiles, Paris, 1867, p. 138.

[35] Duhem, IV, 41.

[36] BN 7482, fol. 1r, "Dominus Iohannes michel in medicina magister parisius bursarius huius collegii phisicus ordinarius christianissimi regis karoli octavi eiusque primogeniti hunc librum ex dono regio legavit huic collegio anno domini 1498 die 17a jullii." *Ex dono regio* perhaps means that Jean made the gift from a royal gift to him, as Duhem seems to have interpreted the passage. This shows that Jean Michel was alive in 1498 and did not die August 22, 1493, as is stated by Renaudet, *Préréforme et humanisme à Paris,* 1916, page 23, and by Chevalier who, however, mentions another Jean Michel who died in 1501. He was an Angevin and probably the author of mystery plays. For some further discussion of the problem of his death and identity see Appendix 60.

[37] Du Plessis d'Argentré, *Collectio judiciorum de novis erroribus,* 1755, I, ii, 325-330.

books was apparently the edition of 1485 by Erhard Ratdolt[38] containing the *De mutatione aeris* without the author's name. Among the treatises which the faculty of theology condemned were the first three in this volume: namely, the *De mutatione aeris,*[39] the pseudo-Hippocrates on astrological medicine in Peter of Abano's Latin translation, and a Latin translation of the work on nativities of Abraham Judaeus or Ibn Ezra. The last-named treatise, however, is not included in present copies of the 1485 edition.[40] The members of the theological faculty were either unaware that the king possessed a manuscript of the *De mutatione aeris,* or were not unwilling to cast an oblique criticism against Charles VIII, who had visited Simon de Phares when he was practising astrology at Lyons. In any case they did not state the author's name, and probably did not know it, since it is not given in the 1485 edition. They might have been shocked to learn that its author was the same whom a pope had honored by consultation on the question of calendar reform, or, in their state of mind as to the non-observance of the Pragmatic Sanction of Bourges, they might have been not unwilling to reflect on pope as well as king. In the manuscript, however, which that king passed on in that year through the agency of his body physician to one of the colleges at Paris, Firminus was named as the author.

How little effect upon the circulation of the work the condemnation by the faculty of theology had is shown by the survival of the 1485 incunabulum edition to the present day in a fair number of copies, and by this donation of a manuscript copy to a college of the university of Paris itself within five

[38] *Ibid.*, p. 326, col. 2, in the censure by the faculty of theology we read, "Item aliud volumen impressum, quotatum ix, in quo isti libri habentur. Primo liber cuius titulus est: Repertorium pronosticum de mutatione artis (*sic*)." *Artis* is evidently a slip for *aeris,* and the words *Repertorium pronosticum* seem to point unmistakably to the 1485 edition, to which this designation of the treatise appears peculiar.

[39] The passage quoted in the preceding note continues, "Incipit autem: Cum in multis voluminibus sapientes antiqui."

[40] Since the faculty of theology go on to mention two more treatises which they do not condemn but represent as contained in the same volume, numbered "ix" in Simon's library, it seems probable that they are dealing with two different editions which had been bound together into a single volume.

years of the book's condemnation by the university's theologians. Nor was this all. Whereas the *editio princeps* of 1485 had been printed at Venice, the next and only other edition was issued at Paris itself in 1539.[41] In the preface to this edition Philippus Iollainus Blereius tells Jean Robert, abbot of St. Julien of Tours, that he has hesitated to print the treatise because of those who think that astrology is to be rejected among superstitious rather than accepted among approved arts.[42] He defends astrology by asserting its importance for medicine, although some rude physicians would impugn it by frigid arguments,[43] and affirming that God wished to lead us to a knowledge of divinity by observation of the marvelous courses and forces of the heavens.[44] In a later preface to the reader Blereius apologizes for Firminus's barbarous Latin, furnishing us with a rather humorous contrast to the statement in the title that he has "restored it to its pristine splendor."

It is perhaps worth adding, as another indication of the penchant of that age for prediction of the future, that apparently the same Jean Michel who transmitted the royal copy of Firminus to the college of master Gervais had been the author of a "Prophecy, Vision, and Revelation,"[45] which appeared towards 1495, prognosticating victory for Charles VIII, a new reformation of the age, and the recovery of the Holy Land.

One more point may be added concerning Firminus himself. According to Simon de Phares[46] he was in the employ of several lords and princes, among them Leopold, duke of Austria, who

[41] *Firmini repertorium de mutatione aeris tam via astrologica quam metheorologica pristino nitori restitutum per Philippum Iollainum Blereium cum scholiis eiusdem,* Parisiis apud Iacobum Kerver sub duobus gallis in via Iacobea, MDXXXIX.

[42] *Ibid.,* page A ii, "qui astrologiam inter superstitiosas potius quam approbatas artes reiiciendam esse putent."

[43] *Ibid.,* A ii verso, "male feriati medici quique libris et epistolis editis astrologiam impugnant tam frigidis argumentis et rationibus nituntur ut nulla in re prodere magis inscitiam poterant."

[44] *Ibid.,* pp. A ii verso-A iii recto, "Voluit enim Deus horum mirabilium cursuum ac virium notitiam ducem nobis esse ad divinitatis cognitionem. Quantum autem refert hominum animos intuentes in illa divinitatis vestigia firmam tenere persuasionem de dei presentia deque providentia!"

[45] See Brunet, *Manuel* and Henri Hauser, *Les sources de l'histoire de France (1494-1610),* for editions and titles.

[46] *Recueil* etc., ed. Wickersheimer, 1929, pp. 231-232.

would have escaped the defeat and death which overtook him at the battle of Sempach in 1386, had he accepted the advice of Firminus and abstained from military enterprises upon days which his nativity showed were unlucky for him. This story appears more than doubtful, however, since Firminus would hardly have lived to see the year 1386. It is barely possible nevertheless that his counsel which the duke disregarded had been given at a much earlier date.

CHAPTER XIX

GEOFFREY OF MEAUX: ASTROLOGY AND MEDICINE

Geoffrey or Godfrey of Meaux (Geoffroi or Gaufred de Meaux in French, Galfredus or Galfridus or Gaufredus or Gamfredus or Ganifredus de Meldis in Latin) will next claim our attention. His literary remains, consisting almost entirely of astrological treatises, although to some extent they are also medical and astronomical, are rather surprisingly numerous considering their minor character. In time they extend from 1315 until after the Black Death of 1348. He discussed the comet of 1315, another of the year 1337, and he reviewed the astrological causes of the great plague *after* the event. Because this latter treatise referred back to the famous conjunction of the three superior planets in 1345, Geoffrey has been represented as one of those—Leo Hebraeus, John of Murs and Firminus of Bellavalle were others—who in 1344 or 1345 predicted the coming effects of that conjunction, but this appears to be a mistake. At least I have found no such prediction by him, although that of John of Murs is sometimes erroneously ascribed to him in manuscript catalogues. Geoffrey did, however, base a prediction upon the similar conjunction of Saturn and Jupiter twenty years before in 1325. This is extant. In fact in the only manuscript of it which I have seen[1] it immediately precedes the retrospective discussion of the causes of the Black Death, with which it has very likely been confused as a single treatise. In addition to these three works we have by Geoffrey a so-called "Compendium of all judicial astrology," which is really a relatively brief compilation limited to astrological medicine. The treatise is undated in such manuscripts of it as I have seen. Finally we may note that in 1320 Geoffrey had composed a calendar of the planets.

While Geoffrey's earliest dated work is of 1315, we are in-

[1] For the MSS of Geoffrey's astrological writings see Appendix 19.

formed as to an event in his life five years earlier. On February 10, 1310, he was one of forty masters and bachelors of arts and medicine appointed at Paris to examine the *Ars brevis* of Raymond Lull,[2] which they found innocuous. Denifle, however, has questioned the authenticity of this document on the ground that such a matter would have been referred to masters of theology rather than to masters of arts and medicine. In any case the document makes it appear that Geoffrey was connected with the university of Paris, and the medical character of much of his writing makes it well nigh certain that he took his degree both in arts and medicine. Duhem characterized this appointment in 1310 as the only known event of Geoffrey's life, but another of considerable importance had been noted by Chéreau half a century earlier.[3] In 1326 Geoffrey de Meaux is named as one of the six royal physicians at the coronation of Charles IV.[4] They were clothed at the king's expense in fine robes trimmed with martin's fur and "menu vair," whereas the six royal surgeons in attendance had to be content with cat and rabbit skins. This makes it certain that Geoffrey had the medical degree.

Another sidelight upon him is afforded by a manuscript noted by Hartwig in his monograph upon Henry of Hesse.[5] Geoffrey had made an astrological prediction based upon an eclipse of sun and moon in 1341. This prediction does not seem to be extant, but we know that the anonymous author of a work against superstition had written anent it to a clerk at Paris that it was not possible to make astrological predictions from such events. A master at Paris named Iohannes de Gauduno or Ganduno, whose identity Hartwig failed to unravel—Jean de Jandun could hardly have been at Paris at that date, or well informed as to what was going on there[6]—then wrote in defense of Geoffrey

[2] *Chartularium*, II, 140-141; Duhem, IV, 70.

[3] A. Chéreau, "Les médecins de six rois de France, 1270-1350," *Union médicale*, NS XXIV (1864), 573ff., 605ff., 621ff.

[4] The others were Jean Hellequin, Guillaume Hemart (Aymard?), Gilbert Hamelin, Raoul de Bellay, Thomas de Pont-de-l'Arche.

[5] For the facts which follow in the text see Otto Hartwig, *Henricus de Langenstein dictus de Hassia*, Marburg, 1857, p. 27.

[6] Jean de Jandun of course had to leave Paris as soon as his part in the writing of the *Defensor pacis* became known,

and abused the aforesaid anonymous foe of astrology. In a treatise preserved in a manuscript at Wolfenbüttel[7] this anonymous author then replied to this John. The incident at least serves further to connect Geoffrey with the university of Paris, and makes it seem probable that he was there in 1341.

Several references to lecturing in Geoffrey's works give the impression that he was a university professor. Thus he says in his *Compendium of all Judicial Astronomy* or treatise on astrological medicine,

> And note that in these things consists the whole secret of judgments of astronomy, and this I will expound to you in clear detail (*sensibiliter*) in my lectures, and then you can have a chance to express doubts and ask questions and receive replies.[8]

Or again he remarks,

> And it may be that in these three matters is found truly great science, but I promise that it will appear more clearly in the lectures when I shall explain to you whatever requires expounding.[9]

On the other hand, some of Geoffrey's works seem to have been written at Oxford rather than Paris. In that on the causes of the Black Death he gives the time of a universal eclipse of the moon of 1345 for the longitude of Oxford[10] and likewise refers the earlier conjunction of 1325 to the same longitude.[11] In this treatise, too, he looks back upon his practice of medicine in 1326, when, as we have seen, he was a royal physician.

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and, after his escape from the papal prison at Avignon, seems to have been with Louis of Bavaria until that monarch's death in 1343, although some would place Jean's death as early as 1328.

[7] Guelferbytanum 83.

[8] BM Sloane 1680, fol. 43r, col. 1, "Et nota quod in istis consistit totum secretum iudiciorum astronomie, et hoc totum vobis exponam sensibiliter in legendo et tunc poteritis habere causam dubitandi et querendi et etiam (?) respondendi." Avignon 1022, fol. 204r, col. 2, reads more briefly, "Et nota quod in istis consistit totum iudiciorum secretum per astronomiam fiendorum (?)."

[9] Sloane 1680, fol. 43v, col. 2; Avignon 1022, fol. 204v, col. 2: "Et licet in istis tribus consistit scientia valde grandis dico quod sensibilius videbitur (*videbis* in Avignon 1022) in legendo quia vobis exponam quidquid fuerit exponendum."

[10] BL Digby 176, fol. 26v, "anno domini 1345 incipiendo annum a ianuari fuerit eclipsis lune universalis cum magna mora 18 die marcii una hora post ortum lune ad longitudinem Oxonie. . . ."

[11] *Ibid.*, fol. 27r.

After explaining why the great pestilence attacked especially the lower classes and spared the magnates, the reason being the lack of stars of the first magnitude in the sign Aquarius, Geoffrey points out that the conjunction of 1325 was more fatal to persons of prominence.

What happened among the nobility after that lesser conjunction of the two superior planets with the presence of Mars you have known and seen, and it is not for me to tell.[32]

He continues, however,

In the second year after that conjunction of the superior planets with an eclipse of the sun there was scarcely a house of any person of importance that I entered or of which I heard but that someone in the house had quartan fever, even down to children of three years.[33]

If Geoffrey was thus well known in his day alike as writer, teacher, and practitioner of astrology and medicine, as an astronomer he appears in one point at least to have been a little backward or at best conservative. In his *Calendar* of 1320, which covered the coming nineteen year period from 1321 to 1340, or would apply in retrospect to the years 1302-1320, he announced that he did not accept the roots of the Alfonsine Tables because of certain insoluble objections which he had set forth publicly in lectures (yet another reference to his professorial activities) but that he employed the old Tables of Arrachel or Toledo.[34] Geoffrey appears nevertheless to have been a well-read and in-

[32] Digby 176, fol. 27r, "quid accidit post illam coniunctionem minorem duorum superiorum cum presentia martis in magnatibus vos novistis et vidistis, non est rectum quod ego narrem." Instead of the last ten words Ashmole 102 reads, "notum est, non est mihi narrare."

[33] Digby 176, fol. 27r, "Anno secundo post illam coniunctionem superiorum cum eclipsi solis vix fuit aliqua domus alicuius valentis in qua ego ingressus fui vel de qua audivi quin aliquis in domo patiebatur quartanam ac etiam pueri trium annorum."

[34] The passage has been noted by Duhem, *Le système du monde*, IV, 70; but since he gave only a French translation, we may add the Latin from BN 7281, fol. 100v: "Et sciant omnes ad quos presens opus pervenit (*devenerit* in BN 15118) quod ego Gaufridus de Meldis non accepi radices Alfonsi propter quasdam rationes insolubiles quas proposui coram omnibus dum legebam, sed accepi radices ab antiquis sapientibus approbatas secundum (*scilicet* in BN 15118) radices Arrachelis positas in tabulis tholetanis."

formed person and, among other authors, cites the works of Roger Bacon.[15]

Geoffrey begins his discussion of the comet of 1315 with the aphorism that that which is conceded on all hands by trustworthy and famous men seems to be true provided it is not repugnant to the Catholic Faith. Now John of Damascus who was great in sacred scripture, and Aristotle who was greater in natural philosophy, and Ptolemy and Albumasar who excelled in the science of the stars, are unanimous that a comet is a prognostic of future events. Nor is this against the holy faith, since it is solely a matter of disposition or inclination and not of necessity. Geoffrey therefore turns to consider what future events are signified by the comet which appeared in the year 1315 for some days before the feast of St. Thomas the apostle.

After premising that it was not a true star but a comet, Geoffrey considers the cause of its generation. John of Damascus would have it that comets are not made from inferior matter by the virtue of the stars but are new creations solely due to the divine will as a sign of future marvels. But others say that they are produced by the virtue of the conjunctions or aspects of certain planets in some appropriate quarter of the sky.

Geoffrey appears to prefer this latter opinion, for he goes on to state that Mars was in the sign Leo when this comet first appeared with Saturn in opposition in Aquarius. Moreover, Mars by its retrograde movement returned again to Saturn, thus producing a double opposition. The comet followed the position and movement of Mars, like it being in the north and having a retrograde movement. Geoffrey records in some detail its movements through the constellations as he observed them night after night. He believes that its influence is especially over the seventh clime, though its effects will also be felt in the sixth clime and several other regions. Writers on comets hold that if a comet appears

[15] In an account of the cause of the Black Death we read: Digby 176, fol. 161, "Frater Rogerus Bacon in tractatu suo post horarum significationem dicit sic. Secunda pars terre sunt centra diversarum orizontum ad que con. diversarum pyramidum virtutum celestium veniunt."

before sunrise its effects will be felt quickly, but if it appears after sunset, their fulfillment will be delayed. The comet of 1315, however, was seen both by day and night. Taking also its size and duration into account, Geoffrey estimates that its virtue will endure for two years at least.

This comet signifies corrupt blood and unnatural cholera. In consequence robberies and dissensions will be numerous, while good faith, truth, and justice will be rare. Its juncture with Jupiter shows that royalty will be affected. Few will obey their king, and many will murmur against him. Women will suffer from windyness and pustules, and the pregnant will be in peril. Many persons will flee abroad. Scarcity of crops is indicated by the comet, but fortunately this is not borne out by an examination of the revolution of the year which begins on March 13, when the sun enters the sign of Aries. The fact that Mars, the lord of the coming year, is in an aquatic sign indicates that many will be submerged in the sea. The further circumstance that Mars is in an evil sign at the time when the sun enters Aries forebodes many future ills for the nobility, and that the honor of some nobles is threatened. On the night following October first there will be an eclipse of the moon for a half hour, followed later by a total eclipse.

The treatise on the comet of 1337 resembles the earlier work in many ways. John of Damascus is cited as before, and Geoffrey once more prefers to regard the comet as produced naturally in the sky by the influence of the planets. Again Geoffrey carefully records his repeated observations of the comet and notes an eclipse in connection with it, this time a solar eclipse which preceded it on the third of March. He believes that the conjunctions and oppositions of the planets are of stronger virtue when they coincide with an eclipse. At the time of the eclipse Mars was going towards Saturn in conjunction, and then Saturn, beginning to retrograde, returned towards Mars, so that the one opposed the other, yet both regarded the eclipse. Soon afterwards Mars began to retrograde, and then they were both retrograde and so remained for a long time until finally they were in conjunction

in direct course. Since Abraham says that the superior planets when in conjunction attract earthly vapors more strongly when they are retrograde, Geoffrey believes that Mars and Saturn were the cause of the generation of this comet, which moreover directed its course towards them.

Geoffrey does not believe that any true judgment can be made from a comet, unless one discovers the sign of the zodiac under which it was generated. In this case the comet had been seen for twelve days before he knew of it, but he hastened to place it by observing the fixed stars which were nearest to it and drawing circles through them from the pole of the world. He then convinced himself that its motion was not lateral but towards the pole, and therefore concluded that it had proceeded not from Cancer or Taurus but from Gemini.[16]

The comet therefore signifies impure, corrupt, and infected blood. Melancholy, choler, and inordinate appetites will abound in many. The stars do not necessitate but dispose. Epidemics usually follow such comets. Mars will induce falsehoods, robberies, and wars. Saturn will bring cupidities, extortion, rancors, hatred, machinations, terrible deaths, and fear. Gemini threatens magnates and the clergy (*deo servientium*). As in 1315, those on the waters are in danger. The comet's own strong tendency to produce earthquakes will be counteracted by the influence of Gemini, however, while the lord of the year will counteract its tendency to produce a scarcity of crops. As in the case of the comet of 1315, its virtue will last about two years.

In the treatise of 1325 Geoffrey again opens with citation of authorities in favor of the stars as signs of the future—Scripture, Albumasar and (pseudo-)Aristotle in the book *Of the Properties*

[16] Giovanni Villani, on the contrary, noted two comets in 1337, one in Taurus named Ascone lasting four months, and the other called Rosa appearing in Cancer and of two months' duration. *Istorie fiorentine,* Milan, 1803, XI, 67. Yet other comets "in divers parts of the sky in the months of June and July" are referred to the year 1336 rather than 1337 in the anonymous section of the Westminster chronicle: BM Cotton Cleopatra A. XVI, fol. 149, quoted by James Tait, *Chronica Johannis de Reading et Anonymi Cantuariensis,* Manchester, 1914, p. 81. In place of the usual terrifying sequels of comets, these were followed by an abundance of food and reduced prices.

of the Elements.[17] He then turns to the coming conjunction of Saturn and Jupiter about the end of May, first imploring the grace of the Holy Spirit and then, according to custom, noting the hour of the sun's entry into Aries, "because then the astronomer begins his year." In 1325 it will be on March twelfth.[18] Geoffrey then considers the hour of the aforesaid conjunction and what the dominant planet will be. On this last point neither the Holy Spirit nor the method of scrutiny served to enlighten him, so that he adopted a compromise procedure and finally came to the conclusion that the dominant planet would be Saturn.[19] Jupiter it is true would be the stronger but not in a healthy state, and Mars, which was due to join them before their conjunction was complete, would be stronger than they. The sun also would excel them in strength. But the net result of this rather odd reasoning is that, taken as a whole, the conjunction will be very powerful because of the number of bodies concerned in it and accumulation of rays.

By such conjunctions nature ordains concerning its future natural secrets just as barons and potentates deliberate concerning their affairs in their parliaments. Once more we are assured that the stars only dispose men—especially the impulsive crowd—and do not compel them. Geoffrey further agrees with the *Secret of Secrets* of the pseudo-Aristotle that prayer may alter the decrees of the stars. Since, however, he cites that work as "Aristoteles in libro de regimine principum," he might seem to have used the partial twelfth century translation by John of Seville rather than the full thirteenth century version by Philip of Tripoli. Geoffrey asserts that anyone born when the conjunction

[17] Digby 176, fol. 25r, "sicud testatur Aristoteles in libro de proprietatibus elementorum." Geoffrey is probably using Albertus Magnus's commentary on this work.

[18] *Idem.*, "Hinc est quod de eorum coniunctione futura circa finem Maii anno domini M° CCC° XXV° placuit mihi quid significet speculari in primis spiritus sancti gratiam implorandus postea sicud moris est horam notavi introitus solis in ariete quia tunc incipit astronomus annum suum. Ex hoc fit hiis diebus xii die martii deinde consideravi horam coniunctionis predicte."

[19] *Idem.*, "Et invento quod nec per viam spiritus sancti nec per scrutinium posset electio celebrari, ivi ad viam compromissi et inveni nisi erravi tot ardua speculando quod Saturnus per hanc viam est electus."

is at its height would be a marvel, but it is another matter whether God will permit anyone to be born at just that moment. He thinks, however, that this conjunction will make the future time very prone to marvelous occurrences. It signifies grudges, hatreds, seditions, treacherous machinations, deception, worry, war, and disease. Many will incline to incredulity and adhere to sorcery and heresy. There will be novelties and disturbances within the church and general restlessness. Prices will go up. Geoffrey closes his 1325 prediction with the statement that the great part of what the conjunction signifies will come to pass within a period of two years.[20]

In opening what we may call his astrological pest tractate, Geoffrey states that he had been asked by certain friends of his to write something concerning the cause of this general pestilence, showing its cause naturally, and why it befell so many provinces, and why those provinces rather than others. And why more in certain cities and vills of these same provinces than in others of the same? And in the same village why it happened more in one street than another and likewise more in one house than in another? And why it less afflicted the great and persons of good family (*generosi*) than the rest of the people? And how long it would last?[21]

Most of these queries might seem to point to a discussion of contagion, but for Geoffrey all is explainable in terms of astrological influence. The natural cause was the total lunar eclipse on March 18, 1345, at the same time that the three superior planets were in conjunction in Aquarius. Geoffrey lays great stress upon the fact that sun, moon, and earth were in one straight line, thus increasing the celestial influence upon the earth, and

[20] Digby 176, fol. 26r, "Dico quod magna pars significationis predicte coniunctionis infra biennium apparebit."

[21] *Idem.*, "Rogatus a quibusdam amicis meis ut de causa huius generalis pestilentie aliquid scriberem, causam eius ostendendo naturaliter et quare contingit tot provinciis et quare illis provinciis plus quam aliis, et quare plus in quibusdam civitatibus et villis earundem provinciarum quam in aliis predictarum. Et in eadem villa quare contingit plus in uno vico quam in alio ac etiam plus in una domo quam in alia. Et quare minus magnatibus et generosis quam alteri populo. Et quanto tempore duraret. . . ."

that the superior planets drew to themselves the virtue of the sun and moon. He refers to the potency of a compound medicine for purposes of illustration. "Now the assigned natural cause governs the whole habitable earth, according to Ptolemy, which is between the east and the north."[22] Saturn governed the entire eastern portion of the habitable world; Mars, the entire western part; Jupiter, the entire northern part. Those are the reasons why so many provinces were infected by the plague. And so on.

The duration of the eclipse on March 18, 1345, was for three hours, twenty-nine minutes, and fifty-four seconds. This apparent ability to measure the duration of an eclipse to a second is interesting, since minutes themselves had not for long been employed in the measurement of time, and, although mechanical and astronomical clocks were in use in the first half of the fourteenth century, they are usually believed to have not yet been capable of measuring small intervals of time accurately, so that Nicholas of Cusa in the fifteenth century still recommended a water-clock for purposes of measuring lapse of time in experiments. Geoffrey avers that it is known to all astrologers that this was the duration of the eclipse, but as a matter of fact his contemporary, John of Eschenden's, estimate of the time differs some twelve minutes from his.[23] Geoffrey multiplies the duration of the eclipse by twenty, which is the number of years elapsing between the successive minor conjunctions of Saturn and Jupiter, and then divides the number thus obtained by thirteen, the number of lunar months in a year. This process gives five years and five months as the duration of the effects of this constellation and consequently of the pestilence. "You should understand nevertheless that I do not mean to say that this mortality comes wholly through Saturn and Jupiter but more through Mars which was joined with them in the hour of

[22] Digby 176, fol. 26v, "assignata iam causa naturalis gubernat totam terram habitabilem secundum Ptolomeum que est inter orientem et septentrionem."

[23] Digby 176, fol. 9r, Eschenden gives the duration of this eclipse as three hours and forty-two minutes.

the eclipse. And from all these was produced a condition (*complexio*) which will last according to the nature of the dominant planets in the said constellation."[24] It will also vary in different places just as the beginning of the pest did.

Geoffrey disagrees with certain writers at the Roman court, one of whom told the queen of France that the effect of this constellation would last for thirty-five years. This opinion he considers ungrounded because the conjunction of Saturn and Jupiter was a minor and not mean conjunction. Other Roman authors made the conjunction of Jupiter with Mars the cause of the Black Death, but Geoffrey retorts that such a conjunction always occurs within three and a half years, yet we hear of no such pestilence every four years or even every twenty, which further demonstrates that the conjunction of Saturn and Jupiter alone would not have caused it but rather the fact that this conjunction coincided with an eclipse when sun and moon were in a straight line with the earth.

Geoffrey then turns to seek the best remedy against this celestial influence.[25] The nativities of certain persons make them more susceptible to the Black Death than others are. Against cold, Saturnine infirmities he advises not to get cold, to eat and drink lightly, to sweat twice or thrice a week, to take two ounces of linseed and three of camomilla, cook them in wine, dip a sponge therein and rub the patient between the breasts, put him in a warm bed well covered with bedclothing and give him a sweat, and administer spiced brandy. In spring and autumn purge him of phlegm and melancholy. Somewhat different instructions are given in case the illness is due rather to the influence of the planet Mars. But the final piece of advice is the soundest. "Let everyone avoid standing long or communicating with anyone

[24] *Ibid.*, fol. 27v, "Intelligatis tamen quod nolo dicere quod ista mortalitas venit totaliter per saturnum et iovem sed magis per martem que erat cum eis hora eclipsis commixtus. Et ex hiis omnibus fiebat una complexio que durabit iuxta naturam dominantium in dicta constellatione."

[25] *Ibid.*, fol. 28r, "Nunc restat (*Restat modo* in Ashmole 192) scribere remedium magis conveniens quod potest fieri contra istam influentiam celestem." Here we have an approach to that use of the word, Influence or influenza, for a contagious disease which is said to date from the fourteenth century.

having that pestilential illness, since it is contagious in that it is poisonous and deadly in every respect."[26]

Finally we turn to Geoffrey's undated treatise on astrological medicine which, we have seen reason to believe, was the general introduction to a more detailed course of university lectures on the subject. Geoffrey first assumes with all astronomers and natural philosophy the hypothesis of the influence of the heavens upon life on the earth. He places the twelve signs of the zodiac in the *primum mobile,* in which no star exists formally but which contains virtually whatever is included beneath it. Consequently he does not agree with those who would make astrological judgments according to the eighth sphere of the fixed stars and the seven planets, but he would refer houses, exaltations, and all dignities of the planets to the twelve signs of the immobile zodiac in the ninth sphere, on which are based all astrolabes and calendars and astronomical tables. From the primum mobile Geoffrey then passes on to the influences of the spheres of the fixed stars, Saturn, Jupiter, and each of the other planets.

From these spheres Geoffrey comes to the planets themselves. The sun and moon are signifiers of life; Mars and Saturn, of death and corruption. The influence of Jupiter and Venus is beneficial, while Mercury now inflicts life and now death according to its conjunction with other planets, but of itself produces neither great fortune nor misfortune. Natural virtues are distributed among the planets thus: Saturn is retentive; Jupiter governs digestion, nutrition and growth; the sun is vital; Venus is appetitive; Mercury is rational; the moon, expulsive and motive. Mars seems to be inadvertently omitted. In their direct courses the planets are restrictive, but when retrograde, they are laxative.

The twelve houses or accidental parts of the sky are next considered, and the members of the body ruled by each. The discussion of these in manuscript Sloane 1680, is for the most part

[26] Digby 176, fol. 29r, "Vitet etiam unusquisque (*Sed vitet unusquisque* in Ashmole 192) eorum stare diu vel communicare cum aliquo habente istam egritudinem pestilentialem quia contagiosa est pro eo quod venenosa interficiens a tota specie (Ashmole 192 adds *indisposito*)."

omitted in Avignon 1022. When a planet is lord of a particular house it governs "accidentally" those diseases and members of the body which are under that house. Suggesting that the reader endeavor to elevate his intellect to an arduous, difficult, and subtle matter, Geoffrey then imparts the information that in transmutations and daily business the accidental significations are more important to note, but that great affairs and alterations extended in time depend rather on the natural properties of the planets[27] which had been discussed earlier. It is further to be noted that when the planets are in the east they signify new diseases, and when in the west, chronic complaints.

These preliminary generalities having been enunciated, Geoffrey devotes the last three-fifths of the treatise to an exposition of the astrological determination of crises in disease, uroscopy, and administration of medicines with election of the proper hours.

[27] Sloane 1680, fol. 43v, col. 1, "In transmutationibus et negotiis cotidianis magis fortes sunt significationes accidentales, sed in negotiis magnis et alterationibus longi temporis est econtra."

CHAPTER XX

JOHN DE MURS AND THE CONJUNCTION OF 1345

John or Jean de Murs (in Latin, Iohannes de Muris)[1] was a prominent astronomer and writer upon arithmetic and music at Paris in the first half of the fourteenth century.[2] He tells us himself that he was born in Normandy in the diocese of Lisieux. Our earliest notice of him appears to be on March 12, 1318, when he was still a student in the faculty of arts at Paris.[3] On this occasion he made an important astronomical observation at Evreux of the vernal equinox or entry of the sun into Aries. Historians of science have made a great deal of fuss about the mural quadrant of Tycho Brahe at the close of the sixteenth century, as if it constituted a remarkable modern advance in the development of astronomical instruments. Tycho's much vaunted device had a radius of about six feet and nine inches, and the aforesaid historians of science have often contrasted this with the small dimensions of medieval portable astrolabes. But three centuries before Tycho our undergraduate employed a *kardaja*[4] with a

[1] E. Déprez, "Une tentative de reforme du calendrier sous Clement VI," *École française de Rome, Mélanges d'archéologie et d'histoire,* XIX (1899), 137-138, remarks: "il ne faut pas, comme certains, l'appeler Jean des Muris ou de Meurs."

[2] My account of John de Murs follows along somewhat the same lines as that of Duhem, *Le système du monde,* IV, 30-39, 41-60, etc., but is based upon a reexamination of the manuscripts of Paris cited by him and use of additional manuscripts at Oxford and elsewhere.

[3] This information and the statement of his Norman origin are contained in the opening passage of his earliest known treatise: BN 7281, fols. 159v-160r, De introitu solis in ariete. "Queritur preterita universi presentis et futuri quia ego Io. de Muris pro tempore degens Ebroic. studens in facultate artium de Normania oriundus in episcopatu Lexomen. una vice considerans circa motus planetarum introitum solis in ariete volui reperire anno domini 1318. . . ."

[4] Duhem, IV, 31, gives John's spelling of the word as *kardaya,* but according to my reading it is *kardaga.* The instrument employed by John differed somewhat from the definition of the word, *kardaja,* given in Sarton's *Introduction to the History of Science,* I, 530, note o, as the arc equal to one ninety-sixth of the circle. Here it was one twenty-fourth. Dr. Sarton has since elaborated further the history and definition of the word in *Isis,* XIV (1930), 420-422.

radius of fifteen feet for his astronomical observation. Its arc, it is true, was only one-sixth that of a quadrant. And if Tycho's quadrant had the advantage of being affixed to a wall, our medieval undergraduate's *kardaja* was at least set up by him "on immobile stone" and "as absolutely straight as possible."[5] Nor was John de Murs' *kardaja* the only instance from that time of the use of large instruments for astronomical purposes. Sixteen years earlier in 1302 we hear of a correction of the position of the stars being made at Barcelona with two large armillaries "by a great astrologer whom the king of Aragon compensated for doing this."[6] Apparently it was only in Tycho Brahe's day that such large instruments had become a rarity. Our young astronomer was pleased to find that his results were in essential conformity with the Alfonsine Tables and with the observation made by William of St. Cloud in 1290. He states that he has composed on this basis a table of entries of the sun into Aries, but it does not seem to be included in our manuscript, which perhaps reproduces only its prologue.[7]

John closes with a burst of proud confidence in his results and defiance of possible criticism thereof, penned in a somewhat curious and bombastic tone, more resembling the style of an astrological prediction than that of astronomical tables. He and his treatise[8] will guarantee to all astrologers and their heirs the entries of the sun and other contents, and defend these against envious and ignorant critics who despise the utterances of others and against any persons, lay or clerical, before any judges, especially the astrolabe and *turquetum*—scientific instruments which can neither be moved by entreaties nor corrupted by gifts to sup-

[5] BN 7281, fol. 160r, "Et ego prefatus Iohannes multo affectu desiderans veritatem huius sensibiliter agnoscere mihi corde omnia ista consentiens et comprehendens instrumentum ad hoc congruum 15 pedum in semi-dyametro conficiens sextam partem quadrantis arcuatam quod kardaga nominatur elevavi in vera meridiona (*sic*) super lapidem immobilem rectissime quam possibile fuit. . . ."

[6] BN 7324, fol. 50v, "Iste stelle fuerunt correcte anno domini 1302 in civitate Barcinone cum 2 magnis armillis per unum magnum astrologum quem dominus rex Aragonum compencionabat pro hoc faciendo."

[7] Someone has written at its close, "Prologus de Muris credo."

[8] Duhem, IV, 32, who does not give the Latin text, has translated the opening words, "Et sic ego Io. prefatus et qua-

press the truth.[9] What a noble and intrepid declaration on behalf of science these words would be esteemed by historians of science, had they come from the mouth of some astronomer in the days of Galileo! But having been uttered in 1318, they have been buried in oblivion, along with other "village Hampdens," "mute, inglorious Miltons," unadvertised Tycho Brahes, and unpersecuted Galileos.

We have just said that our earliest notice of John de Murs appears to be on March 12, 1318. But in a manuscript at Vienna there is ascribed to him a work on the calendar and finding the date of Easter,[10] in which 1317 is more than once mentioned as the date of writing.[11] However, this ascription, which occurs only

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terni mei . . ." as "Et ainsi moi, Jean susnommé, et mes seconds," but *quaterni* here surely means "quaternions" or the folded sheets of a book.

[9] BN 7281, fol. 160r, "Et sic ego Iohannes prefatus et quaterni mei omnibus astrologis et eorum heredibus predictos introitus solis et inclusa tenemur et tenebimur garantizare et deffendere contra omnes invidos reprehensores ignorantes et contempnentes aliorum dicta et quasque personas religiosas et mundanas coram quibuscumque iudicibus specialiter astrolabio seu turqueto quoniam pro tacendo a veritate nec flecti prece nec obliquari munere dignarentur. Completum est hoc opus anno et die supradictis. Amen."

[10] Vienna 5292, 15th century, fols. 199r-209v: opening, "Autores kalendarii nostri duo principaliter tractaverunt in doctrina inveniendi lunam primam . . ."; and closing, so far as the text is concerned, at fol. 206v, ". . . que est sufficiens notitia vulgari computatori. Benedicatur filius dei qui me perduxit ad finem eius quod ad gloriam sui et edificationem fidelium scribere volui." Tables for the months, two to a page, beginning with March and April and ending with January and February, occupy fols. 207r-209v. At the bottom of the last page beneath the tables for January and February is written in the same hand as the tables, "Et sic est finis kalendarii Ioannis de muris de observantia termini pascalis." This appears to be the only indication that John de Muris is the author. Kaltenbrunner, "Die Vorgeschichte der Gregorianischen Kalenderreform," *Sitzb. d. philos.-hist. Classe d. k. Akad. d. Wiss.*, Vienna, LXXXII (1876), 322, noted the MS and very briefly described the treatise without giving the date of its composition. Another copy is Vienna 5273, 16th century, fols. 91r-102r.

[11] Vienna 5292, fol. 201r, while dividing "Annos Christi 1316 perfectos" severally by four for leap-years, by 28 for solar cycles, and by 19 for lunar cycles, the author says, "Item constat quod annus Christi 1317 in quo iam sumus." See also fol. 206r, "pro tempore in quo sumus, hoc est anno Christi 1317"; and fol. 205r, "Bene est ut dictorum ponam exemplum: Anno Christi 1318 volui scire medium tempus. . . ." At fol. 204r-v, after noting the dates of Easter in 1291, 1294, 1298, 1301, 1304, 1305, 1311, 1314, 1318, 1321, 1322, 1325, 1328, and "anno sequenti", the author exclaims, "Ecce quot errores infra tam paucos annos sustinuit ecclesia." But he might use this tense in writing in 1317, since the majority of these dates were then in

at the close of the treatise, may be incorrect. The manuscript is of the fifteenth century,[12] and another work on the calendar attributed to John de Murs immediately follows it, after which comes the joint work with Firminus of 1345. A noticeable feature of this treatise of 1317 is that it employs the Tables of Toulouse, which the author says he has found more accurate than others,[13] and gives no sign of acquaintance with the Alfonsine Tables, which we have just seen John de Murs using in 1318. The Tables of Toulouse had been used by William of St. Cloud in composing his *Almanach* for the twenty years beginning from 1292,[14] and by observations of the planet Mars made on March 3 and April 21, 1290, he had found an error of three degrees in those tables.[15] Nor does the author of our calendar and discussion of Easter appear to be a young man. He recalls how the Jews ridiculed the Christians for their error in the date of Easter in 1291.[16] Of course, John de Murs may not have been a

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time past. Possibly, however, this passage may be in part a later interpolation.

[12] At fols. 201v-202r, a horoscope for the first of May 1407 and 1408 appears to have been interpolated into our text.

[13] *Ibid.*, fol. 204v, "Ad inveniendum ergo secundum veritatem medias coniunctiones et oppositiones luminarium quantum ad tempus describam tabulas extractas de tabulis ad meridiem Tholose quia eas veriores aliis tabulis sum expertus." See also fol. 200v, "Fuit enim introitus solis in arietis primum initium anno Christi 1308 lapsis de martio 13 diebus 0 horis 10 minutis ad meridiem et longitudinem Tolose;" fol. 201r, "ut patet in tabulis Tolosanis"; fol. 202r, ". . . 0 in mensibus, 12 in diebus, 19 in horis, 48 in minutis, 9 in secundis ad meridiem longitudinis Tolose quod de facili equari potest ad longitudinem Ierusalem." Kaltenbrunner (1876), p. 322, in his brief notice of our treatise says nothing of its using the Tables of Toulouse, but remarks: "Das Kalendarium hat richtig gestellte Numeri aurei; die Stellungen derselben aber weichen vielfach von denen der besprochenen Probetafeln ab. Wahrscheinlich sind letztere für den Meridian von Paris gestellt, während von den ersteren ausdrücklich gesagt wird dass sie für Jerusalem berechnet sind." The only justification for these last words that I could find is the passage above quoted.

[14] BN 7281, fol. 141v, ". . . per tabulas Tholose"; fol. 142r, ". . . similiter etiam per tabulas Toletanas ad huc maior invenitur differentia quam per Tholosanas." He also notes from an old manuscript an observation made on March 4, 1226, of a conjunction of Saturn and Jupiter, which disagreed with the Tables of Toulouse and came nearer to his own reckoning in the case of an observation made by him in 1285.

[15] HL XXV, 72. The observations made by William of St. Cloud have since been discussed further by Duhem, IV (1916), 10-19.

[16] Vienna 5292, fol. 204r, ". . . ecclesia secundum usum suum celebrat diem pasche 22 die aprilis luna existente 23ª

young man when he studied in arts at Paris in 1318, but the odds are in favor of this, especially since his activity continued into or through the pontificate of Clement VI. While, then, this treatise of 1317 does not seem directly to concern us here, we may note in passing that its author, arguing the question whether Christ died in his thirty-third or thirty-fourth year, decides that it could not have been in the latter, and that he comes to the conclusion that the passion fell on April 3 and the resurrection on the fifth.[17] It is also worth noting that he already reckons time by hours, minutes, and seconds,[18] and that this method appears to have characterized the Tables of Toulouse, although in one passage he also employs the division of the day into sixty minutes.[19]

In 1321 John de Murs composed several works. One was *Canons* for a Table of Fractions, both sexagesimal and vulgar which he composed for a friend and divided into two parts. Or perhaps the work should rather be called "Canons of a Table of Proportions," or "The Table of Tables."[20] At its close he states that in the same year he had produced an elaborate work on music,[21] a solution of the squaring of the circle,[22] an

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quod est contra statuta decretorum suorum predictorum qui error fuit anno Christi 1291°. Et hoc Iudei nobis Christianis eo anno irridendo improbaverunt" (*impropaverunt* in the manuscript).

[17] *Ibid.*, fol. 203v.

[18] In addition to passages quoted in note 13, we may note, fol. 202v, "elapsis 8 diebus 7 horis 14 minutis 50 secundis ipsius mensis ad meridiem Tholose."

[19] *Ibid.*, fol. 199r, "annum lunarem . . . esse 354 dies et 11 partes de 30 partibus unius diei, hoc est 22 minuta."

[20] Only the closing fragment of it is preserved in BL Digby 190, early 14th century, fol. 66, from Macray's description of which I draw the Latin quotations in this and the following notes. "Explicit tractaculus canonum tabule minutiarum philosophicarum (*phisicarum* would be the more usual word to designate sexagesimal fractions) et vulgarium qui tractatus et tabula composita sunt a magistro Io. de Muris Normano qui eodem anno complevit plures alios tractulos (*sic*) cum isto ut huius tractaculi finis manifestat."

The full work appears to be preserved in BN 7401, pp. 115-124, and perhaps in Erfurt, Amplon.F.377, fols. 37-38. Both open, "Si quis per hanc tabulam tabularum proportionis. . . ." The former MS includes, at pp. 116-117, a table for multiplying and dividing fractions. It ends, ". . . propter amorem scientie solempniter exaltare. Explicit canones tabule tabularum edite a magistro Iohanne de Muris anno 1321." The Amplonian MS ends similarly, but according to Schum the year mentioned is 1322.

[21] It may best be described in his own words: "Notitia artis musice proferende figurande tam mensurabilis quam plane

exposition of the Alfonsine Tables,[23] and a *Genealogy of Astronomy*. These works, "unheard of and unknown in the preceding years, had lain as it were asleep in the treasury of wisdom."[24]

quantum ad omnem modum possibilem discantandi non solum per integra sed usque ad minutissimas fractiones." The wording is practically the same in BN 7401, p. 124.

[22] It does not seem to be extant.

[23] Duhem, IV, 32, asserts that in a Paris MS which I have since examined, BN 7401, pp. 115-124, are found joined together two writings of John de Murs, entitled *Tabula tabularum* and *Canones tabule tabularum*, at the close of which we read, "Expliciunt canones tabule tabularum edite a Magistro Iohanne de Muris anno 1321." He would identify these Canons with *Canones tabularum Alfonsi* contained in a manuscript at Oxford, and because that manuscript contains the statement that they were "composed at Paris in the Sorbonne by John of Murs," he concludes that John was writing at the Sorbonne in 1321. Duhem gave no shelf-mark for this Oxford manuscript, but referred for it to Steinschneider's article, "Intorno a Iohannes de Lineriis e Iohannes Siculus," in Boncompagni's *Bullettino di bibliografia e di storia delle scienze matematiche e fisiche*, XII (1879), 348. From this I learned that the Oxford manuscript was Aulae B. Mariae Magd. 2, and from its reference to Coxe's catalogue of manuscripts in Oxford colleges and halls that this manuscript is of the fifteenth century and contains John de Murs' work at fols. 127-136. Since the publication of Coxe's catalogue and the replacement of Magdalen Hall in 1874 by the second foundation of Hertford College, the manuscript has changed its shelf mark to Hertford 4, and some busy hand has renumbered the leaves of our treatise as fols. 140-147. From this it might seem that the length of the treatise had in the meantime shrunk from ten to eight leaves, but this is not the case. The aforesaid busy hand was simply in too much of a hurry and skipped two leaves, which it subsequently numbered 141a and 141b. Why will librarians persist in renumbering the leaves of manuscripts? Probably for the same reason that they displace volumes on the shelves, to make more work and bother for themselves and everyone else.

When we had finally succeeded in orienting ourselves in this rechristened and mispaginated manuscript, we indeed found the statement, adduced by Coxe, Steinschneider, and Duhem, that John de Murs composed these canons at Paris in the Sorbonne, but also the date, 1339, which neither Coxe, Steinschneider, nor Duhem had disclosed. A portion of the same work in another manuscript at Oxford, Digby 97, fol. 125r, ending, ". . . in minutis facienda. Hos autem canones disposuit Iohannes de Muris Parisius in anno domini 1339 in domo scolarium de Sorbona," supported the same date. Moreover, the opening part of the work gives 1338 A.D. as the year in two examples: see Hertford 4, fol. 140. It therefore seems doubtful if this work is the same as that which John says he composed in 1321, or as that so dated in the Paris manuscript, BN 7401, or if John was as yet connected with the Sorbonne in 1321.

[24] "Cognitioque circuli quadrature perfectissime demonstrata; Expositioque tabularum Alphonsi regis Castelle; ac Genealogia Astronomie nobis claruit, Altissimo collaudato; que tanquam inaudita et ignota ceteris annis antecedentibus quasi sopita in thesauro sapientie iacuerunt." Also in BN 7401, page 124.

Thus John again displays abundant confidence in the scientific importance of his work. With his exposition of the Alfonsine Tables, or at any rate with the year 1321, may be associated a *Calendar and Patefit,* ascribed to him in the manuscripts, which equates the solar calendar to the year 1321, and contains tables of conjunctions and oppositions of sun and moon for the meridian of Toledo according to the Tables of Alfonse, king of Castile, which begin with 1321 A.D. and run to 1396. Thus John de Murs appears to have begun to use or introduce the Alfonsine Tables almost simultaneously with John de Lineriis and John of Saxony. The title, *Patefit,* comes from the first word of the text that accompanies these and other tables.[25] This text comprises a preface praising the study of the stars and two parts on the solar and lunar calendars. With it is run together a discussion of the rules of computists and a brief treatise on astrological elections in medicine. The author also refers in the aforesaid preface to the time he has already spent on astronomy and to a large work which he has written on the revolutions of the stars.

In 1323, at the Sorbonne in Paris, John de Murs wrote his *Speculative Music,*[26] an abbreviation of the work of Boethius on music. John's work was commented upon in the next century by Prosdocimo de' Beldomandi. It was printed at Leipzig in 1496, at

[25] "Patefit ex Ptholomei disciplinis in libro suo qui dicitur almagestis. . . ." I have examined the *Patefit* in rotographs from two Erfurt MSS: Amplon.Q.360, 1360 A.D., fols. 33v-55; Amplon.Q.371, 14th century, fols. 8-42v. See Schum's catalogue for fuller descriptions. Other MSS are BM Royal 12.C.XVII, first half of 14th century, fols. 146-210, where it is dedicated to Gaufridus, abbot of Bec, and is called *Kalendarius Beccensis;* and Metz 285, 15th century, in which a note questions the attribution to John of Murs and states that some ascribe it to a monk of Bec. There was, however, no abbot of Bec named Gaufridus in 1321. Gaufridus or Geoffroi Fae, previously prior of Prato, was elected abbot of Bec only in 1327 and died in 1340. See Porée, *Chronique du Bec,* 1883, pp. 47-53; Bourget, *The History of the Royal Abbey of Bec,* translated from the French, London, 1779; Eubel, *Hierarchia,* I, 234. The *Patefit* may either have been dedicated to him years after its composition, or have been dedicated to him in 1321, and the title, abbot of Bec, be a later insertion of a copyist.

[26] Duhem, IV, 33: "Les manuscrits nombreux qui nous ont conservé la *Musica speculativa* se terminent tous par ce colophon, qui nous permet de dater cet ouvrage: 'Explicit musica speculativa secundum Boetium, per magistrum Iohannem de Muris abbreviata Parisiis in Sorbona anno domini 1323.'"

Frankfort in 1508, and in the modern collections of medieval writers upon music of Gerbert and of Coussemaker. Prosdocimo further commented on two other works on music by John de Murs of which we do not know the date of composition: *Tractatus practicae cantus mensurabilis* and *Ars summaria contrapuncti.* Possibly his chief work on music was the *Speculum musicae,* in which he alludes to the *Speculative Music* as by a modern doctor without naming himself.[27]

In 1324 from the Sorbonne John de Murs published what Duhem terms "a synoptic table of the science of numbers."[28] In December of the same year he completed a demonstration "of the quantity and figure of the molten sea of Solomon."[29] At some unstated date he made an abridgment of the *Arithmetic* of Boethius which was twice printed in 1515 and 1538.[30] But the next fixed date for a work by John de Murs after 1324 appears to be 1337, when he is said to have proposed to correct the Julian calendar by omitting leap-years for the next forty years.[31] Possibly, however, there is a confusion here with a later work by him on the same general subject.

In 1339 John de Murs completed, "in the house of the scholars of the Sorbonne," the following astronomical tables and canons,

[27] This statement is made by R. Hirschfeld, *Johann de Muris, seine Werke und seine Bedeutung als Verfechter der Classischen in der Tonkunst,* Leipzig, 1884. The *Speculum musicae* was edited in Coussemaker's second volume from BN 7202.

[28] BN 16621, fols. 62v-64r, "Fractiones M. I. de Muris. . . . Hec est arbor Boetii de arte numerorum sumpta et ordinata 1324 in domo scolarium de Sorbona per Magistrum Iohannem de Muris." I follow Duhem, IV, 33, for the description of this manuscript which I have not examined.

[29] Bruges 523, 13-14th century, fols. 31r-32r: "Cum de figura maris aenei inter barbaros . . . / . . . meliori credimus demonstrasse. Explicit demonstratio quantitatis et figurae maris aenei Salomonis de quo habetur 3 Reg. a. acta a magistro Io. de Muris anno verbi incarnati 1324 mense Decembri." On fol. 32v is a figure of the brazen sea.

[30] Duhem, IV, 33-34, or Favaro in Boncompagni's *Bullettino,* XII (1879), 231.

[31] Duhem, IV, 51, citing from Moritz Cantor, *Vorlesungen über Geschichte der Mathematik,* Bd. II, Schubring, *Zur Errinerung an die Gregorianische Kalenderreform* (1883), p. 7, a work which I, like Duhem, have been unable to find. Kaltenbrunner, *op. cit.,* p. 322, discusses two works on the calendar by John de Murs contained in MSS Vienna 5273, fols. 91r-102r, and 102v-111v; 5292, fols. 199r-209v, and 210r-219v, but assigns no dates to them. We have discussed one of them above and dated it in 1317.

variously described as "Canons of the Alfonsine Tables," and "Canons of eclipses of John de Murs."[32] This divergence of title is readily explicable, however, since the two captions apply to different parts of the treatise or collection of treatises. First are described seven tables,[33] of which the last deals with the conversion of hours of the day and their fractions into minutes of days and their fractions.[34] Then comes a second part concerning the movements of the planets which is followed in its turn by a treatment of the revolutions of years. At the close of the latter we read, "Here end the canons of the tables of the illustrious king Alfonso, composed at Paris in the Sorbonne in the school house."[35] But immediately following this it is stated that "To operate and use the tables of the illustrious king Alfonso of Castile must first be considered what is the *titulus* of time with which we should enter the tables and what the *titulus* of motion." The next heading treats of the quantity of the year[36] and begins by telling what the followers of Alfonso have said. It is with this heading that the second manuscript which I have seen begins.[37] After instructing how to find the sine, both manuscripts then turn to rules for eclipses and tell how to find "the second diversity of the aspect of the moon in longitudes . . . variations of diversity of aspect of one hour," the extent and duration of a solar eclipse, the diameter of the earth's shadow in eclipse, and the extent and duration of a lunar eclipse. An explicit follows the discussion of solar eclipses,[38] and Macray in his catalogue of the Digby manuscripts has made John de Murs author only of the brief treatment of lunar eclipses which follows this explicit. It can hardly be held, however, that the date

[32] In this I follow the heading on the fly-leaf of BL Digby 97, rather than the description in Macray's Catalogue, "Canones de eclipsi lunae."

[33] "Prima tabula docet differentiam . . ." is the incipit of Hertford College 4, fols. 140r-147r, Canones tabularum Alphonsi compositi Parisiis in Sorbona.

[34] *Ibid.*, fol. 141a, recto, "7 tabula est de conversione horarum diei et suarum fractionum in minuta dierum et earum fractiones."

[35] *Ibid.*, fol. 142v, "Expliciunt canones tabularum illustris regis Alfonsii compositi Parisiis in serbona (*sic*) in domo scolarum."

[36] *Ibid.*, fol. 143v, "Sermo de anni quantitate. Dixerunt alfonsiste. . . ."

[37] Digby 97, fol. 122r.

[38] "Explicit ars brevis de equatione eclipsis solis"; Hertford 4, fol. 146v; Digby 97, fol. 124v.

of composition, 1339, given at the close in both manuscripts, should apply only to this short discussion of lunar eclipses, since in the opening description of the seven tables the year 1338 is mentioned in two examples.

Duhem appears to suggest the year 1341 for the composition of two other treatises by John de Murs, a prediction from a conjunction of the three superior planets and his chief work on arithmetic, the *Quadripartitum numerorum*. For the latter, however, he also mentions the correct date, 1343,[39] so that the 1341 seems a misprint in this case and is perhaps so in the other.[40] At any rate, the only conjunction of the three superior planets at this time was in 1345, since a conjunction of Saturn and Jupiter occurs only every twenty years. In the same year 1345, as we have seen, he and Firminus de Bellavalle addressed their treatise to Pope Clement VI on the subject of calendar reform. Probably John composed his prediction either early in 1345 or at some time during the previous year, perhaps before he received the papal mandate of September 25, 1344, since his treatment of the conjunction of 1345 is not addressed to Clement VI, whereas he did address to that pope a work on two later conjunctions. Both the *Quadripartitum numerorum*[41] and the treatise on calendar reform have been sufficiently discussed elsewhere,[42] but the prediction from the conjunction may occupy us a little further.

The conjunction of 1345 received much attention, especially subsequently when the Black Death occurred and this preceding conjunction was looked back upon as the celestial cause which had corrupted the air, while some astrologers claimed that they had predicted the plague back in 1345 from the conjunction. Several of the prognostications which were made in 1344 or

[39] Duhem III (1913), 300, and Duhem IV, 34.

[40] However, both at IV, 35 and 38, Duhem ascribes the conjunction as well as the treatise on it of John de Murs and Leo Judaeus to the year 1341.

[41] A. Nagl, "Das Quadripartitum des Johannes de Muris und das praktische Rechnen im vierzehnten Jahrhundert," *Abhandlungen zur Geschichte der mathematischen Wissenschaften*, 1890; L. C. Karpinski, "The 'Quadripartitum numerorum' of John of Meurs," *Bibliotheca Mathematica*, XIII (1912-1913), 99-114.

[42] See Chapter 18 on Firminus de Bellavalle and the references given there.

1345 have been preserved, and we find them more or less grouped together in the manuscripts. In a fourteenth century manuscript at Paris occur one after the other three such predictions ascribed respectively to Leo Judaeus, John de Murs, and Firminus de Bellavalle.[43] In another fourteenth century manuscript at Erfurt the same two predictions are attributed to John de Murs and Firminus,[44] but the prognostication by Geoffrey of Meaux which precedes them and which Schum in his catalogue of the manuscripts took to be a prediction from the triple conjunction of 1345 really has to do with the comet of 1337. In a third manuscript at Paris the letter to Clement VI on calendar reform by John de Murs and Firminus is preceded by the same two predictions from the conjunction of 1345 ascribed to Firminus and John de Murs.[45] In a manuscript of the fourteenth century at Oxford, which appears to have been the model or type for two other later manuscripts there, we have in that order the prognostication by John of Eschenden or Ashendon from the eclipse and conjunction of 1345, the prediction of Leo Hebreus—as he is now called—which has been already mentioned, and the prediction which in the other two manuscripts of the fourteenth century was ascribed to Firminus but which now appears under the name of John de Murs. After some intervening tables there follows the prediction of Geoffrey of Meaux from the conjunction, not of 1345 but of 1325, and his *ex post facto* association of the great pestilence of 1348 with the conjunction of 1345.[46]

The attribution of three such predictions to Leo Judaeus,

[43] BN 7378A, fols. 62r-63r, 63r-v, 63v-64r. Duhem, IV (1916), 38, in referring to this manuscript has incorrectly dated the conjunction in 1341.

[44] Amplon.F.386, fol. 59v, col. 2, "Firmini" (this word is perhaps a later insertion than the following text). "Tres principes de militia superiorum . . ."; fol. 60r, col. 2, "Io. de Muris. Ex doctrina mirabili sapientum. . . ."

[45] BN 15104, fol. 206r-v, "Tres principes de militia superiorum . . . / . . . per aliam viam reversi sunt in regionem suam. Explicit pronosticatio Magistri Firmini de Bellavalle super coniunctionem Saturni Iovis et Martis anno domini 1345."

Ibid., fols. 206v-208r, "Ex doctrina mirabili sapientum . . . / . . . duratio huius accidentis erit 18 annorum etc. Explicit pronosticatio magistri Iohannis de Muris super coniunctione Saturni etc."

[46] BL Digby 176. See Macray's catalogue of 1883 for detailed description.

John de Murs, and Firminus de Bellavalle receives contemporary confirmation from Symon de Covino of Liège in his astrological poem on the *pestis inguinaria,* entitled *Of the Judgment of the Sun at the Banquets of Saturn* and written in 1350. In the prologue he states that the judgments of the sun as given in the poem follow the writings of master John de Murs, master Symon de Belvaco (i.e. Firmin de Beauval), and master Leo Judaeus of Montpellier, and that he has added nothing of his own except the metrification.[47]

One of the continuators of the chronicle of William de Nangis, Jean de Venette, a Carmelite, opens his account of the years, 1340-1368, with two prophecies whose import he confesses is not wholly clear to him. One of them is by John de Murs, a great astronomer, but it is not definitely stated whether it relates to the conjunction of 1345 or not. It is couched in obscure, mystical, and figurative language. The son reigning in the better part of the world will be moved against the seed of the lion and will stand in a field of thorns. Then the son of man will come bearing wild beasts in his arms, and his kingdom is in the land of the moon. He will cross with a great army and will enter the land of the lion who will lack aid because the beasts of his region have torn his flesh. In that year an eagle will come from the East with extended wings by treachery with a great multitude of his eaglets in aid of the son of man. In that year castles will be destroyed, there will be great terror among the people, and in each part of the lion will be the lily. Between many kings on that day will there be bloodshed, and the lily will lose his crown with which thereafter the son of man will be crowned. For four years following there will be battles in the world between the Faithful, the greater part of the world will be destroyed, the head of the world will be brought low to earth, but the son of man with the eagle will prevail. Then shall there be peace in all the lands and abundant crops. Then the son of man,

[47] See the edition of Symon's poem, *De iudicio solis in conviviis saturni,* by E. Littré, "Opuscule relatif à la peste de 1348, composé par un contemporain," *Bibliothèque de l'école des chartes,* II (1840-1841), 208.

wonderful sign, shall cross to the land of promise, because all the promises of the First Cause shall then remain fulfilled.[48]

This prophecy does not correspond at all to either of the two predictions from the conjunction of 1345, which are variously ascribed in different manuscripts to John de Murs and to Firminus de Bellavalle. Let us first consider that which opens, "Tres principes ex militia superiori. . . ."[49] This prediction resembles the prophecy, however, in its mystical and figurative tone, although it is less obscure and contradictory. Three chieftains of the celestial militia, born of noblest lineage, are hastening from remote parts o'er many a desert and by tortuous route to a general council[50] in the year of Christ 1345 on the last day of the shortest month of the Latins, that is in the beginning of that in which the creation occurred. Evidently March is meant, when the sun enters Aries. One of them is an old man, dark, and of sombre visage—obviously Saturn. The second is just, pious, handsome, chaste, devout, merciful—meaning Jupiter. The third is ruddy, bellicose, impetuous—no other than Mars. The second and third will meet on the first day of the said month after midnight, and the result for the world will be wars, slaughter, floods, corruption of the air, epidemics, discords,[51] and unexpected catastrophe from above. The first and third will be joined on the fourth[52] day of the same month at daybreak, threatening or sowing[53] discords, deceits and frauds, wars, violent winds, and dis-

[48] The Latin text of this prophecy is found in D'Achery's *Spicilegium,* p. 104, cols. 1-2, and in the edition of the *Chronique latine de Guillaume de Nangis de 1113 à 1300 avec les continuations de cette chronique de 1300 à 1368,* II (1843), 180-181.

[49] Ascribed to John de Murs in Digby 176, 14th century, fols. 17v-18r, whose text I follow; Ashmole 393, 15th century, fols. 80v-81, and 192, fols. 20r-21v, which last seems a copy of the former and so possesses no independent value; and Melk 51, 15th century, fol. 218v. Ascribed to Firminus de Bellavalle in Amplon.F.386, fols. 59v-60, and BN 7378A, fol. 63.

[50] The figurative language resembles Geoffrey of Meaux's comparison of planets in conjunction to barons and potentates in parliament in his treatise of 1325.

[51] Following the word, "discordias," comes an expression which I have been unable to translate, "atque lites circesignaturas" (or perhaps, "circa signaturas"). Possibly quarrels over treaties are meant. The sentence then ends, "et casum desuper insperatum."

[52] Digby 176 however reads "the tenth day."

[53] Amplon.F.386, fol. 60r, col. 1, has "seminantes in terris discordias maiores et guerras," while Digby 176, fol. 18r,

ease. The first and second will meet in another seat on the twentieth day of the aforesaid month, of which our manuscripts now attempt to give the Hebrew name, Nisan,[54] and ordain changes of kingdoms, famine, wars, seditions, and marvelous innovations unheard of since distant times. The three chieftains are in complete accord that there shall ensue destruction of sects, changes of kingdoms, appearance of prophets, sedition of peoples, new rites, and finally a horrible blowing of winds. All this, however, will not come to pass the same year but at different times, "as they have sealed in secret conclave. And so," concludes our author in the words of the Gospel concerning the three Magi from the East, "having taken leave, they returned to their own country by another route."[55] In the Digby manuscripts seven lines are then devoted to restating the effects of the three planets less figuratively and more plainly, but probably this explanation is a later gloss, since it does not occur in the Amplonian and Paris manuscripts.[56]

The second prediction which we find assigned both to Firminus

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seems to read, "minantes in terris discordias inter maiores et guerras."

[54] Amplon.F.386, "que Nissan appellatur more Hebreorum immediate sequens mensem Bauzer" (i.e. Adar). Digby 176, "que Incen appellatur more Hebreorum immediate sequens mensem Vaofar." These are good illustrations of the way that foreign proper names are mangled by the copyists of manuscripts.

[55] BN 15104, fol. 206v; Amplon.F.386, fol. 60r, col. 2; "Et tunc (*sic* in Digby 176) sumpta licentia (*sententia* in Digby 176) per aliam viam reversi sunt in regionem suam." In the Amplonian manuscript we then read in larger letters: "Explicit pronosticatio magistri Firmini de Bello Valle super coniunctione Saturni Iovis et Martis." So far as I can judge from the rotograph, the foregoing words are in the same hand as the text preceding and following, while the additional words, "anno domini 1345°," referring to the prediction just concluded, and "Incipit Io. de Muris," which have reference to the coming prediction, opening, "Ex doctrina mirabili . . ." appear to have been inserted later where the incomplete line, "Martis . . ." left room for such an addition. In the top margin above the first column is written, "Pronosticatio M. Firmini," and to the right of the second column opposite the incipit, "Ex doctrina mirabili . . ." are the words "Io. de Muris."

[56] At least this seems the case so far as I can make out the illegible writing of BN 7378A, where at fol. 64r, col. 2, the closing words, "et tunc usurpata (?) licentia, per aliam viam reversi sunt in regionem suam," are immediately followed by the copyist's colophon, "Expliciunt hec multa bona; sit scriptor sanus et possessor male vanus." There then appear to ensue some geomantic figures and accompanying text which fill out the column.

and John, and which opens, "Ex doctrina mirabili sapientum . . ." is not at all figurative and mystical in tone. It begins with the statement, made in a somewhat rhetorical style, that from the marvelous doctrine of wise men who have studied with diligence concerning the movements of the heavenly bodies, it is known to a certainty that in 1345 the three superior planets will be located in the second *facies* of Aquarius. On the first day of March Mars and Jupiter will be in conjunction in the fifteenth degree of that sign; on March fourth Mars and Saturn will be in conjunction in the seventeenth degree; and on the twentieth there will be a conjunction of Saturn and Jupiter.[57] These dates agree with those of the other prediction. The prognostication at present under consideration makes the further point that the force of this triple conjunction will be increased by the fact of its coinciding with the revolution of the year and vernal equinox, which then occurred about March twelfth. At this time things on earth are just beginning to grow or revive after the winter, and hence their power of resistance to the influence of the stars is weak. The force of the fixed stars in Aquarius is also taken into account.[58] Of the three superior planets involved in the conjunction our author seems to feel that Saturn will be more influential than Mars, but that Jupiter will hold its own fairly well. The greater part of his prognostic is then given over to citation of the views of Arabic astrologers such as Messahalla, Albumasar, Abu Hali, and Haly Heben Raghel (Rodan is the

[57] Amplon.F.386, fol. 60r, col. 2: "Ex doctrina mirabili sapientum qui circa notitiam motus corporum celestium cum diligentia studuerunt efficaciter cognoscitur quod anno domini 1345, inchoando tamen a Ianuario, 3 planete superiores aliisque motu tardiores Aquarii facie 2ª locabuntur non quod eodem celi minuto eodemque temporis momento convenire videantur sed quia quilibet istorum cum alio quolibet in modico temporis magnitudinisque spatio secundum longitudinem coniungentur. Martii namque prima die 15°que gradu Aquarii coniungetur Mars cum Iove; quarta autem die mensis eiusdem in 17 gradu Aquarii Mars iungetur cum Saturno; die quoque 20 mensis eiusdem patebit Iovis et Saturni coniunctio. . . ."

[58] *Ibid.*, fol. 60v, col. 2: "Stelle etiam fixe que sunt in Aquario significant supra naturam humanam et supra naturam quorundam animalium et avium prout linee ducte de stella ad stellam secundum similitudinem specierum sibi correspondentium in terrenis artificiose figurarent. Agunt etiam stelle fixe predicte supra mores hominum. . . ."

more common form). This makes the treatise considerably longer than the other. Its author further notes that a great eclipse will precede the conjunction of Saturn and Jupiter, and that the events signified by the eclipse will continue for at least three and three quarters months thereafter.[59]

Of the treatment of the triple conjunction of 1345 by John of Eschenden, we shall speak in the following chapter upon that English astrologer. But we may add here to that of John de Murs the discussion of this conjunction by another astronomer and mathematician who wrote and predicted for the popes at Avignon. This was Leo Hebraeus or Judaeus, also known as Léon de Bagnols (Leo de Balneolis), Levi ben Gerson, and Gersonides. His chief work was the *Milchamot Adonai* or *Wars of the Lord*, and he was a physician and commentator on Aristotle as well as a religious philosopher, astronomer, and mathematician. In 1319 he commented upon the *Prior Analytics*, in 1320 he drew up solar and lunar tables for the meridian of Orange, in 1321 he composed an arithmetic. His description of the astronomical instrument known as Jacob's rod was translated in 1342 into Latin with the title, *De instrumento secretorum revelatore*, by Peter of Alexandria, a member of the Augustinian order, and was dedicated to pope Clement VI.[60] Simon de Phares, who mentioned

[59] The work closes, Amplon.F.386, fol. 61v, col. 2: ". . . Haly tamen dicit quod duratio huius accidentis erit 13 annorum. Explicit pronosticatio magistri Iohannis de Muris super coniunctione Saturni et Iovis." The remainder of the column is left blank.

[60] For these facts concerning Leo see Duhem, IV, 38-41, and the works there cited. Duhem does not mention, nor is it noted in the index to the catalogue of manuscripts, the following codex of the 1342 translation: BN 7293, 14th century, opening treatise. In BN 7289 is something by Leo which was translated from the Hebrew in 1340. In Lyons 326 (259) is a 16th century copy of part of a work by him with observations of the year 1334 according to Delandine, or 1336 according to the later catalogue which cites fol. 149. At Rome, Vatic. 3098 contains Leo de Balneolis de astronomia, opening, like the Lyons MS, "Hec ait Leo. . . ." Another MS is Klagenfurt Bischöfl. Bibl. XXX b 7, 15th-16th century, fols. 23r-33v.

For fuller details on the life and mathematics of Leo Judaeus may be consulted the Inaugural-Dissertation at Heidelberg of Joseph Carlebach, *Lewi ben Gerson als Mathematiker*, printed at Berlin about 1908 or 1910. Carlebach has little on Leo's astrology and calls his prediction on the conjunction of 1345 a horoscope: p. 87, "Auch der Astrologie widmet er sich mit besonderer Innigkeit; gerade als letzte Gaben

Leo under the year 1336 as flourishing in the parts of Dauphiné towards Orange, ascribed to him a verification of the fixed stars as well as astrological prognostications and replies to particular interrogations.[61]

Some of the keenest critics of astrology in the middle ages owed their knowledge of the subject to their devotion to, or curiosity concerning it in their youth. On the other hand, many an astrologer is said—usually, however, on the authority of pious opponents of the art—to have abandoned it in his last years or repented on his deathbed. But apparently the treatise on the conjunction of 1345[62] was the last work upon which the learned Hebrew, of whom we have just been speaking, labored, leaving it unfinished[63] at his death on April 20, 1344. The same friar, Peter of Alexandria, already mentioned, with the aid of Leo's brother, Solomon, translated it from Hebrew into Latin without adding to or subtracting from it.[64]

If this was Leo's last treatise, it was not his first essay in the field of astrological interpretation. That it was not improbably intended for Clement VI, is suggested by Leo's allusion to a prediction which he made for the late pope, Benedict XII (1334-1342), from signs seen in 1339, which signified a conflict of southerners. And immediately in the same year followed a conflict in Spain between the north and south. Leo further alludes to signs seen in 1337 and to what the previous conjunction of Saturn and Jupiter in 1325 signified. He includes the eclipse of

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seines Geistes liegen zwei Horoskope aus den Jahren 1343 und 1344 vor, von denen er das letzte nicht mehr beenden sollte; der Tod 'kam ihm zuvor.'"

[61] *Recueil,* ed. Wickersheimer, 1929, pp. 214-215.

[62] Leo's treatise occurs in BN 7378A, fols. 62v, col. 1-63r, col. 1: BL Digby 176, fols. 16r-17v, which I have chiefly used; Ashmole 393, fol. 81r-v; and Ashmole 102, fol. 21v. It opens: "Quoniam (*quidem* then occurs in BN 7378A but not in Digby 176) fuit declaratum antiquitus per experientias longas et certas. . . ."

[63] "Et non plura dixit Magister Leo," is the close of the text proper.

[64] After the close of the text we read: "Magister Leo morte preventus anno christi 1344 die 20a mensis aprilis circa meridiem de hac coniunctione nil amplius ordinavit. Ego vero frater Petrus de Alexandria ordinis fratrum heremitarum sancti Augustini cum adiutorio magistri Salomonis fratris carnalis predicti magistri Leonis istud inventum et ordinatum per eum de hebreo transtuli in latinum anno quo supra sue sententie nil addendo vel in aliquo minuendo."

Friday, March fourth, at ten hours and fifty-five minutes after noon in his prediction, as well as the conjunction, the figures for whose date seem to vary in our manuscripts. The significations of the eclipse will be very bad (*pessime erunt*) but the details of his prognostication do not seem to correspond to the subsequent events. Leo gives only one short paragraph to the conjunction of Saturn and Jupiter, and then his work breaks off uncompleted. In the opening paragraph he had affirmed the influence of the stars over "these inferiors," which he declared greater in the case of the human species than of any other composite being, "and this is in accordance with the law and the prophets, as is demonstrated perfectly in our book, *The Wars of the Lord*." But he believes that men should, forewarned by the stars, provide for the future, since those influences may be altered in two ways, first by human free will, second by divine grace.

Simon de Covino, like Geoffrey of Meaux, wrote his astrological interpretation after the plague but based it largely, as we have seen, on the predictions of 1345. He emphasized the fact that all the other planets were one after the other in conjunction with Saturn in its own house, Aquarius, within the space of the three months of January, February, and March, and that a conjunction of Saturn and Jupiter in that sign occurred only once in nine hundred years. Saturn was superior to Jupiter in this conjunction both because Aquarius was its own house and because of its position in its epicycle. He represents the sun as sitting in judgment because it is the leading planet from which the others receive their light and because all judgments concerning the workings of the celestial bodies depend upon the sun.

In a manuscript at Tours is "A Treatise concerning the natural causes of certain future events in the world and tribulations and other changes."[65] Upon examination it turns out to be a collection of extracts made by someone from various prophecies and astrological predictions. Whoever the compiler or excerpter

[65] Tours 520, 15th century, fols. 97r-104v: "Tractatus de causis naturalibus quorundam eventuum futurorum in mundo et tribulationum et ceterarum transmutationum. Coniunctio anni Domini 1345 facta in Martio est significatrix bellorum. . . ."

was, he had great respect for Ptolemy and his *Quadripartitum* and the *Centiloquium* ascribed to him. He also regarded astrologers as on the same plane with prophets, patriarchs, and sibyls as recipients of divine influence and forecasters of the future. He opens with predictions from the conjunction or conjunctions of 1345, turns to Daniel's interpretation of the image seen by Nebuchadnezzar in his dream, passes on to the Erithean sibyl's vaticinations concerning Frederick II, Charles of Anjou, the emperor Henry VII, and others. There follow selections from Saint Hildegard of Bingen, the gray monk of Tripoli for the years following 1287, and another member of a religious order who saw a vision when beyond the Rhone from the empire in the diocese of Terrasson. Finally some bits from the prophecies of Joachim conclude the farrago. The excerpts concerning the conjunction of March, 1345 are not full enough to be identifiable. None of them can be said to predict the Black Death. Indeed, they pay more heed to wars and other disasters than to sickness. One is from an astrologer who had also made further forecasts in French.[66] Our compiler seems to attempt to distinguish three conjunctions, presumably of Saturn and Jupiter, Saturn and Mars, and Jupiter and Mars, but he does not explicitly mention the last. The day of March on which the conjunction of Saturn and Jupiter occurred is omitted in our manuscript, but it was the first hour after noon and seventeen minutes, with Saturn in Aquarius, seventeen degrees and forty-five minutes.[67]

Among those who professed to have foretold the Black Death may well have been John of Bassigny who, although he gave the year incorrectly as 1352, predicted that then would begin a general mortality and pest which would afflict the whole world, carry off from one half to two-thirds of the population, and last for thirty-five years or more.[68] He further averred that ills such as

[66] *Ibid.*, fol. 97r: "Sequuntur quedam alia que scripsit ille vir in gallico."

[67] *Ibid.*, fol. 98r: "Sequitur coniunctio punctualis Saturni et Iovis anno domini 1345 die mensis Martii post meridiem prima hora 17 minuta. Et erat Saturnus in aquario 17 gradus 45 minuta. . . ."

[68] Ioannis de Bassigniaco prognostications, opening, "Tacui et silui. Nunc autem propter eventus mirabiles quos audivi et didici. . . ." I have used BN 7352, paper, 15th century, fols. 2r-4v. Another MS, cited by N. Valois, "Conseils et prédictions addressés à

the world had not seen since it began would prevail from the year 1352 A.D., when the influences of the planets would be very bad, until 1373. John did not base his prediction merely on the stars but also on study of holy scripture, of the poets and philosophers, and on contacts with many doctors and masters during extensive travels, especially conversations held beyond the seas with a Syrian and a Chaldee about the year 1336 and with a Jew about the year 1342. This intercourse had to be carried on through an interpreter, but John "was with them for practically two years."[69] Although he does not specifically advert to the conjunction of 1345, John mentions that year as the origin of disasters and the worst conspiracies and as the approximate date for a crushing defeat of the king of France, which will be thrice repeated before peace is made. About 1356 the king will be captured and the greater part of the world destroyed.

Employing the allegorical tone common among medieval prophecies and political predictions, John affirms that the eagle will fly through the world and that many nations will be subjected to him. About 1354 he will be crowned with three crowns in token of victory and virtue. Later he will enter his nest and not fly from it until he passes gloriously heavenward. His eaglets will fight and despoil one another. Such political and religious prophecies lie rather beyond the limits of our present investigation, but we may complete that of John as a brief specimen of the genus. There will be uprisings in many cities and new constitutions. No one will keep faith with his neighbors. Italy will have its troubles. The Turks and Alani will devastate many isles of the sea and will slaughter many Christians. The Greeks will invade the Latin kingdom. Armenia, Frisia, Denmark and Norway will be sadly vexed by infidels. Floods and earthquakes will

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Charles VII en 1445 par un certain Jean du Bois," *Annuaire-Bulletin de la Société de l'Histoire de France*, année 1909, p. 223, is Tours 520, fols. 146-149. Jean du Bois quotes Bassigny.

[69] BN 7352, fol. 4v: "Hec autem omnia cum labore maximo diligentius quam potui sicut multum affectabam inquisivi. Et parcat mihi rogo qui legerit si rudius ista compilavi quia re vera Siri linguam nec Caldei neque Iudei intelligebam nisi tamen sicut meus interpres mihi omnia explanabat, licet cum eis fuerim quasi per duos annos continuos."

overthrow many a town and castle by Tiber, Danube, Rhone, and Loire. Cyprus, Sardinia, and Vienna will be terribly devastated and almost wiped out. Between Aragon and Spain will be tribulation, dissension, and cruel war until one or the other is utterly destroyed. Gascony will bemoan the death of its inhabitants.

And ere the world reaches the year of our Lord 1382, the church universal and whole world will grieve for the destruction, depopulation, devastation, and spoliation of the most noble and most famous city which is head and mistress of the entire realm of France.

A doleful picture which neither the revolutionary movement of 1357 nor of 1382 at Paris would quite seem to justify.

The church will also have woes of its own. All the malice of men will be turned against it. For twenty-five months and more there will be neither pope nor emperor nor rightful ruler in France, and only those prone to evil will be of repute in the world. The pope will change his seat, and, before the year 1383 arrives, it will be lucky for him and the cardinals if they can find any place of refuge. The elements will be altered; the sea will rage against the land and cause many shipwrecks; the air will become fetid and corrupt because of human iniquity. Lorraine will lament, and Champagne vainly implore aid from its neighbors. Irish and Scots will invade England aided by a youth who will recover the crown of the lily and dominate the whole world. He will destroy the sons of Brute and their island root and branch, so that there will be no more even a memory of them. A good pope will be elected who will reform the clergy and a good emperor to aid him in establishing one law and peace. Then all will grow worse than ever again with false prophets, the approaching end of the world, and antichrist.

Since this prediction by John of Bassigny is preserved in fifteenth century manuscripts—in one of which the writer adds a note concerning three suns seen late in May, 1414, while in the other the date 1342 is changed to 1411—its composition before 1345 is open to some doubt, or its predictions and dates which are most nearly correct may have been improved by later revi-

sion and interpolation. Or it may have been preserved because out of a host of such prognostications it seemed to approach somewhat more closely to the subsequent events than did most of the others.

Giovanni Villani devoted a chapter of his history of Florence[70] to the triple conjunction of 1345 of Saturn, Jupiter and Mars in the sign Aquarius in the belief that such conjunctions were of great significance to the age.[71] Master Pagolo di ser Piero placed it on March 28, a little after the ninth hour, in the twentieth degree of Aquarius; but according to the *Almanach* of Profatius Judaeus and the Tables of Toledo it ought to occur on the twentieth of March, with Mars in the 27th degree of Aquarius, and with a lunar eclipse on the eighteenth in the seventh degree of Libra. When the sun entered Aries on March eleventh, Saturn was in the ascendent in the 18th degree of Aquarius and lord of the year. Jupiter was in the 16th and Mars in the 22nd degree of Aquarius. But according to the aforesaid Paul, one of the modern masters, he observed the conjunction with his instruments on March 28th, with the sun in the 16th degree of Aries and in its exaltation, and its house, Leo, in the ascendent at thirteen degrees, while Mars was already in the sixth degree of Pisces, Venus in its own house in the 14th degree of Taurus in midsky, Mercury in the first degree of Taurus, and the moon in the fourth degree of Aquarius. Villani states the effects of the conjunction only in general terms with reservation of free will and divine power. He notes further, however, that Mars entered Cancer on September 12, 1345, and remained there until January 10, when it retrograded into Gemini until February 16, then re-occupied Cancer until May 21, 1346. This long stay of the war-like planet in Cancer, where it usually spends only about fifty days, was held to bode ill for the realm of France whose sign is Cancer. Finally Villani replies to some reader who may ask what is the use of introducing this astronomy into the present

[70] *Istorie Fiorentine di Giovanni Villani cittadino fiorentino*, Milan, 1803, vol. 8, pp. 108-111; lib. XII, cap. 41, "Della congiunzione di Saturno e di Giove e di Marte nel segno d'Aquario."

[71] Closing words of the chapter preceding, ". . . che sono di grande significazione al secolo."

work, by pointing out that by reading his chronicle and comparing the events which have followed past conjunctions one will be better able to prognosticate from future conjunctions.

Villani himself survived the conjunction for only three years, dying of the Black Death in 1348. He noted in his chronicle that the astrologers had predicted the great mortality from the revolution of the year of 1347, since at the time of the vernal equinox in March Virgo was in the ascendent, while Mercury, the ruling planet, was in Aries and the eighth house signifying death. And if the fortunate planet Jupiter had not been found there along with Mercury, the mortality would have been infinite. Villani added, however, that the pestilence should not be explained solely from the course of the stars, but also as a divine punishment for men's sins, God as ruler of the universe making the course of the stars conform to his judgments.[72] In August of the same year he noted the appearance in Taurus of the comet Negra which is of the nature of Saturn and signifies death of kings and potentates and great mortality in regions under the aforesaid sign and planets.[73]

Before leaving the conjunction of 1345, we may add a passage from the *Chronicon Hirsaugiense*[74] of the learned abbot, Trithemius, at the close of the next century. Referring to the Black Death, Trithemius states that a certain astronomer, skilled in his art, had predicted it three years before. Inasmuch as his prognostication was tersely expressed, Trithemius gives, or purports to give, it verbatim.

There will be but one lord of the world. The Roman empire will be exalted. There will be many struggles on earth. The tyrant king of the Gauls will fall with his barons. There will be an unusual and fearful amount of thunder. There will be great effusion of blood. The pope with his cardinals will be dissipated. There will be great famine in the lands. Also pestilence and terrible and incalculable loss of human life through the whole world. There will be great heat in the summer and excessive cold in the winter. The seeds will decay in the ground. The injury of

[72] *Ibid.*, XII 84; VIII (1803), 208.
[73] *Ibid.*, XII, 98; VIII (1803), 234-235.
[74] II, 204-205, in the St. Gall edition of 1690.

the king will be avenged, and the queen of Venus will pass in flight to foreign lands. Fleas, locusts, and venomous animals will abound on the face of the earth, and there will be many signs and wonders in the air.

Trithemius assures us that many of these things happened in the year 1348, but not all of them. He is not sure whether the astronomer really foresaw them from the stars or inferred them conjecturally from what had gone before. To the modern reader the most remarkable feature of the prognostication is the dim suggestion of a connection between the spread of the pestilence and fleas. Trithemius further states, as Villani had at the time, that in 1347 a vast vapor from the north settled over the earth to the great terror of those who saw it, and that some writers mention that in this year innumerable minute forms of animal life[75] (*quasdam minutas bestiolas*) fell from heaven to earth in the orient and produced the pest by their corruption.

Returning to John de Murs, we find evidence that his relations with Clement VI continued after the report which he and Firminus made in 1345. In a manuscript at London is an "Astronomical Calendar arranged by master John de Muris and several other experts in astrology at the mandate of lord pope Clement VI in the fifth year (of his pontificate) with a Canon."[76] Since Clement VI became pope in 1342, this was presumably written in the year 1346-1347. The calendar makes no provision for February 29th, or, for that matter, for October 31st, although it states that October has thirty-one days. The omission of February 29th might bear some relation to the scheme ascribed to John of rectifying the solar calendar by omitting leap-years for a time, but nothing is said to this effect, and the calendar is primarily, at least, lunar.[77] The *Canon* following it deals with the

[75] Villani, XII, 84; VIII (1803), 209, more specifically describes them as worms with eight legs and about a span in length.

[76] BM Sloane 3124, membr., 15th century, fols. 2-7, Kalendarium astronomicum ordinatum per magistrum Iohannem de Muris et plures alios in astrologia expertos ad mandatum domini Clementis Pape sexti anno quinto cum canone. The Canon follows at fol. 8r-v.

[77] *Ibid.*, fol. 8v, occurs a note which may serve to explain the omission of February 29: "Nota glosa, 'Nil cum bisextus' in fine glose Digesti de verbo significant."

renovation of the moon[78] and, referring to a table covering the nineteen years from 1356 to 1374 inclusive, explains that "in the first column for each month in the said table is written the number of days of that month. In the second, the letters for the days of the week. In the third, the lunar letters, that is the letters having reference to the renovations of the moon"—i.e. 19 letters of the Latin alphabet from a to t. "In the fourth column the number of hours of the renovation of the moon. In the fifth, the number of points; and in the sixth, the fraction of the hour to make the number of points more unmistakable." The same table may be used over again for each succeeding cycle of nineteen years. These remarks seem to fit the preceding calendar. The author adds that hours are to be counted from sunrise, that there are twenty-four hours in a day and night, that 1080 *puncta* make one hour, and that twenty *momenta* make two *puncta*.[79] This method of dividing the hour seems a backward one, and is not in accord with the treatise of 1345 in which John and Firminus collaborated and which divided the hour into minutes and seconds as at present,[80] or with the tables of 1339 in which John converted the hours of the day into minutes. It would therefore seem doubtful if John de Murs is to be accepted as one of the authors of this calendar and canon in 1346-1347 or thereabouts.

John de Murs, like Leo Hebraeus, continued his devotion to astrology as his life progressed, and again, as in the other's case, what appears to be the last work by him that we possess was a prognostication based on planetary conjunctions. In this treatise he also continued his relations with Clement VI, for it

[78] *Ibid.*, fol. 8r, "Canon autem tabule ita scripte ut supra apparet est de renovatione lune et fuit composita et ordinata Parisius per magistrum Iohannem de Muris et plures alios magistros in astrologia expertos ad mendatum (sic) domini Clementis pape sexti anno quinto."

[79] *Ibid.*, fol. 8v, "Item scias quod tabula ista semper incipit numerando horas ab ortu solis illius diei in quo literam illam inveneris. Hore autem computantur die et nocte 24. Puncta vero 1080 faciunt horam. Et 20 momenta faciunt 2 puncta." This is a quite different evaluation of the *punctum* and *momentum* from that of Bartholomew of England in the thirteenth century, for which see *Magic and Experimental Science*, II, 419, or from those noted by Mr. Robert Steele, *Opera hactenus inedita Rogeri Baconi*, VI (1926), 290-291.

[80] Duhem IV, 54.

takes the form of a letter addressed to that pope.[81] It is concerned with the conjunction of Saturn and Mars in Cancer on June 8, 1357, and that of Saturn and Jupiter in the eighth degree of Scorpion on October 30, 1365.[82] The fact that Clement VI died in 1352 might lead us to question whether such a prognostication would be addressed to him so many years in advance, but the addressing of our manuscript to him is very explicit, and its contents go far towards explaining why it was composed years before the conjunctions in question. Moreover, we have the corroborative testimony of Simon de Phares at the end of the fifteenth century that John de Murs sent a letter to pope Clement in the year 1365, making mention of the ruin and destruction of the king and realm of France, if peace and union were not made between the kings, by means of a great conjunction of Saturn and Jupiter which befell about this time.[83]

[81] It is headed, "Epistola magistri Iohannis de Muris ad Clementem 6^m," in the same handwriting as the following text, in what appears to be the only known manuscript, BN 7443, fols. 33r-34v. It opens, "Sanctissimo et Reverendissimo patri et domino suo carissimo domino Clementi divina providentia sancte Romane ac universalis ecclesie pape sexto, sua devota et humilis creatura que inferius est subscripta. . . ." There is, however, no such subscription in our manuscript. The text closes, ". . . Mandet et precipiat predicta sanctitas in hiis et aliis quibuscumque quidquid voluerint sue beneplacita voluntatis. Explicit." Duhem, IV, 35-37, gives a French translation of a large part of it, but unfortunately confused two of the planetary signs and so says "Jupiter" in cases where the reading should be "Saturn", and *vice versa,* making nonsense of the prediction. I have verified the notes which I took from the manuscript in 1927 by a rotograph procured in 1930.

[82] The chronicle of John of Reading states that there was a triple conjunction in 1365, Mars and Jupiter being in the twentieth degree of Libra on August 4, and Mars and Saturn in the thirtieth degree of Libra on the nineteenth day of the same month, in addition to that of Saturn and Jupiter in the eighth degree of Scorpion on October 30: *Chronica Johannis de Reading et anonymi Cantuariensis,* ed. James Tait, Manchester, 1914, p. 166.

[83] *Recueil des plus celebres astrologues . . . faict par Symon de Phares,* ed. Ernest Wickersheimer, Paris, 1929, p. 231. At p.216 also, under the year 1338, Simon writes, "En ce mesme temps furent à Paris plusieurs grans astrologiens, comme maistre Johan de Muris, qui estoit grant astrologien. Cestui Johannes de Muris fist choses esmerveillables à Paris, touchant les jugemens particuliers. Cestui escripvit une epistre au pappe Clement." John of course could not have written to Clement in 1365, as Simon states above, but he gives the tenor of John's letter correctly. Indeed, at p.218 he gives a very accurate résumé of John's remarks in the same letter concerning the conjunction of 1357, often employing his very words, but ascribing the prediction to Leopold of Austria.

After a eulogy of the Roman church as set high above all others, and, like the cherubim, all eyes and wings, John points out the advisability of foreseeing far in advance matters of the utmost import to the Faith and to all Christendom and of providing, "with due caution and opportune remedies," for these future contingencies. The pope should therefore know that on the thirtieth of October, 1365,[84] in the eighth degree of Scorpion there will be one of the greater conjunctions of Saturn and Jupiter, with change from the aerial to the aquatic *triplicitas* or group of three signs. Mars also will be in conjunction with them in the same year and sign. This conjunction will be the first revolution from that most famous conjunction which denoted the religion and power of the Saracens, preceding that religion's appearance by fifty-two years. Since then there has been no conjunction like it until this one.[85] The Arabic astrological authorities give us to understand that it will be a critical time for that sect, and the Christian world should therefore prepare for a determined effort to overthrow Islam. Success, however, cannot be looked for incontinently or in the same year, since only gradually will the virtue and *complexio* of that conjunction be impressed on inferiors.

John then calls the pope's attention to the fact that on June 8, 1357, there will be a conjunction of the two unfortunate planets, Saturn and Mars, in the sign of Cancer, which is disastrous for one of them and detrimental for the other. And the conjunction will be in the *termini*[86] of Jupiter in the twenty-first degree of Cancer, in which Jupiter has sway and its exaltation. Many experiences have shown that Saturn is lord of England, Mars of Germany, and Jupiter of France. Since the conjunction is very evil and indicates great wars and effusion of blood, deaths of

[84] BN 7443, fol. 33r, "anno christi currente 1365to currente die 30^{a} octobris." Evidently here *currente* does not indicate the present year or the day of writing.

[85] *Ibid.*, fol. 33v, "nec a tempore illo usque nunc reversa fuit aliqua coniunctio omnino similis nisi ista."

[86] That is, certain degrees of the zodiac appropriate to it. Duhem, IV, 36, who misread the abbreviation of the MS as *terris*, mistranslates, "cette conjonction a lieu sur les terres de Saturne," as if conjunctions occurred on earth and not in the sky.

kings, destructions of realms and their transfer to foreigners, John fears, unless the pope before that time arrives establishes a firm and lasting peace between the lands in question, that the king and realm of France will be in peril of overthrow and everlasting disgrace. For Jupiter is in no position[87] to impede or repel the malice of the conjunction. What is worse, by its retrograde movement it leaves its own house, Pisces, and flees from the view of Saturn and Mars into Aquarius, the house of Saturn, which manifestly indicates the rout of the king and of the French, particularly as Cancer is their sign. The pope alone by his prudence and power can avert this disaster.[88] And if he does not, there will be little prospect of Christendom's being in any position to utilize the second conjunction to triumph over the Saracens. John closes by humbly beseeching the pope to correct him, if what he has written seems silly and demented, and by offering to write further, if the pope approves of this. One wonders whether John wrote this letter before or during the truce which the pope arranged between England and France, and which lasted from 1347 to 1355, and, if it was before 1347, whether it had any effect in inducing the papal intervention.

Simon de Phares tells us further concerning John de Murs that, in addition to this letter to Clement, "he made also a treatise to find easily the proportions of the movements of the planets by means of tables carefully worked out."[89] We have already noticed other tables and canons by John, but perhaps what Simon had in mind are certain tables and canons dealing with revolutions and conjunctions of the planets, which are preserved in a manuscript of the Bodleian library and constitute a more considerable treatise than the tables and canons hitherto mentioned.[90] The first table is of the mean principal conjunction of the sun and Saturn according to the calculations verified by

[87] BN 7443, fol. 34r, "Nam Iupiter non aspicit coniunctionem. . . ."

[88] *Idem.*, "quod enim apud alios impossibilia seu necessaria estimantur, apud vos possibilia et levia merito reputantur."

[89] *Recueil* (1929), p. 217, ". . . par maniere de tables moult exquis."

[90] BL Canon. Misc. 501, 15th century, paper, folio, fols. 55-108, "Explicit compositio tabule de certis revolutionibus planetarum." I have not examined the manuscript itself, but follow the description of the catalogue.

Alfonso, king of Castile, at Toledo, whose distance west from Paris is stated in hours.[91] At the close are the following Latin verses in honor of John de Murs and his calculations and measurements.

I. sum de Muris qui tot supponere curis
Me volui duris munitus mille figuris
Ut coniecturis et veris calculaturis
Gressibus in puris sint si dicta nota futuris
Certis mensuris ut continue redituris
Annis venturis sic perpetuo valituris.

Just as for the conjunction of 1345, so for those of 1357 and 1365 John de Murs' prognostication is not the only one that has reached us. John of Eschenden, in fact, discussed both. Of his predictions we shall treat in the next chapter. Concerning the conjunction of 1357 alone there was a brief but sufficiently terrifying prognostication which purported to be the work of Milo and other masters of Toledo.[92] They begin by advising all Christians to be contrite and confess, because in 1357 there will be more horrible and terrible events than ever happened in the world before. These will begin in March but grow worse in May, when the sun will be joined with certain planets in Libra, and the moon will be very obscure. Then kings will shed their blood, and there will be terrible signs in the planets and unspeakable tribulations on earth. Homicides will prevail on land and sea for two days, and the sea will inundate the land for four days, more than

[91] But none too clearly: "super Toletum distans a Parisius in occidentibus per 48, ii. hore." Forty-eight days and two hours would seem too much, since Toledo was reckoned only seven days' journey in any direction from the Spanish coast. In medieval reckonings of longitude it was often placed about twelve degrees west of Paris, which of course was nearly twice too much.

[92] BL Ashmole 393, 15th century, fol. 80v; Ashmole 192, fol. 19r-v: "Pronosticum Milonis Toletani de coniunctione facta anno 1357", opening, "Universis Christi cultoribus ubique terrarum magister Milo et alii magistri de Toleto. . . ."

These pretended prognostications of masters of Toledo more often appeared under the name of John David. See *Magic and Experimental Science,* II, 76, note; also for that of 1329, Vatic. Barberini 172, 14th century, BM Arundel 134, 14th century, fol. 159r, and for that for 1371, as current at Bologna, the *Cronaca Bolognese di Pietro di Mattiolo,* ed. Corrado Ricci, Bologna, 1885, pp. 7-9 (in *Scelta di curiosità letterarie inedite o rare,* vol. 202). See BM Addit. 16606 for a prediction for 1229 and the seven years following which is perhaps the original version.

ever since the flood. And the four chief winds will come together with terrible force. Many cities will be submerged, and then for twelve straight days the excessive heat of the sun will set the roofs of many houses on fire. There will be copious bloodshed especially in the kingdom of France, and thereafter city will rise against city, vill against vill, kingdom against kingdom, province against province, and son against father. More Saracens will be converted to the Catholic faith, but this is the only good news. Few will escape the thunderbolts and storms which will rage. "So God be with you and defend you from the wrath to come." Such is the frightful tone of this prediction for 1357, but it does not seem especially to envisage the conjunction of Saturn and Mars for that year.

Finally may be noted one or two treatises which may or may not be by John de Murs and which cannot be assigned to a definite year. In a fifteenth century manuscript at the Bodleian library are *Aphorisms conforming to Ptolemy in his Judgments* by a master John Morey[93] who is very possibly no other than John de Murs, who is called John de Morys in another English manuscript.[94] In a manuscript of the fourteenth century at Venice, a considerable work of geomancy is credited to John de Murs,[95] both in the titulus and at the close. The sixteen geomantic figures are related to the planets and signs. Egyptian days to be avoided are listed. Geomancy, like astrology, is said to have had its beginning from the time of Noah, and we are assured, "This art is not luck but rational and constituted by men of

[93] BL Ashmole 393, 15th century, fol. 43v, "Amphorismi isti conveniunt Ptholomeo in suis iudiciis. Magister Joh' Morey. Scire directionem alicuius loci vel planete ad alterum. . . ."

[94] BL Ashmole 192, fols. 20r-21r: it is the prognostication on the conjunction of 1345.

[95] S. Marco VIII, 44 (Valentinelli, XI, 105), 14th century, fols. 64r-99r: "Compilatio magistri Iohannis de Muris in arte geome'tre (*sic*) . . . Sicut dicit Boetius in arismetica sua, omnia que a primeva rerum origine processerunt ratione numerorum formata sunt . . . / . . . Nam vero sequentes poteris invenire filias per doctrinam primam primi libri de questione filiarum . . . residuas invenies per doctrinam secundam secundi libri. Explicit compilatio magistri Iohannis de Muris . . . Deo gratias, Amen." The writing was in places illegible. It will be remembered that geomantic figures and text immediately follow the prediction on the conjunction of 1345 in another manuscript, BN 7378A, where, however, the prediction is ascribed to Firminus, not to John de Murs. See note 56.

wisdom."[96] Next are considered the houses of geomancy, which, like those of astrology, are twelve in number. To these twelve of the sixteen geomantic figures are allotted, while the thirteenth figure is "right witness of the question," the fourteenth figure "designates the power[97] of the thing sought," the fifteenth "is the judge finishing the question."[98] The author or compiler spends much of his space on what the different geomantic figures signify in the different houses, and a prime purpose is to relate geomancy closely to astrology. The work indeed seems to be a compilation or collection of geomantic treatises, since at fols. 88v and 89v, if not once before, the subject is gone over again from the beginning.[99]

[96] S. Marco VIII, 44, fol. 67r, "Hec ars non est sors sed est rationalis a prudentibus constituta."

[97] Or perhaps we should read *possibilitatem* in place of *potestatem*.

[98] What the sixteenth figure was I did not make out.

[99] *Ibid.*, fol. 88v, "Ad hoc ut geomantia possit gaudere de iudiciis librorum astrologorum in primis facias quatuor lineas punctorum . . .": fol. 89v, we read in the margin, "Incipit liber notularum geomantie."

CHAPTER XXI

JOHN OF ESCHENDEN: SPECIALIST IN CONJUNCTIONS

The name of the author to whom the present chapter is devoted has been variously spelled in the manuscripts of his works and elsewhere. We have such forms as Eshenden, Eschenden, Aschendon, Aschendene, Ashenton, Eschuid, Aschelden, Aysheden, Escynden, Esshenden, Veschinden, Ashenden, Ashindon, and Eastwood.[1] We are also left somewhat in doubt whether he called himself John Eschenden or John of Eschenden, but it seems probable that most cases where no *de* is found in the Latin renditions of the name can be explained as an abbreviated form of Iohannes Eschendensis, or something of the sort, and that therefore the second part of John's name is to be taken as a place name. There would consequently seem to be little doubt that he came from Ashendon in Bucks county, but he will usually be called John of Eschenden in the ensuing chapter, as the form of his name which on the whole seems to have been the one most favored in the middle ages. All that we know of his life seems to be found in his own works and will be brought out as we treat of them. His connection with Oxford and Merton appears in their colophons and elsewhere, but I have not found authority for the statement that he was or became a fellow of Merton in 1338.[2] He was perhaps dead by 1379, when John de Ponte made an abbreviation of his chief treatise, but evidently the influence of his astrological writings was still potent then.

There seems to be no reason for identifying our John of Eschenden of the fourteenth century with a Dominican professor of theology, John de Essendia, of the convent at Wesel, who dis-

[1] The last three forms I take from R. T. Gunther's *Early Science in Oxford*, II, 55, rather than from the manuscripts and edition of 1489, whose spellings will be found detailed in subsequent notes or in Appendix 20.

[2] Gunther, *idem.*, so states without citing his authority.

cussed the sayings and doings of a spirit in the village of Meyerick near Duysborch in the duchy of Cleves, apparently in the year 1437.[3]

Of the astrological works by John of Eschenden of which we shall treat the earliest was a prognostication made on March 20, 1345, from the total eclipse of the moon and conjunction of the three superior planets in that year.[4] Eschenden gives the time of the eclipse as nineteen days, nine hours, and 46 minutes completed from the beginning of March, which does not agree with Geoffrey of Meaux's placing the eclipse on March 18th of that year. Since a great conjunction of Saturn and Jupiter—Geoffrey called it a minor conjunction—will prevail two days and nine hours after the eclipse, "it is probable according to divers astronomical authors that that eclipse signifies great and durable effects." Since Eschenden later claimed to have foretold the great pestilence of 1348 in this prognostication of 1345, it will be worth while to examine it in some detail. Like other writers of the time he did not call it the Black Death, a name which came into use only much later.

The effect of the eclipse will be felt especially in the northeast quarter of the earth. Eschenden states that the eclipse will begin in the second hour of the night or an hour and thirty-five minutes after sunset, which is difficult to reconcile with his previous statement that it would occur after nine hours and 46 minutes of the day were completed. On March 20 the day and night would be of approximately equal length, so that it would seem that the latter time should read "nineteen hours and 46 minutes" which would make sunset occur at about 6.11 P.M., reckoning the hours from midnight. Eschenden goes on to infer

[3] Utrecht 173, 15th century, fols. 224r-228v, "Narratio quorundam dubitabilium circa acta seu dicta per spiritum in Meyerick, quam decidit Jo. de Essendia, ord. praed. conventus Wezaliensis, S. Theol. prof." It is preceded at fols. 210v-224r, by a "Narratio de spiritu quodam in villa Meyerick juxta Duysborch ducatus Clivensis apparente (Arnoldo Boosman) anno 1437." Essendia's *Narratio* is said to have been printed among the works of Henry Kalteysen.

[4] BL Digby 176, 14th century, fols. 9r-16r. See Appendix 20 for a fuller description of this and other MSS of Eschenden's works.

that because the eclipse begins in the second hour after sunset, therefore its effects will begin to be felt in the second month after the eclipse. And since the eclipse will last for three hours and forty-two minutes—it will be remembered that Geoffrey of Meaux gave a different estimate—therefore the duration of its effect will be for eight years and six months, a result which is obtained by complicated multiplication and use of the lunar month as a unit.

During these eight years and six months men and beasts will suffer long diseases, and there will be death and many wars and flight, cold and much rain and snow in their seasons, and violent winds and damage to navigators, great corruption in the air and great scarcity of crops from excessive cold and rains and worms. This will increase human mortality. The injury to crops and fruits will come especially at harvest time in the autumn.

During the first part of the eight and a half years the sun will somewhat temper the malice of Saturn. Then Mercury will become dominant and bring many dry infirmities such as cotidian fever, coughs, and consumption, and domestic animals will be especially susceptible to ills. There will be men of subtle genius, but untoward occurrences in the churches and divine offices, and changes of laws and customs. Eschenden further predicts for this middle period violent winds, thunders and coruscations, floods, many robberies, and catastrophes at sea. Also great drought and sudden death and many fevers, wars, quarrels, wrath of kings, transgressions of laws, burnings and slayings and rapine, great heat, great winds, many thunderbolts, scarcity of animals and fruits. In the last part of the eight and a half years Saturn will be lord both universally and specifically, though checked by Jupiter slightly with respect to the quality of the air and famine and disease. The fixed stars, however, will all be of the nature of Saturn and only make matters worse. Therefore Eschenden continues to predict great wars and mortality and infirmities and great corruption of the air; great rains and snows, coruscations and thunders and winds and much cold and heat in their seasons. These predictions are accompanied, of course, by astro-

logical argument for them and by frequent citation of the chief Arabic astrological authorities. Astrological figures are given for the total lunar eclipse of March 19 or 20 in the 22nd degree of Libra and for the great conjunction of Saturn and Jupiter on March 21 or 22 in the 19th degree of Aquarius. The effects of the conjunction in Eschenden's estimation will begin to be felt four and a half years after it and will then last for three years. Its effects sound a good deal like those of the eclipse, except that Eschenden devotes some space to trying to elicit from Messahala and Albumasar that the king of England will gain the victory over his enemies. Next figures are given for the conjunctions of Saturn and Mars and of Jupiter and Mars respectively. The special signification of the former relates to wars, that of the latter to weather change, corruption of the air, and also famine and war. The generalization is then reached that the effect coming from the aforesaid eclipse and conjunction will be scarcity of crops, war, and many infirmities and tempests.[5]

So far Eschenden has on the whole stressed war, scarcity of crops, and bad weather as much or more than infirmities and mortality from disease, to say nothing of any approach to a definite forecast of the Black Death in particular. But now in lighter ink is added a closing paragraph, patched out by a brief marginal insert. It runs somewhat as follows:

Great mortality and great corruption of the air. And other evils which I predicted. And this especially because that was a very great conjunction. For, as Messahalla says in his *Epistle*, chapter 9, a very great conjunction is when all three superior planets join in one *facies* or third of a sign as in the second *facies* of Aquarius. And since Aquarius is an aerial sign, those conjunctions signify great corruption in the air and other ills. And because Aquarius is of human form, men especially will be affected by mortality, famine, and infirmities. And the eclipse will magnify all these effects.

Is this the conclusion of the original 1345 prognostication or a later and *ex post facto* supplementary note by the author?

[5] Digby 176, fol. 16r, "Ex predictis patet quod effectus proveniens ex eclipsi et ex istis coniunctionibus erit caristia et guerra et multe infirmitates et tempestates in locis predictis."

By far the longest of John of Eschenden's extant works is his *Summa iudicialis de accidentibus mundi,* of which the first book was completed at Oxford on July twentieth, 1347,[6] and the second book on the 18th of December, 1348.[7] Either book comprised twelve distinctions, perhaps in recognition of the astrological importance of that number in the signs and houses. Each distinction was further divided into chapters. This long and elaborate *Summa* was not, however, an attempt to cover the whole field of judicial astrology, but simply to give a thorough treatment of one of its departments, namely, revolutions and conjunctions, or universal accidents of the world, that is to say, general events such as climatic changes, storms, floods, earthquakes, famines and pestilences, which affect men generally or at least in large numbers. The more difficult subject of nativities or determination of the character and fate of individuals from their date of birth is not included, much less interrogations and elections, which Eschenden regards as "the more ignoble and less useful parts" of astrological prognostication. The first book of his *Summa* is only a little more than half as long as the second,[8] and is occupied largely with matters preliminary to prediction, such as the age of the world and position of the planets at the beginning, and the natures of the planets, fixed stars, and signs. Of the longer second book the first seven distinctions are devoted to weather prediction, the four following distinctions to universal accidents on earth and among animated beings—earthquakes, floods, pestilences, famine, high prices, fertility, wars and conflagrations—while the final distinction reviews all the rules of prognostication of both books and interrelates them. The amount of space given to weather prediction is noteworthy.

[6] And not in 1341, as Coxe's catalogue of the MSS in Oxford colleges states, probably by a misprint. See CLM 221, fol. 77r, col. 2; and Oxford, Oriel 23, fol. 78r: "Completa est ergo hec compilatio tractatus primi summe iudicialis de accidentibus mundi in civitate Oxonie per magistrum Iohannem de Aschenden (Aschelden) 20 die mensis Iulii anno Christi 1347."

[7] Oriel 23, fol. 225v; CLM 221, fol. 222v: "Completa est hec compilatio tractatus secundi summe iudicialis de accidentibus mundi 18 die mensis decembris anno Christi 1348."

[8] The first book occupies only 75 and 77 fols. in Oriel 23 and CLM 221 out of a total number of 225 and 222 leaves respectively.

Eschenden's *Summa* is long-winded and garrulous as well as detailed and elaborate. Since it is furthermore a compilation, I have made no effort to read it through. That the work was needlessly long and repetitious, was already recognized in the fourteenth century when John de Ponte of Lyons prepared an abbreviation of it, finished on Wednesday, February 23, 1379. He justified his action in the following words:

> Here begins an abbreviated opusculum extracted from the book called *Summa iudicialis de accidentibus mundi* which John of Eschenden composed . . . as one finds stated in his treatise on the circle. The reason which moved me to undertake this abbreviation was that in the aforesaid *Summa* there were so many allegations and so many duplications with some other superfluous matters that they disturbed the mind of the student.

John de Ponte adds that if anyone takes his abbreviation in bad part, " I ask that he spare me his reproaches and turn back to the original if he will." The abbreviator succeeded in reducing Eschenden's *Summa* by half.

Eschenden's *Summa* is crowded with a great variety of citations of authorities. Thus in the first chapter on the beginning of the world he cites Julius Firmicus Maternus, Hermes Trismegistus, Lincolniensis (Robert Grosseteste?), Rabanus on *Exodus,* the *Etymologies* of Isidore, Sacrobosco, friar Walter of Odynton monk of Evesham, Helpericus "in a certain book that he wrote about astronomy," Leicester "in his *Compotus*," another *Compotus* which begins, "Omnis compoti ratio . . .", Roger Bacon "in his book which he wrote to pope Clement," Alfonso king of Castile, Vincent of Beauvais in the *Speculum historiale,* the *Policronicon,* Gildas on the history of the Britons, Orosius, Maimonides' *Guide for the Perplexed,*[9] and Marianus. Some of these authorities are cited more than once in this chapter, and the references to them are apt to be to specific passages of their works for which Eschenden gives book and chapter, indicating that he used them at first hand.

Eschenden finished his *Summa* while the great pestilence was

[9] Oriel 23, fol. 9r, "Rabymoyes vero de duce dubiarum c° 181 dicit."

raging and "the whole world was in evil state," as he himself tells us in a concluding passage.[10] What he has to say on the subject of pestilence is therefore likely to be the most original and up-to-date part of his work, and is important as one of the first contemporary discussions or pest tracts. He now claimed to have predicted the event in his prognostication from the lunar eclipse and conjunctions of 1345.

Just as I wrote in the year of Christ 1345. For whatever I have said to you now about the aforesaid effects, that same thing I predicted then in accordance with the opinion of the astronomers. And the aforesaid evils came to pass immediately afterwards and that abundantly. For so great was the mortality in the world in the year of Christ 1347 and 1348 that the whole world was upset, and in many lands cities and vills were left deserted, and the few who remained alive in them fled from those places leaving houses and possessions, nor did men dare to visit the sick or bury the dead for fear of infection from them.[11]

Thus the contagious character of the disease was realized almost from the start. Many said that it was from the stars; other denied that it was from the stars or other natural cause, regarding it as a divine punishment of men's sins. But for Eschenden there is "a great proof that the said mortality was produced by God in the first way, forsooth by the lunar eclipse and aforesaid great conjunctions as by natural instruments. Since that mortality and the other effects mentioned were predicted before any of their

[10] Oriel 23, fol. 225v, "Et quia auxiliante deo iam in hoc tempore pestilentiali in quo totus mundus in maligno positus est, fessus a labore scribendi, non ex presumptione seu gloria inani sed fraterna caritate coactus huic summe iudiciali de accidentibus mundi finem imposui, gratias quantas sufficio referens deo patri cui sit honor et gloria per infinita secula amen." CLM 221, fol. 222v, col. 1, is practically identical, and John de Ponte, the abbreviator, has preserved the wording unchanged: BN 7335, fol. 100v, col. 2.

[11] Oriel 23, fol. 222v; CLM 221, fol. 219v, col. 2-220r, col. 1: ". . . prout eo scripsi anno christi 1345. Quicquid enim tibi dixi iam de predictis effectibus, illud idem predixi tunc secundum sententiam astronomorum. Et advenerunt predicta mala post statim immo habundanter. Tanta enim fuit mortalitas in mundo anno christi 1347 et 1348 quod totus mundus erat turbatus et in pluribus terris relicte erant civitates et ville deserte et qui remanserunt vivi in eis scilicet pauci fugerunt ab illis locis relinquentes domos et possessiones suas nec audebant homines visitare infirmos nec mortuos sepelire per timorem infectionis eorum."

effects happened. And that same prognostication was founded on the books of the astronomers."[12]

The passages just quoted concerning the great pestilence occur at the close of Eschenden's *Summa,* but it is earlier in the ninth distinction of his second book that he discusses pestilence and epidemics and corruption of the air in general. In five chapters he treats of their generation, their prediction from great orbs and great conjunctions and eclipses of the luminaries, or from revolutions of years of the world and the four seasons, of signs prognostic of pestilence, epidemic, and corruption of the air, and of preservation and cure from pestilential fevers and diseases according to medical men.[13] It is characteristic of the voluminousness and discursiveness of Eschenden's method in the *Summa* that he begins with definition of the word, pestilence, citing at length Isidore, Bede, Peter of Abano on the *Problems* of Aristotle, John of Genoa's *Catholicon,* Hermes Trismegistus, the *Lilium* of Bernard Gordon, Aristotle, the *Pantegni* of Constantinus Africanus, Rasis, Galen, Avenzoar, and Averroes.[14] Sometimes he cites a less familiar author such as John of Alexandria on Hippocrates.[15] Albertus Magnus *De proprietatibus elementorum* is given as authority that a conjunction of Jupiter and Mars in Gemini brings pestilential winds and corrupt airs which suddenly kill a multitude of men and animals. At this point there is half brought into the text a brief paragraph inset from the margin with reference to such a conjunction of Mars and Jupiter on September 10, 1360.[16] This would seem to be a later

[12] *Idem.,* "Sed magna evidentia est quod predicta mortalitas fuit producta a deo primo modo, scilicet per eclipsim lune et per coniunctiones magnas supradictas tamquam per instrumenta naturalia. Cum illa mortalitas et alii effectus supradicti pronosticati erant antequam aliquis eorum effectuum contingebat. Et illa eadem pronosticatio totaliter fuit fundata ex libris astronomorum."

[13] In Oriel 23 the five chapters begin at fols. 152r, 158r, 160v, 168v, and 169r; in CLM 221, at fols. 155r, 162v, 165v, 174r, and 175r—in each case in the first column. The ninth Distinction ends in Oriel 23 at fol. 170v; in CLM 221 at fol. 176v, col. 2.

[14] Oriel 23, fol. 152r.

[15] *Ibid.,* fols. 152v and 156v.

[16] Oriel 23, fol. 155v; CLM 221, fol. 159r, col. 2. In both cases the paragraph is aligned with the text but is separated from it by a surrounding blank space on three sides, the fourth side being flush with the side margin. The paragraph occurs in Bodley 714 and Digby 225 but not in Savile 25.

gloss and to have been copied by our manuscripts from an earlier one where it was probably written in the margin by perhaps another hand than Eschenden's. From Albertus Magnus is also taken the tale of Philip of Macedon and Socrates detecting two dragons who were polluting the air in the mountains.[17]

The chapter on medical treatment against pestilence is in large part a patchwork of passages from such Arabic authorities as Rasis, Avicenna, Avenzoar, Haly, and Averroes. But the more recent Latin writer, Bernard Gordon, is also used, and a remedy employed by the most skilful physicians of Oxford in the present plague of 1348 is described, namely a powder compounded of aloes, myrrh, cinnamon, saffron, mace, cloves, and mastic. A century later Nicolaus de Comitibus of Padua repeated this "marvelous medicine against the corruption of the air in the time of pestilence which John of Oxford gives as tested by all the medical men of England in the great mortality which prevailed throughout the world in the year of grace 1348."[18] Various precious stones are listed later as beneficial against a hot pestilence: pearls, jacinths, sapphires, emeralds, coral white or red, and many others. Smelling or eating camphor is also one of the remedies recommended against a hot pestilence, and the house should be purified by sprinkling with such aromatics as rose leaves or an abundance of cold water and vinegar. Eating acid things like pomegranates is also recommended.[19] But the procedure varies considerably according as the pestilence is hot or cold, sanguine or choleric, and so on.

Finally among our few selections from Eschenden's long *Summa* to give some notion of its character may be included the third and last chapter of the twelfth and last Distinction of his second book on "The Requirements for One Who Would Predict by the Science of Astronomy concerning the Accidents of the

[17] Oriel 23, fol. 156r-v.

[18] Venice, S. Marco VIII, 78, fol. 86r.

[19] This and the remedies immediately preceding in the text come from the concluding paragraph of t chapter (beginning in CLM 221 at the bottom of the second column on fol. 176r, with the words, "Ex predictis igitur potest recolligi . . .") where Eschenden briefly summarizes a preservative and curative regimen without the long quotations from authorities of the earlier part of the chapter.

World."[20] Such an one should refer all his acts to the Creator, shun human praise and glory, avoid presumptious pride in his predicting and esteem all others superior to himself. He should not use obscure language but should speak so that the simple can understand him. He should shun verbosity; on this point Eschenden himself has hardly practised what he preaches. He should follow truth closely and not attempt to deceive, be guided by reason, not passion, envy, luxury, or desire for riches. He should be chaste and sober, and avoid intoxication. In his predictions he should take times and persons into account. He should not answer what is not lawful, or deal with matters too remote from the human senses. Let him abstain from such illicit arts as magic, nigromancy, and geomancy. But because such arts are sometimes confused with astronomy by their practitioners is no good reason for condemning astrological prognostications as to the accidents of the world. Eschenden declares against fatalism or necessity in astrology and recognizes that nativities, while having an indubitable basis of natural inclination, may involve prediction that is over-curious and remote from the human senses. But what Catholic would deny that heat and cold and all the impressions of the air come from the celestial bodies, or that mortality and pestilence, failure of crops and famine, have the same source? Who would deny that certain constellations sometimes dispose men to strife and war? With such assurances of the morality and orthodoxy of astrological prediction from revolutions and conjunctions the *Summa* ends.

Probably an extract from Eschenden's *Summa* is a "Prognostication by revolutions of the years of the world" according to John of Eschenden in a manuscript at Avignon.[21]

Although John of Eschenden represented himself as "tired by

[20] Oriel 23, fol. 224v, it opens: "Tu qui preclare scientie astronomie volueris esse auditor et qui secundum regulas huius libri de accidentibus mundi pronosticari intendis. . . ."

[21] Avignon 1022 (Anc. fonds 341), fols. 8v-11v. It is entitled, "De pronosticatione futurorum secundum Johannescenden (*sic*)"; but the opening and closing words give a more specific idea of its scope: "Pronosticacio per revoluciones annorum mundi sic poterit haberi, dixit Johannes Escenden . . . / . . . volentibus iudicare de accidentibus mundi. Deo gratias."

the labor of writing," when he laid down his pen after finishing his *Summa,* within less than two months, in February, 1349, we find him again engaging in astrological composition. It was then that he published a *Pronosticatio* from the conjunction of Saturn and Mars in the fourth degree of Aries on the 23rd of March, from the total eclipse of the moon in the seventeenth degree of Capricorn on July first, and from the conjunction of Jupiter and Mars in the eleventh degree of Cancer on the seventh day of August, all in the same year 1349.[22] Eschenden again dates these coming celestial phenomena to the hour and minute. Saturn and Mars will come into conjunction when 22 days, 10 hours, and 16 minutes of March have elapsed. The eclipse will occur when eleven hours and 43 minutes have passed on July first, and will last for three hours and 42 minutes—exactly the same duration as he had given for the eclipse of 1345. The conjunction of Jupiter and Mars will come when six days, 21 hours and 49 minutes of August have been completed.

Eschenden again claims to have successfully predicted the outcome of the previous conjunction of the three superior planets in Aquarius in 1345, and of the lunar eclipse then. They signified, he now says, wars and combustions and battles and flight and invasions of kingdoms and great human mortality and many infirmities of the nature of Saturn, and great corruption of the air with great scarcity of crops, earthquakes, and violent storms, "just as I had written at the beginning of the same year of Christ, 1345, concerning the significations of th' aid great conjunction and said eclipse. And all these things were all too well fulfilled within three years afterwards, as we have sufficiently

[22] BL Digby 176, fols. 30r-33r, "Pronosticatio coniunctionis saturni et martis 4 gradu arietis 23a die martii eclipsis lune universalis 17 gradu capricorni primo die Iulii coniunctionis Iovis et martis 11 gradu cancri 7 die augusti." Opening, "Sicut dicit haly 2° quadripartiti tholomei ca° 6° cum fuerit eclipsis vel coniunctio. . . ." and closing, ". . . cum marte in qualitatibus suis non impediet totaliter effectum suum. Expliciunt iste pronostications 6to die mensis Februarii anno christi millesimo CCCmo xl nono."

A brief anonymous prediction from the stars for 1349 of the rise of a new religious sect much after the order of the Flagellants occurs in BM Additional 24145, 14th century, fols. 7v-8r.

experienced." He seems to forget that he had predicted that the effects of the conjunction would begin to be felt only after four and a half years, and would endure for three years after that, and that the effects of the lunar eclipse of 1345 would last for eight and a half or even nine years. To recall these awkward facts would be to suggest that his previous forecast had really not been accurate; neither would they agree any too well with his present intention of making a new prediction from the celestial phenomena of 1349. Besides the two conjunctions and the eclipse he considers the revolution of that year. Scattered through the treatise[23] are figures for the entry of the sun into Aries in 1349, the opposition of the luminaries immediately preceding, and the two conjunctions and eclipse already mentioned.

On such basis Eschenden predicts that corruptive drought will continue, with many infirmities, wars, combustions, and bloodshed. Early in the year there will be thunders, coruscations, and floods, or at least great hail and wind storms; but in the summer great heat and drought. Saturn and Mars by their conjunction signify especially wars and combustions, and that the more because they are in a fiery sign. Scarcity of crops and famine will prevail more in the south of Europe than in England, because in the north these are more often the result of excessive damp than of drought. The opinions of Arabic astrologers are quoted as in Eschenden's other works, and we are told that "according to Ptolemy there will befall men sudden death and tertian fevers and spitting of blood." It will be observed that Eschenden had not mentioned this characteristic of the Black Death in his prediction of 1345. "And these will especially befall adolescents."

Eschenden tries, however, to find some ray of hope from the new conjunctions for the mitigation of the horrible pestilence, "which has lasted continuously for the three past years in divers lands." But his method is by a rather tortuous line of reasoning. He premises that the new conjunction of Saturn and Mars signifies great dryness in the air, and that the great pestilence came

[23] Digby 176, fols. 30r-v, 32r-v.

from the dominance of Saturn in the lunar eclipse and great conjunctions of 1345. And he admits that Saturn is naturally a dry planet. *Per accidens* it nevertheless strongly signifies rains and tempests and moist corruption, "and it is very probable that this pestilence and mortality of men came from moist corruption which was caused by Saturn. And experience leads us to this conclusion because in each of the three past years since the time of the great conjunctions and lunar eclipse of 1345 we have had great excess of humidity at unusual times of year."[24] Eschenden therefore hopes that the drought induced by the new conjunction of Saturn and Mars, in which Mars dominates rather than Saturn, may counteract this pestilential mortality, especially since the sun adds its salutiferous influence. Because the new conjunction is in a mobile sign, its effects will appear the same year but will last until the next conjunction of Saturn and Mars three years following. Moreover, during those three years the summers will be hot and dry, and the winters cold and frozen because Saturn will remain in a dry sign, Aries or Taurus, whereas during the five past years Saturn has moved continuously in moist signs, Aquarius and Pisces, and so generated this pestilence from excessive and corrupt humidity, from which with the change to dry signs relief may be looked for with God's aid. Some persons, it is true, have expressed a doubt whether Mars will dominate in its conjunction with Saturn since it is within the sun's rays, and Messahala in his work on revolutions has stated that when a planet is under the sun's rays it loses its force and becomes patient rather than agent. Eschenden holds, however, that the sun will not lessen Mars' hot and dry influence, though it may perhaps mitigate its malice.[25]

[24] Digby 176, fol. 31v, "verisimile est quod hec pestilentia et mortalitas hominum proveniebat ex coruptione humida que causabatur a saturno, et experimentum ducit nos ad hoc eo quod quolibet annorum trium preteritorum a tempore coniunctionum magnarum et eclipsis lune predictarum que apparuerunt predicto anno christi 1345 habuimus nimium excessum humidorum in temporibus anni non debitis sicut constat satis."

[25] Digby 176, fol. 32v. Meanwhile at fol. 32r-v Eschenden had taken up the signification of the eclipse and other conjunctions, but without any utterances that seem of interest.

The next conjunctions to which we find Eschenden giving his attention are those of 1357 and 1365, which, like John de Murs, he appears to have considered together in a single treatise or a work in two parts written in the former year. This was finished on March tenth, 1357. Eschenden states that he had intended for some time to write it but had waited to see if others would treat the same subject. This gives the impression that he did not know of John de Murs' prediction, composed at some time before the death of Clement VI in 1352. Eschenden adds that many persons who are ignorant of the authoritative works on astronomy and astrology steal the predictions of other writers, and, thereby deceiving themselves and others in the worst way, prognosticate erroneously concerning the accidents of the world and bring the science of astronomy into discredit. All that he himself pretends to do is to state the opinions of recognized astrological authorities without pronouncing anything from his own head except in so far as it may be legitimately inferred from the principles set forth in those authoritative works. Eschenden further informs us that of late he has totally disassociated himself from scholastic activities and the study of so great and so difficult sciences and has been occupied with worldly cares and anxieties which multiply about him in these times. In closing, however, he states that he has written the treatise for the common utility of students of astronomy and especially for the exercise and solace of his associates in Merton Hall (he does not call it College), Oxford, on whom and "our House" he invokes the divine blessing.

In stating the time of the occurrence of the two conjunctions there is some disagreement between our manuscripts. Eschenden also in one instance introduces what seems a different usage from that of his previous predictions. In the Digby manuscript the conjunction of 1357 is placed "in the month of June, there being completed of the same month seven days, 22 hours, and 30 minutes, beginning the day from noon of the preceding day as astronomers do."[26] But we have seen reason to believe that

[26] Digby 176, fol. 42r: "Cum ergo hoc anno christi 1357° in mense Iunii completis de eodem mense 7 diebus 22 horis et 30 minutis incipiendo die a

in his other predictions he began the day at midnight, as we do. Ashmole 393 disagrees only in the number of the minutes, which is given as thirty-eight. Both these manuscripts agree in placing the 1365 conjunction when 29 days, 14 hours, and 22 minutes of October have been completed, but Ashmole 192 here presents a slight variation, placing the conjunction of 1365 on October 30 at the fifteenth hour and fifteenth minute, with which the Royal manuscript of the British Museum agrees, except that the number of minutes is given as twenty-five. In the case of the 1365 date it is not expressly stated that the hours are counted from noon of the preceding day, but in dating a partial eclipse of the moon for August first, 1357, the reckoning is six hours and forty-six minutes, "beginning the day from noon of the day preceding."[27]

This prediction is also notable for its citation of recent authors, although this may be purely accidental. Whereas in the predictions of 1345 and 1349 only Arabic astrologers were cited so far as I recall, now Eschenden refers to John of Seville in *Quadripartitum,* first part,[28] Giles in the beginning of his treatise on the pulse,[29] and Simon de Bredon, "who about the year 1340 equated the movement of the eighth sphere with greatest diligence."[30] But of course there were many such citations in Eschenden's long *Summa.*

The places especially affected by the conjunction of 1357 will be France and Burgundy, England and Flanders. The effects of the conjunction upon the weather will begin immediately after it. Wars and other such consequences will come more slowly, some after fifty days, some after three months. Men will suffer acute fevers and tertians and cotidians, coughs and consumption and pleurisy and spitting of blood and sudden death. Death of kings is also called for by the meeting of two unlucky planets

meridie diei precedentis prout faciunt astronomi."

[27] Digby 176, fol. 49v. This is given "iuxta calculationem Galteri Eshmuden," which is perhaps a copyist's corruption of Walter of Evesham who about 1316 at Oxford wrote on the motion of the eighth sphere.

[28] Digby 176, fol. 42r.

[29] *Idem.,* "Merito ergo cum Egidio in principio de pulsibus suis dicam."

[30] *Ibid.,* fol. 45r, "Ista patent secundum Magistrum Simonem de Bredon qui circa annum christi 1340 equavit motum 8e spere cum maxima diligentia."

in Cancer. Wars and burnings and battles and depopulations and changes of kingdoms are especially signified, since Mercury and Mars will share in the house of that conjunction, but Eschenden argues that these ills will come to France rather than to England. In fact, the kingdom of France will pass to England. One suspects that the English victory at Poitiers in the preceding year has more influence, though perhaps subconscious, upon Eschenden's prediction than the positions of the stars. He again refers with pride to his prediction of 1345 in which he said that the king of England would always obtain the victory so long as the effect of that conjunction lasted.[31] He has won in the past and will continue to do so all his life, since the conjunctions both of 1357 and 1365 so indicate. The conjunction of 1357, however, signifies many false and fraudulent and tricky proffers of peace and friendship, especially between the kings of England and France, and many wiles and deceptions on the part of the French because in their treaties of peace they will strive to deceive the king of England.[32]

Eschenden displays the same sort of astrological logic or inference as in his other prognostications. For example, because the constellation Argo is in the direction of the conjunction, there will be ill doings at sea, burning of ships, naval battles, tempests, wrecks, and so forth.[33] The effects of this conjunction of 1357 will last until that of 1365. Indeed, some of them will be prolonged for thirty-two years because the conjunction of 1365 will have similar significations. In conclusion Eschenden mentions an opposition of the sun and moon and a partial eclipse. He cites his *Summa,* as well as the prediction of 1345, more than once in the present prognostication.[34]

The conjunction of 1365 was regarded by Eschenden as of great importance because it occurred in a new triplicitas (i.e.

[31] Digby 176, fol. 47r; the reference is to fols. 12v and 15v in the 1345 prediction.

[32] Digby 176, fol. 47v.

[33] Digby 176, fol. 48r.

[34] Digby 176, fol. 40r, "sicut in summa mea iudiciali de accidentibus mundi in primo libro et secundo in diversis dictionibus frequenter declaravi": *idem.*, "sicut probavi in libro primo summe mee iudicialis distinctione 9a ca° 5°."

one of the groups of three signs associated with each of the four elements). The planets Saturn and Jupiter now passed from the triplicitas of air to that of water, and most of the other planets were present with them in the same sign, Scorpio, except Mars which was just leaving this sign as they entered it, and the moon which was in the opposite sign, Taurus.

According to his usual practice, of which we have hitherto not taken cognizance, Eschenden orders his discussion of the conjunction under four heads, asking first where it will occur, the answer being in the eighth degree of Scorpion; second, when it will occur and how long its effects will endure. They will begin after about three years and will be felt for no less than seventy. The third question is *de generibus,* or in what kinds of things the effects will appear. The fourth and last question is what sort of events will follow, good or bad. Omitting much of John's astrological citation and inference and less important detail, we may note the two chief events he predicts. First, although he does not wish to assert anything contrary to the Catholic faith or to offend pious ears, he thinks that this conjunction signifies the destruction of some old sect or beginning of some new one or rise of a new prophet. In particular he inclines to suggest that it signifies the destruction of the Saracens, for Albumasar said that religion would last 693 years, and the number of the beast in the Apocalypse is 666. "And those two numbers . . . do not show much discrepancy, which will be of great weight in this case." Not much can be said, however, for John's chronology. He doubts if the conjunction is in the right house for a new sect or prophet and so will not assert that it signifies this. But if it does, the sect will be under Mars and Scorpio, and hence marked by all cruelty and wickedness, all falseness and deceit. Perhaps this is a covert reference to antichrist or to the Ottoman Turks or Tartars. The other chief event which Eschenden foresees is the destruction and depopulation of the kingdom of Scotland. Citing Albertus Magnus in the *De proprietatibus elementorum* as to the four astrological causes or conditions which combine to produce a great flood, Eschenden concludes

that the conjunction of 1365 at least portends a particular deluge in a particular land and great rains and inundations. Also shipwrecks and destructive insects and famine, but more in the north than in the south. There is the usual prospect of human illnesses, coughs and consumption, diarrhoea, quartan fever, paralysis, and death of old men. There is also danger of great oppression of pope and prelates and of the Roman church at the hands of kings and princes of the earth.

After the close of the prediction in the Paris manuscript,[35] the Digby manuscript[36] goes on to attack the predictions of the abbot Joachim for the years 1357-1365 as unsupported by astrological inference from the conjunctions for these years. He said, for example, that in 1357 there would be rival popes at Lyons and Rome, that in 1360 the church and clergy would sink lower than at any time since the emperor Constantine,[37] and that in 1365 all Greece would return to obedience to the Roman church, after which the preaching of antichrist would begin. Eschenden does not know how and by what spirit Joachim made these prophecies but he finds no astrological sanction for them. He doubts if the coming of antichrist can be predicted and thinks that we are forbidden by the Bible to try. He also discusses the possibility or impossibility of determining from the Scriptures the time of Christ's second coming, or of predicting the end of the world. Such predictions are in these days being broadcast by charlatans and deceivers. A lecturer at Oxford recently, Eschenden has heard from others, asserted that there would be 7500 years between Noah's flood and the future deluge of fire, by which he presumably meant the end of the world, but in Eschenden's opinion any such attempt to set a date for the end of the world is an act of great temerity and presumption.[38]

[35] BN 7443, fols. 221r-227v; see Appendix 20.

[36] Digby 176, fol. 38r *et seq.*

[37] *Idem.*, "Erit ecclesia et clerus in tanta vilitate in quanta non fuit a tempore Constantini imperatoris."

[38] Digby 176, fols. 39v-40r. The paragraph opening, "Quidam tamen nituntur probare quod poterit sciri ex scripturis tempus secundi adventus Christi . . .", which begins in Digby 176 near the bottom of fol. 38v, occurs at fol. 89r, the last page, of Ashmole 393, and at fols. 104r-106r in Ashmole 192, but the two Ashmole MSS do not carry the discussion so far as Digby 176,

If we compare the predictions of John de Murs and John of Eschenden based on these conjunctions of 1357 and 1365, we observe a general resemblance. Both interpret that of 1357 as portending evil to the kingdom of France, and both see in that of 1365 a sign of religious change. Eschenden does not display the hopefulness of John de Murs as to the overthrow of Islam, perhaps because he wrote after the Turks had occupied Gallipoli. He also caters to local British interest in his reference to the fate of Scotland. John de Murs' heart is evidently with France; Eschenden manifests a militaristic English nationalism. The days of John de Lineriis and John of Saxony are no more.

The latest astrological treatise extant by Eschenden appears to be that made by him in 1368, which was chiefly devoted to weather prediction for the ensuing years to 1374.[39] It was written for some personage, seemingly ecclesiastical—possibly William Rede, bishop of Chichester 1368-1385—who had requested it through a third person and common friend of them both. Eschenden gives the impression that he had written no astrological treatise for some time past, since he professes to be out of practice in rendering such judgments.[40] He is now asked to predict the natural effects of the stars for some years immediately following.

In complying with this request Eschenden first gives five constellations or "diagrams of the heavens" (*figuras coeli*) as a basis for his subsequent predictions. Three of these are already in the past at the time he writes, the most remote being the great conjunction of the three superior planets in 1365 in the last *facies* of the sign Libra on the first day of August. John's second diagram is for the seventeenth day of the same month; the third is of the conjunction of Saturn and Jupiter in the eighth degree

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breaking off at about the middle of fol. 39r of that manuscript in the midst of the discussion of Daniel's prophecies.

[39] I have read it in BL Ashmole 192, I, 4, fols. 12r-16v. It is also found in Ashmole 393, 15th century, fols. 79-80. The incipit is: "Carissime (or, Karissime) et Reverendissime, quoniam fide cuiusdam communis utriusque et vobis et mihi valde dilecti amici crebra relatione didici. . . ."

[40] Ashmole 192, I, 4, fol. 12r, "Et licet hucusque in talibus dandis iudiciis exiliter nimis sim institutus sicut veraciter fateor. . . ."

of Scorpio with all the other planets except Mars. This last occurred in October of the same year, i.e. 1365. It is apparent from these three constellations that the treatise is referred to at its close as "Of the Three Conjunctions" (*De tribus coniunctionibus*) but this appellation does not give a complete idea of its purpose or content. John's other two constellations are for the coming year 1369.

On this basis Eschenden predicts terrible things to come, including wars as well as various kinds of bad weather, beginning with excessive rains and ending with a three year drought. He saves free will but opines that most men yield to inclination and that only a few resist their passions. The tone of his prediction may be illustrated by two brief quotations. In regard to the year 1372 he says, "And this I affirm boldly, that before the end of October and in the month of November notable cold weather will appear."[41] Anent the coming three years' drought he remarks, "and, to speak briefly, so great and so notable a drought and so excessive has not been seen in the life of any man now living above earth with the single exception of Enoch and Elias of whom holy scripture tells."[42] After Eschenden has completed his prediction for 1374 and said "Amen," both Ashmolean manuscripts[43] add a further note to the effect that a certain calculator—probably not the famous Calculator or Richard Suiseth—has asserted that there will be an eclipse of the sun in 1371, on October ninth, 21 hours, 47 minutes, and 30 seconds. It will last for one hour, 44 minutes, and 28 seconds. On the 24th day of the same month there will be a lunar eclipse, coming at nine hours, nine minutes, and 44 seconds, and lasting for two hours, 45 minutes, and 38 seconds. These meticulously detailed forecasts are interesting, not merely as an attempt at least at scientific accuracy and as early examples of expressing fractions of hours in

[41] Ashmole 192, fol. 15v, "Et hoc audacter dico quod ante finem Octobris et in mense Novembris patebit notabile frigus."

[42] *Ibid.*, fol. 16v, "Et ut breviter dicam tanta et tam admirabilis siccitas atque tam excessiva non apparuit in vita alicuius nunc viventis hominis super terram solos excipio Enoch et Heliam de quibus loquitur in sacra scriptura."

[43] Ashmole 192, fol. 16v; Ashmole 393, fol. 80r.

seconds as well as minutes, but also as again making us wonder whether there were then any time-pieces by which the fidelity of such predictions could be tested when the time came. Only after these added forecasts of eclipses for 1371 do we read in the manuscripts, "Explicit Aschynden de tribus coniunctionibus."

It will have been noted that all of John of Eschenden's particular predictions, as well as his more general *Summa,* were concerned with conjunctions and eclipses of the planets and the universal accidents of the world, predictable from the revolutions of the years or annual entry of the sun into the sign Aries. He spoke slightingly of the departments of astrology known as interrogations and elections, to say nothing of the art of constructing astrological images which formed an adjunct to the latter. He does not seem to have drawn up any horoscopes for individuals or to have written treatises on nativities. We should regard him therefore as a specialist in the particular department of revolutions and conjunctions.

In close juxtaposition to the predictions by John of Eschenden from the conjunctions of 1357 and 1365 in manuscript Digby 176 are two letters dealing with astrological matters by Reginald Lambourne, a monk of Eynesham near Oxford. The earlier in date, written on February 27, 1363, treats of the lunar eclipses of that year in March and September and is apparently addressed to a John of London, as whose disciple Reginald represents himself.[44] In Lambourne's opinion there has been no lunar eclipse of such importance since the universal eclipse which accompanied

[44] Digby 176, 14th century, membr., fols. 50r-53v, opening, "Magister mi reverende et dilecte multum in Christo et sub Christo domine, quia me discipulum iam tarde coram reverentia vestra constitutum vestris (or perhaps *votivis;* I could not make out the word, which seemed, however, to terminate in the abbreviation for *us* rather than *is*) desideriis pulsastis ut vobis aliquid traderem in scriptis de hiis que mihi videntur futura significari inferiori huic mundo. . ." At the close we read: "Scripta sunt hec primo et concepta per vestrum Reginaldum monachum simplicem Eyneshanne 27 die mensis februarii anno supradicto. Domino Iohanni London." But the last three words look as if they might be an addition to the original letter. In that case, this letter may not have been addressed to John of London but to the same personage as the second letter, since Reginald speaks of himself as his disciple in both cases.

the conjunction of the three superior planets in 1345.[45] Since Lambourne is said to have studied at Merton college under John of Eschenden and William Rede, one wonders if this John of—or at—London is the same as Eschenden. The latter letter is also addressed to some "most reverend lord" whose disciple Reginald professes himself.[46] This second letter deals with ills to come in the years, 1368 to 1374, in a very similar way to the prediction for those years by Eschenden himself which we have just discussed. They are in substantial agreement as to whether the respective years will be dry or wet, hot or cold. The insertion of Reginald Lambourne's tracts between those of Eschenden also suggests that he is his pupil. Possibly, however, as Macray supposes, he is addressing as his master William Rede, who as bishop of Chichester (1368-1385) would be "most reverend" and to whom the manuscript containing these letters belonged.

[45] Digby 176, fol. 53r-v.

[46] Digby 176, fols. 40r-41v, opening, "Reverendissime domine, ut recentius nunc perficiam quatinus industrie mee parvitas suppetit in hiis que memini me infra presentis anni spatium doctorali reverentie vestre. . . ." The writing has an indistinct and rubbed-off appearance, and is no more legible in a rotograph than in the original.

CHAPTER XXII

JOHN OF RUPESCISSA: CHEMIST AND PROPHET

The recording angel must smile frequently at the little ironies of history. One of these amusing inconsistencies of real life is that followers of St. Francis, the apostle of poverty, should have interested themselves in making gold. True it is that the opponents of alchemy assure us that the devotees of the Hermetic art soon waste their substance and become poverty-stricken, but the mendicant friars were supposed to have no wealth to start with. Yet among the charges against brother Elias, one of the companions of Francis, when he was deposed from the generalship of the order in 1239, was that of occupying himself with alchemy,[1] and treatises in that art are extant under his name.[2] Roger Bacon is

[1] Ed. Lempp, *Frère Elie de Cortone*, Paris, 1901, p. 121.

[2] Such as I have seen in MSS, however, appeared to be late compilations incorrectly ascribed to him. An example is Vatic. Reg. Suev. 1242, fols. 1r-11v, in three books, the last incomplete. "Liber fratris reverendissimi Elie generalis ordinis minorum ad Federicum imperatorem. Documenta artis atque notationes liber primus. Sciant artifices huius artis quod operatio non potest fieri sine dissolutione corporis et spiritus. . . ."

Another is Vatic. Palat. 1330, 15th century, fol. 198v (190v) *et seq.*, "Opus fratris Helie de Almania. Accipe mercurium bene lotum cum aceto et sale . . ."

A third MS is BU 138 (104), fol. 138v: "Liber fratris Helye de Asisio ordinis fratrum minorum de secretis nature incipit feliciter. Amicum induit qui iustis amicorum precibus condescendit . . ."; fols. 241v-243v, "De elixire ad album et rubeum. Cum de infrascriptis aquis distillationibus . . . / . . . Explicit ars maior et minor philosophorum a fratre Helya ord. min. compilata, deo gratias, Amen." The former of these two incipits appears to have been appropriated from a medical work of Platearius, while the alchemical tract which it is used to open is attributed in Vatic. Barb. 273, fol. 225r, to Raymundus ab Angelis and in Cambrai 919, fols. 114-118, to Raymond de Terminis rather than to Elias. In English MSS, however, the work is ascribed to brother Elias the Minorite: see DWS No. 172.

See also Lami (1756), p. 230.

In the alchemical bibliography in Vatic. Barb. 273, fols. 284r-289r, yet other tracts with their incipits are ascribed to "brother Helias." The text of one occurs in the same MS, fols. 115r-121r, De compositione lapidis philosophalis qui quidem liber intitulatus Vade mecum, opening, "Queritis me et non invenietis Joannes nono capitulo . . ."

Kopp, *Die Alchemie in älterer und*

an even clearer case of a Franciscan who believed in alchemy. Raymond Lull, who appears to have belonged to the third order of St. Francis, became, whether rightfully or wrongfully, a great name in alchemical literature. And now we have to turn our attention to a Franciscan of the middle of the fourteenth century, John of Rupescissa, who attained considerable notoriety because of his repeated imprisonments, his prophecies as to the coming of antichrist and the future of church and state, and the alchemical treatises which were ascribed to him, if not composed by him. Like Arnald of Villanova and Raymond Lull, he was a Catalan, and it may be that this fact has resulted in some confusion in the attribution of alchemical writings to these three men. Rupescissa further resembled Arnald of Villanova in making prophecies concerning the coming of antichrist and the like.

John of Rupescissa's writings are sometimes found in the manuscripts in the Catalan language,[3] although they appear to have been first written in Latin. We have such forms of his name as Juan de Pera-Tallada or Ribatallada, Johan de Rochatallada, Roquetaillade, or Jean Rochetaillade,[4] the last in Froissart who praises some of his prophecies.[5] In one Latin manuscript of prophecies by him his name is spelled Rupecissa or Ruppecissa rather than Rupescissa.[6] His birth-place appears to have been "Peratallada, villa des Bayo Ampurdam," in Catalonia,[7] though he is called a Spaniard in one manuscript of works of alchemy ascribed to him.[8] In the prohemium to the work on the fifth es-

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neuerer Zeit, 1886, I, 250-252, associated the name Elias with the prophet Elijah as well as with the Franciscan.

[3] Carpentras 332, 15th century, fols. 1-184: see C. G. A. Lambert, *Catalogue descriptif et raisonné des MSS de la bibliothèque de Carpentras,* 1862, 3 vols., I, 174-176. In the *Catalogue général des MSS des bibliothèques publiques de France. Départments.* Tome 34, Paris, 1901, p. 164, Carpentras 336 (L 332), fols. 1-183v. My citations are by the old number.

[4] Menéndez y Pelayo, *Heterodoxos Españoles,* III (1917), 241, gives the first two forms. In Catalan we also find Johan de Roccatagliada.

[5] Cited by Valentinelli, II, 198-199. Froissart, *Chronicles,* London, II (1844), 145-146.

[6] BN 3598. This is also the case in some of the manuscripts of the alchemical works ascribed to him.

[7] Menéndez y Pelayo, *op. cit.,* p. 241. Tanner, *Bibliotheca Britannico-Hibernica,* London, 1748, p. 646, probably had no authority for placing his birth at Gammage in Devonshire.

[8] Wolfenbüttel 479, 15th century, fols. 227-241.

sence, he states that he spent over five years in the study of secular philosophy at the university of Toulouse[9] before entering the order, and that he continued "the din of empty words and war of useless disputations" for more than five years after he became a friar. Since, however, the prohemium is not found in some of the manuscripts, although it appears in others and in the printed editions, this passage is somewhat open to suspicion, even if in general we accept the alchemical writings ascribed to Rupescissa. Despite their medical side, neither they nor their author are mentioned by Guy de Chauliac who wrote in 1363 and might have heard of Rupescissa at Avignon.

At the time of his first imprisonment John appears to have been connected with the Franciscan convent of Aurillac.[10] In the *Vade mecum* of 1356 are two passages which indicate his personal interest in Aurillac. Among past prophecies of his which have come true he lists a reply which he made "by revelation of God . . . (from Roman prisons)"[11] to a query either from

[9] In a late MS, Naples VIII.D.20, fol. 1v, the name is given as Turin, "in florentissimo studio Thaurinen.," but this seems to be an error.

[10] Sbaralea, *Supplementum,* II, 128, citing John's own statement from Colbert 4356, now BN 3598, Visiones fratris Ioannis de Rupescissa, "Ego Frater Johannes de Rupescissa Ordinis Fratrum Minorum provinciae Aquitaniae, Custodiae Ruthenensis, et Conventus Aurelhiaci. . . ." This professed quotation does not exactly correspond to Rupescissa's statement either at the beginning or the close of the *Visiones,* but is a sort of hybrid from both passages which read as follows in the MS itself. BN 3598, fol. 1r, ". . . Ego Frater Iohannes de rupecissa ordinis fratrum minorum provincie acquitanie provincie Ruthenensis et conventus aurelhiaci . . ."; fol. 44r, "Scripta sunt hec per me Fratrem Iohannem de Rupecissa ordinis fratrum minorum provincie acquitanie custodie Ruthenensis conventus aurelhiaci. In Romana curia in Avinione in carcere domini pappe Clementis vi° pontificatus sui anno octavo. Qui carcer vocatur carcer soldani Anno ab Incarnatione domini nostri Ihesu christi M° CCC° xlix° In mense novembris In die sancti martini ad gloriam dei. Amen." But doubtless the second *provincie* in the first passage is a slip for *custodie.* In Edward Brown, *Appendix ad Fasciculum rerum expetendarum & fugiendarum,* London, 1690, II, 494, Rupescissa is called "custodis Ruthenensis ac causidici Aureliaci." See also Carpentras 332, and Menéndez y Pelayo, III, 242-243. Berne 215 reads, ". . . custodie Ruthenen. et conventus Aureliaci in curia Romana in Avinione scriptus" etc.

[11] E. Brown, *Appendix ad fasciculum rerum,* II (1690), 497. Presumably he means the papal prison at Avignon, but there is no Latin equivalent for "from Roman prisons" in S. Marco III, 39 (Valentinelli, VII, 28), 14th-15th century, fol. 2v, "Tertio quia nepoti ves-

his nephew Anselm or from a master William, the nephew of his friend Peter the physician, whether the aforesaid nephew would obtain the church of St. Mary's, Aurillac. And of his twenty headings or *Intentiones* under which future ills are grouped the fifteenth is primarily devoted to dangers that threaten Aurillac, where the convent of the Minorites will soon be completely deserted.[12] He was not in the first instance imprisoned in 1345 at Avignon by pope Clement VI, as has sometimes carelessly been stated. His first imprisonment indeed occurred in that year but was at Figeac by the provincial minister of Aquitaine.[13] Next we find him imprisoned at Toulouse in 1346 in the local convent of his order,[14] and only thereafter was he transferred by Clement VI to Avignon. It was from the papal prison that he wrote out some of his prophecies under thirty headings at the command of cardinal William Curti in November, 1349.[15] But this was not his first composition of the sort, since he refers in it to previous books of his.[16] In the *Vade mecum in tribulatione,* written in 1356, he cites more specifically a small book entitled, *Ut non erubescant de tractatibus laudatorum,*[17] and two longer prophetic works, four books *De speculis temporum et de reserationibus arcanorum scripturae sacrae* and a large volume entitled *Ostensor quia adesse festinant tempora.*[18] The brief *Copia*

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tro magistro Guillelmo per dei revelationem denuntiavi cum me requireret per literam. . . ."

[12] *Ibid.,* II, 503.

[13] BN 3598, fol. 1r, "Cum anno domini millesimo tricentesimo quadragesimo quinto multis diebus flerem vinctus ferro in carcere Suti (according to Sbaralea, but it looks to me more like *luti*) in conventu Figiaci stupens. . . ."

[14] Carpentras 332, fol. 51. BN 3598, fol. 6r, "Septimo intellexi sed magis explicite Tholoze in carcere . . ."; fol. 16r, "Et alia vidi minus gravia Tholoze debere suo tempore apparere"; fol. 41v, "Secundo pervenit in me Tholoze in conventu fratrum in carcere anno domini M° CCC° xlvi°."

[15] BN 3598, fol. 44r. Also Berne 215, 15th century, 22 fols., at the close. In his later *Vade mecum in tribulatione,* written in 1356, Rupescissa states that 1349 was the first year of his coming to the papal court: Brown, II, 497. Eubel gives this cardinal's name as Guilelmus de Curte.

[16] BN 3598, fol. 41v, "Submitto igitur tam me ipsum quam omnia predicta quam omnes libros meos per me fratrem Johannem de Ruppecissa olim editos vel in futurum edendos correctioni et iudicio sacrosancte romane ecclesie et vestre domine reverende."

[17] S. Marco III, 39, fol. 2v. Brown gives the title as, *Ut non erubescant detractoribus laudatores.*

[18] Brown, II, 496; S. Marco III, 39, fol. 1r-v.

prophetiae opening, "Vos misistis ad me hanc schedulam," which serves as an introduction to the *Vade mecum* in Brown's edition,[19] was written in the same year 1356, although 1349 appears in the title which has perhaps been misplaced. The text contains references to the Black Death. John furthermore alludes to the great mortality in his work on the fifth essence and states that he had disputed much with reference to it in another work of a medical nature, the *Decretorium simplicium electorum*.[20]

It is not wholly clear why John was put in confinement; he himself wonders why and asserts that he was unjustly cast into prison on the testimony of false witnesses.[21] But it is rather clearer that he prophesied as a result of being thrown into prison than it is that he was imprisoned because of his prophecies, since most of them appear to have been inspired in prison, where it would seem to have been easier for the authorities to prevent their circulation had they especially wished to do so. On the contrary, we have seen him write from prison at the command of a cardinal. However, he tells us in 1346 or 1349 that "for more than twenty years before the present wars began I predicted them publicly but was thought stupid and mad."[22] It is further true that some chronicles vaguely ascribe his imprisonment to his prophecies, but this may be *ex post facto* reasoning. Possibly he was kept in confinement in the belief that he was not quite sane or because he was suspected of inclining toward the Spiritual Franciscans. His threatening the clergy with despoliation of their temporalities and a return to apostolic poverty points in this direction. His "voluminous and abstruse" commentary on the prophecies of Cyril and Joachim was composed between the

[19] II, 494-496.

[20] FL Ashburnham 190, fol. 41v; FL Ashburnham 191, fol. 31v; BN 7151, fol. 31v; Naples Bibl. Naz. VIII. D. 20, fol. 53r; under Remedium XIX, cap. 20, of the second book, *De quinta essentia.*

[21] Sbaralea, *Supplementum,* II, 128, continuing his own statement in note 10 above, "et mirans quare cum tanta crudelitate missus essem per fratrem Guillelmum Farmena tunc ministrum Aquitaniae in carcerem. . . ." See also *De consideratione quintae essentiae,* cap. 4, quoted by Sbaralea, II, 129.

[22] Brown, *Appendix ad Fasciculum rerum,* II, 494.

deaths of Louis of Bavaria and Louis of Sicily, in other words at some time between 1348 and 1355.[23]

According to a late copy of the *Liber lucis* ascribed to John of Rupescissa, that alchemical tract was completed on October 4, 1350.[24] But in an earlier manuscript, written in 1428 by a student at Paris, of this same *Book of the Light of the Great Masterpiece,* which seems, after his work on the fifth essence, to be his other chief alchemical composition, the date of its composition is given as September 14, 1354.[25] In yet another manuscript of the *Book of Light* it is said to have been published by Rupescissa on October 14, 1380. This date seems too late, and the further statement that the work remained concealed for many years but was preserved for evangelical men in time of need makes one the more suspicious. A fourth manuscript of the *Liber lucis,* now at Venice, contains a briefer version than that printed by Zetzner and states that Rupescissa published it on October 17, 1370. Such figures are of course liable to be altered by the copyists of manuscripts.

Kampers, who has treated of John's prophecies with particular regard to their political predictions, states that John himself says that he was in prison in 1345, 1349, and 1356.[26] This omits his

[23] Franz Kampers, "Ueber die Prophezeiungen des Johannes de Rupescissa," *Historisches Jahrbuch,* XV (1894), 799.

[24] BL Ashmole 1423, V, pp. 68-77, "Johannis de Rupiscissa practica, quarta die mensis Octobris an° Dom. 1350. Ad sublimandum maximam inopiam et paupertatem sancti et electi Dei quibus datum est misterium nosce(re) veritatis sine parabolis lapidem philosophorum . . . / . . . Igitur ex toto tuo corde et animo gratias Deo—amen. Explicit veritas huius artis per Johannem de Rupiscissa an° Domini 1350. mensis Octobris quarto die." There is an English translation in Ashmole 1424, fols. 24v-26.

[25] For this and other MSS of the *Liber Lucis* see Appendix 24.

[26] Franz Kampers, "Ueber die Prophezeiungen des Johannes de Rupescissa," *Historisches Jahrbuch,* XV (Munich, 1894), 796-802. Kampers mentions but two MSS: BN 2599, 14th century, containing the commentary on the prophecies of Cyril and the abbot Joachim, 270 fols., Commentum super prophetiam Cyrilli heremitae presbyteri, simul cum commento Joachim, editum a fratre Joanne de Rupescissa, ordinis fratrum minorum; and BN 3598, 15th century, 46 fols., Visiones fratris Ioannis de Rupescissa.

Menéndez y Pelayo, who describes these two MSS more fully, notes a third, BN 7371, which, however, he implies adds little to BN 3598—"no contiene más que retazos de estas visiones."

The *Vade mecum* is incorrectly dated

allusions to imprisonment at Toulouse in 1346.[27] In some versions of the *Consideration of the Fifth Essence*[28] John says that he has been imprisoned for seven years. Kampers further notes that the German annalist, Heinrich Rebdorf, states that in 1351 Clement VI caused to be incarcerated a grave and learned Franciscan friar, who had predicted many things to come for the mendicant orders and future popes and emperors, and also concerning many other marvels. Again in 1358 Rebdorf notes that a certain Minorite, skilled in astrology, predicted in the papal court terrible things to come, namely, that within four years from that date the cardinals would flee from Avignon, and that in the year 1365 strong worms would rise from the earth and devour beasts and animals, that many nobles would die, that antichrist would appear publicly, that his disciples would preach at Jerusalem, and that there would come slaughters, tempests, and floods such as had not occurred since the deluge. "He predicted many other horrible things concerning persecution of the Christian faith and on this account was imprisoned by the pope."[29] These items very likely apply to John of Rupescissa, who makes just such predictions in his *Vade mecum* of 1356, but the dates may be inexact. Possibly they refer to astrological predictions anent the conjunctions of 1357 and 1365. In this connection it may be noted that Simon de Phares claimed John of Rupescissa as an astrologer "of subtle spirit and wide speculation in the science of the stars." Simon recognized withal that in many of Rupescissa's predictions he exceeded the limits of astrology and followed his own phantasy although feigning divine revelation.[30]

John appears to have been set at liberty for a while and then to have been cast into prison again by Innocent VI in 1356 or 1357. The Carpentras manuscript includes a letter by him to friar Perot, a fellow Franciscan and doctor of medicine, which

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1353 in the Carpentras MS, or at least in Lambert's catalogue, since it was evidently written in 1356.

[27] BN 3598, fol. 41v, "Secundo pervenit in me Tholoze in conventu fratrum in carcere anno domino M°CCC°XLVI."

[28] Bk. I, cap. 44.

[29] *Annales Hainrici Rebdorff* in Marquard Freher's *Rerum Germanicarum Scriptores*, 1717, I, 633.

[30] *Recueil* (1929), p. 223, under the year 1364.

must have been written after 1356, since it makes use of his *Vade mecum*. Perhaps there is some confusion here, for the *Vade mecum* itself in at least one manuscript is addressed to friar Peter, master of medicine, who had asked for it and had been promised it at Avignon.[31] Probably the letter in the Carpentras manuscript is simply the dedication to the *Vade mecum*. John reminds Peter or Perot that he had forecast the captivity of king John of France in England,[32] a political prediction which Kampers seems to forget when he states that none of John's predictions came true except that of schism in the church. If we accept the introduction to one version of the *Liber lucis* as his, John of Rupescissa made still another approximately correct forecast to the effect that tyrants would seize the temporal possessions of the Roman church. Indeed, this prediction runs through his various prophecies, but he usually sets much too early a date for its realization. A prediction of the *Vade mecum in tribulatione* which was not fulfilled with any exactitude was that in 1362, about July fifteenth, the Roman court would flee from sinful Avignon and spend eight years in Naples and Benevento.[33]

John of Rupescissa modestly disclaimed the title of prophet and believed that he possessed "intelligence, or understanding of the spirit of prophecy," rather than the spirit of prophecy itself. His work for cardinal William is arranged as thirty "Intelligences" rather than prophecies, each beginning, "First—or second or third as the case may be—I comprehended in revela-

[31] S. Marco III, 39 (Valentinelli, VII, 28), fol. 1r: "Ex medullis evangelice caritatis predilecto patri suo in Christo Iesu domino nostro fratri Petro Peper. medicine magistro pauper incarceratus et devotus orator vester (videlicet?) Io. de Rupescissa eiusdem ordinis professor indignus petita per vos in Avinione de futuris eventibus et per me vobis promissa cum laude domini Iehu Christi et cum perfecta plenitudine iter rectum ad celestem patriam properare (*praeparate* in Brown, II, 496)." This passage opens the *Vade mecum in tribulatione* in this manuscript, where it ends at fol. 19v, ". . . patris nostri Francisci et consolatione simplicium electorum, Amen."

[32] Kampers, *Die deutsche Kaiseridee in Prophetie und Sage*, Munich, 1896, p. 215, quotes a like passage, apparently from *Vade mecum in tribulatione* (Brown, *Fasciculus rerum*, II, 499): "ut mihi indignissimo ostendit Dominus in die S. Michaelis immediate praeteriti propter captionem regis nostri Iohannis."

[33] S. Marco III, 39 (Valentinelli, VII, 28), fol. 19r.

tion. . . ."[34] Similarly his *Vade mecum in tribulatione* comprises twenty *Intentiones*. He had had, however, his transcendent moments. While in prison he prayed with tears for the conversion of infidels and Jews, such a wave of the presence and glory of God swept over him that he thought himself translated to the paradise of delights and after that began to catch the true meaning of past prophecies and scriptures.[35] His predictions are based in large measure on those of Ezekiel, Daniel, and the Apocalypse, but with shrewd reference to existing conditions in church and state.

Such was the man to whom works of alchemy are also attributed. Nor are they without their positive contribution to chemistry. Berthelot, in arguing that the *Summa perfectionis magisterii* which was long ascribed to Geber was essentially a Latin composition of the later thirteenth century, blending scholastic argument with practical metallurgy, distinguished other Latin alchemical writings attributed to Geber as somewhat later. The reason was that, while to a large extent they were based upon the *Summa,* they showed an acquaintance with certain chemicals which were unknown to the thirteenth century and marked a stage of scientific knowledge almost parallel with the writings of Jean de Roquetaillade in the middle of the fourteenth century.[36]

Rupescissa's chief writing in the field of alchemy seems to have been his work on the fifth essence, *De consideratione quintae essentiae. The Book of the Service of Philosophy* (*Liber de famulatu philosophiae*) is simply another title for it. Manuscripts of it are numerous and it was printed more than once.[37] This work possessed a marked individuality both in expression and arrangement, distinguishing it from other medieval alchemi-

[34] See Appendix 21 for a full list of them.

[35] BN 3598, fol. 41r.

[36] *La chimie au moyen âge,* 1893, I, 343-344.

[37] For some manuscripts of it, including those which I have read, see Appendix 22. I have used editions of Basel, 1561; *Theatrum chemicum,* Ursellis, III, 359-485; and Basel, 1597, pp. 8-144. A French translation by Antoine du Moulin, *La vertu et propriété de la quinte essence de toutes choses,* was printed at Lyons, Jean de Tournes, 1549. A perversion of Rupescissa's text, combined with bits from the alchemical writings ascribed to Raymond Lull, was printed at Venice in 1514 and 1518, and at Augsburg, 1518, as the *De secretis naturae libellus . . . seu quintae essentiae,* of Lull. I have used this last named edition as bound up with MS Vienna 11342.

cal treatises, and it created a correspondingly profound and wide impression. Copies of it were multiplied, various versions and perversions of it seem to have taken form rapidly. It has reached us in at least four main guises, and some if not all of these include lesser variants. There are the printed editions of the sixteenth century and since, which seem to be trying to use as many words as possible and which spin out and attenuate the argument and interlard it with pious cant and mystical small-talk so that the text becomes insufferable reading and seems for a certainty apocryphal and supposititious. But most of the manuscripts do not make this painfully fulsome and stilted effect. Their style is apt to be more picturesque, vigorous, and to the point, although they vary a great deal in length. The simplest and briefest manuscript text uses the fewest possible words to say what it has to say and is marked by clear straightforward thinking. It is much shorter than the printed text, and some superstitious matter found in the longer manuscript versions is not included. One would like to accept it as Rupescissa's original text, but the chief example of it thus far known to me is a late manuscript of the fifteenth and sixteenth centuries, so that we must perhaps regard this version as a later condensation of the original text. It has no introduction, beginning immediately after the titulus with the first Canon. On the other hand, we have at least two specimens of the fuller manuscript text going back into the fourteenth century, one a handsome and orderly arranged codex which makes a favorable impression, although it is clearly a copy and not the autograph and contains some errors. But these two fourteenth century manuscripts do not present exactly the same text, one omitting an important passage found in the other and in most manuscripts of the work. Moreover, apparently before the end of the fourteenth century the work of Rupescissa had already been made over into a treatise on the fifth essence which was passed off under the name of Raymond Lull. Lullian matter was introduced, much characteristically Rupescissan material was dropped out, the arrangement and divisions were altered, and the characteristic literary style

of Rupescissa was, as in the printed versions already mentioned, largely obscured or overloaded.

It thus appears that liberties were taken with Rupescissa's text soon after it appeared, and that even fourteenth century manuscripts of it are not necessarily close to the original. But as against either the late printed text or the early Lullification of the work, the other manuscripts preserve what is evidently more forceful, original, and racy in style and more distinctive in content. Since what we have termed the shortest version is practically included entire in the longer manuscript texts, to which its superiority lies chiefly in terseness and directness of statement and compactness of thought, we shall make it the backbone of our treatment and then add further details from the well-written fourteenth century manuscript of prepossessing appearance to which we have already referred. These two manuscripts will be our chief guides, as they seem the most dependable of those which have been examined, but they will occasionally be checked or compared with others.

The Consideration of the Fifth Essence is in two books subdivided, the first into canons, the second into remedies. In what we may term, relatively speaking at least, genuinely Rupescissan manuscript texts the number of canons in the first book is seldom more than a dozen or fifteen and sometimes as few as nine or even six, although there usually are other rubrics and subheads sprinkled under them. In the Lullified version and the printed text the numbered divisions, called in the latter case chapters, run much higher. In one late manuscript of the more strictly Rupescissan text a division into fifteen canons is paralleled by a division into sixty-six chapters. Thus chapters 56 to 66 are included under the fifteenth canon.

The original work of Rupescissa is not an attempt to penetrate the secret of the transmutation of baser metals into gold but centers its attention upon the problem of an elixir of youth, or rather a method of prolonging life by staving off corruption and putrefaction. The author recognizes that everyone must die sooner or later, and that "it would be fantastic to try to find any-

thing in this life which could render our body immortal." His objective is the more modest one of maintaining health and vitality so long as is naturally possible and of enabling evangelical men to perform the works of the evangelical life even in their old age. Towards this objective he proceeds not with mystic bombast but sober logic. "Since the body cannot be preserved from corruption by that which is itself corruptible, therefore the root of life is incorruptible."[38] Consequently one must seek for something which bears the same relation to the four qualities as the heavens bear to the four elements. And just as the heavens are regarded as a fifth essence superior to the four elements, so Rupescissa calls his supreme medicine against corruption the fifth essence.[39] Nor does he keep us long in the dark as to what this inferior fifth essence is. In his second Canon he plainly asserts that it is *aqua ardens* or alcohol[40] or, more strictly speaking, a sort of cordial made by repeated distillations. It can be identified by its marvelous odor which is very different from that of ordinary *aqua ardens*. The medicinal and preservative properties of alcohol therefore seem thus far the central conception, the gist and backbone, of John of Rupescissa's *Consideration of the Fifth Essence*. In a way it simply continues the tradition of the various medieval discussions of *aqua vitae*.

The third Canon may seem somewhat more mystical. It instructs how to extract this fifth essence from human blood, or from fruits, leaves, roots, and herbs, and also how to extract the fifth essence of each element separately from blood, flesh, eggs, and the like. But the fourth Canon, "On the secret of the mastery of fixing the sun in our sky, so that it shines therein and sheds light and the principle of life upon our bodies," reduces to the simple operation of heating a gold piece or two

[38] Oxford, All Souls College 81, fol. 100v, "Sed quia per rem corruptibilem non potest corpus a corruptione servari, ergo radix vite est incorruptibilis."

[39] All Souls College 81, fol. 100v, ". . . oportet rem quaerere que sic se habet respectu quatuor qualitatum sicut se habet celum respectu quatuor elementorum, que res vocatur quinta essentia sicut celum."

[40] All Souls College 81, fol. 101r. "Ego assero quod quinta essentia est aqua ardens. . . ."

florins and quenching it or them in *aqua ardens* or in good white wine. We are also instructed how to reduce gold and silver to a powder so that they are not recognized. The fifth Canon, "on fixing all the stars in our sky so that they may exercise their properties there,"[41] is simply a figurative way of saying that all herbs and simples, aromatics and laxatives are vastly improved by being stewed for three hours in alcohol. The sixth Canon is on extracting wood or iron from a wound.[42] The seventh deals with astringents, mollificatives, and purifiers.

The eighth Canon instructs how to extract the fifth essence from minerals,[43] beginning with gold. Here, as in the third Canon above, we pass from the conception of alcohol as the fifth essence to that of a fifth essence in each thing—a conception which historians of alchemy, medicine, and science have commonly represented as originating with Paracelsus in the sixteenth century but which should evidently be credited to John of Rupescissa in the fourteenth. The fifth essence from antimony is perhaps that over which he waxes the most enthusiastic.[44] The passage, nevertheless, seems to be omitted from the printed editions and also in some manuscripts.[45]

God is witness that I shall now reveal to you so great a secret that it has hitherto been revealed to few or none and is the archanum of all philosophers. Pulverize the mineral antimony until it is imperceptible to the touch and put it in the best distilled vinegar until the vinegar

[41] In BN 7151, fol. 10r, the heading is worded a little differently: "Canon quintus in fixione omnium terrestrium in cello ut influat in eo suas proprietates et occultas virtutes."

[42] This Canon is numbered 8 in BN 7151, fol. 15r, and 10 in Naples VIII.D.20. In BN 7151, fol. 10v, "Canon sextus ad redendum quintam essentiam calidam in quatuor gradibus caliditatis . . .;" fol. 11v, "Canon septimus. Scientia in extractione quinte essentie a rebus frigidis in primo gradu in affixionem in cello nostro", with the other three degrees of cold and those of dry and wet following as sub-heads on fols. 12r-14r, where, however, we read, "Iam perfecimus gratia dei quatuor canones precedentes in consideratione utili quatuor graduum in rebus calidis frigidis siccis et humidis," whereas really only two Canons have been indicated.

[43] This is Canon XI in BN 7151, fol. 19r, where IX and X have covered the ground of Canon 7 in the All Souls MS.

[44] All Souls 81, fols. 114r-116r, "Scientia ad extrahendum quintam essentiam de antimonio et marchasita plumbea."

[45] It is not in Digby 43, for instance.

is colored red. This done, remove the colored vinegar in another vase and pour on it more vinegar until, over a slight fire, it too is colored, when it should be removed. And keep that up until the vinegar no longer is colored. Then put all the vinegar which has colored into a still, and first the vinegar will rise. Then you will see a stupendous miracle because through the beak of the alembic you will see as it were a thousand particles of the blessed mineral descend in ruby drops like blood.

Which blessed liquor keep by itself in a strong glass bottle tightly sealed, because it is a treasure which the whole world cannot equal. Behold a miracle! forsooth the great sweetness of antimony so that it surpasses the sweetness of honey. And I declare by God's love that the human intellect can scarcely believe the virtue and worth of this water or fifth essence of antimony. And Aristotle in the book, *Secret of Secrets,* says that it is its lead. Believe me that never in nature was there a greater secret. For all men have toiled to sublimate the spirits of minerals and never had the fifth essence of the aforesaid antimony. In short I never would be able to express the half of this discovery. For it takes away pain from wounds and heals marvelously. Its virtue is incorruptible, miraculous, and useful beyond measure. Forty days it needs to putrefy in dung in a sealed bottle and then it works marvels.

Nor do you believe that what I have said is impossible. For if ceruse is put in distilled vinegar and boiled in it for two hours or more until the vinegar evaporates and what remains is of the thickness of oil, this is called Oil of Saturn and has the sweetness of honey. Yet that sweetness is a will o' the wisp, but the sweetness of the fifth essence of antimony is as the sweetness of honey and sugar. Believe me, you may turn the pages of all the books of the philosophers and you will never find such as it is nor will you find a true art so that anything except quicksilver can be marvelously colored red. So praise God.[46]

This was the lively way they wrote chemistry in the fourteenth century.

The ninth Canon is the science of reducing mercury sublimate or its fifth essence to a water called "Milk of virgins" among the ancient philosophers. Under it we find the following recipe for making "Fire of the Adept."

[46] For the Latin text of the passage see Appendix 23.

The excellence of the fire of the secret adept is so great that its virtue cannot be told. It is made thus. Take mercury sublimate with vitriol and common salt, but better is its fifth essence. Take sal ammoniac nine or ten times sublimated, mix them together and grind diligently and spread on a slab of marble and put at night in quiet and serene air or in a cold cellar. And there 'twill be converted into a water which is of so great virtue that if one small drop falls thrice on your hand it will immediately perforate it and similarly if it falls on a plate of copper or iron.[47]

Many call this product *sal amarum* (bitter salt), though they do not teach how to make it.[48] Of another water Rupescissa says that if you wish to increase its virtue to the maximum, mix with it the water of the "Fire of the Adept," and it will work "more than the fire of hell."[49]

After a paragraph on the science of separating silver from gold which does not appear in the printed editions, Rupescissa closes his first book in two of the manuscripts which I have examined with an explanation why the secrets of philosophy are not further revealed and are rightly hid because of the unworthy. Since sacred theology has it that obedience is better than sacrifice, out of reverence for the statutes of his order he will not reveal the super-marvelous medicines which not only miraculously cure our bodies from every evil disease but also transmute imperfect metals into gold and silver in the twinkling of an eye, although the true mastery of them was revealed to him in prison.[50] In other manuscripts in a passage at the end of the first book, which is essentially the same as that in the edition of 1597, Rupescissa asserts that he has been unjustly imprisoned for seven years, "as the day of judgment will show," and rather

[47] All Souls 81, fol. 118r; Digby 43, fol. 114r; Canon. Misc. 37, fols. 37v-38r. For the Latin text of this passage see Appendix 23. This passage occurs also in the printed editions as cap. 43.

[48] All Souls 81, fol. 118v, "Multi enim hanc rem sal amarum vocant, licet non doceant magisterium eius."

[49] All Souls 81, fol. 119r, "Et si vis virtutem eius augere ad summum misce cum ea aquam ignis adepti et operatur plus quam ignis inferni."

[50] For this closing passage of Book I, which is much briefer in All Souls 81, fols. 119v-120r, than in the printed editions where it is spun out to cover two pages, see Appendix 23.

implies that this has been on account of his stupendous works of philosophy, sublime theories, and celestial illuminations.

The second book of John of Rupescissa's *Consideration of the Fifth Essence* is less interesting. It is in the main a repetition and rearrangement of the first book according to particular diseases.[51] A score of numbered remedies are given against the impediments of age, to restore one nearly dead to his senses, to cure or hide leprosy, against all lesions and skin disease, paralysis, consumption, fantasy and possession by demons, fear and fickleness, sorcery, worms and itch, poison, quartan fever and melancholy, ills resultant from the taking of medicine, fevers such as continuous, tertian, cotidian, and pestilential, mental diseases, and spasm. The nineteenth remedy against pestilential fevers rather takes the reader by surprise, however, since Rupescissa merely declares that it would be fantastic and stupid to seek a remedy, when the disease is incurable and sent to destroy the people by divine mandate, against which there is no remedy save from God's goodness. He then quotes the twenty-eighth chapter of *Deuteronomy* to prove that pestilence is a divine affliction.[52] On the other hand, he informs us that the mere odor of mercury is mortal poison to worms and skin afflictions in the human body, and recommends a mercury ointment.[53] There is also, at least in some versions of the second book, an interesting personal passage under the tenth remedy in which John states that, when his mortal enemies held him contrary to God's will in bonds in a noisome dungeon where his flesh corrupted from the squalor and the chafing of his fetters, by the kindness of the attendants he was able to obtain *aqua ardens* from a certain

[51] It opens in All Souls 81, fol. 120v, as follows: "Incipit liber secundus de generalibus remediis appellatus. Prologus secundi libri. Licet primus liber tante virtutis existat ut per eum possit curari omnis morbus curabilis, tamen quia non omnes que videntur aliquid esse sciunt ex principiis conclusiones elicere docebo in isto secundo libro sanitatis remedia procurare subito et quasi miraculose." In the printed editions this brief opening is spun out to greater length.

[52] Canon. Misc. 37, fols. 10v and 56v-57r. The wording varies considerably in the edition of 1597.

[53] BN 7151, fol. 28r.

holy man and friend of God and by mere unction with that lotion was cured in the twinkling of an eye.[54]

John of Rupescissa lays occasional stress upon experience or experiment. Once he says, "And believe one who has tried it because I have tested it."[55] Again he assures us that it has been experienced many times that a certain substance expels demons from houses they infest, "and in our time drove a demon out of a certain girl."[56] In the case of the pills which he had employed with success he advises that first one try a single pill, then administer two, and then three, so that the experiment may be carried out without peril.[57]

It seems evident from Rupescissa's own words that he was a practising physician as well as friar, prophet, and alchemist. He tells of a patient afflicted in the chest by an excess of viscous humors whom he relieved by pills of ierapigra and euforbium administered in a little *aqua ardens*.[58] That he believed in astrological medicine is further indicated by his describing a certain humor "as of the nature of slowest Saturn." But the astrological tinge in this passage is omitted in the printed version.[59]

[54] Wolfenbüttel 3284, 15th century, fol. 77v: "Cum inimici mi mortales et iniuste contra deum me tenuerunt in vinculis in obdurissimo carceris ergastulo vexatus hiis passionibus supra quam credi potest quia corpus corrumpebatur ex malitia squalorum carceris et ferri ingenio et benignitate servorum habui aquam ardentem a quodam sancto viro amico dei et me ex sola unctione cum ea lotione in ictu oculi sum sanatus."

See also Oxford, All Souls 81, fol. 127; BL Canon. Misc. 37, fol. 3v; Digby 43, fol. 118; edition of Basel, 1561, p. 145; Basel, 1597, p. 124; *Theatrum chemicum,* Ursellis, III, 466. These last two editions reproduce the passage exactly as printed in 1561, but the wording differs somewhat from that quoted above. For example, "in ictu oculi" is omitted. This phrase occurs, however, in the three Oxford MSS, but they agree with the printed version in having "servitoris" rather than "servorum." In other minor respects they differ from the other texts and from each other.

In the Lullified version of Rupescissa as printed at Venice, 1514 and 1542, Nürnberg, 1546, the passage is omitted entirely.

[55] All Souls 81, fol. 125v.

[56] All Souls 81, fol. 126r. BN 7151, fol. 27r.

[57] All Souls 81, fol. 129v, "donec sine periculo experimentum habeatur."

[58] All Souls 81, fol. 129r-v. In the editions of 1597 and 1561, pp. 132 and 473-474 respectively. In BN 7151, fol. 29v, Rupescissa states that it was himself whom he cured thus.

[59] Thus, while in Canon. Misc. 37, fol. 51r (under Remedium 12) we read, "et quia illa humor est terreus et de natura tardissimi Saturni ita huius infirmitatis actiones sunt tarde et durant

From the fuller manuscript text we may add further evidence of belief in astrology and in demons. The magnetic needle is adduced as an example of the close bond of love between the stars and images of the sky on the one hand and earthly things on the other—so close, indeed, that Aristotle said that the sky would break sooner than nature would allow any rupture in these inferiors.

I will reveal that influence and bond of love between the celestial bodies and the things that correspond to them on earth. Consider and see how those sailing the sea affixing (?) a needle with the stone adamant make it turn against the polar star. Whence has the needle this property that it always unfailingly turns against that star and does not turn to any other place? Without doubt this is because both iron and adamant by order and command of God are generated on earth by the influence of that star and have in them the nature and influence and property of the star. And therefore the needle always turns to it as to its like.

John proceeds to speak of the moon and the tides which follow that planet, "just as a man by an invisible tie naturally follows the woman whom he loves." Or ierapigra draws humors from the head, neck, and breast, but not from the lower members, because it is governed by the stars of Aries, Taurus, and Gemini which control those parts of the body.[60]

Persons given to melancholy are those in whose generation or disposition of body the influence of Saturn was unfortunate. They are liable to be vexed by demons.[61] Theologians have much discussed whether demons can be routed by natural bodies, arguing that immaterial beings are not subject to physical action, but Rupescissa does not see how they can get around the passage in the *Book of Tobit* that the smoke from a bit of the heart of a fish burned on coals drives away every sort of demon. He believes that no created being is absolutely spiritual, and that God has given demons a certain sensitiveness as to the action of

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ut in pluribus ultra integrum annum": in the ed. of 1507, p. 128, the corresponding text is, "et est humor terreus et de natura tardus et durat in pluribus ultra annum."

[60] BN 7151, fol. 4r-v.

[61] BN 7151, fol. 25r-v.

hell fire. He further gives the usual explanation of incubi and succubi, and affirms that demons delight in things which are governed by Saturn, Mars, and the moon, as is proved by the fact that operators of evil magic observe those constellations, while nigromancers observe the moon.[62] The sun and Jupiter prefigure heaven, while Saturn and the moon represent eternal Gehenna. And so "our fifth essence" which shares in the glory of paradise frees men from demons, especially if one employs the fifth essence of gold and pearls and the seed of the herb called *perforata minor* or *ypericon* or in the vernacular of Aquitaine, *trascalan*.[63] To the discussion of pest it is added in the longer version that God either sends pest from the influence of Saturn, in which case it takes such forms as leprosy, rheum, consumption; or by the influence of Venus which produces pestilential fever with spitting of blood, apostumes under the diaphragm suffocating the heart, great pustules under the arms or in the groin, carbuncles, or sacred fire; or by Mercury buboes in the eyebrows, beard, and chest; or by the moon horrible dreams driving men mad. But we are now assured that these and whatever other pests are sent from God by other influences are perfectly cured and prevented by Rupescissa's fifth essence.[64]

Although in his work on the fifth essence Rupescissa averred that he would not go into the subject of transmutation of metals because the rule of his order forbade, a work primarily devoted to that theme is ascribed to him, the *Book of Light* or *Mastery of the Making of the True Philosopher's Stone*. It is also once entitled *The Book of Light and Tribulation*. It is a treatise considerably shorter than that on the fifth essence, and seems in its original form to have been divided into seven operations by which one advanced by stages to the consummation of transmutation, with a supplementary eighth part on the construction of a furnace for alchemical operations. A leading feature is the use of Roman vitriol or sulphuric acid. When the philosophers wrote that the stone was made of mercury and sulphur, they did not

[62] BN 7151, fol. 26r-v.
[63] BN 7151, fol. 27r.
[64] BN 7151, fol. 32r.

mean common sulphur but an invisible spirit of sulphur. For our author this is found in sulphuric acid which has the property of tincturing things red and yet coagulates mercury in sublimation to the whiteness of snow. Our author employs it with saltpeter, sometimes also using sal ammoniac. Already in his fourth operation, known as "expressing the milk of the virgin," he claims to have separated the four elements from one another. One drop of this *lac virginis* upon an ignited metal plate will whiten it within and without. It is a preparation of which Geber and Avicenna were ignorant, that Hermes touched upon, Alfidius prepared, Rosarius understood, and Arnald recorded. Indeed, unless Rosarius stands here for John Dastin, the latest authority mentioned is Arnald of Villanova whom Rupescissa cites especially for the analogy between Christ's crucifixion and resurrection and the alchemical process. In one version of Rupescissa's treatise, however, the passages in which this analogy is developed are omitted. He cites "Rosarius" as if it were the name of an author instead of the title of an alchemical treatise commonly ascribed to Arnald. Very likely he is referring to one of the *Rosaries* which is not by Arnald, and possibly to the "Desiderabile desiderium . . . " of John Dastin.

The author of the *Book of Light,* whether he be John of Rupescissa or not, does not pretend to be the first discoverer of the seven operations which he details. He is rather simply reporting processes which would appear to have been in fairly common use among alchemists. Thus after he has told how to prepare the marvelous water known as the milk of the virgin, and to separate the elements air and fire in the form of oils, he informs us that some persons operate only with the *lac virginis* and do not bother with the elements air and fire, while other alchemists mix the three together using one pound of fire, four pounds of air, and eight pounds of the milk of the virgin. The former method is especially good for whitening and the latter for reddening. Similarly he tells us that some who wish to make silver first cast the elixir on true silver and then employ that to treat the baser metals with.

Rupescissa's professed contribution is rather in publishing these processes which past philosophers have always concealed. Thus when he suggests combining the different usages as to the employment of *lac virginis,* by placing in the same furnace three vases, one of the milk alone for whitening, another of the milk alone for reddening, and a third of the three elements for gold, he adds: "Believe, poor evangelical man, that before me no man has brought this truth into the open."[65] Previous philosophers had concealed the truth lest evil men abuse it, and Rupescissa, who inveighs against riches and extols evangelical poverty, explains vaguely and clumsily that he has revealed it only in view of the calamities afflicting holy church and the approaching tribulations from antichrist. As his work is a remedy for the afflicted elect, so it will be a snare and a destruction to the carnal beast and the wicked. The opening paragraph of one version of the *Liber lucis* is clearer on this point and makes a connection between Rupescissa's prophecies and his alchemical activity. The author, having considered the prophecies by Christ in the gospels of tribulations of the elect in times to come, especially the times of antichrist, is of the opinion that those times are at hand, and that the church is about to be despoiled by tyrants of all its temporal possessions. To relieve its approaching poverty he therefore makes this plain and unvarnished statement, without elaborate argument or scholastic disputation, of the secret of the philosophers' stone.[66]

The situation with regard to different versions of the *Liber lucis* is roughly similar to that which we have already set forth anent the *De consideratione quintae essentiae.* There are differ-

[65] In S. Marco fondo antico 323, fol. 118r, the "Sexta operatio" ends with this sentence, and does not include the following explanation why Rupescissa has revealed what others have hidden. This explanation occupies more than a page in the Klagenfurt MS (Bischöfl. Bibl. XXIX.d.24, fols. 209v-210v) and in Copenhagen GL. kgl. S. 1712, quarto, fol. 116r-v, and over a column in Copenhagen GL. kgl. S. 236, F., fols. 55v, col. 2-56r, col. 1.

[66] This introductory paragraph is found in the Klagenfurt and two Copenhagen MSS mentioned in the foregoing note. Only a few sentences of it, and those having nothing to do with future crises or contingencies, occur in the S. Marco MS. See further Appendix 24.

ences between the work as contained in different manuscripts, as well as between the printed and manuscript versions. Even the printed versions are not alike. Thus Manget printed it first as John of Rupescissa, *De confectione veri lapidis philosophorum*, and then immediately thereafter as John of Rupescissa, *Liber lucis* with a different incipit, division into chapters, and other variations.[67] The manuscript versions have, however, chiefly concerned us as being more original and dependable. The version represented by the manuscript of St. Mark's at Venice reduced the work to little more than a bare outline of practical instructions as to alchemical processes, very briefly and directly stated. The longer versions, both manuscript and printed, have more of what might irreverently be termed guff. The short version of the *Liber lucis* may be an abbreviation by some practical alchemist or alchemists who had no time or interest to copy what seemed to him or them the superfluous verbiage of the original as it professed to come from the pen of Rupescissa.

Possibly it does not make much difference which was the original version. Whether in either case the shorter and meatier version was by Rupescissa or a forger or some later abbreviator acting in good faith, the fact remains clear that there were evidently alchemists who preferred the terser and more business-like versions and who did not care for mysticism, pious cant, religious analogies, or other excrescences. And on the whole we get the impression that John of Rupescissa or whoever else wrote under his name in the main catered to this type of audience. For even the more fulsome versions profess to avoid alike the intricacies of scholastic argument and the cryptic and enigmatic utterances of earlier adepts. If they talk a little too much about poor evangelical men, after all they state their case and tell their

[67] Manget, II, 80-83 and 84-87, reproducing Zetzner, III. 180-107 and 284-295 respectively, of which the latter reproduces the text of the *Liber lucis* from the edition of Cologne, 1570, *Secreta alchimiae magnalia D. Thomae Aquinatis* etc. opera Danielis Brouchuisii . . . cum praefatione D. Ioannis Huernii. In fact Zetzner III, 267-303, at the same time reproduced from this edition the two tracts ascribed to Aquinas and the *Clavicula* of Raymond Lull.

story in a way that even a poor evangelical man could understand.

An alchemical bibliography in an early modern manuscript, which gives other incipits for the *Liber lucis*[68] in addition to the usual one, also attributes to Rupescissa two other alchemical titles, a *Treasury of the Universe*[69] and *An Abbreviation of Secrets of Secrets*[70] which was printed in 1610. A discussion of *aqua vitae rectificata* is ascribed to Rupescissa in a copy made in 1468.[71]

[68] Vatic. Barb. 273, fol. 290r, lists it with the usual opening, "Consideravi tribulationes," but at fol. 291v with the incipit, "Intentio mea est recolligere diversos . . ." and at fol. 293r with the incipit, "Accipe vinum medii coloris . . ."

[69] Vatic. Barb. 273, fol. 294r, "Thesaurus mundi."

[70] Vatic. Barb. 273, fol. 293r, "Abbreviatio quedam de secretis secretorum magistri Joannis pauperum." It was there listed without opening or closing words, but Carbonelli (1925), p. 47, citing the same MS without giving the page, quotes as the incipit, "Rogo eternum deum qui cuncta ex nihilo creavit . . .," and as the desinit, ". . . vocatus a magnis philosophis ludus puerorum et exercitium mulierum." This incipit in fact occurs at fol. 249r of Vatic. Barb. 273, and the work was printed in *Artis auriferae,* III (1610), 131-139. A MS is S. Marco VI, 215, 1475 A.D., fols. 140-146. It is doubtful if this Johannes Pauperum should be identified with John of Rupescissa. For other works by Johannes Pauper see DWS, vol. I, Nos. 217, 218.

[71] Wolfenbüttel 3721, 15th century, paper, different hands, fols. 253r-257, rubric, "Incipit aliud opus Rubreisse (*sic*) de aqua vite rectificata." Incipit, "Recipe ergo de vino albo vel rubeo. . . ." Colophon, "Finis huius per me Steffanum Huller auriscriba etc. temporis rector scolarium theutonicorum. Anno 68."

CHAPTER XXIII

CALCULATOR AND THE RISE OF MATHEMATICAL PHYSICS[1]

> Vellem etiam edi scripta Suisseti vulgo dicti Calculatoris qui Mathesin in philosophiam scholasticam introduxit.
> —Leibnitz to Thomas Smith, 1696

The celebrated work of Richard Suiseth or Swineshead entitled *Calculationes,* from which its author received the sobriquet of Calculator, in one sense does not bear at all closely upon the history of magic and experimental science. Primarily mathematical and logical in character and purpose, with an eye single to the relentless pursuit of abstract and intricate *sophismata,* it offers not the slightest opening for magical modes of thought to intrude themselves. Its aim is measurement, not marvels; calculation, not divination. But while primarily mathematical and logical, it is not entirely disassociated from experimentation. Moreover, the *Calculationes* of Richard Suiseth appear as the leading model of a great mass of writing during the closing middle ages devoted to the intensity and remission or latitude of forms, to uniformity and difformity, the proportions of velocities, reaction, maximum and minimum, and kindred topics and concepts. This involved and subtle scholastic discussion of problems which were physical and mathematical as well as exercises in logic became anathema and an object of loathing to the tired humanists of the so-called Italian Renaissance and to those who lightly praised folly and preached reform beyond the Alps. Few modern scholars have had the time and patience to try to puzzle it out. But although to a superficial view it appears to have been discarded then and neglected since, one suspects that in reality it was laying the foundation for the later development of the mathematical method in physical science; that it was striving

[1] This chapter first appeared in *Speculum,* April, 1932. I have added references to the St. Mark's MS and made a few other changes.

to express in words and arguments what was later to be put much more clearly, forcibly, and conveniently into symbols and equations; that it was giving a first faulty theoretical expression to what was in time to be formulated upon a more concrete and exact basis of experimental physics. Nor is this medieval thought entirely defunct. I turn from scholastic disputations *De instanti* to Gilbert N. Lewis's fascinating *Anatomy of Science* only to find him wondering "whether, when two molecules collide, the impact is instantaneous or lasts a certain definite time, or whether it begins at infinite distance, becoming appreciable only at close approach."[2]

Whether it may be worth while or not to attempt the resuscitation of the details of these forgotten modes of thought, it does seem that they constituted a preliminary discussion which was helpful, in its failures as well as its surmises, and probably even essential under the circumstances to the further development of scientific thought. We would not then wholly pass over this considerable body of later medieval writing and thought, as so many historians of philosophy, mathematics, and physics have done, but give it some attention, though inadequate enough, in noting one of its earlier and apparently its greatest individual expressions, the work of Calculator. Even if this type of writing and thinking had done nothing more than, as has already been hinted, to take experiment away from natural magic and associate it to some slight extent at least with logical, mathematical, and physical argument, it would have served a great negative purpose. Not that all writings of this type were so severely free from any interest in magic as the *Calculationes*. Later we shall hear even so rational a critic of marvels as Nicolas Oresme adducing the principles of uniformity and difformity to explain the possibility of natural magic.

Despite the growing distaste for scholasticism in the later fifteenth century, at least three editions of the *Calculationes* appeared from the printing press. The undated *editio princeps* appeared at Padua under the editorship of John of Cyprus, doctor

[2] G. N. Lewis, *The Anatomy of Science,* New Haven, 1926, p. 115.

of arts and medicine.[3] This edition is now placed in the year 1477 rather than in 1485,[4] because the only two other volumes known to come from the same press, the *Dubia* of Paolo da Pergola, and the *Consequentiae* of Strodus, are dated of that year. Moreover, the copy of this edition owned by Duhem already had manuscript marginal notes dated December 16, 1481.[5] The edition mentioned by Hain of Pavia, 1488, is probably an error for the 1498 edition at that place. The work was again printed at Venice in 1520.[6] Meanwhile Bassanus Politus in 1505[7] and Alvarus Thomas in 1509[8] had printed what they intended to serve as introductions to the work. The reputation of the Calculator among the learned continued through the sixteenth century. Raggius of Florence, by whom an astronomical work is also extant, undertook to confute the arguments of the Calculator in a work addressed to Salviati early in the sixteenth century on proportion, propinquity, and remoteness.[9] Pomponazzi in 1514 devoted his

[3] I have used a rotograph of the copy at the British Museum numbered IB. 29968, opening at fol. 1r, col. 1, without title, "Penes quid habeant intensio et remissio . . ." and closing at fol. 83r, col. 2, ". . . ad extremum remissius. patet ergo prima pars conclusionis. Subtilissimi Doctoris Anglici Suiset Calculationum Liber Per Egregium Artium et Medicine Doctorem Magistrum Iohanem de Cipro diligentissime emendatus foeliciter Explicit. DEO GRATIAS. PADVE."

Hermolaus Barbarus, who speaks in his correspondence of reading Suiseth, had probably used this edition rather than a manuscript: see Arnaldo Ferriguto, *Almorò Barbaro,* in *Miscellanea di storia veneta,* XV (1922), 34-35, citing the Lucca MS of Barbaro's letters.

[4] As the British Museum copy used to be tentatively dated.

[5] Duhem, *Études sur Léonard de Vinci,* III (1913), 415.

[6] *Calculator. Subtilissimi Ricardi Suiseth Anglici Calculationes noviter emendate atque revise.* After a dedication and table of contents on fol. 1v, the text opens at fol. 2r, col. 1, "Incipit perutile ac ad omnes scientias applicabile calculationum aureum opus Ricardi Suiseth Anglici Doctoris subtilissimi. Penes quid habeant intensio. . . ." At fol. 68v, col. 2, "Explicit Calculationum opus aureum magistri Raymundi Suiseth anglici viri in hac facultate eminentissimi atque acutissimi nuper diligenti examine emendatum ab excellenti doctore domino Victore trinchauello veneto." This edition has more headings and paragraph divisions than the *editio princeps* and some figures to illustrate the text. I am indebted to Professor Richard P. McKeon for the use of his copy of this edition.

[7] *Tractatus proportionum introductorius ad calculationes Suiset,* in the group of such treatises published at Venice, 1505, and headed by his *Questio de modalibus.*

[8] *Liber de triplici motu proportionibus annexis magistri Aluari Thome Ulixbonensis philosophicas Suiseth calculationes ex parte declarans,* Paris, 1509, "die Februarii 11."

[9] Rome, Bibl. Casan. 1431, (B.VI.7), membrane, about 1520 A.D.

De intensione et remissione formarum entirely to a refutation of Suiseth but recognized the sharpness of his intellect.[10] The humanist Vives shrank from his elaborate calculations, but Cardan included him with Duns Scotus as the two medieval Latin thinkers among his ten leading intellects of the world, five being ancient and the other three medieval writers in Arabic.[11] Scaliger coincided in this view, and it was kept alive in the seventeenth century, when Casaubon congratulated himself upon being able to read the *Calculationes* at Oxford and Gabriel Naudé and his English translator Evelyn re-echoed the estimates of Scaliger and Cardan.[12] Even in the middle of the eighteenth century Jacob Brucker in his *Critical History of Philosophy*[13] devoted considerable space to the Calculator, whereas Cantor's late nineteenth century *History of Mathematics* barely mentions him.

Pierre Duhem had much more to say concerning the Calculator in discussing medieval physical theories in the third volume of his studies on Leonardo da Vinci. But he attempted to overthrow all the previous conclusions and judgments of posterity on the subject. In the first place he held that Richard Suiseth or Swineshead was the author merely of the treatise *De primo motore* and not of the *Calculationes,* which he ascribed rather to a Richard de Ghlymi Eshedi who thus became the real Calculator. But it is fairly evident that this Richard de Ghlymi Eshedi, an absurd form of name found in a single manuscript and otherwise

[10] P. Duhem, *Études sur Léonard de Vinci,* III (1913), 120.

[11] *De subtilitate,* XVI, 607, "Frequentiores licet in disciplinis viros praestantes invenire e quorum numero decem selegi unicuique iudicium suum relinquens." The five Greeks named are Archimedes, Aristotle, Euclid, Apollonius of Perga, Architas of Tarentum. The Arabic writers are al-Khowarizmi, Alkindi, and Geber Hispanus. Cardan calls Suisset by the Christian name "Ioannes," thus adding to the multiplicity of such designations for him. As an after thought he adds Galen as an eleventh name and Vitruvius as "last of all" and twelfth.

[12] Gabriel Naudé, *Instructions concerning the erection of a library,* interpreted by Jo. Evelyn, 1661, p. 51: "What shall we then say, that Scaliger and Cardan, two of the greatest personages of the last age, consenting both in the same point concerning the premises of Richard Suissent, otherwise called the Calculator, who lived within these three hundred years, to place him in the rank of ten of the rarest witts that ever appeared; whilst we are not able to find his works in all the most famous Libraries?"

[13] Jacob Brucker (1696-1770), *Historia critica philosophiae,* 1742-1744, III, 849-853.

unknown, was the erratic creation of a French scribe or copyist who could make nothing of the English word, Swyneshede and turned it so to speak into Ghlymshede instead,—which is, for that matter, as much like the other word as Suiseth is. Duhem suggested that a *Summa Eshilde,* or *Eshedi, Anglici de iudiciis* might also be by this Riccardus de Ghlymi Eshedi, but of course it is really the astrological *Summa* of John of Ashenton or Eschenden, and is another good illustration of how English names are distorted by French pens. In the second place Duhem endeavored by various all too perceptible squirmings to make out that the *Calculationes* were written after the works of Oresme and other Parisian schoolmen to whom he wished to give the lion's share of the credit for being precursors of Galileo. But Duhem's evidence seems to me too flimsy and his argument too tortuous and prejudiced to spend further time over.[14]

[14] An instance of his questionable methods is his using the confused—as he himself calls it—note-book of a student at Paris for the *De motibus naturalibus* or *De primo motore* of Swineshead and the views of other men instead of consulting their own works which might be expected to give a much fairer and completer notion of their positions. Thus he airily writes, *Études sur Léonard de Vinci,* III, 452, "C'est encore notre étudiant parisien, ce sont ses précieux brouillons qui nous dispenseront d'aller chercher à Oxford les renseignements dont nous aurons besoin." No wonder that he finds Swineshead's views in the *De primo motore* hard to reconcile with those on the same topics in the *Calculationes,* when he takes the word of another person, who was presumably an immature student, for some of them.

K. Michalski, *Bulletin international de l'académie polonaise,* Classe de philologie, Classe d'hist. et de philosophie, L'Année 1925, p. 61, has already rejected Duhem's argument on the ground that the MSS generally give the work to Swineshead, and, since he is sometimes called William, has suggested that Ghlymus may have been for Guilelmus and Eshed for Swenshede.

This opportunity may be taken to add, however, that Duhem sometimes places even the Parisian schoolmen of the fourteenth century a little too late. In his account of Buridan (*Le système du monde,* IV, 124-142) he certainly is more correct than Chevalier, who represents Buridan as rector of the university of Paris in 1317, or Hauréau who made him rector in 1327 (*Hist. de la philos. scholastique,* III, 1880, p. 452), in following the documents which show him to have been a student in arts there in 1329 and elected rector in 1340. Duhem says (p. 127), "En 1340, Jean Buridan est, *pour la seconde fois,* nommé recteur de l'Université; nous ne savons pas à quelle date il avait été, pour la première fois, investi de cette fonction." But all that the *Auctarium* says is: (I, 41) "magister Johannes Brudan (*sic*) de natione Picardorum electus fuit in rectorem Universitatis Parisiensis," which would not attest any pre-

If Richard de Ghlymi Eshedi is merely a slip of the pen, we do not as yet know any too much concerning the real Calculator, Richard Swineshead or Suiseth. He was sometimes also called Roger, but Brucker long since decided in favor of Richard, and until we find better evidence, the matter may be allowed to rest there. We know enough, however, to place his activity definitely in the second quarter of the fourteenth century. His treatise on natural motions is found in a manuscript at Erfurt of the date, 1337 A.D.[15] He was implicated in the disorderly election of a chancellor at Oxford in 1348.[16] In the *Calculationes* the most recent and indeed almost the only work cited is the treatise on proportions of Thomas Bradwardine, who is referred to in these terms in the printed text, "As the venerable master, Thomas de Berduerdino, in his book concerning proportions clearly states."[17] The date of this work by Bradwardine we know

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vious election to that office. But the point on which I wish to correct Duhem is his statement that Buridan's discussion of 1335 of such matters as division to infinity and the reality of the point "is, without doubt, the oldest extant monument of his intellectual activity." For a manuscript at Klosterneuburg contains other works by him dated both in 1335 and 1332. Claustroneoburgi 291, 14th century, fols. 163-172: "Ad defensionem veritatis quam quidam impugnare nituntur de dependentiis effectuum ex suis causis . . . / . . . Ut superius videbatur. Et hoc ad presens sufficiant ad istam questionem. Explicit questio de dependentiis et convenientiis et diversitatibus determinata per magistrum Iohannem Buridan. Anno domini 1332." *Ibid.*, fols. 172-205: "Alias composui quendam tractatum de diversitate generis ad speciem . . . / . . . Expliciunt defensiones determinationis mag. Ioh. Buridani de diversitate generis ad speciem quas idem mag. congregavit a.d. 1335."

Similarly Duhem, III (1913), 4, argued that the date 1368 at the close of a Paris MS of the questions of Albert of Saxony on the *De coelo et mundo* must be the date of composition, but Georg Heidingsfelder, *Albert von Sachsen*, 1921, p. 22 (*Beiträge z. Gesch. d. Philosophie des Mittelalters*, Bd. XXII, Heft. 3-4) called attention to previous MSS dated 1365 and 1360.

[15] Amplon.F.135, 1337 A.D., of English provenance, fols. 25-47v, Subtilissimus tractatus Anglicanus magnus de motibus naturalibus et annexis compilatus a Rogerio Swynshede et est summe utilis in loyca et philosophia naturali, "Inc. tract. mag. Wilhelmi Swineshep datus Oxonie ad utilitatem studentium. Motore primo primitus invocato . . . / . . . impassibilem consistit cui ——— ——— gloria, am. Expl. tract. de mot. nat. datus a mag. Rog. Swyneshede etc."

[16] See the *Dictionary of National Biography* and its references.

[17] Ed. of 1477, fol. 3v, col. 1; ed. of 1520, fol. 4r, col. 2: "ut venerabilis magister Thomas de Berduerdino in suo libro de proportionibus liquide declarat." Likewise in S. Marco VI, 226, fol. 4r, col. 2, except that the name is spelled "Tomas Braduardini."

from the manuscripts to be 1328,[18] and he was appointed archbishop of Canterbury in 1349 and died of the plague in the same year. The use of the present tense in this citation of Calculator and the calling Bradwardine master instead of archbishop is no sure indication that it was written during his lifetime and before he became archbishop, but it would be an appropriate enough form to employ under such circumstances.

The old printed editions of the *Calculationes* are full of abbreviations and difficult to read. Headings and divisions in the text are much better accentuated in the edition of 1520 than in the *editio princeps,* but it is equally abbreviated. A modern critical edition is to be earnestly desired at no distant date. Manuscripts do not seem to be numerous. There is one at Venice,[19] and another at Rome.[20] In England a Gonville and Caius college manuscript at Cambridge carries the text through the first thirteen tractates of the printed editions,[21] while another at Worces-

[18] At Paris, BN nouv. acq. 625, fols. 62r-70v, "Explicit tractatus de proportionibus editus a magistro Thoma de Bradwardin anno domini 1328, scriptus Parisius anno eiusdem 1348 deo gratias." Duhem, *Léonard de Vinci,* III (1913), 299, cites BN 14567, fol. 261, and 16621, fol. 212, for the same explicit so far as the year 1328 for composition is concerned.

[19] S. Marco VI, 226 (Valentinelli, XI, 11), 15th century, fols. 1r, col. 1-98v, col. 1, folio, membr. et chart., legible but extremely abbreviated: "Penes quid habet intensio et remissio qualitatis attendi plures sunt opiniones . . . / . . . quam ad extremum remissius. Patet igitur prima pars conclusionis. Deo gratias Amen. Sit semper dei nomen benedictum. Hic est finis huius tractatus de inductione gradus summi et cum eo completum est totum opus calculationum Suiseht scriptum per me . . . die ultimo Iulii." The copyist's name and perhaps the year have been erased. A subsequent note states that Iohannes Marchanova presented this volume to the Augustinian canons of the monastery of St. John of Padua in 1467. On the left hand page facing fol. 1r under the date 1440 and the name, "Ioannes Marchanova artium et medicinae (a somewhat early occurrence of the diphthong) doctor P.S. Pec. Em." is the following table of contents:

The folios indicated are not always correct: thus *De potentia rei* does not begin until fol. 43v, while *De maximo et minimo* starts at fol. 49v.

[20] Vittorio Emanuele 250, 15th century.

[21] CU Gonville and Caius 499, 14th century, fols. 165-203. Further material by

ter cathedral begins where the Cambridge codex leaves off.[22]

Calculator's first chapter deals with the intension or remission of a quality.[23] Intension may be understood as the alteration by which a quality is acquired. In this case it is a kind of motion. Or it may be understood as the quality by which anything is intense. It is with this definition that he will begin. Some regard intension as approaching toward the highest degree within a given latitude and remission as increasing distance therefrom. Others regard intension as increasing distance from a degree of zero and remission as departure from a degree of perfection. Others look on intension as going away from zero and remission as approaching zero. The Calculator argues against all three of these positions and seems to prefer to regard qualitative variation as a purely relative matter like the distinction between great and small. He also holds that intension and remission are not comparable, and considers such a question as whether from uniform loss of intension follows uniform acquisition of remission.

The second chapter turns to intension in difform things.[24] It is largely occupied with paradoxical problems involving infinity, but the author suggests as a key to all such *sophismata* the axiom that "of no part is there any proportion to an infinite whole."[25]

In chapter three we pass from the intension of a thing in one quality to the question of an element having two first qualities

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Suiseth follows at fols. 204, 212, and 213, some of which may be extracted from the *Calculationes:* see M. R. James's catalogue.

[22] Worcester Cathedral F35, 15th century, fols. 3-124, described in the catalogue of J. K. Floyer and S. G. Hamilton as "Swyneshed de motu locali et aliis physicis", but the incipit they give, "Hic incipiunt quedam regule," is that of Tractatus XIV of the *Calculationes.* I am indebted to Mrs. D. W. Singer for calling this MS to my attention.

[23] Editio princeps, fol. 1r, col. 1; ed. of 1520, fol. 2r, col. 1. S. Marco VI, 226, fol. 1r, col. 1.

[24] Editio princeps, fol. 4v, col. 2; ed. of 1520, fol. 5r, col. 2. S. Marco, VI, 226, fol. 5v, col. 2.

[25] Editio princeps, fol. 8v, col. 2; ed. of 1520, fol. 9r, col. 1: "Infinita quasi sophismata possunt fieri de infinito que omnia si diligenter inspexeris quod nullius partis ad totum infinitum est aliqua proportio, faciliter dissolvere poteris per predicta." What seems to be the corresponding passage in S. Marco, VI, 226, fol. 10v, col. 2, is worded quite differently: "Multa alia possunt fieri sophismata per rarefactionem subiecti et per fluxum qualitatis et alterationis qualiter (?) secundum subiectum in-

of unequal[26] intensity. Here there are three views. The first maintains that the intensity of the element will correspond to the middle degree equidistant between those two qualities. The second view is that the intensity of the element will correspond to that of its more remiss quality. Third, it is held that the intensity of the element will follow a mean proportion between the intensities of the qualities, so that if these are 2 and 8, it will be 4, and not 5 as the first view would maintain.[27]

From the elements chapter four turns to mixed bodies, concerning the intension and remission of which there are four positions. First, that their intensity follows the proportion of the dominant element in the compound to the less dominant element. Second, that it conforms to the dominant element without regard to the other. Third, that it is half the difference between the two. Fourth, that it corresponds to the entire difference.[28]

Rarefaction and density are the theme of the fifth chapter. As to their intension there are only two rational opinions. One is that a thing is rarefied in the ratio of its quantity to its matter (or, of its size to its mass), and increases in density according to the ratio of its matter to its quantity. The second opinion is that rarefaction is not a question of quantity merely but in comparison to matter.[29] It is hard to see how this view differs from the other. The question then is raised whether density and rarefaction are both positive terms, or whether only one is to be so regarded, and which of them it is.[30] Another question is whether every body which is difformly dense, and of which either half is uniform or is uniformly difform, corresponds to its middle degree.[31] Various propositions are then discussed of which two may

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tendi debet et remitti per huiusmodi rarefactionem fluxum et alterationem ad que omnia considerando proportionem totius ad partem responsionem eligere faciliter poteris ex premissis."

[26] *Eque* in S. Marco VI, 226, fol. 10v, col. 2.

[27] Editio princeps, fol. 9r, col. 2; ed. of 1520, fol. 9r, col. 2. S. Marco VI, 226, fol. 10v, col. 2.

[28] Editio princeps, fol. 12v, col. 1; ed. of 1520, fol. 12v, col. 1. S. Marco VI, 226, fol. 14r, col. 1.

[29] Editio princeps, fol. 17r, col. 1; ed. of 1520, fol. 16v, col. 2. S. Marco VI, 226, fol. 20r, col. 1.

[30] Editio princeps, fol. 17v, col. 1; ed. of 1520, fol. 17r, col. 1. S. Marco VI, 226, fol. 20v, col. 1.

[31] Editio princeps, fol. 19v, col. 2; ed. of 1520, fol. 18v, col. 2. S. Marco VI, 226, fol. 23v, col. 1.

be selected at random as examples. If two bodies of like density but different quantity are rarefied or condensed at equal speed, the larger one will acquire or lose quantity faster.[32] If two bodies are of unequal size and unequal density, and the ratio of the quantity of the denser body to the quantity of the other is less than the ratio of their respective densities, if they gain or lose density at equal speed, the denser body will lose or acquire quantity more slowly than the rarer body.[33] Other questions are whether all that is uniformly difformly dense is uniformly difformly rare,[34] whether anything is equally rare and dense, whether from uniform acquisition of density follows uniform loss of rarefaction and vice versa, whether objects will remain equally rarefied which start from no degree of rarefaction and become more rarefied at equal speed, and whether density is increased at the same speed and ratio as rarefaction is lessened and vice versa.[35] Then comes the type of problem involving infinity in which the Calculator seems especially to delight: if an object of infinite extent has a finite part which is infinitely dense, would the whole be of infinite density?[36] He points out, however, that it is really the same as his previous problem as to the intension of an infinite subject having an infinite quality in a finite part.[37] He also notes that, when something is increased in extent by rarefaction, some point must remain quiet while others are in movement.

The next chapter or tractate considers the velocity of the motion of augmentation.[38] One view is that it varies according to "proportional requisition of quantity." The other view is that it depends solely on the amount of increase without reference to the original quantity. If anything increases from nothing, and in every proportional part of the time of its increase doubles in

[32] Editio princeps, fol. 21r, col. 2; ed. of 1520, fol. 20r, col. 1. S. Marco VI, 226, fol. 25r, col. 2.

[33] Editio princeps, fol. 21v, col. 1; ed. of 1520, fol. 20r, col. 2. S. Marco VI, 226, fol. 25v, col. 1.

[34] Editio princeps, fol. 22v, col. 1; ed. of 1520, fol. 20v, col. 2. S. Marco VI, 226, fol. 26v, col. 1.

[35] *Idem.*

[36] Editio princeps, fol. 23r, col. 2; ed. of 1520, fol. 21r, col. 2. S. Marco VI, 226, fol. 27v, col. 1.

[37] Editio princeps, fol. 25r, col. 1; ed. of 1520, fol. 22r, col. 2. S. Marco VI, 226, fol. 29r, cols. 1-2

[38] It opens at fol. 25r, col. 2, of the editio princeps, and at fol. 22r, col. 2, of the edition of 1520. In S. Marco VI, 226, at fol. 29r, col. 2.

size, "it would certainly begin swiftly to acquire quantity." But if it first doubled, then tripled, then quadrupled, and so on to infinity, it would begin infinitely slowly to acquire all its quantity. And if it increased in a ratio less than double to infinity it would begin its increase in size quickly.[39] If two surfaces of unequal length and equal breadth keep growing wider at the same rate, the longer will increase in quantity more rapidly. Or if two surfaces of equal length and unequal breadth keep growing longer at the same rate, the wider will augment the more rapidly. But if two surfaces of equal length acquire breadth at the same rate, they increase in size at the same rate, whether equal in width at first or not.[40]

Reaction is the subject of the seventh treatise.[41] It is asked if it is possible. Experiences or experiments attesting it are the quenching of a hot iron in water which cools the iron and at the same time warms the water, or the mixing of cold with boiling water warming the one and cooling the other below the boiling point, or the warming a cold hand in the bosom which is chilled thereby, or the case of two sharp knives cutting each other in two. Calculator wishes to study the variation of force and resistance and how one part helps another to act or to resist. "It cannot be said that anything has more potency because of its density," does not seem a very promising start on his part.[42] Motion does not follow absolutely the ratio of force to resistance but depends on other circumstances such as application. If a certain object possessed a certain supply of form and half of the matter in the object could be removed without affecting the form, the force of the object would be the same as when it was twice as large.[43] But usually when an object is reduced in size,

[39] Editio princeps, fol. 26v, col. 2; ed. of 1520, fol. 23r, col. 1. S. Marco VI, 226, fol. 30v, col. 2.

[40] Editio princeps, fol. 29v, col. 2; ed. of 1520, fol. 25r, col. 2. S. Marco VI, 226, fol. 34v, col. 2.

[41] Opening editio princeps, fol. 30r, col. 1; ed. of 1520, fol. 25v, col. 1. S. Marco VI, 226, fol. 35r, col. 1.

[42] Editio princeps, fol. 31v, col. 1; ed. of 1520, fol. 27r, col. 1. S. Marco VI, 226, fol. 37r, col. 2.

[43] Editio princeps, fol. 31v, col. 2; ed. of 1520, fol. 27r, col. 1. S. Marco VI, 226, fol. 37v, col. 1.

it loses form as well as matter. As the parts of a composite object are distant from the agent so they resist it less.[44] But the remote part aids the other in resisting. A single body has most resistance in its middle point.[45] Action and reaction are possible between difform as well as uniform bodies. If a man had two equal weights in his hands he would lift one the more slowly for holding the other, as experiment shows.[46]

In the brief eighth tractate Calculator argues against the position that force varies with the amount of form in matter and not with the intension of that form nor extension.[47]

As to how difficulty of action varies there are several opinions. One makes it depend on the ratio of greater inequality, so that what acts by the greater ratio causes the greater difficulty. A second view makes it depend on the ratio of less inequality, so that what acts by the smaller ratio causes more difficulty because it is more fatigued in acting. The third position is that it varies according to the force producing the action so that the greater force always causes the greater difficulty.[48]

In discussing maximum and minimum Calculator also explains the meaning of *maximum quod non*—"not so much but everything larger," and *minimum quod non*—"not so much but everything smaller."[49]

In connection with the doctrine, then commonly accepted, that every element has its natural place, the question is raised whether

[44] Editio princeps, fol. 32r, col. 2; ed. of 1520, fol. 27v, col. 1. S. Marco VI, 226, fol. 39r, col. 2.

[45] Editio princeps, fol. 33r, col. 2; ed. of 1520, fol. 28r, col. 2. S. Marco VI, 226, fol. 39v, col. 2.

[46] Editio princeps, fol. 34v, col. 2; ed. of 1520, fol. 29v, col. 1: "Item si homo haberet duo equalia pondera in manibus tardius levaret unum propter reliquum ut apparet experimentaliter." S. Marco VI, 226, fol. 41v, col. 2, omits *pondera* and in place of the last two words has "patet ex experimentis."

[47] Ed. of 1520, fol. 30v, col. 1: "Nunc (*tunc* in *editio princeps*) arguitur contra positionem ponentem quod potentia rei *attenditur penes multitudinem forme in materia et* non attenditur penes intensionem illius forme nec extensionem." The words italicized are omitted in the editio princeps of 1477, fol. 36r, col. 2, and in S. Marco VI, 226, fol. 43v, col. 2.

[48] Editio princeps, fol. 37r, cols. 1-2; ed. of 1520, fol. 31v, col. 1. S. Marco VI, 226, fol. 45r, col. 1.

[49] Editio princeps, fol. 40v, col. 2; ed. of 1520, fol. 34r, cols. 1-2. S. Marco VI, 226, fol. 49v, col. 1.

a part of the earth beyond its center offers resistance to the descent of a part this side of the center.[50]

In the printed versions the intensity of luminous bodies is next considered and the further problem of their action in various media,[51] but in the manuscript text these subjects are not taken up until later. Instead the theme of resistance is pursued further, which would seem the more logical arrangement. As usual, a distinction is made between the size and the potency of the luminous body, although it is recognized that the loss of a portion of a body usually means the loss of that much form. Such corollaries are then drawn as that if two luminous bodies are equal in quantity, but one is more intense than the other, and they diminish in size at equal speed in proportional quantities, the more intense will lose its luminosity faster. Whereas if two luminous bodies of unequal quantity and the same intensity decrease in size with equal speed, the greater will lose its luminosity more quickly. While if two bodies of equal quantity and unequal intensity are remitted as wholes in degree, while their quantity remains constant, they lose their luminosity at the same rate. Or two luminous bodies of unequal size but of the same degree of intensity which diminish in quantity while their intensities remain constant, will lose their luminosity at the same speed. These are, *mutatis mutandis,* about the same propositions as had been made concerning density and rarefaction.

It is stated that light acts immediately (*subito*) for its whole latitude in every medium. It does not, however, act over an equal distance in every medium but covers a greater distance in a rare medium than in a dense one.[52] If light is shining through a uni-

[50] Editio princeps, fol. 43r, col. 1; ed. of 1520, fol. 35v, col. 2. S. Marco VI, 226, fol. 52r, col. 1.

[51] Editio princeps, fol. 45a, recto, col. 2; ed. of 1520, fol. 38r, col. 1. S. Marco VI, 226, fol. 64r, col. 1.

[52] Editio princeps, fol. 47r, col. 1; ed. of 1520, fol. 39v, col. 1: "Pro isto ergo dicitur quod luminosum agit subito totam suam latitudinem in omni medio vel in omne in quod sufficit agere, non tamen per equalem distantiam agit in omne medium sed in medium rarius agit per maiorem distantiam quam in densius." S. Marco VI, 226, fol. 66r, col. 1: "Pro istis dicitur quod luminosum subito agit totam suam latitudinem in omne medium in quod sufficit agere, non tamen per equalem distantiam agit in omne medium sed in aliquod medium tardius aget ut in medium rarius aget ad maiorem distantiam quam in medium dempsius."

form medium and part of the medium next to the light is made more dense, the light is remitted with equal velocity to every point in the residuent part remote from the light just as to the extremity of that condensed part which is further from the light.[53] If the medium is difform in which a luminous body shines with uniform difformity, then that light cannot shine with uniform difformity in any uniform medium.[54] Wherever a luminous body shining in a uniform medium is decreased in quantity with other things remaining equal, the light will vary more slowly in intension or remission for points nearer the luminous body than for those more remote. If the luminous body is not altered at all, but the medium is rarefied or condensed at a uniform ratio, the variation in light will again be slower for points nearer the luminous body. If the luminous body remains constant in quantity and varies in degree of intension or remission, the light will vary with equal velocity for every point of the uniform medium.[55] If a portion of the medium next the luminous agent is rarefied, but at the same time the luminous body is lessened in quantity, so that the same degree of light as before is maintained at the extreme limit of the rarefied portion, this will also be true of the entire rarefied portion while in the rest of the medium the light will be remitted.[56] These do not exhaust the Calculator's theorems concerning the action of luminous bodies in media but they perhaps sufficiently illustrate them.[57]

The next section of the work deals with rules of local motion supposing that the motion increases in geometrical proportion.[58] Of such rules and conclusions there are some fifty-eight. Then

[53] Editio princeps, fol. 48v, col. 1; ed. of 1520, fol. 40v, col. 2. S. Marco VI, 226, fol. 67v, col. 2.

[54] Editio princeps, fol. 49r, col. 1; ed. of 1520, fol. 41r, col. 1. S. Marco VI, 226, fol. 68r, col. 2.

[55] Editio princeps, fol. 49v, col. 1; ed. of 1520, fol. 41v, col. 1. S. Marco VI, 226, fol. 68v, col. 2.

[56] Editio princeps, fol. 50r, col. 1; ed. of 1520, fol. 41v, col. 2. S. Marco VI, 226, fol. 69r-v.

[57] The discussion of luminous bodies and their action in media extends to fol. 52v of the editio princeps and fol. 43v of the edition of 1520. In S. Marco VI, 226, it goes to the bottom of fol. 71v, col. 2, which ends, ". . . quod ad nullum punctum distantem agetur gradus agentis etc. deo gratias Amen. Et hic secundum aliquos est finis calculationum."

[58] Editio princeps, fol. 52v, col. 1; ed. of 1520, fol. 43v, col. 1. S. Marco VI, 226, fol. 72r, col. 1.

follow some conclusions in the case of the generation of a resisting latitude in a non-resisting medium.[59] Other conclusions are added for a uniformly difform medium in which the force *a* begins to increase from no degree.[60] A long closing section treats of the induction of the highest degree, returning to the original theme of intensity.[61] In the edition of 1520 it is divided into five chapters.[62] Some of the points made are as follows. If something uniformly difform is altered in a latitude uniformly difform, the whole will remain uniformly difform, until some part reaches the highest degree or no degree, or the whole becomes uniform.[63] If two unequals, terminated to the supreme degree, are altered in the same degree and the proportion of the quantity of one to the quantity of the other is greater than that of the latitude of the larger one to the latitude of the lesser, the supreme degree will be induced more slowly in the less than in the greater.[64] No matter how difform a body may be, the highest degree can be induced uniformly in it, if the latitude of alteration

[59] Editio princeps, fol. 59v, col. 1; ed. of 1520, fol. 48v, col. 2. This section occurred earlier in S. Marco VI, 226, beginning at fol. 54r, col. 2.

[60] Editio princeps, fol. 63r, col. 1; ed. of 1520, fol. 51r, col. 2. S. Marco VI, 226, fol. 58v, col. 2.

[61] Editio princeps, fol. 67r, col. 1; ed. of 1520, fol. 54v, col. 1. S. Marco VI, 226, fol. 79r, col. 2.

[62] Ed. of 1520, fol. 57v, col. 1, Cap. 2m, "Nunc qualiter gradus summus inducetur per subiectum uniformiter difforme mediante latitudine alterationis difformiter difformi semper consimiliter extensa in parte remissa sicut in principio in toto omnibus aliis motibus deductis est dicendum." Fol. 59v, col. 1, Cap. 3m, "Dictis quibusdam regulis communibus de inductione gradus summi alteratione extensa in principio per totum subiectum, restat dicere qualiter etiam si sit ab extremo intensiori versus extremum remissius particularis acquisitio alterationis." This sentence also marks the beginning of a new section in S. Marco VI, 226, fol. 86v, col. 1. Fol. 60v, col. 2, Cap. 4m, "Penes quid attenditur inductio gradus summi in subiecto rarefacto vel maiorato potest dubitari." Fol. 66v, col. 2, Cap. 5m, "Nunc dicendum est qualiter per generationem partibilem alterationis per subiectum aliquod potest ipsum manere seu fieri uniformiter difforme, unde vocatur uniformis generatio quando sicut sunt puncta propinquiora extremo a quo incipit alteratio progredi sic citius ad illa deveniet: in qua materia quedam conclusiones seu regule notande sunt quarum prima est hec." This sentence occurs in S. Marco VI, 226, at fol. 96r, col. 2.

[63] Editio princeps, fol. 67r, col. 2; ed. of 1520, fol. 54v, col. 2. S. Marco VI, 226, fol. 79v, col. 1, "Quarta regula."

[64] Editio princeps, fol. 68r, col. 2; ed. of 1520, fol. 55v, col. 2. S. Marco VI, 266, fol. 81r, col. 1.

is infinite.[65] The speed of attaining the highest degree varies according to the subject in which it is attained.[66] The effect of rarefaction and condensation on attainment of the supreme degree is considered in a number of theorems.[67]

[65] Editio princeps, fol. 71v, col. 2; ed. of 1520, fol. 58v, col. 2.
[66] Editio princeps, fol. 75r, col. 1; ed. of 1520, fol. 61v, col. 1.
[67] Editio princeps, fols. 76r-77v; ed. of 1520, fols. 62r-63v.

CHAPTER XXIV

JOHN DE DONDIS AND SCIENTIFIC MEASUREMENT

If the *Calculationes* of Richard Suiseth laid a theoretical foundation for the introduction of mathematical method into physical science, a more practical manifestation of an increasing tendency towards careful, systematic observation and measurement is provided by the works of a famous father and son of the same century, Jacopo and Giovanni de' Dondi dall' Orologio, or, as we shall call them, James and John de Dondis. Their very name is associated with that epoch-making invention of the mechanical clock or clock-work which marked the fourteenth century or at least comes clearly into view only then.

For a long time there was confusion, uncertainty, and controversy as to the respective shares of James de Dondis, author of the *Liber aggregationis sive Aggregator Paduanus de medicinis simplicibus,*[1] and his son, John de Dondis, in the construction of what appeared to be one of the first considerable mechanical clocks. As far back as 1753 Falconet had pointed out that James had devised a clock before John.[2] In the last quarter of the eighteenth century, Tiraboschi,[3] in his justly celebrated *Storia della Letteratura Italiana,* touched on the question and made use of facts concerning the career of James which had been communicated to him by a descendant, Francesco Scipione Dondi dall' Orologio. Thereafter the tendency was to hold that credit for the clock should go exclusively to John, that James was merely a medical man. But in 1896 Andrea Gloria, the learned historian and editor of the sources for the university of

[1] This is the form of title used in an incunabulum edition in the British Museum numbered IC. 666. The work was also called *Promptuarium medicinae.*

[2] "Sur Jacques de Dondi et sur les anciennes horloges," *Mémoires de l'académie des inscriptions,* XX (1753), 440-458.

[3] Modena, 1772-1705; and in subsequent editions. For Jacopo de' Dondi I have used the edition of 1823, vol. V, pp. 340-341.

Padua during the thirteenth and fourteenth centuries,[4] published an article on "The Two Marvelous Clocks Invented by Jacopo and Giovanni de' Dondi,"[5] which seemed to give solid ground to stand upon. He showed that James was born at Padua before 1293, instead of in 1298, as had previously been stated, a date which had made his election as municipal physician of Chioggia in 1313 come at the early age of fifteen or sixteen! Gloria showed that he was recalled to Padua as professor in 1342, that he made a clock which was placed in the Carrara tower there in 1344, that he was called "dall' Orologio" in the documents—evidently because of his clock—and that this epithet, which became part of the family name thereafter, was not first applied to John. The clock of James is not extant, but one in the Piazza dei Signori, finished in 1434, is probably a copy of it and not of John's clock, on which he worked from 1348 to 1364, which had more elaborate astronomical details, which Gian Galeazzo placed in the castle at Pavia, and which also is no longer in existence. Gloria regarded as contemporary and reliable the epitaph on the baptistery which alludes to James' clock and to his astronomical as well as medical knowledge.[6] He further noted that Prosdocimo de' Beldomandi, mathematician and astrologer of the early fifteenth century, ascribed to James tables of the movements of the planets.[7] James died in 1359.

[4] Andrea Gloria, *Monumenti della Università di Padova* (1222-1318), 1884, in *Memorie del Reale Istituto Veneto di Scienze, Lettere, ed Arti,* vol. 22. *Monumenti della Università di Padova* (1318-1405), 1888, in *Univ. Studi.,* vols. I-II.

[5] "I due orologi meravigliosi inventati da Jacopo e Giovanni Dondi", in *Atti del Reale Istituto Veneto di Scienze, Lettere, ed Arti,* Serie 7. Tom. 7, Disp. 7, 1896.

[6] "Ars medicina mihi coelumque et sidera nosse . . .
Utraque nempe meis manet ars ornata libellis."
Indeed it would have been unusual for a medical professor of that period to have had no concern with astronomy.

[7] As I have already noted in *Isis,* X (1928), 360-362, correcting *Isis,* VIII (1926), 744, Gloria's paper is ignored and the old assertions revamped in Giovanni Astegiano, "La cittadinanza Veneta a Jacopo de' Dondi," *Rivista di storia delle scienze mediche e naturali,* XVI (1925), 317-326. Astegiano again makes Jacopo only sixteen in 1314, repeats the assertion of Francesco Scipione Dondi that Jacopo constructed no clock and was unacquainted with mathematics and astronomy (although writing concerning the influences of sun and moon on tides), and states that Jacopo's work on tides remained unpublished until 1912, whereas both Fabricius and Tiraboschi list a sixteenth

John de Dondis was born at Chioggia in 1318, while his father was municipal physician there. John became professor of astronomy at Padua in 1350, according to Vedova,[8] in 1352, according to Tiraboschi.[9] He lectured on medicine at Florence in 1368 or from 1367 to 1370; in 1371 represented Padua at Venice as ambassador; in 1374 was left fifty ducats by Petrarch to buy a gold ring to wear in memory of him. From 1379 to 1388 his name appears frequently in the records of the university of Pavia;[10] in 1389 he was summoned to Genoa by the doge, Antonio Adorno, and died there.

James and John de Dondis, father and son, so shared the same interests and even held the same positions that confusion between them is apt to result. Both taught medicine and were interested in astronomy; both were professors at Padua; both made astronomical clocks; both wrote on the hot mineral springs near Padua, from which James had devised a method of extracting salt. His treatise covers only two double columned pages, while that by John fills fifteen. James indeed wrote a standard medical or pharmaceutical work, the *Aggregator de medicinis simplicibus* or *Promptuarium medicinae,*[11] which was not paralleled by John.

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century edition, where it is combined with Jacopo's method of extracting salt from hot mineral springs: Jacobus de Dondis, *De modo conficiendi salis ex acquis calidis Aponensibus et de fluxu et refluxu maris,* Venetiis, 1571. However, this edition does not appear in the printed catalogues of the British Museum and the Bibliothèque Nationale, Paris. The work on extracting salt had been printed earlier in *De balneis,* apud Iuntas, 1545, under the differently worded title, *Consideratio . . . de causa salsedinis aquarum et de modo conficiendi sal ex eis;* while in *De balneis,* Venetiis apud Iunctas, 1553, fols. 94r-108v, is Giovanni de' Dondi's *De fontibus calidis agri Patavini,* followed at fol. 109r-v by *Tractatus de causa salsedinis aquarum et modo conficiendi salis ex eis ex consideratione Iacobi de Dondis.* Prosdocimo's Canons on James' astronomical tables occur in Prag 2436, 1454 A.D., fols. 2r-9r, and the Tables themselves at fols. 13v-72v. See also note 14 below. I have not seen the paper of Vittorio Lazzarini, "Di una carta di Iacopo Dondi e di altre carte del Padovano nel Quattrocento," in *Atti e memorie della R. Accademia di Scienze lettere ed arti in Padova,* XLVII (1931).

[8] Giuseppe Vedova, *Biografia degli scrittori Padovani,* 1832-1836, II, 339-340.

[9] Tiraboschi, V (1823), 348.

[10] Consult the index to *Codice diplomatico dell' università di Pavia,* I (1905).

[11] Fabricius, *Bibliotheca latina mediae et infimae aetatis,* Marburg, 1734, II, 179, mentions editions of Venice, 1481 and 1576. I have seen an undated incunabulum at the British Museum (IC. 666) of 286 folios, *Liber aggregationis sive aggregator Paduanus de medicinis simplicibus.*

In astrology we find ascribed to James two rules for rectifying the theme of nativity from the hour of conception together with a table of the period passed by the child in the womb.[12] John, on the other hand, wrote a brief pest tract,[13] while none by his father seems to be extant, although it would have been natural enough for him to compose one at the time of the Black Death. But both James and John seem to have written an astronomical work with the title, *Planetarium*. That by James appears to have consisted of astronomical tables.[14] That by John gave instructions for the making of an astronomical clock and is the work which we shall now consider as one of the earliest considerable documents describing the mechanism of early mechanical clocks.

The manuscript of John de Dondis' *Planetarium* which I have consulted was a large folio volume of about eleven by seventeen inches, written on membrane in double columns each about four inches wide and containing sixty-eight lines of text. There are forty-three leaves in all but they are partially covered with figures and diagrams. Thus on the majority of pages there is a circular figure over half the page in size.[15]

John of course does not claim to be the inventor of mechanical clocks. Even James had presumably not introduced them but had simply devised a more complicated instrument to mark the courses of the planets instead of merely the hours. John goes a step further in the same direction and devises a still more elabo-

[12] Vienna 5208, 16th century, fols. 43r-44v: "Canones duo pro rectificando themate nativitatis ex hora conceptionis unacum tabula morae infantis in utero. Ptholomeus inquit, Locus lune hora . . . / . . . ad tabulas Blanchini." See also BL Canon. Misc. 436, 15th century, fol. 48v: "Ad inveniendum verum ascendens nativitatis secundum Iacobum de Dondis," opening, "Dico quod locus lune tempore casus spermatis in matrice erit ascendens nativitatis. . . ."

[13] Florence, Riccard. 1219, membrane, 14th century, fols. 1r-3r: de modo vivendi tempore pestis. Printed by Karl Sudhoff in the *Archiv. f. Gesch. d. Medizin*, V, 351-354.

[14] BL Canon. Misc. 436, paper, double columned folio, 15th century, fols. 13r-24v, with tables following: Iacobi de Dondis Patavini Planetarium praeviis expositionibus ab anonymo quodam confectis. Incipit expositio, "Cum plures et varie tabule ad celestes motus composite sint et nonnulle veluti Toletane . . . / . . . ad hoc aptum prout in eorum docetur canonibus. Finis cum dei laude 1468 17 VIIII. bris."

[15] For this and other MSS see Appendix 25.

rate astronomical clock. But incidentally he tells us how "common clocks" are made, and this account seems to be the clearest and fullest that we have on this subject from that century and possibly also the next.

In such ordinary clocks there is, says John, a wheel called the *spera horaria* or circle of the hours which, moving uniformly and equally, completes its revolution in the space of a natural day. An accompanying figure of the wheels of an ordinary clock shows a large *rota prima* or first wheel which is moved by weights suspended from a rope wound about its axle and which is geared into the hub of a smaller *rota secunda* or second wheel which is geared into the hub of the *rota freni* or bridle wheel, if we may so translate the expression. Its circumference has teeth on the inside, while above it is the *frenum*. There is a table of the wheel of the hours marked with twenty-four hours around its circumference, and three of the hours are subdivided into sixths. John explains that to a single revolution of the big wheel there will be 43,200 agitations and percussions (i.e. of the *frenum*) or 1800 in an hour or thirty per minute or one every two seconds. "And such is commonly the number of agitations and percussions which the *frena* make in clocks during the space of one hour."[16] He recognizes that it will be impossible or extremely difficult to attain such exquisite proportions in the size of the cog-wheels and the number of the teeth that the clock-work will maintain precisely the requisite velocity in each movement. Speaking of the defects liable to happen in the movements of ordinary clocks, he explains that they may move too fast and get ahead of time either from added weight, or from dry rarefied air which permits the *frenum* to move more easily, or from the wheels and their teeth and axles becoming worn and polished so that they retard each other less. Or the clocks lose time and go too slowly because of loss of weight, heavy humid air, or the surfaces of the clock-work becoming rough and covered with dust. These defects may be remedied and counteracted by decreasing the weights or add-

[16] The points thus far taken up in this paragraph are from S. Março VIII, 17, fols. 3r, col. 1-4r, col. 1.

ing to the *frenum,* if the clock is too fast, and by increasing the weights or lightening the *frenum* if the time-piece is too slow.[17]

The information concerning ordinary clocks of the time which we have noted is incidental to John's elaborate directions as to his own planetary clock. He begins with instructions concerning its case. Besides the wheels which his clock has in common with ordinary ones, there are others to move the circle of the year, to produce the motion of the primum mobile, to move the eccentric of the sun, and so on. His wheels vary in size from a thick wheel a foot and a quarter in diameter, with a long thick axle to sustain a heavy weight, to wheels only as thick as a knife blade. Besides the table or dial to show the hours, there are others for the spheres of Venus, the moon, Mercury, Saturn, Jupiter, and Mars, and directions for composing the epicycles of Mercury, the moon, Saturn, and Venus, and the aux of the deferent of the sun, Venus, Mars, Jupiter, and Saturn. Even the head and tail of the dragon are not forgotten. These movements also require rectification of errors. In the motion of the circle of the year one must allow for an extra day in leap years. The primum mobile has to be corrected, because the sun does not cover equal portions of the zodiac daily. And there are defects to rectify in the movements of the planets. According to Michael Savonarola in the next century, John made the parts of his clock with his own hands and worked ten years on it. Its construction was so complicated that after his death no one could put it together again until an astronomer came from France recently who had succeeded in so doing. Savonarola ranked this astronomical clock, which recorded feast days and all the movements of the planets in the firmament, with the wonders of the world. He declared that there was no other one like it and that none such had been heard of in previous ages.[18] The *Planetarium* was praised in equally high terms by two contemporaries and friends of its maker: Philippe de Maisieres, author about 1389 of *Le songe du vieil*

[17] S. Marco VIII, 17, fol. 41v, cols. 1-2; Pars III, cap. 1.

[18] *Libellus de magnificis ornamentis regine civitatis Paduae,* in Muratori, *Scriptores,* XXIV (1723), 1138.

pélerin, and Giovanni Manzini, podestà of Pisa in 1405.[19] The former states that John spent sixteen years on it, and that it was made with his own hands without assistance "entirely of brass and copper." In the St. Mark's manuscript the material of which the wheels and other parts were composed did not seem to be specified.

The work of John de Dondis on the hot springs near Padua[20] illustrates another side of his scientific activity and thought, and is very germane to our investigation in its combination of careful observation and statement with a considerable residue of occult science, and in its mixture of scepticism and credulity. The treatise is addressed from Padua to a James of Vicenza and was written shortly after John had spent a year at Pavia in medical attendance upon the son of Galeazzo Visconti, count of Vertus.[21] The allusion is presumably to Azzo, son of Giangaleazzo Visconti, born in 1368 and died in 1381, and John's attendance upon him would have been at some time between 1372 and 1378.[22] The dedicatory letter to James is couched in the phraseology of humanistic friendship, while the text proper adheres to the canons of scholastic presentation. In the course of the work John alludes several times to his father, James de Dondis.

James had written his brief treatise in four chapters to defend against rivals and invidious detractors his recent invention of making salt from the hot springs near Padua. While salt was extracted from sea water by evaporation in the sun, and from well water in Carinthia, Burgundy, and parts of Lombardy such

[19] The passages are reproduced from earlier publications by Carlo Magenta, *I Visconti e gli Sforza nel castello di Pavia,* 1883, I, 218-224.

[20] Printed in the collection, *De balneis,* Venetiis apud Iunctas, 1553, where the text occupies fols. 94r-108v: Ioannis de Dondis Patavini De fontibus calidis agri Patavini consideratio ad magistrum Vicentinum. In a publisher's preface at fol. 90r it is stated that this work of John has lain hidden for nearly two hundred years.

[21] *Ibid.,* fol. 94r, col. 1, ". . . cum Galeacii Vicecomitis Mediolani et comitis virtutum filius praeclarae indolis in difficilem ac gravum morbum incidisset integrum annum in Papiensi urbe illi assidere sum coactus." This is one of the excuses given for not having complied sooner with James's request.

[22] Since in 1368-1370 Giovanni was at Florence, in 1371 at Padua and Venice, while after 1379 he was teaching at Pavia, not Padua.

as Piacenza and Parma, by heating over a fire in iron vessels—the men of Parma added the blood, already corrupted, of animals that the salt might congeal better and in greater quantity—James introduced a third process by means of the heat of the hot springs themselves. The water of these springs was first placed in vessels of decoction in the springs, whose surrounding heat first separated the sulphurous substance in the water from it in the form of an exhalation and then evaporated most of the water. The remainder was transferred to a wide vase of congelation where the rest of the water evaporated, while the salt formed on the surface of the vessel and the other earthy substance contained in the water settled to the bottom of the vessel in the form of stone entirely separate from the salt. James therefore denies the accusation that his salt in the course of time produces lung complaints because of the sulphur it contains. All the sulphur in the water has evaporated and the salt has no odor of sulphur, even if it is cast on live coals. Moreover, the charge is ridiculous, because sulphur is good and not bad for the lungs. James and his family have used his salt for more than three years and are in good health.

It is interesting to compare with the foregoing John's fuller and somewhat divergent account of the same process. In the first place, he affirms that there is no sulphur whatever in the hot springs themselves, whereas his father had admitted a certain amount. This admission John ignores. In the second place, John is more specific concerning the vessels employed, stating that those used first are round earthenware pots which float about half full in the boiling water. The others are of stone, flat and wide and hollowed out so that they have a surrounding rim about half a palm high. When the water in the first pot begins to taste salt and indications of coagulation appear on its surface, it is transferred to the stone vessels which are immovably fixed in the pool. The water is poured into them to about the depth of a thumb, and a very white and very pure salt is deposited. On the bottoms and sides of both the earthenware and stone vessels there forms with time a hard, white, lustrous, stony sub-

stance which appears to be gypsum and has no perceptible taste except a certain stipticity. Evidently John de Dondis was not aware that sulphur is one of the chemical constituents of gypsum![23] But let us turn to the general plan of John's treatise.

First, John will set forth certain marvelous properties of the said waters which he has often tested personally together with some from Cassiodorus for which he cannot so vouch. Next, he will rehearse the reasons for their fervor adduced by previous authorities—Aristotle, Vitruvius, Seneca, and Albertus Magnus, that "great investigator of nature." Third, although it may seem presumptuous of him, he will oppose the explanation which has hitherto found most general favor, namely, that hot mineral springs are caused by subterranean waters flowing over veins of sulphur. Fourth, he will suggest a better explanation based, none the less, on the natural principles laid down by Aristotle and others. Fifth, he will list objections to his view, and, sixth, answer them. Seventh, he will give natural explanations for all the other marvelous phenomena connected with hot springs, especially those of Padua. Eighth and last, he will discuss their medical properties. John's gifts as a scientific observer are shown in his careful, detailed description of the baths of Abano: their disagreeable odor suggestive of sulphur, although no trace of that mineral is found in them by diligent examination; the fact that animals will not drink the water though it has no perceptible taste; the deposit which they leave and its different color if deposited by water flowing out from the springs in a channel, or if allowed to settle in a still vessel; the fact that the springs occasionally are riled without external cause and turn milk white for a time, while particles like ashes or charcoal sometimes appear in them. If a dyke is raised from one of these hot springs so that it cannot flow away, it will gradually rise to the top of the dam and overflow it, unless the dam is raised to a certain height, when the spring will cease to bubble up any higher. But so soon as the surrounding dyke is lowered, it will resume flow-

[23] For John's discussion see chapter 8 of his treatise, fols. 106v-107v in the *De balneis*, 1553.

ing. The water of hot springs may appear as clear as that of cold, but is really mixed with particles of mineral matter, "as it is easy to learn from most certain experiments," but the sight is deceived because the particles are so small or are luminous and glistening or white, as in the case of salts and alums.

John asserts that it has often been tested by experience that water from these hot springs will not boil any sooner over a fire than an equal amount of cold water from another source in the same kind of a vessel. On the other hand, he has not himself seen the small worm-like animals which are said to swim about uninjured in these hot springs, and for which there are such authorities as Peter of Abano and Augustine, although he remembers having seen some dead ones which were said to be of that sort and whose peculiar shape he describes.[24] Later he mentions that a live worm was found inside solid rock in a recent excavation in Hungary.[25] He expresses grave doubt as to the truth of the tradition that, while these springs would ordinarily remove the feathers from a bird or hair from an animal plunged in them, they would not do this in the case of a stolen fowl or beast. If true, it would have to be explained as due to some occult virtue.[26] John also manifests some literary scepticism and textual criticism, stating that it is dubious if the *De proprietatibus elementorum* is by Aristotle, and that many other works ascribed to him differ markedly in style from his works of undoubted authenticity.[27]

John's explanation of hot springs is that they are heated by subterranean fires and gases. Although the earth *per se* is a cold element, the action of the celestial rays and occult influences of the stars heat the earth a certain distance into its interior and produce subterranean exhalations of various sorts. For all elements and compounds beneath the moon are subject to the virtues of the stars and to superior movements. "For they are led,

[24] *Ibid.*, fol. 95r, col. 1: "satis extra formam aliorum vermium erant namque annulosa lata in medio et tendentia ad acutum versus utranque extremitatem ad formam fusi longa non amplius latitudine duorum pollicum."

[25] *Ibid.*, fol. 106v, col. 1.

[26] *Ibid.*, fol. 106v.

[27] *Ibid.*, fol. 95v, col. 1.

ruled, and governed by them, as Aristotle says in the first book of the *Meteorology*." The earth's surface where it is not covered by water is a common meeting place of the three elements, earth, water, and air. The variety of compounds produced beneath the earth's surface is comparable to that of vegetation and animal life above ground. "Hot gases are hot exhalations generated and elevated by virtue of the heat of the sun and stars, as we have said, and especially smoky exhalations which are of a fiery nature."[28] Thus we see the general astrological hypothesis unquestioningly accepted and utilized.

There is one more passage from the treatise on the hot springs in Paduan territory of John de Dondis which I would quote here *in extenso* as an apt and vivid example of that attitude of wonderment toward nature which was an almost inevitable and entirely natural feature of the stage then attained by scientific development and of its inheritance of, or confusion with, magic and occult science. Says John:

> And so I, from the first seeing these waters and considering the properties aforementioned which appear in them and seem beyond the nature of other waters and other springs, was not a little astonished and, not finding explanations for the phenomena that were wholly satisfactory, I for a long time was in doubt on many points. But now I have learned from the passing years and I have gathered from long experience that there is nothing which is not marvelous, and that the saying of Aristotle is true, who writes in the first book on the parts of animals that in every natural phenomenon there is something marvelous, nay in truth many marvels. So indeed it is, brother. Among marvels are we born and placed and surrounded on all sides, so that to whatever object the eye first turns, the same is a marvel and full of marvels, if only we examine it for a little. But of many things which are equally marvelous familiarity and daily use and abundance either removes or lessens our admiration. For this reason, therefore, I marvel not as of yore but, finding everything marvelous and pondering thereon, I have bade myself to marvel at nothing much.[29]

[28] *Ibid.*, fol. 101v, col. 1: "calidi spiritus . . . sunt exhalationes calide generate et elevate virtute caloris radiorum solis et stellarum ut diximus et precipue fumosae exhalationes que sunt igneae naturae."

[29] *Ibid.*, fol. 95v, col. 1: "Ita et ego a principio videns has aquas et conside-

We shall encounter similar passages in the writings of Nicolas Oresme, a contemporary of John de Dondis, and it may be that one was influenced by the other.

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rans prescripta accidentia que apparent in eis quae videntur extra naturam aliarum aquarum et aliorum fontium non mediocriter admiratus sum et non occurentibus causis illorum quae apparent que plene satisfacerent longo tempore in multis dubitavi sed iam docentibus annis didici et experientia longa collegi nihil non esse mirabile verumque esse dictum Aristotelis primo de partibus animalium scribentis quod in unoquoque naturali inest aliquid mirabile immo vero mirabilia multa. sic profecto frater est inter mirabilia nati et positi sumus et undequaque circundati adeo ut ad quodcunque primum oculos vertimus id mirabile sit et mirabilibus plenum si parumper profundimus intuitum sed plurimarum rerum eque mirabilium familiaritas et quotidianus usus et copia admirationem aut tollit aut minuit. propter hoc ergo non sicut antea miror sed omnia mirabilia cernens et cogitans mihimet imperavi de nullo valde mirari."

CHAPTER XXV

ORESME ON ASTROLOGY

The critical dialectic of William of Occam in the first half of the fourteenth century had shaken many of the conceptions and theories of previous scholastic philosophy and theology. Hauréau in his history of scholastic philosophy has represented the Invincible Doctor as purging the Augean stables of scholasticism of many a metaphysical fiction and absurdity by the clear current of his outspoken common sense and psychological insight. A somewhat analogous criticism of occult science was launched in the third quarter of the same century by others who had studied at the university of Paris, notably Nicolas Oresme and Henry of Hesse. Their attacks, objections, and strictures against the magic, astrology, and other occult arts of their time will occupy our attention in the chapters immediately ensuing. Whether their negative criticism was as destructive of occult doctrine and magic as Hauréau represented the effect of Occamism to have been upon the attempt to attain theological and scientific truth by rational speculation will be seen in the sequel.

Nicolas Oresme, who died in 1382 bishop of Lisieux, should require little introduction to the reader. He studied theology at the university of Paris and was for some years head of the college of Navarre. He is known for his French translations of, and commentaries upon various works of Aristotle;[1] his political and economic views, especially in his treatise on money;[2] his ecclesiastical and theological writings such as the sermon against pluralities before pope and cardinals at Avignon; his positive contributions to the progress of mathematics.[3]

[1] Francis Meunier, *Essai sur la vie et les ouvrages de Nicole Oresme*, Paris, 1857.

[2] Émile Bridrey, *La théorie de la monnaie au XIVe siècle, Nicole Oresme*, Paris, 1906: here will be found the bibliography of previous works on the subject.

[3] Maximilian Curtze, *Die mathematischen Schriften des Nicole Oresme*, Berlin, 1870: only 20 pp., and devoted largely to bibliography. In 1868 Curtze edited Oresme's *Algorismus proportionum*. Heinrich Wieleitner, "Ueber den Funktionsbegriff und die graphische

Oresme's views on astrology have already been discussed somewhat by Meunier and Charles Jourdain,[4] with excerpts from his writings on the subject. Thereby illuminating glimpses of his attitude have been offered us. But for our purpose it is essential to give a fuller, and in especial a more systematic and specific presentation of Oresme's thought and the treatises in which it was set forth. We cannot follow his arguments in all their detail, but we shall endeavor to note the main directions in which they lead, and the respects in which they seem novel and important. For this purpose I have examined anew most of the manuscripts, chiefly in Parisian libraries, which were utilized by Jourdain and Meunier and have consulted others of the Vatican, Bodleian, Vienna, etc., which they did not use.

Oresme on various occasions gives us the impression that he had written several times against astrologers. It is uncertain whether all these writings are extant, but what we possess are probably enough to reflect his attitude fairly completely, since he repeats the same ideas a good deal in those treatises which are available. For this reason it does not seem to be a matter of much consequence in what order they were composed, since there appears to be no marked development of thought or progression in views between them. They may rather be considered and combined as a whole. It will be well, however, first to give some account of them individually. Because of their common theme it is desirable to distinguish them carefully. Meunier described the *De proportionibus proportionum* as a treatise against astrology,[5] but Charles Jourdain declared, apparently correctly, that it contained nothing relative to that subject.[6]

Most persons of any experience with medieval authors know that it is a difficult task to date their works from the authors'

Darstellung bei Oresme," *Bibliotheca Mathematica,* XIV (1914), 193-243. P. Duhem, *Études sur Léonard de Vinci,* III (1913), 375-398.

[4] Charles Jourdain, "Nicolas Oresme et les astrologues de la cour de Charles V," in his *Excursions historiques et philosophiques à travers le moyen âge,* Paris, 1888; pp. 559-586. Unfortunately Jourdain often failed to give the shelf-marks or incipits of the MSS which he used, so that it has been necessary to identify them afresh.

[5] Meunier (1857), p. 31.

[6] Jourdain (1888), p. 572.

own citations of them. For example, because in work A an author cites his treatise B, and in B cites a third work C from his pen, it might seem clear that B was written before A, and C before B, and that consequently C was certainly composed before A. But then in C one finds A cited! Or not only does the author cite B in A, but also cites A in B. Such experiences—which one has, for example, with the writings of Roger Bacon or Peter of Abano —make it evident, either that medieval authors worked simultaneously upon two or several works, or that they inserted cross references in their works after they were completed or in anticipation of other works being completed, or that we possess later revised versions of their earlier writings.

These remarks apply with equal force to the writings of Oresme, the more so inasmuch as it is often not certain just which treatise against astrology or other work of his he is citing or has reference to. I therefore am less certain than Jourdain[7] that Oresme's briefest known tract against astrology is also the earliest of those which we have, but it may be first noted. Perhaps because of its brevity and the relative ease with which it could be copied, it seems to be the most widespread in manuscript collections of Oresme's works against astrology,[8] although we find it listed under a confusing multiplicity of designations. It may therefore be best identified by its opening words, "Multi principes et magnates noxia curiositate solliciti vanis nituntur artibus occulta perquirere et investigare futura. . . . " As these words suggest, the excessive devotion of princes to astrology and divination especially occupies the author in this treatise, although he devotes some space to general argument against astrology. The treatise is in seven chapters—perhaps an unconscious recognition

[7] Jourdain (1888), p. 571.

[8] I have utilized rotographs of the three following manuscripts of it: FL Ashburnham 210 (old number 142: listed as 136 in the *Indici e Cataloghi* of the Ministero della pubblica istruzione, VIII, *I codici Ashburnhamiani,* I, 3, 1891; but this official renumbering was not recognized at the Laurentian library in 1925-1927-1931), membr., 15th century, fols. 84v-89r. Vatican 4275, 14th or 15th century, fols. 35r-40r. Vienna 4948, 15th century, fols. 162-168r. In Amplon.Q.125, 1301-1306 A.D., fols. 142r-149v, the treatise is entitled, "Hasso de principalibus arti magice non dandis," but Schum adds in a note that it is ascribed to Oresme in Amplon.Q.-205, and its incipit shows it to be our treatise. It occupies fols. 54r-60v of the latter manuscript.

of planetary influence—which are described as follows by Oresme himself. In the first are given arguments in favor of princes studying astrology. In the second it is shown that kings who have been devoted to astrology have generally been unfortunate. In the third the author indicates how princes should spend their time. In the fourth he argues generally against the astrologers. In the fifth he states what parts of astrology may be studied and what not. In the sixth he shows what the attitude of princes should be to the mathematical arts, and in the last chapter rebuts the arguments of the opening chapter in favor of princes devoting themselves to astrology.

A second treatise by Oresme against other forms of divination as well as astrology consists of seventeen chapters. It seems to have first been written in French under the title, *Des divinations,*[9] according to Curtze in December, 1361,[10] and later to have been translated into Latin. At the close of the Latin translation we read: "Here ends the book of master Nicolas Oresme on divinations, translated into Latin because he composed it in French."[11] This wording suggests the possibility that another person than Oresme may have executed the Latin translation. If so, he was a very superior sort of translator, and the work has benefitted by his handling of it. It is easily the clearest, most concise and coherent, most readable and best presented of Oresme's works against astrology. This is the more remarkable since the corresponding French treatise appears to have been

[9] MSS are BN fonds français 1350 and 19951; Berne Stadtbibliothek 476. In BN 1350, fol. 39r, the work opens, "Ci commence le livre maistre Nichole oresme de divinations. Mon entencion a laide de dieu est monstrer en ce livret . . ."

In BN 19951, 15th century, fols. 1r-31r, the sentence last quoted is the incipit of what may be called the prologue, a table of contents follows at fol. 1v and then the text proper opens on fol. 2r, "Plusieurs ars ou sciences sont par lesquelles on seult enquerir . . ." At fol. 31r the text ends, ". . . mais ils mesmes gouvernassent fortune." Then follows in Latin: "Et hic finis huius libri. Explicit liber magistri Nicolai Oresme de divinationibus."

Berne 476, paper, 15th century, fols. 25r-42v: "Cy commence le livre de divinations. Le proheme. Mon entention a layde de dieu est montrer en ce livret par experience par auctorites et par raison . . . / . . . Explicit 1449 30 feb." There would seem to be something wrong with the day of the month.

[10] "Extrait d'une lettre de M. Maximilian Curtze," *Bull. des sciences math.,* VI (1874), 57-60.

[11] BL Canon. Misc. 248, fol. 33v, col. 1, "Explicit liber magistri nycholai oresme de divinationibus translatus in latinum quia ipsum composuit in gallico."

his first attempt to express himself in that language. From this fact Jourdain argued that the *Des divinations* must have been an early work, precedent to Oresme's skilfully executed French translations of Aristotle. But the Latin translation is a smooth and finished literary performance and piece of exposition. Since Meunier and Jourdain treated rather of the French *Des divinations,* I have used the Latin version, of which there is a beautifully clear manuscript in the Bodleian.[12] At least in this manuscript the Latin version lacks the preface and table of contents of the seventeen chapters which precede them in the French text. In the Bodleian manuscript the work opens, "Plures artes seu scientie per quas scitur de futuris seu occultis. . . . "[13] Headings are given in the text for all the chapters except the first, which opens without any particular caption of its own.

A third work by Oresme against astrology was written in 1370 and is the only such work that we are able to date exactly.[14] It is the most elaborate and complicated of his attacks

[12] Canon. Misc. 248, double-columned, fols. 28r-33v, "Incipit tractatus magistri nicholai oresme contra iudiciarios astronomos et principes se in talibus occupantes."

[13] Jourdain failed to give the incipit of the treatise in Codex F.V.6 at Basel, originally written in Paris, 1411 A.D., to which he referred. In response to my inquiry Professor G. Binz, the Oberbibliothekar of the Oeffentliche Bibliothek der Universität, Basel, courteously informs me that the treatise opens in Codex F.V.6 at fol. 48r as follows: "Plures artes seu scientie sunt per quas scitur de futuris seu occultis. . . ."

Similarly the first chapter of the *Des divinations,* in BN français 1350, fol. 39v, col. 2, opens, "Plusieurs ars ou sciences sont par lesqueles on seult enquerir des choses avenir ou occultes secretes. . . ."

[14] I have studied it as found in the two following MSS, of which I have further procured rotographs: BN 15126, 15th century, fols. 1-39r; FL Ashburnham 210 (already mentioned), 15th century, fols. 3r-21r. In the latter manuscript the text is preceded by the following heading, "Incipit questio contra divinatores horoscopios qui facta hominum in constellationibus ponunt per M. Ni. Oresme anno domini 1370 parisius compilata et determinata." In BN 15126 the text opens without heading, "Utrum res future per astrologiam possint presciri. Arguitur quod sic. . . ." The Ashburnham manuscript has the same incipit except that it reads *astrologos* instead of *astrologiam.* The treatise closes in both manuscripts: "Et sic finitur questio contra divinatores facta anno 1370 quam non feci causa alicuius invidie nec causa apparentie sed ut se corrigant et advertant quos detinuit error devius, quia sepe in astrologia studui et codices earum revolvi et cum actoribus contuli et ad experiendum musavi (*musam* in Ashburnham 210). sed ultra quam posuerim veritatem non inveni igitur vigilate."

upon astrology but seems left in rather rough shape so far as literary finish is concerned, whereas it indulges if anything too much in serried scholastic ramifications of argument and counter-argument. Oresme continually fails to complete his quotations from authorities, his lists of examples, or his line of thought, breaking off constantly with an *etc.*,—an abbreviation which studs well-nigh every page of his text, much abbreviated in the manuscripts at best. He also endlessly iterates that the practices or rules or arguments of the astrologers are frivolous (*frivola*) or fraudulent (*truffa*). The opening words of this treatise of 1370 are, "Utrum res future per astrologos possint presciri. Arguitur quod sic per Aristotelem capitulo septimo primo politice. . . . " After fifteen such arguments or citations in favor of astrology have been briefly listed, a more elaborate exposition of fifty-five points to the contrary is given. This, however, is only the beginning of the battle. Next we approach the very citadel of astrology and consider ten fundamental principles upon which astrologers rely. Then follow eighteen considerations against them and ten notable things to be kept in mind in passing upon the validity of their art. Next eleven conclusions are stated. They are then proved one by one except the last which does not seem to be reached. Instead six objections to the contrary are raised, after which Oresme appears to resume his discussion of notable things to be kept in mind (*Notabilia*), adding to the previous ten a series of paragraphs numbered from 11 to 25 inclusive. He then replies to the six objections which had just preceded this second series of *Notabilia* and finally answers one by one the fifteen arguments or citations in favor of astrology with which the work had opened.[15]

[15] The pagination of these divisions of the treatise in the two manuscripts which I have especially used for it is as follows:

Divisions of the treatise	*Ashburnham 210*	*BN 15126*
15 citations for astrology	fol. 3r, col. 1–	fol. 1r–
55 arguments against astrology	fol. 3r, col. 2–	fol. 1v–
10 fundamentals of astrology	fol. 9v, col. 1–	fol. 13v–
Eighth fundamental	fol. 10r, col. 2	fol. 15v
Ninth and Tenth fundamentals	fol. 11r, col. 1	fol. 17r-v
18 considerations	fol. 11v, col. 2–	fol. 19r–

These various numberings and re-enumerations are not, however, of very much service in marking divisions in the author's thought or in grouping his ideas, and we shall venture to disregard them as little more than artificial and arbitrary sections of the work. This treatise of 1370 is none the less the most penetrating as well as elaborate of Oresme's several onslaughts upon astrology. Among other things it includes a long discussion of causation—a matter to which we shall likewise find Henry of Hesse giving much attention.

At the close of the treatise of 1370 occurs what may be regarded either as a continuation of it or as another treatise. It is couched largely in the form of questions or problems of a very miscellaneous character which are well described in one manuscript as *Quotlibeta* and will be so designated here. They more especially relate to apparent marvels and their possible natural explanation. Hence the treatise as a whole will be reserved for fuller discussion in a later chapter. But a number of the questions relate to astrology and so will be treated in the present chapter. They were presumably written at the same time as or not long after the treatise of 1370. Some of them resume its discussion of causation.[16]

Another work by Oresme which has no little bearing upon his attitude to astrology is that discussing whether the movements of the heavenly bodies are commensurable or incommensurable, a treatise which is variously known as *De commensurabilitate motuum celestium* or *De incommensurabilitate motuum celestium*.[17]

Divisions of the treatise	*Ashburnham 210*	*BN 15126*
10 notabilia	fol. 12v, col. 2	fol. 21r
11 conclusions	fol. 14r, col. 1–	fol. 24r
Proof of the first	fol. 14v, col. 1	fol. 25r
Proof of the tenth	fol. 16r, col. 2	fol. 28v
6 objections	fol. 16v, col. 1	fol. 28v
11th to 25th notabilia	fol. 16v, col. 2–	fol. 29r–
Replies to the 6 objections	fol. 18r, col. 2–	fol. 33r–
Replies to the 15 citations	fol. 19v, col. 2–	fol. 36r–
Quotlibeta begin	fol. 21r, col. 2–	fol. 39r–

[16] Quodlibet 11, "Que et quot requiruntur et sufficiuntur ad concludendum aliquid esse causam alterius," 12, "Quid est causa?" 13, "Quomodo plures cause concurrunt ad eundem effectum et quibus modis?"

[17] For this treatise I have chiefly relied upon Vatic. 4082, fols. 97v-108v. At

As a matter of fact, these rival, and to first glance seemingly inconsistent, forms of the title are equally justifiable. Of the three parts into which the work is divided, the first is devoted to propounding twenty-five propositions which will hold true on the supposition that the celestial movements are commensurable. In the second part, on the other hand, are set forth twelve propositions which will be true in case some of the celestial motions are incommensurable. The third part then inquires whether the movements of the heavens are commensurable or not. But the consideration of this weighty point now abandons the method of mathematical demonstration characteristic of the two previous parts and is couched instead in the form of a Boethian or Capellan allegory. The author falls asleep; in his dream Apollo and the Muses appear before him; Arithmetic delivers an oration in favor of commensurability, Geometry defends the opposite side, and the author wakes before the debate is solved one way or the other—"Ecce finem sine fine."[18]

Arithmetic had contended with many citations of past authors that incommensurability and irrational proportion would detract from the perfection, beauty, and harmony of the universe, and be unendurable to the heavenly Intelligences that move the orbs. "For if anyone should make a mechanical clock, would he not make all the wheels move as harmoniously as possible?"—an interesting allusion to the recent invention of clockwork. Arithmetic further pointed out that if you deny numerical proportion to the velocities of the heavens and stars, it will be impossible to predict any aspect or conjunction of the planets, or to foresee their effects, and that astrology would have never been discovered, all the astronomical tables would be false, and the *mag-*

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the end we read, "Explicit tractatus de incommensurabilitate motuum celestium editus per magistrum nicholaum orem et per me petrum de fita padue 11ª novembris 1401 deo gratias amen scriptum." I have also made some examination of BN 7281, fols. 259r-273r, "Tractatus de commensurabilitate motuum celi . . . / . . . Explicit hic tractatus de commensuratione motus." The work itself opens, "Zenonem et Crisippum (*Crispum* in Vatic. 4082) maiora egisse affirmat Seneca quam si duxissent (*dixissent* in Vatic. 4082) exercitus gessissent honores leges tulissent. . . ."

[18] These words are not found in BN 7281, which otherwise has the same explicit as Vatic. 4082, ". . . nescio quid super hoc iudex decreverit apollo."

nus annus of the philosophers and music of the spheres would be impossible fictions. Under such circumstances why did God let man look at the stars and walk with erect head?

Geometry replies that irrationality of proportion will not rob the heavens of their beauty or be inconsistent with regularity of movement. Variety is better than uniformity of color; the song of changing cadence is sweeter than the noblest single strain. Geometry thinks it more pleasant, perfect, and congruent with Divinity not to have the same positions and effects repeated but ever to produce new and dissimilar effects from the prior constellations. Were all the celestial movements commensurable, the sun and moon would never meet throughout eternity except in a few points of the sky, "and similarly with the other aspects and remaining planets." The music of the spheres is a matter of doubt anyway, but there might be proportion of sound without proportional velocities. There also is no agreement as to the *magnus annus*, and Geometry prefers that men should not be able to know all the future movements of the stars exactly and to predict all future events.

But this conception that astrology lacks any precise basis in astronomy for its prediction of future events, because we cannot be sure even whether the movements of the heavens are or are not commensurable and in proportion, while if they are incommensurable and with disproportionate velocities, there is no basis for a system of forecasting from them, although one might still roughly date the coming occurrence of eclipses and conjunctions:—this is a point against astrology to which Oresme adverts again in his other treatises.

It should not be supposed that Oresme was the first to broach this conception of the incommensurability of the celestial movements. It goes back at least to Henri Bate's Latin translation in the thirteenth century of Abraham ibn Ezra's *Liber de mundo vel seculo*. Henri Bate, however, represents the idea as an innovation of the translator from Hebrew into French: "Nescio quare hic translator deturpavit pergamentum ponendo se in textu et ostendendo se scire mathematicam."[19]

[19] Quoted by Duhem, IV, 28, from the edition of 1507, fol. 80, col. c.

Let us now turn to a composite estimate of Oresme's argumentation against astrology and astrologers. In this we shall naturally be more interested to note criticisms which possess some tinge of novelty and originality, or something of the flavor of contemporary thought like that just mentioned on the question of commensurability or incommensurability, than those which merely echo sentiments already repeatedly expressed in the discussions of astrology *pro* and *con* through the preceding centuries. At the same time it must be self-evident that in the case of a subject so frequently and fully debated it would be very difficult to make any really new contribution, and that only on rare occasions were any fresh weapons forged for the warfare against astrology, wherein the same sword thrusts of argument had been repeatedly parried, and the same javelins of criticism had rattled harmlessly off the serried shields of astrological technique in many a previous battle of the books and conflict of opinion.

As in most treatises of the scholastic period, so in those of Oresme the citing of authorities occupies considerable space. On the greater part of these we need not dwell, but there are one or two points to note in this connection. It is almost needless to observe that Augustine as usual is one of the sources most often drawn upon for anti-astrological argument. What is more impressive is that Oresme, who translated various works of Aristotle into French, repeatedly tried to show that the Aristotelian philosophy was unfavorable rather than favorable to astrology. This may be illustrated from the treatise of 1370. Here Oresme cites the last chapter of the fifth book of the *Politics* against the notion that the duration of a city or constitution depends on the disposition of the heavens at the moment of its foundation—a passage which I have failed to find there in modern editions of Aristotle. Very possibly, however, the reference is to Aristotle's criticism of Socrates' theory of cycles of revolutions in states with its use of such astrological terms as period, syzygy, and solstice, of which modern editors[20] seem to have made less sense than

[20] See Richard Congreve, *The Politics of Aristotle*, 2nd ed., 1874, p. 398, and B. Jowett, *The Politics of Aristotle*, 1885, pp. 184-185. Also James Adam, *The Republic of Plato*, Cambridge, 1902, II, 306-312.

Oresme. Especially does Oresme cite the works of Aristotle in support of the contention that inferior causes and especially the action of the four primary qualities, hot and cold, dry and moist, and their derivatives, must be taken into account as well as the celestial movements as factors in the determination of future phenomena. Thus he cites the first and fourth books of the *Meteorology,* and the second book of *De anima* that diverse effects are produced according to the diversity of patients without variation on the part of the agents. He cites the fourth chapter of the second book of *De generatione et corruptione* in support of the contention that if the disposition of the air and elements are unknown, one cannot predict the effect of a given constellation on the elements. Similarly, if the father's disposition is unknown, one cannot predict from the stars for the son. Oresme cites the last chapter of *De somno et vigilia* that a dream may be due to the body or imagination as well as to the heavens. He cites the *History of Animals* that an inferior cause is more potent in delay of the foetus than a superior cause,[21] or that we know more about animals and trees than about the stars, of whose size and motion we may know something but of whose virtues and natures we can judge only from their effects.[22] Again Oresme cites the fourth book of *Meteorology* and second *On Generation* to prove that the action of the four elements and four primary qualities are enough to explain all generation and corruption without resort to the stars.[23] He points out that Aristotle in explaining winds in the *Problems* and *Meteorology,* and why the sea is salt, and in expounding in other books such matters as the generation of metals, does not give an astrological explanation for any of these phenomena but only adduces the heat of the sun, action of light, and the like.[24] In another passage he holds that Aristotle and Plato never wrote any particular works of astrology or for astrology.[25] The *Secret of Secrets,* which Aristotle was supposed to have written to Alexander, Oresme was inclined to

[21] All citations of Aristotle thus far mentioned in this paragraph occur at BN 15126, fol. 1v.
[22] *Ibid.,* fol. 2v.
[23] *Ibid.,* fol. 4r.
[24] *Ibid.,* fol. 6r.
[25] *Ibid.,* fol. 19r.

reject as spurious,[26] and to remain consistent with the assertion we have just heard from him he would have had to place in the same category various other works of the pseudo-Aristotle and pseudo-Plato which circulated in the middle ages.

In the third question of the *Quotlibeta* which follow the treatise of 1370 Oresme again asked whether Aristotle and other notable philosophers agreed with the judgments of astrologers so far as concerned particular judgments, such as those concerning nativities, elections, and interrogations,[27] and again answered in the negative. He again cited the last chapter of the fifth book of the *Politics,* and argued furthermore that if Aristotle had believed in astrology, he would have devoted more space to it and would not have centered his attention so exclusively on particular and immediate causes.[28]

Oresme also found some arguments against astrology among the Arabic writers, despite the fact that translation from the Arabic was one of the chief sources for the literature of astrology then existent. From the close of Avicenna's *Metaphysics* he derived the idea that the disposition of the sky and stars cannot be fully known and that therefore we cannot attain knowledge of the future from them. Avicenna made the further criticism that the rules of astrological technique were founded on poetry and rhetoric, that is, on fables and modes of reasoning which ought not to be received in natural science. At least, these observations are ascribed to Avicenna in the Latin translation of Oresme's *Des divinations.*[29] In the brief treatise dissuading princes from astrology it is Averroes who is represented, in com-

[26] BN Canon. Misc. 248, fol. 32v, cap. 14 of the Latin translation of the *Des divinations;* and Vatic. 4275, fol. 40r, last cap. of the brief tract against astrology.

[27] FL Ashburnham 210, fol. 39r, col. 2: "Utrum Aristoteles et alii philosophi notabiles consenti erant iudiciis astrologorum quantum ad iudicia particularia, ut de nativitatibus et electionibus et de interrogationibus. Et quod futura contingentia et particularia seu singularia per astrologos possunt presciri per regulas datas super hiis ab astrologis."

[28] *Ibid.,* fol. 46r, col. 1: "Contra ad tertium. Respondeo quod non, ymo hoc reprobaverunt ut patet 5° politice expresse capitulo ultimo. Et certe si in illis consensisset (*sic*) plus debuissent vacasse et declarasse de illis et circa illa quam fecerunt et non sic immorari in causis particularibus et immediatis."

[29] Canon. Misc. 248, fols. 30v-31r, cap. 11.

menting on the twelfth book of Aristotle's *Metaphysics,* as saying that many of the rules and assumptions of astrology are groundless.[30] In any case it will be noticed that both these Arabic criticisms of astrology were closely related to the *Metaphysics* of Aristotle. Oresme also cited the authority of Averroes against astrological images.[31]

Oresme was further influenced against divination and astrology by Latin classical writers. It was in imitation of the *De divinatione* of Cicero that he entitled his treatise in seventeen chapters *Des divinations* or *De divinationibus*.[32] Yet he could commit the anachronism of citing Cicero for the assertion that Vergil was most expert in all sciences.[33] In at least two of his works Oresme quotes or cites as a warning to princes to devote themselves to government rather than astrology the famous lines of Vergil:

> Excudent alii spirantia mollius aera;
> Credo equidem vivos ducent de marmore vultus;
> Orabunt causas melius coelique meatus
> Describent radio et surgentia sidera dicent.
> Tu regere imperio populos, Romane, memento.[34]

Oresme seems to have been much taken by a statement of Seneca that whom Fortune makes wretched and unhappy, those she furthermore renders superstitious. This he interprets to indicate that misfortune is apt to accompany a trust in divination, or that an excessive craving to learn the future is a forerunner of disaster.[35] He adds in his treatise on the configuration of qualities that such curiosity may furthermore be regarded not merely

[30] Vatic. 4275, fol. 36v, cap. 4.

[31] Canon. Misc. 248, fol. 28r, col. 2, cap. 3.

[32] *Ibid.*, fol. 31r, col. 2, cap. 11. "Item Tullius fecit unum librum de divinationibus in quo sufficienter per historias, per experientias antiquas, et per rationes ostendit quod in predictis nulla est certitudo, ad cuius libri exemplum placet michi istum sic intitulari scilicet De divinationibus."

[33] *Ibid.*, fol. 32r, col. 2, cap. 13. "Virgilius, ut recitat Tullius, in omnibus scientiis fuit expertissimus qui Virgilius docet quas artes et quas scientias humanas principes scire tenentur."

[34] They soon follow in the passage cited in the previous note. See also Vienna 4948, fol. 166r, and the citation of BN 10709, fol. 55r by Jourdain (1888), p. 579.

[35] Canon. Misc. 248, fol. 30v, col. 1, and caps. 22 and 34 or 37 of Oresme's *De configuratione qualitatum* or *De uniformitate intentionum.*

as a sign but actually as a cause of catastrophes, because the minds of such persons are thereby afflicted with an inconvenient difformity in taking action and so fall into evil events.[36] At the close of the treatise in seventeen chapters Oresme cites the lament of Sallust that people entrust their lot so much to fickle fortune.[37]

Oresme evidences wide reading in medieval Latin as well as classical and Arabic authors, and in those who favored astrology as well as those, like John of Salisbury, who opposed it. For example, he cites Bernard Silvester's comparison of the starry sky to a book in which may be read the fates of kings and affairs of fortune.[38]

In all his three treatises directed especially against astrology Oresme touches on the religious argument against it, citing the Biblical prohibitions of divination, the utterances of the church fathers and Decretals against astrology.[39] Those who rely too much on divination put too little trust in God,[40] and the astrological practice of elections attributes to the hour what should be attributed to Jesus Christ.[41] The astrological writer Abraham (ben Ezra?) "said many shameful things about Christ and Moses."[42] In asserting that Christ was born and suffered freely and not under the stars, as Albumasar and others had suggested, Oresme offers the further argument that by Christ's supernatural birth and voluntary sacrifice was introduced a new causal factor which had profoundly modified all subsequent history and events, so that but for it perhaps Oresme himself would never have been born or the present king would not be on the throne of France. Therefore not only Christ's own career but many events since have not been under the stars, and the task of the astrologer in attempting prediction has become more difficult.[43]

The argument from free will is also employed,[44] and it is

[36] BN 14580, fol. 57r, col. 1.
[37] Canon. Misc. 248, fol. 33v, col. 1.
[38] Canon. Misc. 248, fol. 29r, col. 1, cap. 6.
[39] See cap. 4 of the brief tractate, cap. 9 of the *De divinationibus.*
[40] Canon. Misc. 248, fol. 30r, col. 2, cap. 10.
[41] BN 15126, fol. 18r.
[42] *Ibid.*, fol. 19r.
[43] *Ibid.*, fol. 8v (argument numbered 33).
[44] *Ibid.*, fol. 3r; Canon. Misc. 248, fol. 31r, col. 2, cap. 11.

contended that astrology really posits necessity which is contrary to moral philosophy and law.[45] The practice of elections of favorable hours in particular is regarded as unethical,[46] while one Quodlibet asks why it is that those putting interrogations to astrologers are ashamed of it.

Oresme makes much use of the familiar argument against astrology, and nativities in particular, drawn from twins,[47] although he is apt to express it in the more general terms that persons born at the same time and place meet with marked diversities of fortunes.[48] He also adduces the converse of this argument, namely, that many persons die simultaneously and from the same cause, such as a pest or storm, whose nativities indicated differing deaths.[49] Another trite argument, going back in part at least to Augustine, is the reproach against astrologers that though they cannot tell if the child will be male or female —a natural matter which might well be subject to necessity, they venture to predict whether he will be rich or poor—a largely contingent matter.[50] Another favorite and analogous reproach with Oresme is that the astrologers are very cautious about predicting the weather, a natural matter, because their forecast can be soon verified or shown to have been mistaken, whereas they boldly draw up the nativity of a child because a long time will intervene before most of their prediction can be either fulfilled or nullified.[51] In view, however, of the numerous treatises of the fourteenth century on weather prediction, Oresme's reproach does not seem wholly justified. That astrologers themselves do not agree,[52] and that they and their patrons come to a bad end and gain nothing by their prying into the future,[53] were other time-honored arguments against the art which Oresme revamped. He gives the latter a somewhat new turn by applying it to

[45] BN 15126, fol. 13r.
[46] *Ibid.*, fol. 17v.
[47] See cap. 4 of the brief tractate.
[48] BN 15126, fols. 4v and 9r (arguments numbered 18 and 35).
[49] *Ibid.*, fol. 11v (argument 47).
[50] *Ibid.*, fol. 8v (argument 34).
[51] Cap. 4 in the manuscripts of the brief tractate; in the treatise of 1370, BN 15126, fol. 10v (argument 42).
[52] Canon. Misc. 248, fol. 30v, col. 2, cap. 11; BN 15126, fol. 19r.
[53] See cap. 2 of the brief tractate, cap. 8 of the *De divinationibus*.

kings and magnates especially, and by stressing the bad psychological effect of either fear or over-confidence as to the future which results from trusting in predictions. Thus excessive desire to know the future is in itself in a sense a sign of coming evil. In this connection Oresme even turns astrological technique against astrology, noting that in many places in books of astrological judgments it is stated that the inclination to inquire as to hidden matters by divination, sortilege, and magic arts is produced by Saturn and Mercury, malevolent planets which always signify ill fortune.[54]

The uncertainty of astrology because of our inexact and incomplete knowledge is another line of attack. It has already been suggested by Oresme's position on the question of the commensurability or incommensurability of the celestial motions. He further urges that the fixed stars are not where they were at the time of former observations, predictions, or conjunctions.[55] Moreover, inferiors as well as superiors may have altered since the last occurrence. He further insists that the powers of the stars are unknown, that there are as yet not enough observations to serve as a basis even for prediction as to the weather and crops, so that mariners and peasants are better judges of these matters than astronomers, and one philosopher has said that an interpreter of dreams would find the truth quicker than an astrologer.[56]

We have already noticed in treating of Oresme's citations from Aristotle a view of which he made much, namely, that the future was affected by the patient and inferiors, and not merely by the action of the superior bodies.[57] He put this very strongly in the treatise of 1370 in his tenth conclusion:

> that magnitude of effect or intension or perfection or disposition in these inferiors is more induced and measured according to the dispositions of those inferiors to one another than according to the dis-

[54] Canon. Misc. 248, fol. 30v, col. 1, cap. 10.

[55] BN 15126, fols. 2v, 10v (arguments 11 and 43); Canon. Misc. 248, fol. 28r, col. 2, cap. 2.

[56] Vatic. 4275, fol. 37v; Canon. Misc. 248, fol. 30v, col. 2.

[57] BN 15126, fol. 3r (argument 14), fol. 11v (argument 45).

positions of those celestials. And I mean material dispositions, that is, first qualities and secondary ones following them.[58]

This is in many respects Oresme's main point to which in the 1370 treatise he is continually returning. Tyriac has the same medicinal force regardless of the hour when it is made.[59] If the material disposition is unknown, nothing can be known through causes from celestial effects.[60] Minor happenings, Oresme was inclined to hold, were not dependent on the heavens or at least could not be accurately predicted therefrom.[61] In the *Quotlibeta* Oresme argues that generation and corruption would go on here below even if the sky stopped.[62]

Oresme was furthermore inclined to limit the action of superior bodies to the effect of light and heat, varying with their motions. Somewhat like Roger Bacon, he thought of luminous bodies as acting upon a given point by a pyramidical figure in which the agent or luminous body formed the base. "And the shorter and more obtuse the pyramid is, so much the stronger is the action and virtue."[63] Oresme held like Bacon that action was stronger along a perpendicular line than any other, but in conformity with his statement concerning the pyramid of force he added that action is weaker at a point on the perpendicular which is farther from the agent. This meant that influence would decrease with distance, and was not favorable to the conception of celestial control.[64] Moreover, Oresme rejected the notion of an occult influence exerted by the planets and held that light and motion in the heavens and the action of the four primary qualities here below would account for everything without resort to any more mysterious effluvium.[65] He questions whether a particular occult power could be exerted by the stars on a man, or a subjective quality implanted in him, which would cause him to die by hanging or drowning.[66] He asks whether the *qualitas* to

[58] *Ibid.*, fol. 24v.
[59] *Ibid.*, fol. 11r (argument 45).
[60] *Ibid.*, fol. 11v, "ignota materiali dispositione nichil potest sciri per causas celestis de effectibus."
[61] BN 15126, fol. 3v (argument 15).
[62] Ashburnham 210, fol. 48r, col. 1.
[63] BN 15126, fol. 23v.
[64] *Ibid.*, fol. 24v (eighth conclusion).
[65] *Ibid.*, fol. 7v (argument 27).
[66] *Ibid.*, fol. 7v (argument 28).

make a man sick at a later time or cause him to fight then enters at his nativity.[67] He asks whether the celestial influence at a given moment is unified or is a complex of the virtues of the different planets.[68] He makes other objections to this conception of an occult celestial influx varying with the constellations. He cannot see why a planet should exert a totally different influence when in the ascendent than when in the eleventh or twelfth house, or when another planet is in aspect than when it is not.[69] He objects to the views that the sun has greater power on Sunday than on Monday,[70] that one hour of the day is ruled by a certain planet,[71] or that the moon is the source of natural virtue, Saturn of retentive virtue, Jupiter of growth, and Mercury of thought.[72] He can see no reason for assigning a certain property or sex to one degree and another to another, or associating colors with the astrological houses.[73] This denial of any occult influence of the celestial bodies in general, and of especial properties assigned to particular parts and positions, is a second leading and strong point in Oresme's criticism of astrology. In the tenth question of the *Quotlibeta* he argues that the heavens as a simple body cannot have diverse opposing qualities nor as many virtues or influences distinct in kind as there are effects distinct in species here below.[74] To understand such effects one must know the intermediate arrangements and coagencies.[75]

There are other dilemmas which Oresme puts to the defenders of astrology and other criticisms which he directs against particular rules of astrological technique. But let us pass for a moment from those criticisms which are directed against the hypotheses of the art itself to those which have to do with the tricks and deceits of its actual practitioners.[76] Oresme deals with

[67] *Ibid.*, fol. 6r (argument 24).
[68] *Ibid.*, fol. 5r (argument 20); see also fol. 10r (argument 40) and fol. 11v (argument 48).
[69] *Ibid.*, fol. 9v (argument 38) and fol. 16r.
[70] *Ibid.*, fol. 17r.
[71] *Ibid.*, fol. 5v (argument 22).
[72] *Ibid.*, fol. 24r.
[73] Cap. 4 of the brief tractate.
[74] Ashburnham 210, fol. 39r, col. 2: "Utrum in celo sunt tot virtutes seu influentie specie distincte quot sunt hic inferius effectus specie distincti."
[75] *Ibid.*, fol. 48v, col. 1: "Ex quo sequitur quod qui nescit dispositiones intermedias et coagentia ipse etiam nescit quis vel qualis effectus fiet."
[76] This matter is discussed especially in *De divinationibus*, cap. 12, "Quomodo

the tricks and deceits of astrologers largely in order to explain why so many of their predictions appear to come true. One explanation of this is the widespread tendency to make predictions after the event. Another is the ambiguous nature of their predictions which may be taken either way. Again, they receive credit for forecasts which are realized by happy chance, while their mistakes are excused on one ground or another, such as that some technical detail was overlooked in making the prediction. Moreover, so many are the ups and downs of fortune that any prediction is likely to be right in part. But unscrupulous astrologers make secret inquiries concerning their patrons and then pretend that they have learned these facts by scrutinizing the stars. If they have predicted some event which they later have reason to fear will not come to pass, they try to bring it to pass themselves, not hesitating at treachery, fraud, nigromancy, or sorcery. Or they may have learned through dreams, magic, or demons of the future events which they pretend to reveal from the stars. Oresme, however, does not at all emphasize resort to demons in connection with astrology nor ascribe that art to them.

It should not be thought that Oresme rejected astrology entirely. If some astrologers are deceivers, others are true students.

> I say that the prince and any other person should greatly honor true students in astrology who make tables of observations and critical rules for judgments and those who know how to consider scientifically the natures of things, discriminating the true from the false.[77]

The seventh conclusion of the treatise of 1370 declares that the sky acts here below, and that many things are done here which would not be done, unless the sky so acted.[78] How far, then, did Oresme grant validity to the different branches of judicial astrology? He admitted that weather prediction was naturally

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multi decipiuntur per tales artes," Canon. Misc. 248, fols. 31v-32r; and in argument 55 of the treatise of 1370, BN 15126, fol. 13v; see also fols. 20r-21r.

[77] Canon. Misc. 248, fol. 32v, col. 1, cap. 13: ". . . dico quod princeps et quilibet alter veros studentes in astrologia facientes tabulas observationum et regulas de iudiciis examinatores multum debent honorare et eos qui sciunt naturas rerum considerare per rationes verum a falso discernendo. . . ."

[78] BN 15126, fol. 24v.

possible but thought that the present rules for it were mainly incorrect.[79] To astrological medicine he was oddly unfavorable, stating that beyond the effects produced by the sun and moon little or nothing could be known.[80] The human soul controls the body more than the stars do, but many things escape its control; therefore many more will not be influenced by the sky.[81] Oresme also questioned the administration of laxatives and bloodletting according to the moon, apparently upon the basis of experience to the contrary.[82] He objected to such predictions as that a person would die at a given hour unless remedies were applied.[83]

On the other hand, Oresme believed that from revolutions and conjunctions such general events as pestilence, famine, floods, war, and political or religious change even to the rise of prophets and new sects could be forecast in a general way,[84] although not so precisely as to indicate in what country or month of the year these would occur or what persons would be affected by them.[85] Such at least was his attitude in the *De divinationibus*. In the treatise of 1370 he makes what seems a more hostile utterance as to revolutions, asserting that "by the figure of the sky in the hour of the entry of the sun into Aries cannot be known the disposition of the coming year in regard to qualities."[86] But in the manuscripts which I have used he vouchsafes no explanation of this conclusion.[87]

In *De divinationibus* Oresme further allowed the possibility of general conjecture, though without certitude, concerning wars and pestilences from comets and other strange meteorological

[79] Vatic. 4275, fol. 37r, cap. 4; Canon. Misc. 248, fol. 28r, col. 2, cap. 2; BN 15126, fol. 10v (argument 42), also fol. 23v.

[80] Vatic. 4275, fol. 38r, cap. 5; Canon. Misc. 248, fol. 28r, col. 2, cap. 2.

[81] BN 15126, fol. 4r (argument 17).

[82] *Ibid.*, fol. 5v (argument 21).

[83] *Ibid.*, fol. 7v (argument 26).

[84] Canon. Misc. 248, fol. 28r, col. 1, cap. 1.

[85] *Ibid.*, col. 2, cap. 2.

[86] BN 15126, fols. 24v-25r; Ashburnham 210, fol. 14v, col. 1: "Et potest poni aliter conclusio scilicet quod per figuram celi in hora introitus (fol. 25r) solis in arietem non potest sciri dispositio anni futuri in qualitatibus."

[87] It follows his eleventh conclusion (undecima conclusio), but when he goes on (BN 15126, fols. 25r-28v; Ashburnham 210, fols. 14v, col. 1-16r, col. 2) to prove his conclusions, he stops with the tenth and then turns to objections.

phenomena. In his opinion these did not necessarily bring evil in their train, since Seneca reported that the comet under Octavian was entirely beneficial.[88] In the fourth question of the *Quotlibeta*[89] which follow the treatise of 1370, Oresme grants that comets and conjunctions of the planets produce changes on earth, but he doubts if these can be accurately forecast.[90]

Nativities Oresme in *De divinationibus*[91] would accept in so far as the physical constitution and natural inclination of the individual were concerned, but not in regard to contingent matters affected by fortune, free will, and circumstances beyond the individual's control. But as for interrogations and elections, they have no rational foundation nor is there any truth in them.[92] Later, however, he granted that the influence of the stars might incline some one to make an interrogation of an astrologer just as it might move him to go to war.[93] In the treatise of 1370 he noted the inconsistency between nativities and elections,[94] declared that friendships and enmities could not be explained on the sole ground of sympathy or antipathy between the nativities of the persons concerned,[95] and in his conclusions showed a tendency to lump nativities, elections, and interrogations together in one condemnation without distinction.[96] Astrological images Oresme regarded as possessing no truth and having no effect unless through magic and nigromancy.[97]

In several of the *Quotlibeta* elections, interrogations, and astrological images are again considered[98] but without adding much of importance. Oresme states that he once had been credulous concerning elections like most people and had experimented with

[88] Canon. Misc. 248, fol. 31v, col. 1, cap. 11.

[89] Ashburnham 210, fol. 39r, col. 2: "Utrum aliqua et que sunt illa possunt presciri per astrologiam vel per alium modum et per quem unde per cometes et magnas coniunctiones et per coniunctionem et lucem utrum multa presciri posse patet de fluxu maris de evacuatione seu diminutione medullarum ossium et cerebri in novilunio aut ante modicum. Et multi sensuntur dolores in membris. . . ."

[90] *Ibid.*, fol. 46v.

[91] Canon. Misc. 248, fol. 28r, col. 2, cap. 3.

[92] *Idem.* and Vatic. 4275, fol. 38r, cap. 5 of the brief treatise.

[93] Canon. Misc. 249, fol. 32r, col. 1, cap. 12.

[94] BN 15126, fol. 6v (argument 25).

[95] *Ibid.*, fol. 8r (argument 31).

[96] *Ibid.*, fols. 24v-25r.

[97] Canon. Misc. 248, fol. 28r, col. 2, cap. 3.

[98] In *Quotlibeta* numbered 29, 30, and 37.

them extensively but without success. When he complained of this to an astrologer, he was told that it was due to his nativity which prevented him from attaining truth through astrology. Oresme thereupon demanded why the astrologer had not informed him of this before when he interpreted the figure of his nativity. He also sarcastically inquired whether the whole heavens had to change just on his account.[99] The advocates of images claimed not only the authority of Ptolemy and Haly but also of Moses, "as is said in the *Historia scholastica*."[100] Oresme suggests that the last is an unwarrantable inference from the raising of the brazen serpent in the wilderness at God's command as a sign of Christ, that the works on images ascribed to Ptolemy are spurious, but that in any case "he was mistaken in many matters just as Averroes was and just as you see many sufficiently subtle and good mathematicians who are responsible for many abuses and have strange and fantastic opinions."[101] Oresme also charges the *Historia scholastica* with spreading the notion that Moses while fasting forty days in the wilderness had acquired the *ars notoria* of marvelous memory and acquisition of knowledge, which is also contrary to nature and frivolous.[102] Oresme also rejects the explanation that certain persons receive magic power from the stars or that a certain nativity produces a prophet.[103]

We have already heard Oresme cite astrology or astrologers as an authority against itself or themselves. This shows a certain respect and is not merely intended to make them out inconsistent, for of course it is equally inconsistent on Oresme's own part. The reader may have been struck in reading Oresme with the fact that astrology was criticized more north of the Alps than in Italy where all orders seemed to accept it. Oresme gives us an astrological reason for this, too. Ptolemy says in his

[99] Ashburnham 210, fol. 62v, col. 2.

[100] *Ibid.*, fol. 65v, col. 2, "4° quia moyses fecit ut dicitur in hystoria scolastica."

[101] *Ibid.*, fol. 66r, col. 2: "Nec mireris me negasse Tholomeum primo quia ille qui fuit philosophus et qui fecit Almagesti non fuit ille qui scripsit tales abusiones sicud ponit Albumasar in introductorio suo. 2° hoc concesso adhuc dico quod cum hoc stat quod ipse in multis erravit sicud et Averroys et sicud tu vides multos satis subtiles et bonos mathematicos quod ponunt multas abusiones et habent mirabiles et fantasticas opiniones."

[102] *Ibid.*, fol. 66v, col. 1.

[103] *Ibid.*, fol. 47r, col. 2.

Quadripartitum, and Haly assents, that southerners show a greater aptitude for astrology than northerners. Whence Oresme concludes that Frenchmen and Englishmen and the inhabitants of northwestern Europe generally cannot become proficient in astrological judgments.[104]

Oresme treats of other arts of divination than astrology in two connections: in the treatise *Des divinations* and its Latin translation together with astrology and its branches, in the *De configuratione qualitatum* and the *Quotlibeta* in connection with magic. In the *De divinationibus* he twice refers to his discussion in the *De configurationibus qualitatum,* as it is there called, not merely of "nigromancy and magic and incantations," but of "prophecy from divine revelation" and of "visions and natural prophecies whether true or false."[105] He therefore does not go extensively into this side of divination in the *De divinationibus.* What he does say, however, is not entirely consistent with his remarks in the other work, where he intimated that drunken persons and epileptics were especially liable to visions, whereas now he states that those who have such visions are "persons of sober life and devout, whose souls are like a beautiful polished mirror without worldly thoughts. Whence Rabbi Moses of Egypt (i.e. Maimonides) says that concupiscence and sadness impede prophecies. And the like is written in Isaiah."[106] Oresme says also that he has treated of augury and auspices elsewhere showing that they have the least effect on rational minds and persons exercising free will.[107]

As a matter of fact Oresme does not go very extensively in the *De divinationibus* into any arts of divination other than astrology,

[104] Canon. Misc. 248, fol. 31r, col. 1, cap. 11.

[105] Canon. Misc. 248, fol. 28v, col. 1 (Cap. 3): "De nigromantia et magica et incantationibus monstravi fraudem et malitiam et radices in tractatu quem feci de configuratione qualitatum et motuum. Et ibidem demonstravi rationibus mathematicis quantum effectus possint tales scientie habere in personis furiosis et quot sunt artes malefice seu maleficia naturalia ad ponendum gentes extra suos sensus et quod sunt periculosissime adhuc supposito quod sine peccato liceret eis uti. Et in eodem tractatu locutus fui de visionibus et prophetiis naturalibus tam de veris quam de falsis." See also *ibid.,* fol. 31v, col. 1, Cap. 11.

[106] *Ibid.,* fol. 31v, col. 1, Cap. 11.

[107] *Ibid.,* fol. 28v, col. 1, Cap. 3.

but he does briefly condemn such practices as that of "the head of Saturn," the *ars notoria*, pyromancy, sortilege by wax and like trifles.[108] He has to meet such arguments for divination as that other animals than man possess powers of natural divination, the authority of the past, cases of divination from Roman history, and Biblical instances of lot-casting. He cites Bede for the view that while in antiquity some allowance was made by divine dispensation for lot-casting, the practice is no longer licit.[109] It is plainly evident to all philosophers and to any intelligent person that there is no appearance of truth in geomancy, which amounts to nothing more than the distinction between odd and even. Therefore some call it the game of philosophers because by means of it certain problems can be worked out in arithmetic. Oresme regards it as a medieval invention since he finds no mention of it in ancient histories which tell of arts of divination. "Also since it is easy and pretty, everyone would engage in it, if it were true. I speak in like vein of hydromancy, pyromancy, and similar arts."[110] Chiromancy is a part of physiognomy. There may be a certain amount of truth in it but only in so far as concerns the individual's physical constitution and not in matters of fortune. Its rules are wholly or generally false.[111] Later in the treatise Oresme compares those who put their trust in arts of divination with alchemists, who, having once made gold, cannot stop until they are totally impoverished, so that it would have been better had they never attempted the art. Alchemy seems to have been the Wall Street of the middle ages.

Moreover just as alchemists are most often deceived and are wretched and unfortunate, so are all who trust in the aforesaid arts, nor is it to be wondered at, since those fatuously presume to know the secrets of nature, and these the secrets of fortune.[112]

[108] *Ibid.*, fols. 31r-31v, Cap. 11.
[109] *Ibid.*, fol. 33r, col. 2, Cap. 16.
[110] *Ibid.*, fol. 28r-v, Cap. 3.
[111] *Ibid.*, fol. 28v, col. 1, Cap. 3.
[112] *Ibid.*, fol. 32r, col. 1, Cap. 12: "Item isti assimilantur alchimistis qui postquam semel aurum fecerunt adhuc non possunt abstinere usque totaliter depauperantur et melius fuisset eis primitus destitisse. Item sicut alchimiste sepissime decipiuntur et sunt miseri et infortunati, sic omnes qui predictis confidunt, nec mirum, quia isti presumunt fatue scire nature secreta, illi autem secreta fortune."

The common people especially who are ignorant of the natures of things should keep away from diviners who will lead them into the greatest errors.[113]

In the *Quotlibeta* Oresme argues against such belief in days as that the weather is more likely to alter on a Friday than any other day of the week, or that certain days of the month are unlucky or propitious, or that the character of the year may be predicted from the day of the week upon which the first of January falls.[114]

The association of experiments with occult and magic arts is supported by Oresme's work in French against divinations wherein he gives the following list of secret and occult arts: "astrologie, geomance, ydromance, pyromance, experimens, superstitions, auspices, encontres, chant, volement des oiseaulx, membres des bestes mortes, art magian, nigromances, interpretacions de songe et autres vanitez."[115] This brings to mind a similar passage in the contemporary English poem, *The Vision of Piers the Ploughman,* wherein Dame Study is represented as saying:

> But astronomy is a hard thing and evil to know;
> Geometry and geomancy are guileful of speech;
> Whoso works at these two must stay awake late,
> For sorcery is the sovereign book of that science.
> There are mechanical devices of many men's wits,
> Experiments in alchemy of Albert's making,
> Nigromancy and pyromancy which raise up ghosts.
> If you follow Dowel, deal with these never.
> All these sciences I myself in sooth
> Have found among the first to deceive folk.[116]

It is evident, however, that Oresme has better observed the distinction between science and occult science than Langland who has associated even geometry and mechanical devices with dubious and deceptive arts. In the Latin *De divinationibus* Oresme says of the "experiments written in many books" that they are sheer lies and deceptions. "But some people are so simple that

[113] *Idem.*, col. 2.

[114] See especially Quodlibet 7: Ashburnham 210, fol. 47v, cols. 1-2.

[115] Quoted by Meunier, p. 50.

[116] From the A text, XI, 152 *et seq.*

they believe that everything they read is true."[117] Oresme was also aware of the existence of many spurious books.[118]

What was the future influence of Oresme's attack on astrology? Apparently it was not so great as might have been desired. Nevertheless his work did not fall into oblivion. His arguments against astrology were known to Pierre d'Ailly at Paris in the early decades of the fifteenth century and to John Lauratius de Fundis at Bologna in 1451, though the one cited them only to reject them, and the other to refute them. On the other hand, Pico della Mirandola in his work against astrology represented or even misrepresented any learned man of the past whom he could as a foe of astrology. He therefore seized upon the name of Oresme with avidity. "We come to more recent writers," says Pico, "Nicholas Oresme, who was both a most acute philosopher and most skilful mathematician, waxing wroth assailed astrological superstition in a special treatise, deeming nothing to be more fallacious, nothing more detestable, nothing more pestilential, to all orders indeed, but especially to leading men."[119] From this passage it would appear doubtful if Pico had seen more than one of Oresme's treatises against astrology, namely, the brief and early one addressed especially to princes. In his own time Oresme found an ally and immediate successor in his younger contemporary, Henry of Hesse, who was also mentioned by Pico della Mirandola and to whom we shall give our attention in a later chapter.

[117] Canon. Misc. 248, fol. 28v, col. 1, Cap. 3: "De experimentis scriptis in pluribus libris certum est ipsa esse pura mendacia et homini(s) deceptiones."

[118] *Ibid.*, fol. 32v, col. 1, Cap. 14.

[119] Ioan. Pici Mirandulae in astrologiam lib. I, *Opera*, Basel, 1572, I, 417. "Veniamus ad neotericos. Nicolaus Oresmius et philosophus acutissimus et peritissimus mathematicus astrologicam superstitionem peculiari commentario indignabundus etiam insectatur nihil ratus ille fallacius nihil detestabilius nihil omnibus quidem ordinibus sed principibus maxime viris esse pestilentius."

CHAPTER XXVI

ORESME ON MAGIC AND FASCINATION

Oresme's attitude to the marvelous, the incredible, the miraculous, and to operative magic as distinguished from astrology and divination is found set forth especially in three works or portions of works by him. The treatise of 1370, although primarily concerned with astrology, contains certain reflections on these matters. These points, adumbrated in the treatise of 1370, are developed at much greater length and fulness in the very long supplementary treatise which immediately follows it in the manuscripts and opens with this statement of its aim and purpose: "In order, moreover, that men's minds may be somewhat quieted, although it is beyond what I proposed, I intend to reveal here the causes of certain things which seem marvelous."[1] Thus we are given the impression that Oresme will attempt to relieve the mind of an age obsessed by superstitious fears and inadequate comprehension of natural law. The third place in which Oresme discusses magic is in certain chapters of his *De configuratione qualitatum*. We shall also include some account of a treatise on fascination which is ascribed to Oresme in at least one manuscript but which does not seem consistent with his views expressed elsewhere and is almost certainly by Engelbert of Admont.

It seems best to take up these different discussions of magic and related matters one by one rather than try to blend them into a single composite as we have just done in the case of astrology. The views expressed in the work of 1370 and its supplementary treatise are in sufficient accord to be combined and unified, but the *De configuratione qualitatum* not only approaches the subject of magic from another angle but is also at

[1] BN 15126, fol. 30r; Ashburnham 210, fol. 21r, col. 2: "Ut autem aliqualiter pacificentur animi hominum, quamvis sit extra propositum, aliquorum que mirabilia videntur causas proposui hic declarare."

times somewhat more favorable to certain aspects of it. Moreover, the more miscellaneous *Quotlibeta* which follow the treatise of 1370 have a special interest for the varied picture that they present of Oresme's attitude to nature and scientific views. We shall therefore devote one chapter to the discussion of magic in the *De configuratione qualitatum* and to the dubious account of fascination, while another chapter will deal with the effort made in the treatise of 1370 and its supplement to reduce the apparently marvelous to natural causes or to explain it away as a delusion and unreality. We have said that it is risky to attempt to arrange Oresme's writings in a chronological sequence on the basis of their citations of one another, but if we adopt this method, the *De configuratione qualitatum* would seem to have been written before the supplement to the treatise of 1370, since the *De configuratione* is twice cited in Oresme's translation of the *Politics* of Aristotle,[2] which was published at the latest in 1371.[3] We have also seen that the *De configuratione qualitatum* was twice cited in the Latin translation of the *Des divinations*[4] of which the French original dates from 1361. We shall therefore consider it and the work on fascination now, leaving the attitude to magic in the treatise of 1370 and the *Quotlibeta* for the following chapter.

The *De configuratione qualitatum,* also entitled *De difformitate qualitatum,* or *De uniformitate et difformitate intentionum,*[5] is a treatise which deals primarily with that favorite

[2] Meunier, *La vie et les ouvrages de Nicole Oresme,* 1857, page 31, quotes from livre VIII, chap. 8, "Par art magique et naturelment, si comme je declaray autrefoiz en j traictié appelé *De deformitate qualitatum*"; and VIII, 12, "Et les causes et la maniere comment tele chose puet estre naturelment je mis en j traictié appelé *De difformitate qualitatum.*"

[3] Meunier, 1857, p. 17.

[4] See in the previous chapter, page 420.

[5] My study of the work has been based chiefly upon rotographs of BN 14579, fols. 33r-36r, and BN 14580, fols. 52r-57r, giving those chapters of the second part which especially bear upon magic—approximately chapters 23 to 35. The chapter numbering in BN 14579 seems the same as that given by Wieleitner from BN 7371, but BN 14580 differs somewhat, numbering as 24 what the other manuscripts give as 26, as 29 what they call 31, etc. Later on its own numbering becomes double, so that 33 is also numbered in the margin 36, 34 is also called 37, etc. The text of these two manuscripts also varies. Thus a chapter which opens in BN 14579, fol. 36r, "Et ne quis ex pre-

theme of fourteenth century scholasticism, the intension and remission of forms. Of this treatise Duhem and Wieleitner have already said something and given the headings of its chapters.[6] Its main idea may be briefly indicated as follows, in order to put the reader in a position to follow intelligently Oresme's subsequent argument. Oresme indicates a quality by a horizontal line and represents variations in the intensity of this quality by uprights or perpendiculars of different lengths at different points along the line. Thus the horizontal depicts longitude or extension, while the uprights represent altitude, latitude, or intension. By connecting the tops of the successive uprights one gets a figure representing the configuration of qualities. If the intension of the quality were uniform all along the line, this uniformity of intension would give as the the resulting figure

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dictis occasionem sumat erroris, est advertendum quod huiusmodi divinatores aut magi fingunt et mentiuntur," in BN 14580, fol. 56r, col. 2, begins, "Et ne quis ex predictis sumat causam divinatores (*sic*) erroris, advertendum est quod huius (modi) aut magi fingunt et mentiuntur sunt ut in pluribus false et delusorie." But while the wording varies and often seems corrupt, the general sense is the same. BN 14580 also differs from 14579 in being written in double columns. In the Latin quotations in the following notes I have commonly given the wording from BN 14580 without troubling to note all the variations from BN 14579. The work occurs also in FL Ashburnham 210, fols. 101v-129r, and anonymously in Bruges 486, 14th century, fols. 159r, col. 1-173r, col. 2, concluding with a table of chapters of the three parts. Another MS is Erfurt, Amplon.Q. 150, late 14th century, fols. 1-14v. The correct form of the incipit is, "Cum imaginationem meam (not *veterum*) de uniformitate et (or, *ac*) difformitate ordinare cepissem. . . ."

[6] Pierre Duhem, *Études sur Léonard de Vinci,* III (1913), 375-398, under the captions, "XVII. Nicole Oresme inventeur de la géométrie analytique," and "XVIII. Comment Nicole Oresme a établi la loi du mouvement uniformément varié," discussed the work as contained in BN 7371, 15th century, fols. 214r-266r. Heinrich Wieleitner, who the year before had published his article, "Der 'Tractatus de latitudinibus formarum' des Oresme," *Bibliotheca mathematica,* XIII (1913), 115-145, then published "Ueber den Funktionsbegriff und die graphische Darstellung bei Oresme," *ibid.,* XIV (1914), 193-243, based largely upon Duhem's excerpts from the aforesaid MS, BN 7371, which Duhem had transcribed in Latin but in his book translated into French, whereas Wieleitner published the original Latin. These extracts were limited to mathematical passages which do not concern us here, but Wieleitner added the headings of the other chapters, including those of interest to us. In this MS, BN 7371, the treatise is entitled, "Tractatus de figuratione potentiarum et mensurarum difformitatum," but this wording is unusual and Wieleitner explains, "Das Wort 'potentia' das gewiss hier nichts anderes bedeuten will als eben eine 'qualitas', die 'latitudo' besitzt, kommt in dem von Duhem exzerpierten Teil des Werkes nicht mehr vor."

a rectangle. If the intension decreased uniformly from a high point to nothing, the configuration would be a right-angled triangle. And so on. Not only are the uniformity and difformity of qualities in general discussed, but of such things as velocity and sound in particular. The work is in three parts and the discussion of magic occurs in several of the later chapters of the second part.

The theme of magic is introduced in the second part of the *De configuratione qualitatum* in this wise. Oresme has been speaking of the power of music to affect both mind and body.[7] This he ascribes to the varied configuration of difformity of sounds in intension and remission of sharpness and strength. So many are the conditions essential for beautiful sound and so noble and perfect that it would be impossible to bring them all together in full perfection either naturally or artificially in this inferior world or in passive matter.[8] Oresme believes that the blest and damned after the last judgment will respectively hear better and worse sounds than they ever heard here on earth.[9] It also seems evident to him that by subtlety of art and human diligence something special and marvelous in the way of sound might be achieved beyond what is commonly attained by art or nature. Some unusual difformity or configuration of sounds might be engineered which would exceed the power of music already mentioned as tyriac surpasses ordinary simples. "Thence it is that the magic arts are in part founded in the potency and virtue of a certain configuration of certain sounds as well in respect to melody as to words."[10]

[7] II, 23 (cap. 21 in BN 14580, fol. 52r, col. 1): opening, "Ex testimoniis multorum philosophorum medicorum et theologorum constat esse magnam potentiam musice atque efficaciam quantum ad passiones anime et etiam corporis."

[8] II, 24, Persuasio quod erit musica in alio seculo. In BN 14580, cap. 22, fol. 52r, col. 2, the chapter opens, "Tot sunt circumstantie soni simpliciter pulchri et ita nobiles et perfecte ut non sit difficile videre quod impossibile est omnes illas naturaliter aut artificialiter perfectissime aggregari in hoc inferiori mundo aut in materia passibili."

[9] This thought is expressed in BN 14579 at fol. 33r, and in BN 14580 at fol. 52v, col. 1.

[10] "Inde est quod artes magice fundantur pro parte in quorundam sonorum certe configurationis potentia et virtute tam in melodya quam in verbis": BN 14579, fol. 33r; BN 14580, fol. 52v, col. 2.

This recognition that magic has a basis in both nature and art may surprise us in one who has opposed so much of astrology. But Oresme goes further in what seems to be a semi-approving attitude towards magic. He states that there are two kinds of magic, one which is wrought by aid of demons, and the other which is not. He would rather call the diabolical variety by the name, nigromancy, and reserve the term, magic, for the other. Even in diabolical magic or nigromancy the configuration of the difformity of sounds is said to have a place, since some demons delight in melody while others hate music. "They say furthermore that some demons are held captive by a certain modulation of sounds and others put to flight,"[11] as in the case of David's relieving Saul by his playing. Some even say that demons can be invoked and coerced by words and figures, but this view Oresme declares to be against natural philosophy. It is only by divine permission and with intent to deceive that the demons respond to words and figures. Oresme therewith dismisses this variety of magic and turns to that "for which some rational reason can be rendered and in which, even if a demon is invoked, absolutely no external effect is produced thereby, although the sin which is committed in such an act sometimes is suggested by the devil." And this undiabolic part can be distinguished from nigromancy by the general name of the magic art.[12]

Oresme recognizes that to discuss magic is somewhat in the nature of a digression from his subject, but he wishes to examine its foundations and detect its malign and false character so that no one who has read his discussion may hereafter devote himself to such arts. Therewith Oresme abandons his initial, seemingly not unfavorable, attitude to magic. He states that he has already shown elsewhere in a certain question by authority, reason, and induction that evil has happened to every man who

[11] *Idem.*, "Dicunt insuper quosdam demones certo sonorum modulamine coartari et alios effugari."

[12] *Idem.*, "Hac igitur parte dimissa ad illam volo transire de qua potest reddi aliqua rationalis ratio et ubi demon invocatus nichil penitus operatur ad extra quamvis peccatum quod in ea re committatur quandoque (aliquotiens) a dyabolo suggeratur et ista pars generali nomine ars magica (these two words are omitted in BN 14570) potest dici." These are the closing words of the 25th or 23rd chapter.

meddled with this art. A first evil basis of the art is the false persuasion by which the magician deceives himself and deludes others, or pretends to operate by the power of the stars when he is really resorting to some prohibited art. False too are the incantations and figures by which magicians assume to compel the soul and coerce demons to execute their orders or reply to their questions. That they cannot really invoke demons is shown in Oresme's opinion by the variation in the invocations employed at different times, in different regions, or by different sects and religions.[13] Moreover, these invocations will not work at all for some persons, and one book of magic makes this depend upon the constellations under which one is born. In this connection Oresme seems to accept the view that the stars may at one time incline men to false ideas and light credulity and at another time not, just as the constellations may produce a plague at one time rather than another.

In Chapter 28 (or, 26) Oresme notes that magicians are especially prone to employ as their mediums children who are credulous and impressible, and who, influenced by tales heard from old wives, are ready to see a demon in every shadow. Moreover, old women, especially those with double pupils in their eyes, often are able to produce wonders by imaginative virtue from the corrupt state of the brain. Algazel consequently ascribes most of the marvels of magic to imagination rather than to demons.[14] Another reason for not attributing such things to demons is that sick persons and those afflicted with mania often have such fancies and illusions.

As therefore the said effects can be produced naturally from sickness or some other occasion, so it is possible that the feats of the magicians may be by way of art which imitates nature without other action of a separate spiritual substance.[15]

[13] With this argument we pass from the 26th or 24th chapter to the 27th or 25th, "De probatione prius dictorum ex diversitate sectarum et complexionum."

[14] "Ideo ex sua ymaginatione possunt multa admiranda facere, sicut deducit Algazel in 5° phisice sue, qui effectus artis magice et fascinationes et talia reducit ad causam dictam: non ergo fiunt a demone sed ut plurimum ymaginatione": BN 14579, fol. 34r; BN 14580, fol. 53v, col. 1.

[15] "Sicut igitur predicta possunt fieri ex egritudine vel alia occasione via nature, ita possibile est effectus magorum per viam artis que imitatur naturam

Oresme would account for some of the marvelous effects or illusions by retraction during an outwardly insensible state of the sensitive spirits of the body to the inner virtues where the soul, withdrawn within itself, can act most strongly through them.[16] In attributing such "marvelous power" to the soul Oresme again approaches to a position favorable to magic. Some such result, he continues, is probably attained by the practice of making boys stare into polished surfaces, until their vision is so affected and their spirits so disordered that they often go blind after seeing various visions and apparitions. Oresme also notes the shocking changes that the countenance of a nigromancer often undergoes during his conjurations and invocations, so that he scarcely seems the same person, while his mind also appears to be alienated.[17] All this indicates in Oresme's opinion a great alteration or ferment of the sensitive spirits, and in such a perturbed state it is no wonder if many phantasies and imaginations are experienced. Fastings, special diets, solitary life, choice of darkness and nighttime, are other features of magic procedure which go to show that demons are not really invoked, but that the basis of magic is delusion, imagination, an abnormal state of mind and body, terror, and illusion. This is why apparitions are seen by only one or two or a few persons, seldom by all those present. William of Auvergne, bishop of Paris, had reasoned very similarly in the previous century, and his *De universo* is cited by Oresme in this connection.

But there is another root of magic besides illusion and deception.[18] It is the application of certain objects and has a closer connection with Oresme's main theme in this treatise, the configuration of qualities. By a threefold use of objects the magicians make certain things appear which seem impossible of perform-

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absque alia actione spiritualis substantie separate": BN 14570, fol. 34r; BN 14580, fol. 53v, col. 2.

[16] *Idem.*, "Nunc autem ostendendum est quod aliqua predictorum fiunt principaliter propter revocationem seu reclusionem anime ad intra ac propter retractionem spirituum sensitivorum perspicuorum ad virtutes interiores quia anima sic retracta seu recollecta non in se sed in spiritualibus suis mirabilem habet potentiam."

[17] BN 14570, cap. 30, fol. 34v; BN 14580, cap. 28, fol. 54r, col. 2.

[18] BN 14579, cap. 31, fols. 34v-35r; BN 14580, cap. 29, fol. 54v.

ance naturally. The first method, by altering the human spirits or senses, has already been touched on. It may be done by drugs, for instance. The second method is to change the color, motion, and figures of objects themselves by applying things which, because of the configuration of their qualities, have strange and singular virtues, if they are duly applied. The third method is that of mathematical illusion by such means as mirrors which deceive the spectators. Oresme does not regard the sleight of hand of jugglers as true magic. Optical illusions are especially easy at night, as Witelo tells in his treatise *De natura demonum*.

It will be observed that in treating this second root of magic by natural methods Oresme has again relaxed his attitude of condemnation. He states that many seek to know and use this side of magic and admire those who use it, especially in respect to its first two methods which are natural. He adds that it should be used cautiously, and that concerning the occult efficacies of stones, plants, and other natural objects it is expedient to know only those which are necessary or useful for man and for living well. But they should not be abused as they are by poisoners or in some books of magic like the *Liber vacce* ascribed to Plato. Nature should not be violated. Oresme next alludes to subterranean spirits or gases, exhalations and fumes,[19] which may incline the mind to magic, stupefy the external senses, and give rise to marvelous visions, as in the case of the Delphic oracle or the purgatory of St. Patrick. If before entering such caves and places, you purify them with aromatics and fumigation, and eat strong spices or drink good wine, you will not be subject to such illusions. Probably fumes can be produced artificially which will have a like effect. At any rate, Oresme prefers his explanation to attributing the effects of such exhalations to demons.

The third foundation of the magic art consists in the virtue of sounds or words[20] and is even more closely related to Oresme's main theme of the configuration of qualities, as his introduction

[19] BN 14579, cap. 32, fol. 35r-v; BN 14580, cap. 30, fol. 55r.

[20] BN 14579, cap. 33, fol. 35v; BN 14580, fol. 55v, without chapter number, with the result that the next chapter—cap. 34 in BN 14579—becomes 31 in BN 14580.

of the subject of magic has already suggested. It is better to attribute apparent marvels of magic to great variations in velocity and sound than to ascribe them to the activity of demons. Sometimes magicians change men's minds by this third means without the aid of either of the other roots of magic. Oresme, however, regards the signification of the words which are employed as an unimportant matter; the magic is due rather to the virtue of the configuration of the voice and sounds. Oresme also touches on the possibility of ventriloquism.

Oresme then returns to the point that apparitions and visions are produced by an abnormal condition of the spirits of the human body.

And if there concurs with the aforesaid spirits an extrinsic efficient cause of vision, or if such an extrinsic cause acts of itself without them, then it is possible to have true visions of the future or of other hidden matters, as was said in the last chapter of the first part.[21]

Lest, however, Oresme confirm anyone in the error of divination, he adverts again to the deceits, pretenses, and falsehoods of magicians and diviners.[22] Moreover, while a main purpose of his discussion thus far has evidently been to minimize the participation of demons in the magic arts, he now makes the concession to orthodoxy that certain marvels are so difficult and so remote from any natural process that they cannot rationally be reduced to a natural cause but are to be explained only as the work of demons or angels. He adds that nevertheless some have explained everything on a natural basis and denied that there are any good or bad spirits of this sort, like Alkindi who accounted for all such marvels by radiation and Algazel who ascribed them to the virtue of the soul and power of imagination.

After some observations anent divination whose purport we have already indicated, Oresme engages in a discussion[23] of fascination. Despite the views of Avicenna and Algazel as to the

[21] "Si autem cum predictis spiritibus concurrat causa extrinseca efficiens visionis aut scilicet ipsa causa extrinseca agat (after *aut* BN 14579 has simply, *si agat*) se sola sine eis tunc possibile est ut fiant vere visiones futurorum vel aliorum occultorum ut dictum est ultimo capitulo prime partis": BN 14579, cap. 34, fol. 36r; BN 14580, cap. 31, fol. 56r, col. 2.

[22] *Ibid.*, caps. 35 and 32 respectively.

[23] Cap. 38, "De causis quorundam effectuum in corpore alieno per predicta." It is cap. 35 in BN 14580, fol. 57r.

control of mind over matter, he deems it too absurd and irrational to hold that fascination can be exercised by the soul by mere thought. This would be "remote from philosophy and not consonant with our Faith," and someone—perhaps an Arabic author—had been condemned at Paris for such a view.[24] Oresme's explanation is rather that imagination or affection may be so intense and its difformity so figured that the body is altered by it. The body in its turn affects the surrounding air and other bodies, especially by means of the eye which has a close connection with man's inner spirits and is notably affected by the accidents of the soul. Hence it is possible that fascination be accomplished naturally. As the basilisk kills men by its glance, so a malicious old woman of corrupt physical constitution may injure the tender flesh of infants by merely fixing her gaze upon it. "It is better to say this than to attribute it to demons," adds Oresme for the third or fourth time, but in this case we can regard his view as only the lesser of two evils and as still all too likely to encourage belief in witchcraft.

Besides this discussion in a chapter of the *De configuratione qualitatum,* there is a separate treatise on fascination ascribed to Nicholas Oresme in a manuscript at Munich,[25] where it also occurs anonymously in other codices. It seems almost certainly the work of Engelbert, abbot of Admont in Styria, (c. 1250-1331), who lists among his writings one with the same title and incipit.[26]

[24] Apparently this same condemnation is referred to again in the *Quotlibeta:* see FL Ashburnham 210, fol. 47r, col. 1. See below Chapter 27, page 462.

[25] CLM 18225, quarto, 15th century, fols. 324r, col. 2-334v, col. 2. "Incipit tractatus de fastinacione vom pschrein" is the rubric; "Nycolai orem parisiens." is added in black letters. The treatise is also ascribed to him in the margin of the table of contents on the flyleaf at the beginning of the manuscript. The opening words of our treatise are, "Cum secundum philosophum in primo posteriorum." The work consists of a brief introduction and twenty-six chapters. It appears anonymously in two older MSS: Claustroneoburgi 306, 14th century, fols. 164v, col. 2-179r, col. 1: rubric, "Incipit prologus in tractatu de fascinatione," incipit, "Cum secundum philosophum in primo posteriorum. . . ." The first chapter opens, "Nomine igitur fascinationis solet significari et intelligi impressio quedam et passio facta in homine." CLM 16192, 14th century, paper, fols. 204r, col. 1-213r, col. 1, where it follows the work of Thomas Bradwardine against Pelagius. Also in two other fifteenth century MSS: CLM 5338, fols. 384-397, and CLM 26608, fols. 11-18v.

[26] See his *Epistola de studiis et scriptis suis,* in Pez, *Thesaurus anecdotorum novissimus,* 1721, I, i, 429-436. He gives only three words of incipit, "Cum

In it the mode of treatment is different and much more detailed and leisurely, even gossipy and credulous, than Oresme's but the general position is somewhat the same. The author begins by asking what is the meaning of the word, fascination, of what part of the soul it is a passion or operation, whether it is possible, and in what way one person is fascinated by another. He writes at the request of associates and friends. He defines fascination as the impression of suffering or infection made on a human being or other animal by the glance of another man or animal. The old notion that a wolf, if it sees a man first, renders him speechless, our author is inclined to accept on more recent testimony from the neighborhood of Milan. It is easy to see that fascination is worked by virtue of the soul, since inanimate objects do not exert it, nor do herbs and trees. But since other animals than man are able to fascinate, it must be a function of the sensitive rather than either the vegetative or rational soul. Furthermore, fascination seems always to be worked through the instrumentality of the eye. Several chapters are next devoted to a discussion of the soul and to the power of mind over body and the effects of vivid imagination. The chameleon by vehement intention changes its color, and so on. But the soul must act by the mediation of something in part spiritual, in part corporeal, and so we turn to the sense of sight and to different theories of vision. After rejecting three other theories, the author puts forward that of a visible spirit coming from the eye to join the rays emitted from other bodies. This is not the theory of Witelo and Alhazen whose views Oresme elsewhere seems to accept. The ninth chapter is devoted to a discussion of the three spirits, vital, natural, and animal, in general, and to this visible spirit in particular. The tenth chapter begins with an anecdote of the emperor Frederick, who detected a guilty servant in the night by feeling his pulse and marked him for identification in the morning by cutting a part of his hair off, but was outwitted by the servant's giving all

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secundum philosophum . . .", but it is scarcely likely that another work on fascination would open thus. Since writing this, I find that the catalogue of MSS at Klosterneuburg suggests Engelbert as author.

the other sleeping servants a similar tonsure. The author then tells of a man who made a mirror that was obscured by a black cloud whenever a criminal looked in it—the consequence of the perturbing effect of consciousness of guilt on the humors and spirits of the criminal. Thus we find the middle ages vying with the present day in psychological devices for the revelation of crime. Finally in the eleventh chapter the author asserts what we have been expecting for some time, that the visible spirit is the medium of fascination. This is proved by experience with basilisks, by what Solinus and Isidore say of the hyena, and by the effect of a menstruating woman upon a mirror. Three views are then considered in the twelfth chapter of those who would make the soul directly the cause of fascination. First, that the soul is the image and form of the universe. Second, that the soul is agitated by the light of the intellect universally and expands to affect all nature. Third, as Avicenna and Algazel hold, that the soul can make an impression upon first matter by the vehemence of its affection and intention. But our author regards the first two theories as insufficient to explain fascination, the third as only partly sufficient.[27] From *Liber de differentia inter animam et spiritum* he cites the statement that the sight of the lynx penetrates a wall on account of the velocity and impetus of the visible rays. Not only is the visible or visual spirit the medium of fascination but it is differently affected by different passions.[28] Some are transitory in their effects, others of long duration or permanent.[29] Moreover, the visual spirit of the fascinator often upsets the visual spirit of the person fascinated, so that he is unable to see well thereafter.[30]

Therewith the portion of the treatise which is devoted to fascination ends. With the seventeenth chapter begins the second part of the work which deals with the influence of the soul upon its own body and itself.[31] This part contains little of in-

[27] Cap. 13.
[28] Cap. 14.
[29] Cap. 15.
[30] Cap. 16.
[31] The seventeenth chapter begins in CLM 18225 at fol. 329v, col. 1. In the margin we read, "Incipit 2ª pars de virtute quam imprimit anima in corpus proprium et in se ipsam." The text of the chapter opens: "De potentia vero

terest to us except a passage on man as the microcosm,[32] another on the marvels of the magnet and the magnetic needle, and a more favorable allusion to astrological geomancy than I have noted in Oresme's works. They say regarding geomancy that if a man who is about to put a question walks about in the quiet of the night and thinks the matter over thoroughly and all the reasons pro and con, and then suddenly casts his points without noting their number, the motion of the sky will lead him to the right number and answer. The author adds, however, that whether this is true is not for this time or place to discuss, since the practice of that art is forbidden by the church. But many such things are forbidden not so much as false as because it is harmful to put one's trust in them.[33]

In connection with the magnet the author states that its attractive influence depends on the polar star, and gives an interesting description of a mariner's compass which he had seen with his own eyes at Venice. The experience is more likely to have happened to Engelbert of Admont, who studied for many years at Padua, than to Oresme, and would be more worthy of remark in the thirteenth than the fourteenth century. The sailors have a needle mounted on a pivot in the center of a copper table. From this center lines lead to the circumference along which are designated the names of the cities and harbors and their distances apart. They start the needle revolving by moving a magnet rapidly about it. Then the magnet is suddenly withdrawn and plunged into a receptacle full of water. Thereupon the needle, relieved from the necessity of revolving after the magnet, in good time comes to rest pointing toward the pole, and

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et virtute anime per quam facit etiam quasdam mirabiles impressiones in seipsam et circa seipsam [in quantum est mota et movens seipsam per quandam distantiam et diversificationem sui a seipsa] de reliquo est videndum." The words in brackets are omitted in Claustroneoburgi 306, fol. 172r, col. 1.

[32] CLM 18225, fol. 332r, col. 2; Claustroneoburgi 306, fol. 175v, col. 2.

[33] CLM 18225, Cap. 22, fol. 332v, col. 2; Claustroneoburgi 306, fol. 176v, col. 1: "Quod utrum verum et firmum non est huius loci et temporis pertractare cum illius artis opus et ingenium sit ab ecclesia prohibitum, licet multa talia sint prohibita non imo quia falsa sint sed quia noxia et nociva ad credendum et in talibus confidendum."

the sailors even on a dark night can shape their course accordingly.[34]

The third part of the *De fascinatione,* from its twenty-third chapter to the close, has even less to offer our investigation, discussing in a religious tone the relation of the soul to God.

Another treatise by Engelbert which is of some interest to us deals with the causes of the longevity of the antediluvian patriarchs. In it he subscribed to the theory that if earth is reduced to water, its volume increases ten times; if to air, one hundred; if to fire, a thousand times.[35] He holds that the flood infected the elements, so that vegetation lost its vigor, and human bodies became weaker and less capable of receiving the impressions of the stars. Therefore men would not live longer again, although the stars should return to the positions which they occupied before the flood.[36]

In conclusion, returning to Oresme, let us try to sum up very briefly his attitude towards the occult arts and sciences, and to find a reason why he was so inclined to find fault with astrology, then so generally accepted, but to apologize to a certain extent for magic, then so generally suspected. Will not his scientific

[34] Claustroneoburgi 306, fol. 176r; CLM 18225, fol. 332r: ". . . stella poli a qua et eius influentia causatur et dependet virtus attractiva que est in magnete. Sed in ferro moto et attracto per magnetem mox extincta et abstracta virtute magnetis adhuc stella poli movet (fol. 332v) ipsum ferrum puta stilum vel acum ferream ita quod acuitatem stili vel acus directa linea versus ipsum polum vertit et ibi figit, ergo etc.

Hoc autem ego Venetiis personaliter vidi ex ingenibus et opere nautarum in tenebris noctis navigantium qui in tabula erea semicirculata ponunt unum stilum erectum circa punctum semicirculi ipsius tabule et abinde ducunt lineas ad circumferentiam in quarum capitibus sunt signata nomina civitatum et portuum marinorum et distantie earum ad invicem. Et ponunt stilum vel acum ferream in medio tabule illius et subtus cum magnete faciunt magnum et velocem motum circumductionis ad quod motum continuo et consimiliter movetur ipsa acus vel stilus. Deinde nauta retro se habens scaffam (scafium) cum aqua subito retrahit magnetem et proicit in aqua[m]. Mox stilus vel acus cessante motu magnetis adhuc moti (?) per bonam horam a motu et virtute poli usque quod tandem quiescens stat vertendo ad civitatem directe versus polum. Ex qua directione statim secundum lineas protractas vident naute versus quam partem celi dirigere debeant navem ut ad portum vel locum perveniant quo tendunt." Therewith Chapter 21 ends.

[35] *Liber de causis longaevitatis hominum ante diluvium,* cap. 26, in Pez, *Thesaurus anecdotorum novissimus,* I, i, 477-478.

[36] *Ibid.,* caps. 33, 36; cols. 488, 491-492.

penchant and curiosity account for both attitudes? He opposes astrology because its rules and technique seem to him in large measure unscientific and irrational, and because he prefers to account for terrestrial phenomena by natural reasons rather than by an occult celestial influence. He finds much of magic accountable, if not defensible, on natural grounds. It is true that he also adduces moral and religious considerations, but these militate against the one subject in about the same degree as against the other. It must be admitted that his theory of the possible incommensurability of celestial movements had something to do with his attacking astrology, while his doctrine of the configuration of difformity led him to see a possible validity in magic. But after all these were scientific hypotheses and natural reasons to his mind. Another very noticeable and commendable feature of his treatises is his consistent belittling of the activity and importance of demons. Natural astrology and natural magic, that is what he would reduce both fields to. In all his attacks on astrologers he hardly accuses them once of using the services of demons, and he would reduce the participation of demons in magic to just enough barely to satisfy the theologians and orthodox. But his normal attitude is, why resort for explanation to a remote cause, such as the sky or demons, when natural phenomena close at hand provide a sufficient explanation?

Although Oresme thus greatly restricts the activity of spirits as separate substances whether good or evil in the natural world and occult arts, he is ready, especially in his explanations of fascination and magic, to ascribe excessive virtue and competency to spirits of another sort, to the natural and vital and animal and visible spirits of the human body. And this reminds us that his attitude is a half-way one. Despite his rational scepticism, his ingenious mathematical theories, his scientific curiosity, he still accepts to some extent the astrological doctrine of conjunctions and of revolutions of the year. He believes that the words of incantations may as sounds have a certain potency from the mouths of magicians. But this makes him no less interesting a figure. It was against an age, from king on the throne down to

simpleton, wholly given over to astrology and divination, that he raised his voice in protest. It was against a generation to come, doomed to the depths of demonology and witchcraft delusion, that he sounded his repeated warning note, "It is better to say this than to attribute it to demons." Yet he too, of course, was continuing past traditions—a long series of criticisms of one kind or another against astrology and divination,[37] and such previous recognitions of the existence of a natural magic as those of William of Auvergne, Albertus Magnus, and Roger Bacon. Of his tendency to find a natural explanation for many of the phenomena ascribed to demons we find a thirteenth century source in the treatise of Witelo on the nature of demons, which Oresme cites more than once and from which he has taken a number of suggestions. These general impressions as to Oresme's attitude we shall find largely confirmed by the discussions in his *Quotlibeta* to which we turn in the next chapter.

[37] But Oresme showed much more originality than his contemporary, Raoul de Presles, who, in his *Epistola* or *Musa* to Charles V on the ills of the time, merely repeated the stock list of occult arts and the attitude to them to be found in John of Salisbury and earlier Christian writers: Oxford, Balliol College 274, 1409 A.D., fols. 238-255.

CHAPTER XXVII

ORESME ON THE MARVELS OF NATURE

In the treatise of 1370 Oresme did not confine himself to astrology and other forms of divination, but, especially in the latter part of the work, touched upon the question of occult virtue in inferior objects—which he was somewhat less disposed to deny than occult influence of the stars. He also treated of human credulity, the unreliableness of hearsay and authority, and the popular tendency to see marvels everywhere and ascribe them to demons or to some magic power, if not to astral influence. The discussion in the treatise of 1370 which has some bearing upon the possibility of magic or the relations between magic and natural science occurs mainly in the section devoted to the last fifteen *Notabilia* from 11 to 25 inclusive. It may be summarized as follows. Some agents are simple, some composite. After defining substantial forms with the aid of Alkindi, Oresme notes that they have different properties or actions. Any object has a virtue of its own which is not characteristic of another. It is easier to comprehend a simple quality than a composite quality. To seek the cause why a given agent acts as it does, is to inquire into its very nature. Such action cannot be reduced to the first qualities—hot and cold, dry and moist—since every substance has a different virtue, disposition, and way of acting from every other. Thus far Oresme appears to accept the conception of occult virtue or peculiar properties of individual objects which so often leads on to natural magic. He also grants that these virtues of simples may produce even stronger virtues in compounds.

Oresme will not, however, admit that such virtues come from the stars.

There is no more cause for wonder at the diversity of actions than there is for wonder at the plurality and diversity of things. And if you ask how such things are generated and what they are, I answer that

they are what they are, and that they are generated from the four elements and proportions and harmonies of the first qualities and the secondary ones with the virtue of substantial agents.

Thus, although he had asserted that the action of individual things was different from that of the first qualities, he now holds that individual things are made from the four elements and are corrupted sometimes by one or more of them and resolved again into the elements. But he again affirms that composites have different virtues and actions from the elements. Many or all phenomena of nature are really just as inexplicable as the action of the magnet. Also simple qualities, composites, and species may be contraries of one another and so work seemingly strange effects. Again, a slight disposition or indisposition, the least addition or subtraction may result in a totally different effect. Browning might well have been reading Oresme's twenty-first *notabile* when he wrote,

> Oh! the little more and how much it is!
> And the little less, and what worlds away!

This is a thought which Oresme often repeats in the ensuing *Quotlibeta.*[1]

Oresme then turns to human credulity and the influence upon men's beliefs and actions of their imaginations, passions, and self-interest or devotion. He again, as in *De configuratione qualitatum,* cites Witelo against the tendency to attribute to demons what may be explained by natural action or optical illusion. He reminds us further that sudden alterations of mental and bodily state are possible naturally and do not imply possession by demons. Nor should we accept the statement of anyone except a person of good judgment and training who has studied long and

[1] Some of the passages in which he does so are: FL Ashburnham 210, fol. 27r, col. 1: "Et in principiis modica differentia facit magnam differentiam in effectibus." *Ibid.,* fol. 27r, col. 2: "Et recole quod superius sepe dictum est quia modicus error aut dispositio in principio maximam facit differentiam in effectibus." *Ibid.,* fol. 32r, col. 2; he here gives as an illustration that one word sometimes causes a war. *Ibid.,* fol. 36r, col. 2: here the illustration is that of a sun-dial or clock, "In orologio motus unius gradus mirabilia facit." *Ibid.,* fol. 63r, col. 2: "valde modica differentia et deviatio in principio facit magnam diversitatem."

hard in those matters on which he would be accepted as an authority. We should consider well who is speaking, of what he speaks, in what manner, with what motive, and whether literally or merely by way of illustration. Even from men of repute you will often hear sufficiently naïve assertions.

From these reflections on credulity, evidence, and authority Oresme passes on to observe that transmutation must often be gradual, and that immediate conversion of one thing into another is in many cases impossible. Finally, as his twenty-fifth *notabile* Oresme notes that a virtue which we take for a simple quality may rather be the substantial form of the object concerned, as in the case of the magnet. Thus he again approaches the occult virtue conception. But presently, in replying to the fourth objection of the astrologers—who had asserted that many medicines and stones have many virtues which cannot be reduced to material dispositions, whence the physicians speak of specific form, and the magnet attracts iron thus—Oresme denies that there are virtues which cannot be reduced to material dispositions, and affirms that it is clear that they follow the composition or mixture and quality of the elements. His underlying idea is probably, as in the *De configuratione qualitatum,* that the virtue consists in a special proportion, harmony, and uniformity or difformity of constituents and qualities, but he does not bring this explanation to the fore prominently in the treatise of 1370.

In the treatise of 1370 Oresme several times promises to explain such matters as the apparent gift of tongues or ability to predict future events "at the close of the present question."[2] And in both manuscripts which I have used, after his argument against astrology and divination has been concluded,[3] the text resumes again, "In order moreover that men's minds may be somewhat quieted, although it is beyond what I proposed, I intend to reveal here the causes of certain things which seem marvels."[4] In one manuscript there is inserted before these open-

[2] BN 15126, fol. 32v; Ashburnham 210, fol. 18r, col. 1: "et ista post questionem declarabuntur." *Idem* and *Ibid.*, col. 2: "in fine questionis videbitur." *Idem.*, "et de hoc videbitur."

[3] BN 15126, fol. 39r; Ashburnham 210, fol. 21r, col. 2: Latin already quoted in note 14 of Chapter 25.

[4] *Idem.* For the Latin see note 1 of Chapter 26.

ing words a new titulus, "Here begin Quotlibeta annexed to the preceding question,"[5] which seems an excellent brief description of at least a part of what follows. Charles Jourdain, who was unacquainted with this Ashburnham manuscript and regarded this subsequent matter as merely a concluding portion of the treatise of 1370 against astrologers, criticized Meunier for accepting as separate treatises the following items of a table of contents in the other of our manuscripts, BN 15126:

> Utrum res future per astrologiam possint presciri
> Rationes et cause plurium mirabilium in natura
> Quodlibeta et diverse questiones
> Solutiones predictorum problematum.

Evidently the first item has reference to the treatise of 1370 against astrologers, and the last three to the supplementary matter annexed at its close. It also seems plain that Oresme himself and both our manuscripts regarded this additional matter as a supplementary treatise to that of 1370 rather than an integral part of it. A new numbering of chapters is instituted in it. It does, however, every now and then refer back to the preceding *questio* or treatise or to some one of its *notabilia*. In any case it will be convenient for our purposes to refer to the supplement by a distinct designation. It is primarily concerned with marvels and magic, as the treatise of 1370 was with astrology and divination. On the other hand, a number of its questions had already been raised in the preceding treatise of 1370. The title, *Quotlibeta,* admirably indicates its scholastic character and method—a discussion of miscellaneous problems and queries. It is a very voluminous treatise, nearly three times as long as the preceding treatise of 1370 against astrologers, although that, as we have seen, is sufficiently elaborate. It is rambling, miscellaneous, crudely written without style, repetitious, and at times decidedly mediocre, inferior in point, and less closely packed with ideas than the few chapters of the *De configuratione qualitatum* which we examined in the preceding chapter. It is more ambitious and inclusive, less convincing and incisive.

This supplementary matter in fact falls into three parts, as the

[5] Ashburnham 210, fol. 211r, col. 2: "Incipiunt quotlibeta annexa questioni premisse."

table of contents in BN 15126 suggested. Over a third of it, covering almost as many leaves as the entire preceding treatise of 1370, consists of four preliminary chapters dealing respectively with the senses of sight, hearing, touch and taste, and with the soul and its relations to the body.[6] The last faintly suggests the second part of *De fascinatione* but more in its general theme than in the detailed development thereof. This last chapter is the longest of the four. Some extraneous material is introduced into these chapters, notably a discussion of the possibility or impossibility of the generation of monsters in the chapter on touch and taste.

The second part, covering some dozen pages,[7] is a long list of questions or problems, proposed as it were in scholastic style for disputation and solution. Sometimes, especially towards the close of the list, a few words or lines of discussion accompany the problem. This enumeration of varied problems is in part a table of contents for the third part of this supplementary matter, which is the longest of all[8] and consists of a detailed discussion of the first forty-four problems in the long list which we have just described. The rest remain undiscussed except for the few lines accompanying their statement—in certain cases—to which we have referred. This partial treatment was intentional, however, as an Apology (*Excusatio*)[9] of the author makes evident. In it he further apologizes for not having discussed the forty-four in more exhaustive scholastic fashion with full notice of all possible arguments to the contrary, his object being, he says, merely to suggest an explanation and natural cause. It is the problems of this second and third part which more especially fit the designation of *Quotlibeta*, applied in the Ashburnham manuscript to the whole of the supplementary material or treatise—

[6] In Ashburnham 210 the titles of these chapters are worded as follows and occupy the space indicated: fol. 21v, col. 1, Capitulum primum de causis mirabilium circa visum contingentium; fol. 23r, col. 2, Capitulum 2m de hiis que apparent mirabilia circa sonum ad auditum; fol. 25r, col. 2, Capitulum 3m de mirabilibus que tactui et gustui accidunt et de causis; fol. 31v, col. 2, Capitulum quartum de mirabilibus circa operationes anime et corporis contingentibus. This fourth chapter ends at the top of fol. 39r, col. 1.

[7] In Ashburnham 210, fols. 39r-44v.

[8] *Ibid.*, fols. 44v-70v.

[9] *Ibid.*, fol. 44v, col. 2.

a designation which we shall also use here because of its brevity and convenience. The logical order of the three parts is not quite that of their occurrence in the manuscripts. After the four chapters come the forty-four problems with their discussion, while last belong the other questions and problems which are not much more than broached or stated. There is a good deal of repetition or sameness between the three parts, and the *Quotlibeta* as a whole are in large part devoted to airing more fully ideas already briefly expressed in the preceding treatise of 1370.

In opening the supplementary treatise Oresme states that to assign the particular causes of particular effects is very difficult unless one has examined those effects and their circumstances in individual detail, just as no physician can properly prescribe for a particular patient without seeing him. He gives the impression that he himself will simply declare the workings of nature in general, just as medical writers merely give general rules and leave their particular application to practising physicians.[10] But perhaps this limitation applies only to the four preliminary chapters, since at their close Oresme remarks: "But problems about this and the previous matters, as it were recapitulating and applying *notabilia* to questions, will be more succinctly treated below, stating and solving them particularly."[11] The promise of more succinct treatment is, however, hardly realized in the case of the forty-four which are discussed.

The four preliminary chapters involve some interesting scientific opinions of the times when Oresme wrote. In many cases we find him clinging to notions which have since been abandoned, but in other cases tentatively suggesting a view which has since come to prevail. These views are also important for us to have in mind as a background of Oresme's attempt to reduce the marvelous to a natural basis and as a standard by which to measure the extent and value of his accomplishment. To him

[10] To give the context of these remarks and also the full opening of the *Quotlibeta* I reproduce its first two paragraphs in Appendix 26.

[11] *Ibid.*, fol. 38v, col. 2: "Sed de hoc et etiam de predictis quasi recapitulando et notabilia questionibus applicando magis succincte inferius tangentur probleumata (fol. 39r) particulariter ponendo et solvendo."

they seemed to have a direct bearing upon his discussion of the marvelous except in a few cases where he admits digression or irrelevancy.

In regard to vision Oresme follows Alhazen and Witelo, who were as advanced and correct authorities in optics as could then be found, although dating respectively from about 1000 A.D. and the thirteenth century. Oresme suggests that sound may be nothing but motion "and so perceived by hearing. This, however, is difficult to sustain and not relevant to the point at issue."[12] But he holds that sound is perceived with motion and is not perceived without motion. It carries a long distance by many ways and is heard after its source has ceased to exist. This last point, with the illustration of the ringing which continues after the bell breaks, was a favorite with Oresme and oft repeated.[13] He held that some intermediate agent was necessary to complete any action, just as in the arts gold and silver cannot be joined without some softer metal, and that in sensation the *species* of objects were the intermediary between sense and the thing sensed but required some coagent such as light in the case of vision and motion in hearing. In touch this coagent would be the operation of the first qualities—hot, cold, moist, and dry—which they make of themselves.[14]

All sensation requires time,[15] and is accomplished *per speciem*.[16] Oresme would go farther and account for voluntary

[12] Ashburnham 210, fol. 23v, col. 1, ". . . et forte quod sonus non est nisi motus sic factus et sic perceptus ab auditu. Hoc tamen sustinere est difficile et non est ad propositum."

[13] See, for example, fol. 35r, col. 1. Also, among the supplementary problems, fol. 40r, col. 2: "Propter quid sonus campane vel alterius auditur quamvis campana esset corrupta post percussionem."

[14] Ashburnham 210, fol. 26r, col. 2: "Et nota hoc 10° quod in omni actione antequam possit compleri et passum perfecte agente assimulari requiritur semper quasi ad medium coadiuvans quod nec est simile simpliciter agenti nec etiam passo. . . . Et ita species sunt medie inter sensum et sensibile. Et adhuc requiritur aliquid coagens ut in visione lux aut lumen, in auditione motus, in tactu requiritur operatio quam faciunt de se prime qualitates."

[15] *Ibid.*, fol. 26r, col. 1, "8° nota quod nulla sensatio fit subito ymo nec intuitio ut superius dixi sed requiritur tempus."

[16] *Ibid.*, fol. 26v, col. 1, "Et suppono hic quod omnis sensatio sive in visu sive in tactu sive in tactu (gustu?) vel etc. fiat per speciem, quamvis quidam de tactu et gustu dicit oppositum."

and habitual motor activity as based on the guidance of *species,* since shape and position are impressed on sense just as they appear in a mirror, and movement too appears there.

Galen says that the members of the human body make their own natural operations without learning, that whatever you think your tongue straightway knows how to express, and I express the same thing in the same way, and yet I don't know how you move your tongue nor do you know how I move mine, nor do I myself know how I move mine.

But Oresme believes that *species,* in a way similar to memory, shapes the tongue and moves it. Sometimes, however, it fails, as is shown especially in infants "who have the *species* of things well" but need practice to form words properly.[17] To this theory some may object that there ought to be only one language, since the species are the same for different persons. This, however, Oresme denies, for as different mirrors do not reflect the same object identically, so difference of persons and of instrument such as the tongue, and also use and custom, create and accentuate differences. Frenchmen and Germans form the letters of the alphabet in about the same way but do not put them together similarly.

This insistence on the force of use and custom is oft recurrent through the *Quotlibeta.* As for the problem of language, one of the additional *Quotlibeta* discusses briefly whether two boys brought up without hearing any language would develop an idiom of their own in which to communicate with each other.[18]

The continued and permanent existence of species in the soul or mind, however, is rather vigorously questioned in the later

[17] *Ibid.,* fol. 27r, col. 1: "Ideo dicit Galen quod membra faciunt suas operationes naturales sine doctrina, quidquid igitur cogitas statim tua lingua scit exprimere et illud idem exprimam et eodem modo, et tamen nescio quomodo moves linguam tuam nec tu scis quomodo ego meam, ymo egomet nescio quomodo moveo meam. Sed dico, ut dictum est in primo capitulo et in isto in 10 notabili, et hoc ponit Wytelo in 3a propositione, quod species rei in sensu representatur cum figura et situ sicud est in re. Patet hoc in speculo, ymo et motus ibi apparet etc. Sicud igitur quodammodo est memoria ita simili modo figurat linguam et movet illam species. Tamen quandoque deficit et homo nescit exprimere nec etc. Et patet precipue in infantibus qui bene habent species rerum sed nec per longum usum sciunt nec possunt formare etc."

[18] *Ibid.,* fol. 42v, col. 2.

Quotlibeta, although it is granted that all authors assume their existence there. But it is objected that they do not remain thus in a mirror or medium, and that their preservation in the soul or its organ would be strange when humors and spirits are being constantly generated anew. To preserve species of sound in the soul together with those of other objects of the five senses would, in Oresme's opinion, result in confusion, and they would be almost infinite in number. This difficulty is, however, solved by the suggestion that the soul or mind does not contain so many species as it perceives objects or parts thereof, but only a few such as whiteness and magnitude from which it compounds particular objects as we make all words from a score of letters. But Oresme seems to think that we may go farther and not put any species in the soul, just as the hand performs many different operations without having in itself as many distinct virtues.[19]

Oresme holds the common ancient and medieval hypothesis of the spirits or *spiritus,* conceived as a very subtle fluid in the body. When we experience the emotions of fear and sadness, the blood and *spiritus* leave the members and return to or towards the heart.[20] Of the senses sight is the most spiritual, then hearing, then smell, then touch and taste.[21] And as some swords are more flexible than others, so the *spiritus* of different men differs.[22] The finest variety of *spiritus* acts as a sort of medium between soul and body, and is readily moved to receive species. Avicenna in *De viribus cordis* describes it as a luminous substance, and it varies in quantity and quality and substance. In some men it is abundant, in others scanty. In some it is more luminous than in others. In some it is gross and in others finely tempered.[23]

[19] *Ibid.,* fol. 42r, col. 2-fol. 42v, col. 1. I have, as elsewhere, made a selection from the arguments and somewhat altered their order. The full Latin text of the passage is given in Appendix 26.

[20] Ashburnham 210, fol. 38r, col. 2.

[21] *Ibid.,* fol. 25v, col. 1.

[22] *Ibid.,* fol. 37v, col. 1.

[23] *Ibid.,* fol. 36v, col. 2: "et de spiritu predicto dicit Avicenna in de viribus cordis quod est substantia luminosa et ideo anima gaudet in lumine et tristatur in tenebris. Iste spiritus est quasi medium inter animam et corpus seu inter lucem et corpus et de facili movetur undique pro receptione specierum. Et iste spiritus diversificatur in quantitate et qualitate et substantia ut ibidem declarat Avicenna quod in aliquibus est multus et in quibusdam paucus. In quibusdam luminosus multum et in quibusdam modicum. In quibusdam est temperatus et in quibusdam excedit in grossitie . . ." etc.

To light, indeed, Oresme was inclined to ascribe primal importance in the world of nature. It seemed to him that light and darkness had a better claim to be regarded as first qualities than heat and cold.[24] In another passage he raised the question whether light and local motion were not prior to the four commonly received first qualities. "For you see that motion causes heat and light causes heat."[25] Aristotle in the last chapter of *De motibus animalium* had reduced the motion of the heart to heat and cold, but Oresme suggests that there may be something beyond that and more ultimate, namely, light or species and rarity or density.[26] In this connection, as Aristotle had reduced everything to heat and cold, so Oresme would ascribe such emotions or passions as boldness, hope, love, and desire, to light; and fear, avarice, hate and pusillanimity, to darkness.[27] Nor did he seem to see any objection from the standpoint of Christian theology and orthodoxy to the theory which would reduce all passions to anxiety or delectation and connect these respectively with the systole and diastole of the heart.[28] Again in the *Quotlibeta* Oresme discussed the question whether hot and cold, wet and dry, were really first qualities.[29]

One long *Quodlibet*[30] is devoted to discussion of such favorite topics of the fourteenth century as latitude, intension and remission, maximum and minimum. We are assured that this "is a

[24] Ashburnham 210, fol. 37v, col. 1: "Tamen videtur mihi pro nunc quod lux et tenebra si debeant dici qualitates sunt prime (*priores?*) quam calor et frigiditas, unde omnes motus animalis in quantum animal tamquam ad ultimum habent reduci ad ista duo etc. Et calor et raritas et que inde sequitur habent reduci ad lucem, ut audacia spes amor desiderium, et ad tenebram habent reduci frigus densitas et que inde sequuntur ut timor avaritia odium pusillanimitas."

[25] *Ibid.*, fol. 25v, col. 2: "Utrum autem motus localis sit prior et principalior quam qualitates prime active scilicet calor et frigus vel econtra et quis eorum est causa alterius et si sit aliqua qualitas prior quam iste prime qualitates scilicet lux vel etc., vel utrum istarum primarum qualitatum sit aliqua alia prior et generativa ipsarum. Nam video quod motus causat calorem et lux calorem. . . ."

The last thought is repeated at greater length at fol. 36v, col. 1.

[26] *Ibid.*, fol. 37v, col. 1: "Tamen intellige quod forte aliquid est ulterius vel magis ultimum scilicet lux vel species et etiam raritas aut densitas."

[27] See note 24 above.

[28] *Ibid.*, fol. 38r, col. 1.

[29] Ashburnham 210, fol. 54r, col. 2-fol. 54v, col. 2.

[30] Numbered 28 and extending in Ashburnham 210 from fol. 60v, col. 2 to fol. 62r, col. 2.

beautiful speculation,"[31] but also one of much difficulty, in which Oresme ventures to reach no decision but only to make some suggestions. It is, however, accepted as a fact that "between maximum and minimum both in quantity and in duration there is greater latitude in one species than in another,"[32] greater in men, for example, than in hares. We are also told that a knowledge of intension and remission is necessary to solve such problems as why "such a weight in such a space descends with so great a velocity and another weight with another velocity."[33]

The new fourteenth century doctrine of impetus, which had modified the traditional Aristotelian physics and which Duhem has credited to Jean Buridan, is accepted by Oresme, who would extend it further to the field of psychology as well as dynamics. He says:

> Just as you see a hammer rebound upward from an anvil several times of itself and then come to rest in the middle, when according to Aristotle to descend and ascend is contrary to true motion, but it did this by an impetus acquired from the striker and from natural gravity, so too in movements and powers of the soul there are sometimes produced at the start impetuses and dispositions which have great effect.[34]

The same problem is considered in one of the later *Quotlibeta*, where the illustration is altered to a javelin rebounding as it strikes the ground.[35]

While Oresme in the *Quotlibeta* cites the works of Aristotle more frequently than those of any other author, and particularly the *Problems*, which had not been translated into Latin until the end of the thirteenth century by Peter of Abano, it is interesting

[31] *Ibid.*, fol. 61v, col. 1.

[32] *Ibid.*, fol. 61v, col. 2: "Et potest etiam forte reddi ratio aliqualis quare inter maximum et minimum tam in quantitate quam in durationе est maior latitudo in una specie quam in alia."

[33] *Ibid.*, fol. 61r, col. 2: ". . . sicut querere quare tanta vel talis gravitas in tali spatio tanta velocitate descendit et alia gravitas alia velocitate."

[34] Ashburnham 210, fol. 38v, col. 1: "Sicut autem vides martellum super incudinem resilire superius pluries per se et tum in medio quiescit secundum Aristotelem cum sint motus veri contrarii descendere et ascendere sed hoc fit ab impetu acquisito a percutiente et a naturali gravitate etc. Sic etiam in motibus anime et potentiis fiunt quandoque quidem impetus et dispositiones in principio que prius faciunt ad multa."

[35] *Ibid.*, fol. 43r, col. 1.

to note that he appears to have had some acquaintance with Plato beyond what might be obtained from Chalcidius's commentary on the *Timaeus*. He cites either the *Phaedrus* or the *Phaedo,* which last we know to have been translated from the Greek in Sicily with the *Meno* about 1156, that the intellect from its creation contains all species of knowable things, so that learning is merely a remembering and removing of corporeal obstacles.[36] Since this doctrine is found in the *Phaedo* rather than the *Phaedrus,* it would seem that the *fedrone* of our manuscript must refer to the former work and that Oresme may have been acquainted with the twelfth century translation of it. But perhaps this citation is taken second hand from the commentator on Aristotle's *De anima*. In the *Prior Analytics* Aristotle refers to the doctrine but quotes the *Meno*.

In devoting chapters to the senses a leading object of Oresme is to demonstrate their deceptibility and the almost infinite possibilities for error which they present. Moreover, nothing is perceived directly or solely by the senses,[37] but interior virtue must cooperate and human judgment, which is often at fault, be exercised in perception. Such things as distance, an unsatisfactory medium, or indisposition of the eye may so affect vision, for example, that a beholder will judge another man to be an ass or a bird.[38] Color varies with position; sound, with diversity of figure, with the shape and hardness or softness of the sounding body.[39] Hearing may be deceived by error of the interior virtue judging badly, by bad condition of the organ of hearing, or by reason of the medium and coagents or concurrents to hearing which are many.[40] This fourteenth century attitude to the testi-

[36] Ashburnham 210, fol. 32r, col. 1: "2° nota quod secundum platonem in fedrone et ipsum sequentes ponentem memoriam esse in intellectu et in ipsa ab initio sue creationis esse omnes species rerum cognoscibilium ita quod addiscere necessarium non est nisi rememorari et obstaculum corporeum quoddam removeri. . . ."

[37] Ashburnham 210, fol. 26r, col. 1.

[38] *Ibid.*, fol. 22v, col. 1: "Dico igitur quod sicud propter longitudinem spatii aut indispositionem medii aut oculi aut propter debilitatem iudicative homo quandoque iudicat quod homo sit asinus aut avis."

[39] *Ibid.*, fol. 23v, col. 1.

[40] *Ibid.*, fol. 23v, col. 2: "5° nota quod in auditione cadit error ratione virtutis interioris male iudicantis, 2° ratione organi male dispositi, 3° ratione medii et coagentium seu concurrentium ad auditionem que sunt multa."

mony of the senses may well be compared or contrasted with that of such later philosophers as Hobbes, Locke, and Berkeley.

Human judgment, or the response of the brain to sensation, and even the very organs of sense, are apt to be adversely affected by inordinate humors or fumes which rise in or to the head, causing a ringing in the ears or making men think that they hear other sounds. An extreme case of the bad effect of such vapors is seen in the delusions of those afflicted with melancholy.[41] The power of imagination and fear is also great. Oresme saw a noble who, he believed, fell sick and finally died because he had been told by the people that they had seen a dragon fall from the heavens and that this signified the death of a prince.[42]

Again the senses have so many things to observe—magnitude, position, mass, shape, continuity or separation, number, motion, rest, sharpness, lightness, transparency, density, shadow, obscurity, beauty, deformity, resemblance and difference—that there is plenty of opportunity for diversity and error.[43] Thus Oresme recognized the negative results of the lack of modern scientific laboratories, instruments, and measurement, if he did not advocate them as positive remedy for such ills. Such deceptibility of the senses and errors of human judgment serve to explain a large percentage of so-called marvels which are mistakenly attributed to God, demons, magic, or the stars.

Moreover, men too readily make exaggerated statements or receive them with credulity. In one of the later *Quotlibeta* Oresme wonders why men often believe what is strange, marvelous, and impossible, while they are unwilling to accept what is possible and true. They would sooner believe that at Rome there is a tree or stone which speaks, or that a silly woman can foretell the future, than that a certain medicine is efficacious for such a disease or that what a professor says is true.[44] Even many

[41] For the effects of fumes, humors, melancholy, etc., a rather favorite point with Oresme, see Ashburnham 210, fols. 22v, col. 1; 24r, col. 2.

[42] *Ibid.*, fol. 25r, col. 2.

[43] *Ibid.*, fol. 24r, col. 1.

[44] Ashburnham 210, fol. 42r, col. 1: "Propter quid homines sepe credunt impossibilia et mirabilia et extranea et tamen possibilia et vera nolunt credere. Citius autem credent cras multi quod Rome est arbor aut lapis qui loquitur aut quod est fatua mulier que omnia futura predicit etc. quam quod talis medicina iuvet talem etc., aut quod talis magister dicat verum de etc."

holy men have been over credulous and also many theologians who are not conversant with immediate and natural causes.[45] This thought that clergy and educated persons as well as laity and the uneducated are over credulous is one which Oresme expressed frequently.[46] In another passage he notes that when you press them to give the reasons for their belief in some marvel, they can give no more satisfactory reply than a simple woman would.[47] In a third passage he states that "you would find many clerics and many other able men who would swear to you that they had themselves experienced certain things which are nevertheless pure lies, such as geomancy or the perilous days put in the calendars."[48] "Nay more, in practical and legal matters many simple men often have better judgment than good clerics."[49] To the same effect is a later *Quodlibet* which asks why persons good at speculation are bad at practice and vice versa, although the speculative intellect is superior to the practical and nothing can be practiced without previous knowledge.[50]

Men also tend to represent themselves as having seen what they as a matter of fact only heard, and that long ago. Oresme knew a man, who was able in many respects, who swore that he had seen a juggler in a certain square cut off his attendant's head and cause it to enter his horse where it sometimes appeared in the

[45] Ashburnham 210, fol. 31r, col. 2: ". . . et ideo rara fides ideo quia multi multa loquuntur, unde et multi sancti homines nimis faciliter multa potuerunt credere ymo etiam adhuc multi theologi non vacantes circa causas immediatas et naturales sepe credunt nimis cito et deluduntur a multis non advertentes quod dicitur in Evangelio, Estote prudentes sicut serpentes. . . ."

[46] Among his later problems we find: Ashburnham 210, fol. 42v, col. 1, "Propter quid quandoque boni et magni clerici credunt et assentiunt aliquibus falsis et peius iudicant de aliquibus quam multi simplices vel minus subtiles." See also at fol. 42r, col. 1, the Quodlibet opening, "Quibus hominibus est credendum. . . ."

[47] *Ibid.*, fol. 45r, col. 2: "Et in hoc non solum decipitur vulgus simplex ymo et clerici magni qui sepe dicunt hoc est notorium. Et tamen si queras quomodo scitis hoc, ipsi non plus respondebunt quam simplex mulier."

[48] *Ibid.*, fol. 66r, col. 2: "Dico 4° multos clericos et multos alios valentes invenires qui tibi iurarent se fuisse expertos aliqua que tamen sunt pura mendacia sicud de geomantia, sicud de diebus positis in kalendario periculosis. . . ." Other examples follow.

[49] *Ibid.*, fol. 45v, col. 1: "ymo et in multis practicis et legibus etc., sepe melius iudicant multi simplices quam boni clerici." See also fol. 45r, col. 2: "multos vidi clericos et magis (*sic*) nominis qui frivola crediderunt."

[50] *Ibid.*, fol. 42r, col. 2.

horse's mouth, and that he also saw him throw a rope up into the air and his wife and servant climb up the same. "And when I asked him at what age he had seen this, he said that it was in childhood." Oresme thereupon concluded that he had merely heard it and had later come actually to believe it, but was lying in stating that he had seen it. "And he himself as much as confessed this."[51]

This reference to the supposed magic feat of rope-climbing is very interesting because it exactly parallels the modern situation, which is that this feat is generally regarded as an accomplishment or illusion of magicians in India, whereas they are quite unacquainted with it. The spread of the legend has been supposed to go back to the work of an eighteenth century traveler who asserted that the feat was performed by magicians in China, not India. But we now learn from Oresme that the tradition is much older in Europe itself.

As Roger Bacon had descanted on the causes of human error in order to justify his divergence from the views of the multitude or *vulgus,* so Oresme opposes the notion that common report is proof of a thing or a criterion of truth. He has questioned over a hundred persons who affirmed the truth of a certain thing and not found one of them who was an eyewitness.[52]

Oresme further develops his standards of credibility as follows. In a matter which seems contrary to reason no one man

[51] *Ibid.,* fol. 45r, col. 2: "Vidi enim valentem hominem in multis qui iuravit michi quod audierat (but the context evidently calls for *viderat*) ioculatorem in platea quadam qui absciderat capud famuli et post intravit equum suum et quandoque apparebat in ore equi et quandoque in culo. et vidit etiam quod superius in aere proiecit filum quod postea uxor et famulus ascenderunt. et cum interrogassem eum qua etate hoc vidisset, dicit quod in infantea. Tunc conclusi quod hoc audierat scilicet talis est in tali platea qui sic fecit, cui adhesit postea et firmavit in mente sua quod ita fuit. Et breviter tum bene vidi quod mentiretur ymo et ipse quasi confessus hoc fuerit."

[52] *Ibid.,* fol. 45r, cols. 1-2: "Pro responsione in oppositum, scilicet de fama quod ita sit, nota unum diligenter quod de vulgo multa audivi dicente esse vera et communia apud omnes ita quod quasi non audebam dicere oppositum. Et tamen quesivi ulterius, Vidistine? Dixit, Non. Et hoc (col. 2) a multis plusquam 100, et tamen neminem inveni qui diceret se vidisse actum; quilibet affirmavit quod esset verum et notatum apud omnes. Vide quam mirabile tu credis sine dubio aliquo quod numquam vidisti nec audisti sub aliquo qui vidisset."

should be trusted, but there should be many witnesses and many instances. Even if Oresme had seen such an event, he would not believe his own senses, but would think that they had somehow been deceived. If, however, there were three or four philosophers or men of good natural sense who did not easily believe everything they heard and who testified that they had heard it several times, if it was a matter of words, or had seen it several times, if it was a matter of eyesight, and averred that they had investigated it diligently and a number of times, even then he would hesitate a little, if it was against reason and the common course of nature; but if not, he would trust them implicitly.[53]

Oresme has treated of this subject at such length because he is convinced that this excessive credulity is and has been fatal to natural philosophy, and also in matters of Faith makes and will make great dangers, and will be the cause of the reception of antichrist and the introduction of a new religion.[54]

Another reason for the general belief in marvels, upon which Oresme dwells a good deal, is that we are impressed by certain events and infer an unwarranted causal connection between them, or are astounded at what is mere chance coincidence, or confuse sequence with causation.[55] Oresme also endeavors to belittle certain happenings, which are commonly regarded as miracles or marvels and ascribed to supernatural or preternatural forces, by demonstrating that there are plenty of other natural

[53] *Ibid.*, fol. 45r, col. 2: "Si autem 3 aut 4 bonos philosophos aut boni sensus naturalis qui de facili non quibuscumque auditis credentur ego viderem et audirem referre aliquid et se pluries illud audivisse, si esset de verbis, aut vidisse, si esset de visibili, et super tali se diligenter inquisivisse et pluries, tunc aliqualiter hesitarem si esset contra rationem et communem cursum nature, et si non, tunc eis simpliciter crederem. Unde dico quod de re que est contra rationem sicud illa de qua est sermo et de simili nulli homini est simpliciter credendum, ymmo oportet quod sint plures et pluries, unde si egomet viderem, non propter hoc crederem sed dicerem me in sensu deceptum."

Oresme expresses the same thought in the second Quodlibet on incantations: fol. 46r, col. 1. "Si viderem plures philosophos mee opinionis quibus talia pluries apparent et fuissent facta ipsis invitis, tunc inciperem hesitare et causas aliquas investigare."

[54] *Ibid.*, fol. 45v, col. 1: "Istam autem consequentiam ita prolixe deduco quia videtur mihi quod faciliter credere est et fuit causa destructionis philosophie naturalis, et etiam in fide facit et faciet magna pericula et erit causa recipiendi antichristum et introductionis nove legis."

[55] *Ibid.*, fol. 30r, col. 1-fol. 30v, col. 2.

phenomena which are equally marvelous and difficult to explain.

Take the matter of individual idiosyncrasies. Why is it that some persons cannot drink wine, while others cannot eat fat?[56] Some are almost never hungry and Oresme, who himself seems over-credulous on this point, affirms that some have gone for twenty years without food or drink. Roger Bacon in the previous century, however, had made a like assertion, affirming that a woman of Norwich had lived in the best of health for twenty years without food.[57] Oresme perhaps had derived the idea from Bacon, but does not cite him for it. Oresme does not, like Bacon, explain the phenomenon on astrological grounds, but suggests that it is possible, if the pores are closed, and the bodily heat is not sufficient to dissolve the solid members and gross and humid ones, but is just enough about the heart, veins, and nerves to generate the spirits by which life is maintained, and if the humors are properly disposed so as not to suffocate this heat.[58] But why is it that Sor has gout in one foot rather than the other? Why does Sor die of fever and Plato recover? Why must you try ten times before you hit the mark on the wall with a missile?[59] How is it that I can decide to wake at a certain hour and do so?[60] Moreover, that a man can fast for a long time is no more marvelous than that he needs to eat every day.[61] In the later *Quodlibeta*

[56] *Ibid.*, fol. 27v, col. 1: "Hec enim non sunt mirabilia. Ymo mirabile esset si omnes idem appeterent cum non habeant eandem complexionem organorum et instrumentorum ad hoc requisitorum." The same question is raised in a later Quodlibet, fol. 40v, col. 1: "Propter quid quidam non possunt gustare vinum per totam vitam. Et quidam usque ad tempus et prius etc. Et idem de diversis cibis et tamen videntur sani homines."

[57] *Opus minus*, ed. Brewer, 1859, pp. 373-374.

[58] Ashburnham 210, fol. 27v, col. 1: "Dico 4° quod per idem potest responderi ad hoc quod aliqui quasi numquam famescunt et aliqui facilime et aliqui sepe sitiunt et non famescunt etc. qui autem per 20 annos non comedunt nec bibunt etc. hoc est mirabilius, dico tamen quod possibile est quod numquam famescunt et hoc patet quasi de multis. dico 2° quod si pori sint clausi in talibus ita quod quasi nichil resolvatur ab eis et calor sit modicus in comparatione ad membra solida et etiam grossa et humida ita quod illa non resolvit tamen (cum?) est fortis et sufficiens circa cor et venas et nervos pro sola generatione spirituum per quos stat vita et humores sunt sic dispositi in viis et instrumentis quod non suffocant illum calorem nec extinguatur secundariis causis concurrentibus, tunc casus esset possibilis."

[59] *Ibid.*, fol. 28r, col. 1.

[60] *Ibid.*, fol. 30v, col. 1.

[61] *Ibid.*, fol. 28r, col. 2: "Quod autem homo diu potest ieiunare non est mirabilius quam quod qualibet die oportet eum comedere."

among problems dealing with nutrition the question of human capacity for prolonged fasting is put in somewhat more modest form, the time limit having been reduced from twenty to "two or more years."[62]

The subject of monsters, monstrosities and monstrous births is discussed at considerable length by Oresme in these chapters. It is his opinion that it is easier to produce an element than a perfect compound, easier to produce a perfect compound than a living being, easier to produce a simple living being than a brute, and easier to produce a brute than a human being.[63] He doubts if monsters of different species from the parent are ever generated.[64] Later he questions the Isidorian etymology that monsters are so called because they show something[65]—i.e., of the future. Five of the forty-four problems discussed at length have to do with generation and the permanence of species,[66] and several of the additional questions inquire rather over-curiously into the mysteries of generation and the possibility of monstrous births.[67] It is denied that, if a sow bore a dog, this would be caused by the constellations. As in the third chapter the question was discussed whether a human foetus ever really was a dog or pig rather than merely resembled another species in certain respects and accidents, so in the twenty-fourth *Quodlibet* we are confronted with the converse problem, suggested by the magical *Liber vacce,* a spurious work ascribed to Plato, whether a human being or perfect animal can be produced by other than human agency.

Another reason why certain things seem marvelous to most men is that men differ so in ability and skill that some men appear incomprehensible prodigies to others. There are many kinds of men, and one is good at one thing and useless at another, as we see in the arts and crafts.[68] Some display a marvelous

[62] *Ibid.*, fol. 40v, col. 2: "Utrum homo per 2 aut plures annos possit vivere absque nutrimento ab extrinseco."

[63] *Ibid.*, fol. 28r, col. 2.

[64] *Ibid.*, fol. 28v, col. 1, and the discussion of monsters continues through fol. 29v.

[65] *Ibid.*, fol. 31r, col. 1: "monstrant aliquid."

[66] See numbers 14, 17, 18, 20, 24.

[67] *Ibid.*, fol. 41r, cols. 1-2, "Circa generativam virtutem et plasmativam."

[68] Ashburnham 210, fol. 32r, col. 2: "Et ideo qui bene concedat quot modis

power of learning and making intellectual progress, like a grammar school boy who from a few principles in the first book of Euclid solved various problems which Oresme put to him. Such a mind might well penetrate secrets of the past or future.[69] Others have some highly specialized skill like those who can infallibly detect false coins but cannot tell just how they do it or what particular thing gives them their clue. The question of specialized skill is again raised in a later *Quodlibet* which asks why those who devote themselves to a single art or science, manual or otherwise, attain a greater perfection than those occupying themselves with several, although it would seem that one art or science should aid another.[70] And in general men of genius seem marvelous to the rude and uneducated. One therefore should not be surprised if certain men see more or comprehend more than oneself, nor should one attribute their superior ability to demon aid or to some unknown influence.[71]

Even the same individual feels his intellectual powers ten times as great one day as another, and sometimes exceeds his normal self. Some persons have a quicker and keener sense of touch when sick or wounded than when in good health.[72] So madmen have

causatur diversitas non debet mirari quomodo homines fiant dissimiles et quomodo unus est aptus ad unum et rudis ad aliud et ita de aliis artibus et artificiis."

[69] *Ibid.*, fol. 34r, col. 1: "Unde aliquem vidi solum grammaticum sed ex paucis principiis primi euclidis ipse sciebat invenire mirabiliter, et conclusiones quas sibi proponebam inveniebat et reducebat ad principia mirabiliter. . . . Ex predictis potest concludi et apparere quod non est impossibile quod unus homo mirabilia sciat et inveniat tam de preteritis quam de futuris. . . ." The word *grammaticus* too often is translated, in the letters of Petrarch or elsewhere, by the high-sounding English equivalent, "grammarian," suggesting a specialist in classical philology. The use of the word in the above quotation confirms an impression which I have long had from other passages, that the word may indicate a person who has advanced in his studies no farther than grammar and cannot be termed an "artist" or university student until he has taken courses in the other six liberal arts: *solum grammaticum*, only a grammar-school boy.

[70] *Ibid.*, fol. 42r, col. 2: "Propter quid vacantes circa unam scientiam aut artem tam manuale quam aliam sunt perfectiores quam vacantes circa plures cum tamen una debet perficere aliam vel iuvare videtur."

[71] *Ibid.*, fol. 34v, col. 2: "Non igitur mirere si sint aliqui qui plus videant aut intelligant quam tu, nec propter hoc curre ad demones aut influentiam ignotam."

[72] *Ibid.*, fol. 40v, col. 1: "Propter quid quidam infirmi et vulnerati . . . et quidam alii sentiunt citius et melius

unusual physical strength, and those afflicted with ophthalmia see more clearly for a time than they did before. And in intellectual capacities and their organs, just as in other powers, there are many marvelous proportions and possibilities which are known to God alone.[73] Here we see Oresme touching on his doctrine of the importance of proportion, consonance, commensurability, or configuration. Sometimes one develops a mysterious liking for this or that food or drink which one cannot explain, but when a physician accounts for it, his success is ascribed to his medical knowledge, and he is not reckoned forthwith a prophet or invoker of demons.[74]

This discussion of the differences between different men and the diversities in the same individual occurs in the fourth chapter of the *Quotlibeta* in which Oresme discusses the soul and its relation to the body. It opens with the statement that concerning the workings of the soul and those of the soul and body together there are "some errors and marvelous diversities, more numerous and greater than those concerning the workings of the body." Their nature and modes are not generally understood but will be revealed to Oresme's readers.[75] It is not his intention now, however, to discuss such difficult problems as whether there are two souls in man, the one material, the other immortal; whether in the immaterial intelligence, will, reason, and memory are distinguished and how; and whether there is the same memory for the intellectual and the sensitive soul, supposing that

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quam ipsi sani existentes cum tamen tactus stet in debita proportione humorum (col. 2) et certa proportione." See also a *Quodlibet* at fol. 41v, col. 2: "Utrum sit aliqua infirmitas reddens organum fortius quam quando est sanum;" and at fol. 42r, col. 1, "Utrum sunt alique egritudines in quibus anima minus impediatur quam extra illas."

[73] *Ibid.*, fol. 32v, col. 2: "Etiam videmus quod aliqui frenetici fiunt fortiores et velociores in decuplo quam erant ante frenesim. . . . sicud patiens obtalmiam clarius pro hora videt quam ante. . . . Sunt autem in predictis potentiis cognoscitivis et earum organis multe diversitates et proportiones mirabiles quas solus Deus novit sicud et in aliis potentiis."

[74] *Ibid.*, fol. 33r, col. 1.

[75] *Ibid.*, fol. 31v, col. 2: "Circa operationes anime seu operationes ex parte anime et etiam anime et corporis simul cadunt aliqui errores et diversitates mirabiles multo plures et maiores quam circa operationes corporis quarum esse et modi multum sunt ignoti que etiam quoniam satis faciliter patefient volentibus advertere hiis que hic notabuntur."

these are distinct. These questions are sufficiently treated in other books, whether commentaries on the *De anima* of Aristotle, "or those on the first book of the *Sentences* by our masters treating of the image of the most holy Trinity."[76] Later on Oresme states that whether or no there are several distinct faculties or powers in the soul such as fantasy, memory, and common sense are not matters of present concern to him,[77] but in fact he regularly assumes their existence, remarking in the very next column, for instance, that species are distinct and not mixed in the organ of memory and also in common sense.[78] He says much of unconscious action and habit-forming which we shall pass over. So long as the soul remains in the body, he holds that it can do nothing intellectually or sensitively without the bodily organs, and when it is separated from the body, he believes that it is not a simple or absolute being like God, but still has some accidental properties or dispositions which are capable of intension and remission[79]—another reference to that favorite theory of the fourteenth and fifteenth centuries.

In this chapter on the soul and its relation to the body it is the discussion of the question whether the soul can produce effects in external objects which has most bearing upon the possibility of working magic. Some discussion along this line has already occurred in the preceding chapters. Oresme is ready to attribute not a little to the power of imagination and of mental concentration. He believes that in animals not only are the operations of the senses altered thereby but also the workings of the first qualities and their sequels. Thus we see a man warmed by joy or wrath or chilled by fear.[80] On the other hand, by being

[76] *Idem.*, ". . . quia quedam istorum super librum de anima tractantur sufficienter et quedam super librum primum Sententiarum a magistris nostris de ymagine sanctissime trinitatis tractantibus." Who his masters were he does not state.

[77] *Ibid.*, fol. 33r, cols. 1-2.

[78] *Ibid.*, fol. 33r, col. 2.

[79] *Ibid.*, fol. 36v, col. 1: "Quando autem est separata credo quod non sit simplex ut deus ymo aliquas dispositiones accidentales habet qui possunt intendi et remitti."

[80] *Ibid.*, fol. 26v, col. 2: "Unum tamen dico quod in animalibus operationes sensuum non solum mutantur propter ymaginationem et forte(m) cogitationem, ymo etiam operationes primarum qualitatum et earum sequentium unde ex gaudio videmus hominem califieri et ex ira, ex timore vero frigefieri. Ex ymaginatione rei etiam appetitus mutatur."

strongly intent on something else, a man may not immediately notice when a finger or arm is cut off.[81] Oresme readily admits the influence of the imagination upon its own body[82] and also conversely the influence of the body upon the imagination.[83] Women have other images than men because they are of a different physical constitution (*complexio*).[84] He is willing to go further and entertain the possibility of thought transference from one mind to another by way of *species* and *spiritus*,[85] or through strong fear and desire.[86] But he repeatedly rejects the famous contention and *locus classicus* of Avicenna in the *Sextus Naturalium*, fourth *Particula*, that the virtue of the imagination can move an exterior object such as a stone or camel.[87] Even the species by which thought transference may be effected cannot produce local motion in a distant object. This is contrary to the philosophy of Aristotle, frivolous, and impossible, though other Arabic philosophers than Avicenna, notably Algazel (Al Gazzali) have made the same contention that matter obeys the intellect not only in the same subject but in other bodies.[88] Thus Oresme

[81] *Ibid.*, fol. 27r, col. 2. In a later Quodlibet this is expressed a little differently, the incision which is not felt being described as slow or very sudden: fol. 40v, col. 2, "Propter quid incisio tarda ut digiti per animum non sentitur nec etiam nimis velox ut subita."

[82] At fol. 40v, col. 2, are questions whether imagination aids and hinders digestion and nutrition.

[83] At fols. 43v, col. 2-44r, col. 1, the question, "Que virtutum istarum duarum scilicet ymaginativa et naturalis est principalior," is argued on both sides.

[84] *Ibid.*, fol. 37v, col. 2: "Patet etiam in mulieribus que habent alias imagines quam viri quia sunt alterius complexionis."

[85] *Ibid.*, fol. 35r, col. 1: "Ex hoc potest aliqualiter persuaderi que alique species in anima Sortis fortiter impresse et Sorte pro tunc actu considerante et ipso pro tunc volente et desiderante quod illud scirem aut moverer inde et quod ille species me aliqualiter moveret sic quod illud idem cogitarem quod et Sortes pro tunc cogitat . . . ita videtur possibile quod ille que sunt in Sorte possunt me movere et animam meam."

[86] *Ibid.*, fol. 34v, col. 1: "Dico 5° quod forte homo existens ante alterum fortiter timens aut aliquid desiderans fortiter quando omnia alia sunt disposita ad hoc potest forte animam alterius movere."

[87] *Ibid.*, fols. 34v, cols. 1-2; 37v, col. 2; and the two passages to be quoted in the two following notes. See also fol. 41v, col. 2, among the later Quotlibeta, "Utrum virtus imaginativa possit in corpus extrinsecum agere ut posuit Avicenna (sexto) naturalium quarta particula."

[88] *Ibid.*, fol. 35r, col. 2: "Sed quod localiter ille species moveant subiectum distans ut posuit Avicenna 6° naturalium 4a particula nego id ymo dico quod hoc est contra philosophiam Aristotelis nisi poneretur sicud dixi quod species in Sorte moveret me ad cognoscendum de eodem sicud Sortem. Et consequenter possem me movere sicud

closes one of the most frequented and direct avenues to magic. When in yet a fourth passage he again rejects the doctrine that the soul or intellect or imagination can move other bodies than its own or produce rain, he suggests that Avicenna was influenced to adopt it by a desire not to recognize the marvelous works of Christ and other holy prophets as true miracles but to give a natural interpretation of them.[89] In still another passage of the *Quotlibeta* Oresme tells us that this doctrine of the marvelous power of the intellect has been condemned as an error.[90]

As has already been indicated in one way and another, the particular questions and problems, which make up the last two-thirds of the supplementary treatise and constitute its *Quotlibeta* in the strict sense, follow to a large extent along the same lines as the four preliminary chapters on the senses and powers of the soul. Of the forty-four problems which are discussed at length about a dozen relate to astrology and other forms of divination,[91] and have been noted in the chapter on Oresme's attitude to astrology. Closely related to them are as many more on causation, luck or chance, fortune, man's power to control it, and the problem of evil.[92] Five or six are devoted to human psychology, judgment, and gullibility;[93] as many more to generation and reproduction.[94] Three deal with combustion;[95] two or three with pri-

homo movet seipsum quando placet, sed me invito quod ymaginatio tua me moveret aut lapidem est recte contra Aristotelem . . . Unde fuerunt alii quam Avicenna ut Agazel et quidam alii qui posuerunt quod materia obedit intellectum non solum in eodem subiecto sed et in diversis."

[89] *Ibid.*, fol. 38v, col. 1: "Credo autem quod ad hoc fuit motus propter mirabilia que audivit a Christo domino nostro et ab aliis sanctis prophetiis fuisse facta que noluit concedere esse mirabilia."

[90] *Ibid.*, fol. 47r, col. 1: "unde propter hoc Avicenna in sua metaphysica et precipue in suo 6° naturalium particula 4 posuit intellectum habere mirabilem potentiam, ut superius fuit dictum, quod tamen est articulus condempnatus, et posuit quod pure naturaliter possunt esse tales prophete sicud Christus et Moyses, et in hoc fuerunt decepti."

A number of the 219 articles condemned at Paris in 1277 ascribed great power to the intellect: see articles 73, 86, 112, 115, 189, 193, 211, 212, etc. in *Chartularium Univers. Paris.*, I, 544-555.

[91] See those numbered 3, 4, 5, 7, 8, 9, 10, 29, 30, 37, 38.

[92] Numbers 11, 12, 13, 25, 26, 27, 31, 32, 33, 34, 35, 36.

[93] Numbers 39 to 43 inclusive; 26 might also be put here.

[94] Numbers 14, 17, 18, 20, 24.

[95] Numbers 15, 16, 19.

mary and secondary qualities.[96] Two are about demons, and two are about the power of words in incantations and adjurations. One deals with the difficulties and sources of error in medicine;[97] another, as we have noted, with the intension and remission of forms. They are not, however, arranged together thus by Oresme but occur in a confused order with only a certain amount of grouping. Many of them relate only indirectly to magic and the natural explanation of marvels.

The remaining problems are arranged more under heads, and in this follow somewhat the order of the four chapters. First come a score of questions concerning vision, such as why a coin at the bottom of a vase full of water seems more remote than one in an empty vase; why a burning stick whirled about appears to form a continuous flaming circle; why letters are seen better through a glass lens, while clouds prevent the sun from being seen; why the fixed stars twinkle, and the planets not.[98] Some of these problems repeat some of those which had been listed as a sort of table of contents before the first preliminary chapter. There we read, "In the first chapter it will be seen that a single object can appear two or more to the sight. Second, that several things can appear as one to the sight. Third, that an object can appear to the eye greater or less than it actually is. Fourth, that an object at rest may appear to be in motion, and one in motion to be at rest. Fifth, that an object may appear to the sight to be of another color than it is. Sixth, that an object may appear to be something other than it is."[99]

Next come a dozen problems concerning sound and hearing which add little or nothing to what has already been noted on the subject from the second chapter and the discussion of configuration of sounds in the *De configuratione qualitatum*. It is asked how a person can be recognized by his voice or cough, and why some public speakers have so much better enunciation than other men.

Two questions are put as to odors and the sense of smell, and

[96] Numbers 21 and 22.
[97] Number 36.
[98] Ashburnham 210, fol. 40r, col. 1.
[99] *Ibid.*, fol. 21v, col. 2.

a greater number concerning taste and touch.[100] Those on touch include two not yet noted which relate to superstitions. One inquires whether a red shield floating in the sea, if it should pass over a dead body, would come to rest there. "It seems so because many say so, which would not be the case, were it not true."[101] But we have seen that Oresme had no respect for this type of proof; therefore, had he discussed the matter further, it would probably have been in the negative. In the second case there seems less room for doubt because the question is, Why does a corpse bleed in the presence of a murderer, even when he does not touch it and also when it no longer has power of recognition since it is not alive?[102] The time-honored superstition therefore appears to be taken as a fact, and the question is, how to account for it naturally?

The next two groups of problems are concerned with digestive virtue and nutritive virtue,[103] but the distinction between the two fields is not always wholly clear. A question which is raised under both headings is how fish which are cold are able to digest their food. Nearly two columns of problems anent generation reinforce the two previous discussions of that subject.

The last heading among the problems is "Quotlibeta concerning the operations of the soul or concerning the soul."[104] This corresponds to the fourth and last of the preliminary chapters. One question raised is whether the sensitive part of the soul is in opposition to the reason.[105] Another is whether in the soul there is any innate knowledge such as cognition of the first principle. Oresme says that it seems so, just as the eye has a natural power of vision if an object is presented to it, or heat naturally burns,

[100] All three begin at fol. 40v, col. 1: "Quotlibeta circa olfactum. . . . De hiis que circa gustum. . . . De accidentibus circa tactum."

[101] "Utrum scutum rubeum per mare fluctuans, si contingat ipsum venire supra mortuum aut occisum ibidem quiescet. Videtur quod sic quia ita dicunt multi quod non esset nisi verum esset."

[102] "Propter quid occisus in presentia occisoris emittit sanguinem cum ipsum non tangat et etiam cum non plus cognoscat cum non vivat."

[103] Both headings, "De digestiva virtute probleumata," and "Circa nutritivam virtutem," are found on fol. 40v, col. 2.

[104] *Ibid.*, fol. 41r, col. 2: "Quotlibeta circa operationes anime seu circa animam."

[105] *Idem.*

if it has anything to burn, or a heavy object falls, if there is no obstacle in the way to prevent. From these illustrations one would infer that for Oresme innate knowledge or ideas did not mean more than an inborn capacity for knowledge and intellectual activity. A third question is how the soul, if it is a simple substance, can accustom or adapt itself to something else. It is also inquired whether the soul can know anything except through the organs of the body, whether there can be anything in the intellectual soul which is not in the sensitive, and whether, while life lasts, the soul can ever separate itself from the body. Also whether the soul is less impeded in sleep than waking.[106] A number of questions bear on the point how far human acts are determined by reason, will, appetite, passions, and the nature of things.

The problems next turn to the subject of divination. It is asked whether some persons can predict the future and disclose the past as prophets are said to do, and whether a maniac can foresee the future. Dreams are then taken up. It is asked why many persons do not have dreams, whether any future events are seen or known through dreams, and for what men and at what hour or time of night dreams are more likely to be true.[107]

Most of the remaining problems of a psychological character deal with matters that have already been considered: imagination, species, medium, emotions, memory, and the like. Insanity, mental aberration, and fools are somewhat discussed, and it is asked why we do not have fool horses and fool cows.[108] Some of the remaining problems, however, do not seem strictly to belong under the heading, The soul and its operations. Such is the query why some diseases are of brief duration, like epilepsy.[109] Several questions are suggested by the attractive power of the magnet.[110] Other problems are why repeated drops of soft water wear away stone, and soft meat dulls a steel knife, why an empty dish will burn and one full of water not, why a stick breaks more easily in the middle than near one end, why ignited iron or

[106] *Ibid.*, fol. 42r, col. 1.
[107] *Ibid.*, fol. 41v, col. 2.
[108] *Ibid.*, fol. 42v, col. 1.
[109] *Ibid.*, fol. 42r, col. 1.
[110] *Ibid.*, fol. 43r, cols. 1–2.

steel hardens in cold water and softens when put in the fire again.[111] What directs a bird in building its nest? Are the tides caused by the moon? Does nature act toward an end?[112] such is the scope of interest displayed in Oresme's *Quotlibeta.*

The subject of demons is discussed in one of the preliminary chapters and in two of the *Quotlibeta,* the first and twenty-third. Oresme, as usual, minimizes their activity and rejects almost every argument for their existence except that of sacred Scripture and the catholic faith. It is hard for him to believe that God would permit demons to work marvels in response to the conjurations of some old witch.[113] Discussing "whether it is likely, speaking naturally, that there are any demons," he gives us the gist of his attitude in the remark, "Moreover, if the Faith did not affirm their existence, I would say that from no natural effect could it be proved, because all (their apparent marvelous works) can be saved naturally."[114] Maniacs were commonly called demoniacs. Avicenna seemed to say so in the *Canon,* and Christ's miracles and language in casting forth demons were so interpreted. But Oresme explains away both these seeming authorities.[115] A later *Quodlibet* suggests that apparitions of demons and other terrifying figures are due to the disease of melancholy.[116]

One *Quodlibet* which deals with ways of deceiving and deluding men[117] resembles the exposé already noticed of the methods and tricks by which astrologers contribute to the success of their predictions. In another *Quodlibet,*[118] in denying the efficacy of incantations, to which such effects are ascribed as to make men beat themselves lustily or unyoke their horses from the plough and place the yoke on their own necks,[119] Oresme complains that he has never succeeded in inducing enchanters to perform any

[111] *Ibid.,* fol. 44r, col. 2.
[112] *Ibid.,* fol. 44v.
[113] Quodlibet 1, Ashburnham 210, fol. 45r, col. 1.
[114] Quodlibet 23, *ibid.,* fol. 58v, col. 1: "Nisi autem fides poneret eos esse dicerem quod ex nullo effectu posset probari esse quia naturaliter omnes possunt salvari ut postea declarabo."
[115] Chapter 3, Ashburnham 210, fol. 31r, cols. 1-2.
[116] *Ibid.,* fol. 41v, col. 2.
[117] Quodlibet 43, Ashburnham 210, fol. 69r, col. 1-fol. 70r, col. 1.
[118] Quodlibet 2; 44 also deals with the same problem.
[119] Ashburnham 210, fol. 45v. col. 2.

such marvels in his presence.[120] It will occur to the modern reader that the victims may have been hypnotized.

Oresme complains more than once that some of the evidence for magic, and more especially diabolical magic, is based on confessions made under torture, or when the persons were so frightened that they did not know what they were saying, as he once satisfied himself by obtaining permission from the provost to question the accused woman. Furthermore, says Oresme, they do not clearly confess all that is imputed to them, but when they say "a," they are given credit for the whole alphabet. Sometimes they are self-deluded and believe that they have done something which they have not done.[121] These remarks suggest that trials for sorcery, with use of violence and torture in an effort to extract confessions, were already all too common in the fourteenth century, and that the witchcraft delusion which Hansen dated from the fifteenth century was already under way or at least gathering momentum.

Although Oresme admits the existence of demons as a matter of religious faith and accepts the miracles of the Bible, he does not hesitate to censure certain ecclesiastical frauds and certain superstitious practices which have developed in connection with the exercise of Christian worship. Not only does he accuse

[120] *Ibid.*, fol. 46r, col. 1: "Sed hoc non ymo pro quacumque pecunia nec pro quibuscumque precibus per me immediate et etiam mediante alio et plurimum precibus numquam potui quod mihi talia fient."

[121] The passages which I have noted occur respectively in the first and last of the 44 Quotlibeta: Ashburnham 210, fol. 45v, col. 1: "Ad 5m respondeo quod multi per violentiam tormentorum confitentur que numquam fecerunt. Dico 2° quod ipsi tunc pro timore sunt quasi toti atoniti et quasi stolidi. Dico 3° quod possibile est et ita fuit quod multi tales fatuelli vel etiam mali et malitiosi multa faciunt coniuramenta et credunt quod habeant effectum, quod tamen est falsum quia quamvis quandoque sic contingat sicut (col. 2) dicunt aut sicut volunt, non tamen ille coniurationes sunt cause. . . ." *Ibid.*, fol. 70v, col. 2: "Ad 3m dico quod ex magno timore nesciunt quid dicunt et etiam non ita clare confitentur sicut imponitur eis quia sicud dicunt a imponitur eis quod dixit (*sic*) alphabetum. Et ego hoc vidi quia de una dicebatur quod faciebat et quod ipsa fuerat confessa. Et ego rogavi propositum quatinus promitteret me alloqui illam qui mihi concessit. Sed cum in presentia proprio (*sic*) et aliorum sibi locutus et petivissem et sicud fida (?) effunditur vere nescis (nescio?) quid dico nec quid dixi et multa alia et quilibet percepit quod non esse nisi trufa etc. Dico etiam quod per tormenta fatentur etc. dico etiam quod aliqui miseri vel misere quandoque credunt aliqua facere et tamen in rei veritate nichil faciunt."

many clerics of excessive credulity, he flatly charges that many ecclesiastics have devised fraudulent miracles to secure offerings for their churches, as an illustration of which he mentions the church where is said to be the sudarium of our Lord, Jesus Christ.[122] In another passage he classes with the superstition that the weather changes more on Friday than other days, the faith placed in a cross made while the passion of the Lord is being read on Easter or in a ring made from a penny offered on Friday and on Christmas at the first mass.[123] Such notions and practices are condemned alike by the catholic faith, natural science, and astrology.

Oresme also recognizes that in the Bible and theology as well as in philosophy there are many contradictions, "and sometimes one saint says something which another denies."[124] One of the later *Quotlibeta* raises the question whether philosophy is contrary to theology, since on some matters the two subjects hold opposite views, for example regarding the eternity of the world. It is replied that no truth is contrary to other truth.[125]

While Oresme is opposed to those who would attribute everything immediately to God or to demons, he is equally unwilling to go to the opposite extreme and, like Avicenna, Averroes, and Algazel, ascribe everything to natural causes and deny the existence of miracles. "Faith and truth do not so decree."[126] In the later *Quotlibeta* it is asked why miracles are performed. At

[122] Ashburnham 210, fol. 45v, col. 2: "Dico 2° quod non est mihi necesse credere cuilibet (*quilibet* in the MS) dicenti, 'Talis fecit mihi tale miraculum,' quia sic multi viri ecclesiastici deciperent alios ut oblationes suis ecclesiis offerrent. Patet hoc ad sensum de ecclesia in campana (*sic*) ubi dicebatur quod esset sudarium domini nostri Ihesu Christi. Et de qua infinitur que finxerunt talia etc."

[123] *Ibid.*, fol. 66r, col. 2: "Sicud de cruce que fit dum legitur passio domini die pasche, sicud etiam de anulo qui fit de denario primitus oblato die veneris et in die nativitatis in prima missa. Et sicud quasi infiniti(s) que et catholice et naturaliter et astrologice sunt pura mendacia."

[124] Ashburnham 210, fol. 46r, col. 1: "Et quibus actoribus debeo credere, video enim quod (col. 2) in philosophia et etiam in biblia et theologia etc. sunt multe contrarietates, et dicit unus sanctus quandoque aliquid cui alter contradicit."

[125] *Ibid.*, fol. 41v, col. 2.

[126] *Ibid.*, fol. 47r, col. 2: "Fuerunt igitur et adhuc sunt multi qui omnia deo immediate attribuunt aut demonibus. Et fuerunt alii ut Avicenna et Averroys et Agazel qui omnia causis naturalibus imposuerunt et nulla miracula. Fides autem et veritas non sic ponunt."

first the answer is that there are no miracles, since all here below happens naturally, as has been shown in the four preliminary chapters. But then Oresme adds, "In opposition to this is our Faith."[127] Indeed, it should be recognized that Oresme's scepticism, rationalism, Peripateticism, and critical scientific attitude are limited by his religious orthodoxy. What is more, he does not merely accept the Gospel and articles of faith as a matter of religious belief, but declares that they are without doubt in accordance with reason, and that few conclusions in philosophy are so well attested by sense and reason. If religion requires belief in some difficult dogmas and in miracles, there are many inexplicable matters in nature and natural philosophy which are much more unknown than many articles of faith. "Therefore I indeed know nothing except that I know that I know nothing."[128] A surprising conclusion for one who had set out to give a natural explanation of apparent marvels! We are also now told that the truths contained in the gospels are proved by miracles apparent to the senses, and by the assent of great clerks and philosophers, and the fact that the martyrs suffered freely for them.[129] Yet Oresme has repeatedly told us that even good men and great clerics were sometimes unduly credulous.

Nor is Oresme willing, as one might infer from his remark that no truth is contrary to other truth, to accept religious dog-

[127] *Ibid.*, fol. 43r, col. 1.

[128] *Ibid.*, fol. 46r, col. 2: "Dico 2° quod evangeliis et articulis fidei quia sine dubio sunt rationabilia et cum hoc ut mihi apparet optime probata ut prius declarabo, unde paucas conclusiones notabiles in philosophia scio ita bene probatas quia ad sensum et per rationes. Omnia enim in evangeliis contenta sunt rationabilissima. . . . Unde quamvis fides mirabilia ponat ut trinitatem penetrationem corporum resurrectionem etc., videtur mihi quod etiam multa eque mirabilia ponuntur in philosophia minus probata nisi quia usitata, ut de materia prima que res est, et de ductione forme nove cuius primus nichil exstitit, et de accidentibus que res sunt et quomodo sunt simul, et de anima indivisibili. Ymo quomodo ignis ardet et quare et quid est natura rerum et quidditas . . . et quare lapis descendit deorsum et tamen quandoque per se ascendit sursum naturaliter ne scilicet sit dare vacuum. Quid igitur movet eum superius? Certe, si bene consideras, ista sunt multum ignota multo plus quam multi articuli fidei. Ideo quidem nichil scio nisi quia scio me nichil scire."

[129] *Idem.*, "Qualiter autem etiam sunt probata considera in te quomodo per miracula ad sensum etc., et per magnos clericos et philosophos qui illis assenserunt et per martires qui libere passi sunt."

ma as one body of truth and to discuss matters of philosophy and science apart from it as a separate affair. He sometimes obtrudes theological dogma into a scientific discussion. Thus in debating whether generation and corruption would continue if the movements of the heavens should stop, he argues not only that the movement of the heavens is not responsible for light or heat, but that annihilation pertains only to the Creator and is not a power to be given to the heavenly bodies.

> But it is clear that God who made the sky can make it come to rest, nor is local motion essential to it. Nor will it do to say that it is required naturally but not supernaturally, as I will explain later. Moreover, there is an article condemned at Paris, namely, to say that if the heavens stop, fire would not burn in tow.[130]

Censures by the theological faculty of the university of Paris! "Aye, there's the rub." We should like to have been able to present Nicolas Oresme simply as a critic of magic and astrology and as battling against superstition and the occult. But in his expeditions against what seemed to him error we sometimes find him on the side of theology in what looks very much like a warfare with science. Perhaps Paris was right in contending that fire would continue to burn in tow though motion ceased in the universe at large. But it was intruding into the domain of natural science, and presuming to settle a question beyond its ken, just as truly as was Rome when it forbade the teaching of the Copernican doctrine as true and silenced Galileo. It would have been better for Paris and better for Oresme to have adhered in this matter to his previous know-nothing attitude. It is true that the astrological view that fire would cease to burn the instant the heavens stopped was equally dogmatic, but it was less compulsory, and the way to oppose it was by free speculation and in-

[130] *Ibid.*, fol. 48r, col. 1: "Sed clarum est quod deus qui ipsum fecit potest ipsum facere quiescere, nec motus localis sic est sibi qualiter essentialis. Quin etiam nec valet quod naturaliter implicat sed non supernaturaliter ut post declarabo. Est etiam articulus Parisius condempnatus (col. 2) scilicet dicere quod celo quiescente ignis non ageret in stupa." The allusion is to the 156th of the 219 articles condemned by Stephen Tempier, bishop of Paris, in 1277: vide *Chartularium Univers. Paris.*, I, 552, "Quod si celum staret, ignis in stupam non ageret, quia Deus non esset."

vestigation, such as Oresme's treatises normally represent, not by prohibition, suppression, and force. Moreover, to accept theology as an ally against astrology was rather to imply that the scientific opposition to it was not alone sufficient.

There is one final stricture which must be made of Oresme's critical attitude, especially as displayed in the *Quotlibeta*. It was too negative and purely destructive to meet with anything like general acceptance and approval. The *De configuratione qualitatum* had offered a positive theory or hypothesis to explain marvels—or at least some of them—in place of resort to demons and magic. But the *Quotlibeta* too often simply raise questions or adopt the attitude, "You call this a marvel, but is it any more marvelous than that?" without giving a satisfactory explanation of either. It is not much of a solution to call all natural phenomena inexplicable and therefore to contend that most inexplicable phenomena are natural. A contemporary might well prefer the fascinating astrological hypothesis, even though its assumptions could not be justified, to such a drab and content-lacking position as, "I know nothing except that I know nothing." And he might prefer to continue to explain strange phenomena by the conception of occult virtue or even of the intervention of demons, rather than merely to agree that things are what they are or *quia talis*. Oresme makes a sharp attack upon astrology, magic, and superstition; even, with some limitations, upon demons and miracles. He would find a natural explanation and makes some fertile suggestions. But for the most part he can only offer hypotheses and suggest problems. The marvels still exist; nature is still "one vast realm of wonder."

CHAPTER XXVIII

HENRY OF HESSE

Less known than Oresme to modern scholarship,[1] especially on his scientific and sceptical side, is "the prolific Henry of Langenstein or of Hesse, theologian, moralist, canonist, liturgist, and logician of great renown."[2] A work on medicinal simples is even attributed to him in a manuscript of the fifteenth century, but it may be incorrectly.[2a] He lived from 1325 to 1397, and came up for his baccalaureate at the university of Paris on February 20, 1363.[3] His connection with the Great Schism[4] and his passing from Paris to the recently founded university of

[1] See, however, F. W. E. Roth, "Zur Bibliografie des Henricus Hembuche de Hassia, dictus de Langenstein," *Zentralblatt für Bibliothekswesen,* Beiheft II (1888); P. Feret, *La faculté de théologie de Paris, Moyen-âge,* Paris, 1896, III, 263-272; Joseph Aschbach, *Geschichte der Wiener Universität,* I (1865), 366-402; and Otto Hartwig, *Henricus de Langenstein dictus de Hassia, Zwei Untersuchungen über das Leben und die Schriften Heinrichs von Langenstein,* Marburg, 1857, 54 and 89 pp. Ioh. Phil. Kuchenbecker, "Supplementa quaedam ad vitam Henrici de Hassia," in his *Analecta Hessica,* I, 173-180, lists various bibliographers and historians who have treated of Henry of Hesse, such as Possevin, Bellarmin, Wharton, Cave, Trithemius, Pez (*Thesaurus Anecdot. Noviss.,* I, 74), von der Hardt, Ellies du Pin in the appendix to Gerson's *Opera,* George Ederus in his catalogue of rectors of the university of Vienna, Lambecius in his work on the library of Vienna, Philip Elsens in *Encomiasticum Augustinianum,* Olearius, Carolus Ludovicus Tolnerus in *Codex diplom. Palat.,* Carolus Josephus Moratius in *Theatrum chron. ord. Carthus.,* and Liebknecht in a programma on Henry of Hesse subjoined to his oration on the tie binding mathesis with theology. Gandolfo in his work on writers of the Augustinian order (1704), pp. 160-166, made Henry de Langestain an Augustinian and Henry of Hesse a Carthusian of a different time and place, but ascribed all the latter's works to the former.

[2] Hauréau, *Histoire de la philosophie scolastique,* 1872-1880, II, 453.

[2a] CLM 3073, fols. 247-283: Henrici de Hassia de medicinis simplicibus particula II.

[3] *Auctarium Chartularii Universitatis Parisiensis,* ed. Denifle et Chatelain, I (1894), 279.

[4] See his *Epistola pacis scripta 1379 in schismate inter Urbanum VI et Clementem VII pontifices orto, pro Urbano papa ex codice manuscripto vetusto, Helmstadii ex typis viduae schnorrae* (no date). *Consilium pacis de unione ac reformatione Ecclesiae in concilio universali quaerenda,* Antwerp, 1706. *Tractatus . . . super concilio pro sedatione schismatis celebranda,* edited by Von der Hardt, 1715.

Vienna about 1382-1384 as professor of theology have been commonly noted.[5] His knowledge of astronomy has been remarked in a general way,[6] but while some of his religious writings are to be found in print in the old editions,[7] his treatises that deal with science and occult science have remained in manuscript almost unknown and unnoticed.

Of the works of Henry of Hesse which we have to consider[8] some may be dated by particular years. Of these the first is the question on the comet of 1368, the second is a treatise against the theory of conjunctions written in 1373 or soon thereafter since it was provoked by the astrological predictions for that year, the third is a discussion of Hebrew written in 1388, and the fourth is the work against the hermit Thelesphorus who had made prophecies concerning the end of the world. Since it was finished in 1392 or 1393, it was one of Henry's last works. If we may trust citations, two other writings which concern us may be dated approximately. *On the Reduction of Effects to Their Common Causes* appears to be referred to in the work of 1373 against conjunctions as a treatise of Henry's own "On Saving the Varieties of Effects Naturally Emerging in the Inferior World and its Parts."[9] Hence it appears to have been composed before 1373. Still earlier would be the work *On the Habitude*

[5] Rashdall, *Universities of Europe in the Middle Ages,* 1895, II, 237. G. Sommerfeldt, "Aus der Zeit der Begründung der Universität Wien," in *Mitteilungen des Instituts für Oesterreichischen Geschichtsforschung,* XXIX (1910).

[6] By Pierre Duhem, *Études sur Léonard de Vinci, ceux qu'il a lus et ceux qui l'ont lu,* Paris, III (1913), 14-15; but he gives no specific account of Henry's astronomical views and treatises either here or in *Le Système du Monde.*

[7] The *Census of Fifteenth Century Books in American libraries* lists his *Secreta sacerdotum, Expositio super Dominicam orationem,* and *Regule.* See the printed catalogues of the British Museum and Bibliothèque Nationale, Paris, for others, such as the *Speculum animae,* treatise on the art of preaching, and defense of the immaculate conception of the virgin Mary against the Dominicans. His *Tractatus de contractibus* was edited among the *Opera* of Jean Gerson in the edition of 1484, vol. IV, fol. 188. This work occurs in MS CLM 12258, anno 1466, fols. 213-266, although in the catalogue the title is incorrectly given as *De superstitionibus.*

[8] For the manuscripts of them which have been utilized in this chapter see Appendix 27.

[9] *Contra coniunctionistas,* cap. 2: "Et idem alias ostendi in quodam tractatu nichilominus ad salvandum varietates effectuum naturaliter emergentium in inferiori mundo et eius partibus." BM Sloane 2156, fol. 209v, col. 2; FL Ashburnham 210, fol. 71r, col. 2.

of Causes and the Influx of Common Nature with Respect to Inferiors, if Henry has reference to it when in the *De reductione effectuum* he remarks, "As was shown in a certain treatise *De natura communi.*"[10] That he does refer to it seems assured from the fact that he unmistakably cites it in the work of 1373 by the same brief form of title.[11] While both these treatises on causes and effects thus seem to have been written before 1373, it is uncertain whether either antedates the work on the comet of 1368. In any case, the two works on natural philosophy, like the two works against astrology, were certainly written before Henry left the university of Paris for that of Vienna and before the death of Oresme. On the other hand, they are manifestly later than such works by Oresme as his earlier attacks on astrology and divination or his treatises on the configuration of qualities and commensurability of celestial motions, to which their debt is evident and some of which they specifically cite. The one exception to this general statement is Oresme's treatise of 1370, which is perhaps the latest of his onslaughts on astrology and which was finished two years after Henry's question concerning the comet of 1368. Of more uncertain date is Henry's treatise on distinguishing spirits.

In *De habitudine causarum* Henry states that the problem whether the first cause is bound to follow the concatenation of causes has been treated more diffusely in the treatise *De immaterialitate rerum,* which would thus seem to have been a still earlier work of his than any of those with which we are now concerned. It does not seem to be extant. Hartwig, and Roth after him, classed *De reductione effectuum* as not one of Henry of Hesse's genuine works. But it appears to resemble them in

[10] *De reductione effectuum,* cap. 9: "Nature vero communis plures experiuntur (*experimur* in some MSS) effectus in macrocosmo qui ex natura particulari partium et specierum universi salvari non possunt, ut ostensum est in tractatu quodam de natura communi." Sloane 2156, fol. 120v, col. 1; Vienna 4217, fol. 31r, col. 2; Ashburnham 210, fol. 92r, col. 2.

[11] *Contra coniunctionistas,* cap. 14 of its first part, he repeats the four propositions with which he had opened *De habitudine causarum* and adds, "Iste suppositiones sunt deducte sufficienter in tractatu quodam de natura communi."

style and method, and, as we have seen, to be cited as his own in his *Contra coniunctionistas,* while it in turn cites his *De habitudine causarum.*

The close relationship between the works of Oresme and Henry of Hesse on natural philosophy, occult science, and astrology is attested by the fact that they are sometimes found together in the same manuscript,[12] or even by a work of one being ascribed to the other.[13] Henry adopts the same general attitude as Oresme of endeavoring to explain natural phenomena by ordinary causes and process of nature, and in terms of the four primary qualities and elements, without recourse—if it can be avoided—to occult virtues, marvelous explanations, far-fetched celestial influences, and the activity of demons. The doctrine of the intension and remission of forms was a favorite and widespread conception of fourteenth century scholasticism, which Henry seems to express in the same terms of latitude, proportion or disproportion, uniformity and difformity, as had Oresme. These were not peculiar to Oresme, it is true, but his notions of qualitative configuration and of commensurability apparently made a deep impression upon Henry of Hesse. Both authors were also attracted by the problem of causation, treated by Oresme at length in the treatise of 1370 and by Henry in his *De habitudine causarum.*

Since Oresme appears to have had the more original mind, and ideas which Henry of Hesse in the main merely repeated or developed further, we shall devote rather less space to exposition of Henry's treatises. We shall consider them partly in their order of writing, but since this is not entirely certain we shall also group them together somewhat by the character of their contents. We shall take up first *De habitudine causarum,* then

[12] See Appendix 27.

[13] Thus at Erfurt Amplon.Q.125, about 1391-1396 A.D., fols. 142-149, Henrici de Hassia de principalibus (principibus?) arti magicae non dandis, is really the brief work of Oresme against astrologers, and is correctly attributed to him, as Schum has pointed out, in Amplon.Q.205.

On the other hand, in BM Sloane 2156, Henry of Hesse's work of 1373 against conjunctions is incorrectly ascribed to Oresme in its titulus, but a marginal note points out that it cannot be his since he is twice cited in it.

De reductione effectuum, the question on the comet of 1368, the work of 1373 against the theory of conjunctions, the undated treatise on distinguishing spirits, the treatise of 1388 on Hebrew, and the book against the predictions of the hermit Thelesphorus, which was finished about 1392 or 1393. This order of treatment will bring together the two treatises of most philosophic and scientific import, the two which are primarily directed against astrology, and the three which touch most closely upon the supernatural.

There are two chief ideas in Henry of Hesse's treatise on the habitude of causes and the influx of common nature. One is that God or the First Cause acts upon particular terrestrial phenomena not merely through secondary causes mediately but also directly and immediately so that, instead of being the most remote cause, the First Cause is the most intimate and closest cause of earthly phenomena and of the lowest effects. Action therefore does not occur according to a fixed order or hierarchy of dependence through intelligences and celestial spheres to inferiors on earth. In place of the standard hypothesis of astrology that God had committed the control of the world of inferior nature to the stars, Henry substitutes a theory of the immanence of the First Cause throughout the universe.

The second leading idea of the treatise is a corollary of the other. In addition to the particular natures and tendencies of particular bodies and beings, there is a common and universal force which they obey as parts of the universe even in preference or in contradiction to their particular natures and inclinations. Henry seems to use "common nature" in much the same sense that Roger Bacon spoke of the continuity of universal nature, a theory which he advanced in place of the previous doctrine that nature abhors a vacuum. Similarly Henry states that "common nature sometimes makes water ascend from its natural place," for example, in the case of syphoning. Henry also opines that "according to the law of nature it is less inconvenient that a vacuum should be created than that a substantial change should be made between distant *termini*." Duhem in his study of Bacon's theory of universal continuity did not notice these passages in

Henry of Hesse's treatise, although he cited a half dozen or so other writers of the fourteenth century who had followed Bacon's thesis—which really, however, dates back to Adelard of Bath in the twelfth century among medieval Latin writers.

This influx of common nature, as well as the close relation of the first cause to inferior causes and terrestrial phenomena, is adduced by Henry to minimize the scope of astrological influence. He regards it not only as distinct from the specific natures of inferiors but as a force acting independently of the influence of the stars. This he illustrates by the experiment with the water jar which goes back to Adelard of Bath in the twelfth century. When I keep the water from dropping from the narrow opening in the bottom of the jar by holding my fingers over the perforations in the top and preventing any air from entering, this new quality or conduct of the water, i.e. of not falling, cannot be ascribed to the positions of the stars, because I can admit the air or not at will and so retain or let fall the water.

Another limitation which Henry sets upon astrology in this treatise on the habitude of causes is his practically doing away with the intelligences that move the spheres by denying them any action upon this world by intellect or will power. They may be free beings *in se* and *per se* but in their action upon inferiors they act only through the celestial bodies, and that only naturally and of necessity, not freely and contingently.[14] As the soul cannot alter the organs of the human body, so the movers of the spheres cannot vary the influence of the sky. Indeed, Henry holds that the soul has greater power over its body to which it is united by way of form than an intelligence has over a sphere and its parts to which it is united only by way of motion. In other words, Henry would make the action and influence of the heavens purely mechanical. Indeed, he seems to take a somewhat perilous further step in this direction of a mechanistic universe when he suggests that if the first cause were essentially non-intellectual, nevertheless single effects would be produced in every species and order and beauty as they are

[14] These propositions are repeated in the fourteenth chapter of the first part of *Contra coniunctionistas.*

now, and when he posits that causation of every thing is contained in the essence of the first cause prior to its ideal or exemplary representation in the divine intellect.[15]

Henry goes farther than we have yet indicated in his strictures upon astrology, when he insists that a given star or part of the sky must always retain the same influential quality as it now possesses and has exercised in the past, and when he asserts that the celestial bodies do not undergo qualitative change like the inferior elements. Nor will he admit that great variation of influence results from the changing relations of the stars and parts of the heavens to one another. Such reservations are equivalent to a rejection of a large part of the rules, assumptions, and procedure of astrology. Henry objects to such a doctrine as that of the place of fortune, by which the same great virtue is ascribed to each degree of the signs of the zodiac in turn, or to such a doctrine as that of aspects of the planets. To his mind the effect of two given planets upon inferior matter will be the same whether they are in aspect or not, and he sees no more significance in two planets forming the side of a hexagon than that of an octagon or a decagon. He also objects to the common astrological doctrine that the influences of all the planets are combined and summed up in the sphere of the moon. And he alludes to the article condemned at Paris to the effect that intelligence, since it is full of forms, imprints these in matter through the celestial bodies as it were by instruments.

It must be said that the astrologers would probably not be much perturbed by Henry's insistence that a star must always retain the same quality and that celestial bodies may not undergo qualitative change. They would undoubtedly respond that the important point was not this, but that qualitative change in inferior matter did follow the changing movements of the unchanging stars. Indeed, in the *De reductione effectuum* Henry states as the view of the Parisian school of Peripatetic philosophy that the influences of the sky are neither sensible qualities nor

[15] Vienna 4217, fol. 6r, col. 1; Vatican 3088, fol. 21r, col. 2; Sloane 2156, fol. 203v, col. 1.

species of sensible qualities, yet are productive of sensible qualities.[16]

Logical consistency, however, constrains Henry to leave to the celestial bodies or their movers an important place as causes. For even though they are only secondary and imperfect causes as compared to the first cause, they remain superior and more perfect causes in contrast to inferior causes and the workings of the four terrestrial elements. When Henry argues that the more perfect causes control the more imperfect causes in their most specialized effects, he actually cites the theory and practice of astrology to prove his point. "For astronomers judge as to the particular conditions of natural effects in the inferior world by the causality of superior causes. Nay more, they reduce the particular and individual conditions of those born principally to superior causes." And more to the same effect.[17] Presently he contends that inferior causes merely prepare the ground in a rough, incomplete, and confused manner for the final, form-giving influence of superiors, much as assistant craftsmen get things ready for the real artistry of the master workman. So in the generation of a mouse from putrefaction there first concur in a general and confused way accidental qualities which make a nearer approach to a mouse than to any other vermin or plant. But then superior causes give figure, form, and organization to this inchoate disposition and duly proportion the qualities requisite for a mouse. Returning subsequently to this favorite late medieval problem of the spontaneous generation of lesser creatures, Henry contends that the production within a small space of innumerable different species of worms from the putrefaction of the same rain water cannot be accounted for by the influence of superior secondary causes through the medium of the stars and orbs, but requires the immediate intervention of a free agent absolutely first. He also adduces as inexplicable

[16] Cap. 10, ". . . quod sint qualitates quedam nec sensibiles nec sensibilium qualitatum species, sensibilium tamen qualitatum productive, et illum modum tenet philosophia Peripatheticorum Parisiensis (or, *particularis*)."

[17] See Vienna 4217, fol. 4r, col. 2; Vatican 3088, fol. 18v, col. 2; Sloane 2156, fol. 200v, col. 2.

by the influence of the heavenly movers and bodies such strange events as premonitions of the death of a dear one in distant parts, or what befell a man recently on his way to Paris. He killed several frogs in the road and three or four leagues further on was attacked by a multitude of them. Such events as these or the eduction of the forms of corpses in the case of persons violently slain Henry would ascribe rather to the operation of common nature. He will not deny, however, that secondary causes have something to do with them, and that, especially in the case of the spontaneous generation from putrefaction, they concur at least by way of disposition and preparing the qualities which afterwards are reduced to due proportions by virtue of another agent that acts most immediately by intellect and will.[18]

Although the form of the *De habitudine causarum* is argumentative and scholastic, a number of allusions and appeals are made to experimental physics in its discussion of such matters as nature's avoidance of a vacuum, syphoning, and the magic water jar. For example, it is noted that it is more difficult to lift evenly a flat surface which touches another similar flat surface at all points than if there were some air intervening between them. In the case of such a flat object raised from the surface of water it is observed that the water adheres to it for a time as it is lifted "in the shape of a pyramid."[19]

De reductione effectuum opens in a way that might seem quite favorable to occult philosophy and magic. Henry urges that, in addition to "common and general philosophy" which deals with ordinary phenomena of this sensible world, there is need of a more special and occult philosophy to explain the unusual and what now seems miraculous and preternatural. Especially calling for such explication are certain rare and special effects which are not commonly known save to a few men intent upon an experimental scrutiny of nature. Such unusual natural phenomena are met with in medical practice, in surgery, in alchemy, and in

[18] See the discussion running in Sloane 2156 from fol. 204r, col. 2, to 205r, col. 1; Vatican 3088, fol. 21v, col. 2, to 22r, col. 2; Vienna 4217, fol. 6r, col. 2, to 6v, col. 2.

[19] For the Latin text of the passage see Appendix 32.

astrology; and more of them would be noted if men scrutinized nature more closely and sought to solve the special effects which arise from various combinations and applications of things. This new point of view and mode of interpretation would bear to ordinary natural philosophy somewhat the same relation that metaphysics or theology bears to philosophy at large. Though Henry does not say so, just as the "common nature" of his *De habitudine causarum* bore a considerable resemblance to the "sense of nature" of William of Auvergne in the thirteenth century, so his "natural metaphysics" corresponds closely to the "natural magic" of that same bishop of Paris. Moreover, it would seem to envisage and to correspond very closely to that mingling and association of magic and experimental science which is the guiding star of our present historical investigation.

While Henry thus stresses the need of a distinct treatment of extraordinary and seemingly marvelous phenomena, the main point of his treatise is its denial of the conception of occult virtue. "The art of latitudes," as he several times calls it, had so impressed Henry with the idea of the infinite number of variations in intensity, combinations, and proportions that could be made from a few primary and secondary qualities, that he holds that the four primary qualities and their derivatives are sufficient to account for all such strange occurrences in nature without necessity of an appeal to occult virtue either in the stars or inferior objects. So numerous are the distinct complexional dispositions of the four qualities, so varied the effigial disposition of the parts of anything, so intricate the figuration and organization of natural objects, and sometimes so exactly fitting their harmony and configuration, the relation of agent to patient, the proportion of means and extremes, or the musical consonances possible between the six proportions of the four qualities in the human body, that Henry believes that these qualities alone are sufficient to explain everything in nature.

Take, for example, that stock instance of the maintainers of the conception of occult virtue, the apparent action of the magnet upon iron. Henry's explanation is that the iron is so disposed

qualitatively to the common harmony of nature and to the sensible active qualities of the magnet, that there is educed from the potentiality of the matter of the iron a quality which moves the iron locally. Some say that the magnet with the iron suspended from it weighs no more than alone, and Henry accepts this assertion as proving his view that the iron lifts itself and is not raised by the magnet. For if I take a stone in my hand, my weight is increased that much, but if the stone lifted itself to my hand, I would weigh no more. Similarly the virtues of spices are not occult but due to their heating properties; and if certain odors make the head ache, this is because they heat or chill the brain.[20]

Each part or point of every organ of the human body has its own degree of heat or cold, its uniform or difform intension or remission. Of medicines one from its intension of ordinary sensible qualities is good for the heart, another for the liver, and so on. Occult virtue is unnecessary to explain their healing action. On the other hand, a man may grow weak without it being noticed because, while all the qualities may be reduced in strength, their proportion to one another may remain the same as formerly when he was in good health.[21] Henry also employs Oresme's illustration of the diversity of sounds and their effects, citing both *De configuratione qualitatum* and the work of Boethius on music.[22]

Many are the changes that Henry rings upon these favorite fourteenth century conceptions of intension and remission, of latitude and proportion, and likewise on the teaching of the contemporary science of perspective[23] as to the possibility of variation in lines and colors through radiation, reflection, refraction, and multiplication of species. He predicts with some acumen, or possibly as a result of the Black Death of recent years, that new diseases may keep arising in future times because of the infinite combinations of the forces of nature. In like manner

[20] For the examples in this paragraph see cap. 17.

[21] Cap. 8. But this seems a very remote possibility.

[22] Cap. 25.

[23] See caps. 11 and 22. See the end of our present chapter for a treatise on perspective ascribed to Henry himself.

it is hopeless to try to provide by present laws for all the cases that will sooner or later arise. Henry goes even farther than this and suggests, almost half a millenium before Darwin, the possibility of the origin of new species, at least of herbs, plants, and the like—which he seems to think will be needed to cure the new diseases—nay even of living and inanimate beings.[24]

Some of the ancients had carried Henry's general line of argument even farther and, instead of merely questioning such a conception as occult virtue or associating colors with primary qualities as white with heat and black with cold,[25] had held that the soul was nothing else than a certain harmony rising from the concourse and combinations of natural forces in the animal. Henry merely mentions their view, however.[26]

A considerable section of Henry's treatise, beginning with the second chapter, which turns away somewhat abruptly from the introductory chapter concerning the need of a new philosophy, is given over to a discussion of that favorite scholastic concept, substantial forms, with which it was common to connect the peculiar properties (*proprietates*) or occult virtues of particular things. Henry, on the contrary, holds that to each is joined a certain proportion or disposition of the ordinary sensible qualities which no other thing has and which is sufficient alone to explain all its remarkable effects. The subject involves Henry in a good deal of digression in the nature of discussion of scholastic problems which do not possess any great interest for our investigation,

[24] Cap. 25: FL Ashburnham 210, fol. 100v, col. 1; Vienna 4217, fol. 37v, col. 1; Sloane 2156, fol. 135v, cols. 1-2. The passage seems to deserve quotation in full.

"2° sequitur quod aliqua species videtur possibilis per naturam adhuc cuius nullum individuum fuit umquam. Apparet quia si nove species morborum sunt possibiles et natura non deficit in necessariis ergo etiam videtur quod nova species herbarum vel plantarum vel huiusmodi possit facere oriri quia tunc a primo erit eius necessitas in universo, igitur ante non oportuit eam in esse poni a cursu nature. Sic etiam possibile est quod per naturalium virium combinationes possunt fieri multe species viventium et non viventium quarum nullam natura umquam produxisset sue regularitati dimissa, quia plures videntur species possibiles per naturam quam secundum datam dispensationem et cursum secundum quem erat instituta produxisset, sicut et deo sunt multa possibilia que non est producturus."

[25] Cap. 18.

[26] The passage precedes that quoted in note 24 in the same chapter 25.

but of which it may be well to say something in order to give the reader a more catholic view of Henry's treatise in both its strength and weakness. Thus the supposed fact that the poisonous herb mandragora has a figure and material organization like that of man, and yet its form differs in species from that of man, raises the question whether the soul of man can have a like proportion and intensive configuration of elemental qualities to that of the form of the mandragora. It is suggested that during the corruption of the human body the first qualities might be altered to the proportions in which they occur in some other living being, although it would seem that the vast number of possible permutations and combinations would render this very unlikely. That a fox might be generated from a dead dog is also seriously considered. This in its turn soon merges into a discussion of the relation between the form of the living man and of his corpse, and the question whether, and if so how soon, a plant or animal of another species can be generated from a dead body, human or animal. Henry furthermore credulously tells of the body of a dead saint in England that has to be shaved regularly. His explanation of the marvel is that some vital form, only vegetative in character however, has been introduced into the matter of the corpse[27] and has kept the hair growing. In the twentieth chapter he discusses the difference between substance and accidental forms. It is asserted that another living substantial form never immediately succeeds to the corruption of a living being, and that between the *complexio* of a living man and that of his corpse there intervene innumerable species, and yet in fact there is always made immediately the jump from the one extreme to the other.

Some of Henry's sweeping generalizations in the preceding paragraphs serve to illustrate his tendency to utter dogmatic dicta, a practice on his part which seems hardly consistent with his doubting attitude as to occult virtue and many of the tenets of the astrologers, and his affirmation that many details of nature are unknowable. Yet he will confidently assert that nature

[27] For this story and the preceding generalizations see cap. 4, "Movetur dubium circa predicta de mandragora."

abhors that anything should be idle or in vain as much as it does a vacuum.[28] On the one hand, he will doubt whether the medical man can ever ascertain all the proportions of the four qualities in the human body or any member thereof.[29] On the other hand, he will state as axiomatic that man and other animals have less latitude of *complexio* than more imperfect beings.[30] Henry takes the view that each particular thing has its natural organization and configuration which it automatically strives to regain whenever some outside force alters it. Perhaps he regards this natural *complexio* as given to it by God at creation, but he does not definitely say so in the present treatise.

Other stock questions in scholastic disputations which are introduced into our treatise are whether individual men differ essentially in perfection,[31] and why human flesh, instead of being suitable nutriment for man, is most unfitting.[32] To Henry's mind the form of woman is not quite human though striving to be like man.[33] He explains presently, however, that the form of woman is natural to her in the order of the universe and is limited in order to propagate and conserve the species.[34] More bold and alarming is Henry's suggestion in the closing chapter that it is not clear whether all men are of the same species or not, and so too with dogs and horses. He had earlier suggested that corpses which had been of the same species when living might differ in species from one another when corrupted.

Several chapters of the *De reductione effectuum* deal with the influence of the stars.[35] Henry accepts the usual distinction of macrocosmus and microcosmus,[36] and, as in *De habitudine*

[28] Cap. 7.
[29] Cap. 8.
[30] Cap. 9.
[31] Cap. 9.
[32] Cap. 13.
[33] Cap. 9, "quare natura hominis vel microcosmi continue vero laborat vel nititur se reducere ad complexionem vel organizationem ei equatissimam, et in femella ad complexionem masculi." See also cap. 7, ". . . quia alias masculus et femella differrent specie quidditative et non solum secundum esse naturale."
[34] *Ibid.*, "Sed complexio femelle licet non sit forme hominis naturalis quantum est de se et secundum naturam eius particularem, tamen est ei naturalis in ordine ad universum et sic forma humana limitatur quandoque ad talem complexionem in tali individuo propter conservationem speciei per viam propagationis."
[35] Especially caps. 10 to 13 inclusive.
[36] See cap. 8, "Descendit ad harmoniam

causarum, grants that the stars and spheres exert a very considerable influence and causation upon inferiors. His chief restriction upon the celestial influence is to deny it occult virtue, and to reject the Aristotelian conception of the heavens as a fifth essence different in constitution and qualities from the four elements. As Oresme had limited the celestial action to light and heat, so Henry confines it to species and radiation of the first sensible qualities, although he grants that this is contrary to the accepted Peripatetic philosophy at Paris.[37] He believes, however, that these four qualities of hot and cold, dry and moist, are sufficient to account for the spontaneous generation from putrefaction by the stars of certain plants and animals, and for such other effects as corruption of the air, resulting pestilence,[38] sterilities, and weather changes.[39] As in the other treatise, he sometimes utilizes tenets of astrology as part of his positive argument. Thus we are told that the astrologers would say that it often happens that persons in good health die suddenly, and that an epidemic is possible in which men die, without apparent reason or lesion of the *complexio* and though retaining due proportion of the humors, from the influence of some constellation which prevents these from functioning.[40]

On the other hand, Henry repeats some of the various strictures upon astrology which Oresme had already made. He contends that it is very difficult to predict accurately, because the influx from the stars is reflected and refracted in inferiors like light in water, cloud, and rainbow. Also the multiple variety of the movements of the planets obscures and confuses the influence of the starry heaven, diversifying both intensively and

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et discrasiam microcosmi in generali," and cap. 9, "De comparatione microcosmi ad macrocosmum quantum ad predicta."

[37] Cap. 10; the passage has already been quoted in the preceding account of *De habitudine causarum.*

[38] Cap. 12: "Et ex isto potest sumi etiam unus modus divinationis pestilentie a causis superioribus preter modos in alio tractatu significatos." The "other treatise" here referred to is probably another of Henry's own works. I think that he does not treat of causes of pestilence in the *De habitudine causarum,* so the allusion is perhaps to his discussion of the comet of 1368, to which in that case the *De reductione effectuum* would be posterior.

[39] Cap. 13.

[40] Cap. 8.

remissively its effects upon inferiors.[41] Moreover, fire and ice have the same temperature of heat and cold regardless of what planets are in the ascendent.[42] He also cites Oresme's argument from the incommensurability of the celestial motions.[43]

Henry often employs a mode of expression in the *De reductione effectuum* which seems to ignore the influence of the heavens upon inferior matter. He speaks a number of times of inferior objects determining or appropriating to or for themselves their combination of qualities in its particular intension, proportion, and disposition, as if each substantial form educed its own complex of qualities from matter.[44] But to accept this absolutely would be contrary to the main argument of *De habitudine causarum* which emphasized the importance of superior causes, and also to passages of his work of 1373 against the theory of conjunctions. Moreover, in *De reductione effectuum* he sometimes allows "the subordination of inferior causes to superior causes in educing the form of such a species."[45] His apparent slurring of superior influences elsewhere is possibly because the plan of his treatise calls for a consideration first of inferior objects, but it perhaps also indicates a subconscious tendency on his part to belittle the astrological hypothesis. And his granting the possibility of new species, combinations, and diseases as time goes on would suggest that these and other variations in intensity and remission of qualities were caused by the heavenly bodies. Indeed, he states that the physician in regulating the application of heat and cold to the patient at a given time should

[41] Cap. 11.

[42] Cap. 12; but perhaps I have summarized it too baldly and abruptly.

[43] Cap. 24.

[44] One example is the opening of cap. 7: "Est advertendum propter predicta quod licet quelibet due species substantialis forme appropriant sibi distinctas qualitativas combinationes in materia." See also cap. 6, ". . . secundum quod aliqua alterius animalis forma vel plante sibi appropriat in materia." Cap. 4, "Item inter complexionem hominis et inter complexionem quam sibi appropriat forma cadaveris." Opening of cap. 3, "Et quamvis quelibet substantialium formarum species materialem dispositionem qualitativam notabiliter respectu alterius diversam sibi appropriet." Cap. 9, ". . . una forma substantialis determinat sibi solum unam armoniam qualitatum in materia."

[45] Cap. 6, ". . . a subordinatione causarum inferiorum naturalium ipsis superioribus causis in educendo talis speciei formam."

know not only the patient's constitution but the prevailing hot and cold celestial influences.[46] And there are other passages than this which indicate his acceptance of astrological medicine.[47] He prefers nevertheless to regard the influence of superiors as concurring with and impeding or promoting rather than causing the active natural forces of inferiors, which he seems to regard as having an independent existence. He will not concede that the heating and chilling virtues in inferior bodies are as dependent upon the hot and cold influences of the stars as colors are dependent upon light.[48] On the other hand, the action of active virtues, although they are in due proportion to one another, may be suspended by influence supervening from some constellation.[49]

We heard Henry of Hesse speak of phenomena which seemed mysterious and marvelous as found in the fields of alchemy and of medicine and surgery as well as astrology. Let us see what his attitude was to these other subjects. Henry introduces into medicine the current conceptions of intension and proportion, latitude and configuration. Some of his medical observations have already been cited, such as the possibility of new diseases arising, the need of fitting medicines intensionally and proportionally to the parts of the body, and the doubt whether the art of medicine could ever ascertain the proportion and configuration of the four qualities to the human body as a whole and in every part. Disease is regarded by Henry as variation from the natural latitude of the body or of some part of the body,[50] and since nature tends to restore itself to the best state for itself, medicines are required only to remove impediments to this natural recovery.[51] If these are not known, the best thing to do is to comfort the nature of the infirm member, if this is known. Man, because of the lesser latitude of his *complexio,* is more liable to disorders than a beast, and the beast is more easily put out than a plant. When the latitude of the *complexio* is exceeded,

[46] Cap. 12.

[47] In this same chapter he goes on to admit that pestilence may be caused by the effect of the stars upon the air. See also cap. 8 towards its close.

[48] Cap. 12.

[49] Cap. 8.

[50] Cap. 8.

[51] Cap. 9.

recovery is impossible.[52] Four ways are listed in which a person may sicken without any diseased matter (*sine materia peccante*). The four qualities may have the same intension as in a state of health but diverse species of latitudes. Or the proportion of the qualities may be varied. Or they may be in the same proportion but all proportionally weakened. Or in the fourth place their action may be suspended by some external influence.[53] Henry asserts that there are great possibilities in a duly proportioned diet or medicinal treatment.[54] But of this there seems to be scant hope, since the physician perceives that the proportions of qualities in the patient has altered only by some sensible defect in the natural operations. "Therefore it is not possible that he restore a lost state of health to its exact previous condition except by chance."[55] Thus the application of the new "art of latitudes" to medicine has not increased the prospect of cures, but has only succeeded in making the whole situation seem more intricate and confusing.

Nevertheless Henry was not without faith in the validity of medical compounds and marvelous confections, for he states that these and the recipes of the alchemists show how much force there is in compounds of qualities or special combinations of active virtues. His attitude to alchemy is surprisingly favorable. He affirms that by mixtures of such chemicals as alum, arsenic, sal ammoniac, and vitriol, and by artificial processes diverse species of metals and gems and various marvelous waters and colors are produced. There must be systematic mixing and carefully measured and proportioned processes of transmutation, so that, by application of certain latitudes of heat and the like, gold or copper may result from similar materials in like proportions.[56]

While Henry apparently does not object to medical compounds or to alchemical recipes, there are some combinations which he censures as illicit, such as those of the *Liber vaccae,* which

[52] Cap. 9.
[53] Cap. 8.
[54] Cap. 23.
[55] Cap. 8.
[56] Cap. 23.

are justly prohibited. And likewise those of arts which abuse the forces of nature, such as magic and experimental arts—a verbal coupling which is probably borrowed from William of Auvergne, bishop of Paris. And now alchemy is spoken of less favorably, for Henry says that nature abhors abusive combinations made by men and spirits in magical or alchemical transformations. But this single association of alchemy with magic, like that of magic and experimental arts, should not be overemphasized. Henry does not dwell at all upon either association, and the probability is that these are mere phrases which he repeats from earlier authors or from memory without their having any real meaning for him. Other possible combinations he represents as useless.[57] As for magic, Henry closes his treatise with the declaration that demons cannot be coerced by natural virtues in any combinations.[58]

Henry has rejected the conception of occult virtue as an explanation of strange phenomena, but his substitute theory has proved neither entirely convincing nor certain to simplify science and increase knowledge of nature. It may be an ingenious hypothesis to suggest that the intension and remission, uniformity and difformity, proportion and configuration of the primary qualities and their derivatives are sufficient to explain all natural forces and phenomena without resort to the occult and mysterious. But when we are repeatedly told that these intensions, combinations, and proportions are for the most part unknowable in detail,[59] the practical value of the new theory becomes dubious. We simply pass from the occult to the unmeasurable, and Henry's sceptical attitude makes him regard the art of medicine as largely guess work. There are, however, fields in which

[57] For the statements made thus far in this paragraph see cap. 24.

[58] Cap. 25.

[59] Besides the passages already quoted from chapter 8 on the barriers to medical knowledge, see cap. 24, opening, "Sed dubitatur iuxta materiam capituli precedentis et pro eius ampliori pertractatione utrum homo possit naturaliter discernere vel cognoscere qui quales et quanti effectus speciales et mirabiles naturalium virium combinationibus fieri possint et qui non." Also, in cap. 25, ". . . a communi cursu alienissimus vel dissuetissimus effectus in quem naturalium virium combinationes possunt ab homine non potest reperiri. patet ex propositionibus precedentibus."

Henry's scepticism does not function. He denies occult virtue but he accepts all the old occult phenomena: spontaneous generation, the transmutation of metals, the possibility of dead dogs breeding live foxes, dead saints that still grow beards, the marvelous mandragora, and what not. Indeed, while Henry has taken up with a new theory, he has no new facts at his disposal and therefore not unnaturally still accepts the old fictions.

Henry also develops a number of seemingly very remote and improbable contingencies of his own. If his intensions and proportions and combinations are as multiple and intricate as he represents, it would seem extremely unlikely that in the human *complexio* the four qualities would all be remitted in exactly the same degree so that the proportion and harmony between them would remain identical. Yet he envisages this as a distinct possibility.[60] It seems equally visionary that the *complexio* of a human corpse would coincide with the configuration of qualities in the mandragora,[61] when the possible permutations and combinations are so numerous. Also too much stress seems to be laid upon such remote possibilities as that of two equal intensions one should differ from the other in its intension according to the extension of its subject, or that a uniformly intense latitude should be exactly equal to a uniformly difform latitude.[62] These are leaves belike from the *Calculationes* of Richard Suiseth. Such scholastic subtleties would indeed seem of little practical concern, and Henry appears somewhat stupidly inconsistent in dwelling upon them, when so much of his argument is devoted to emphasizing the almost infinite variations and combinations possible under his hypothesis. Furthermore it sounds carping for him and Oresme to charge astrology with being too intricate or in part unknowable, when the same accusation may be made with equal justification against their own favorite scientific hypothesis, unless their aim be simply to increase the amount of uncertainty and to magnify the extent of the unknowable.

[60] See cap. 5 at the beginning.
[61] See cap. 6.
[62] Cap. 5.

Yet we must regard Henry's two treatises as of some significance in the history of thought, possibly even as marking a distinct turning in the long road from ancient Greek philosophy to modern experimental science. On the one hand, we see the Hessian of Paris upsetting Aristotelianism on certain points by his fourteenth century variety of relativity with its intensive configuration of qualities and proportional organization of things. On the other hand, we see an opening phase in the last stand of the old theoretical philosophy and an attempt to reconcile it with the new method of experimental testing by instruments, such as the lens of perspective and the alembic of alchemy, which had been developing for some time in the Arabic speaking world and then in the Latin middle ages. Combining things and measuring things, that was what the world was coming to. Aristotle indeed had observed and classified the ways of fish and birds and other natural phenomena with a keen eye and brain. But the attempt of Oresme and Henry of Hesse to apply the current fourteenth century "art of latitudes," theoretical as it was, to the solution of natural problems must be regarded, like the *Calculationes* of Richard Suiseth, as an important first step towards the development of modern mathematical method and its application to scientific questions.

While Henry of Hesse repeated some of Oresme's particular arguments against astrology, he does not seem to have ventured to compose another general onslaught upon divination or astrology, but to have preferred to supplement and reinforce Oresme's several works of this sort by more specific and limited criticisms of particular parts of astrology, such as the confidence in comets and in the conjunctions of the planets as signs or causes of future events. Indeed, in dealing at length with these phases of astrology he went farther in the direction of scepticism than Oresme had cared to do, since Oresme had limited his hostility to astrological elections and interrogations, and had not extended it to the subject of revolutions and conjunctions.

The same comet of 1368, which evoked at Bologna from John of Legnano an astrological interpretation of its significance,

called forth from Henry of Hesse at Paris a denial that the appearance of a comet was a prognostic sign of any future events. The medieval German theologian's attack upon the superstitious fear of comets in his *Questio de cometa* anteceded by more than three centuries the famous *Essay on the Comet* of the French sceptic, Pierre Bayle. Henry's tractate is much briefer and less discursive than Bayle's, sticking closely to its particular theme and not using the comet as the later essayist did as an entering wedge for a more general onslaught upon superstition of various sorts. Unfortunately it is not only less witty and less readable than Bayle's sarcasm, it also bases its whole attack upon prognostication from comets upon wrong scientific premises and so could be of no enduring value. When you attempt to criticize astrologers, it is just as well to stand upon firm ground in your astronomy and meteorology. But Henry of Hesse accepts as the foundation stone of his argument the Aristotelian incorrect explanation of comets as exhalations of earthly vapors to the upper regions of air and fire. Since, however, this definition was widely accepted at that time, Henry's treatise may well have exercised some passing influence, and we will briefly recapitulate the main points in its argument.[63]

Henry holds that since comets form only in mid air they can have no future effect upon the earth or the lower atmosphere. Great winds may accompany comets and even be the cause of them, but the comets do not produce the winds. It is not strange that pestilence often follows the appearance of a comet, but this is because both are due to the same cause, namely, pestilential vapors in the viscera of earth, such as poison men who dig wells, and whose exhalation from the earth gives rise to both comets and plagues. By such reasoning Henry tries to explain the natural ills which were supposed to follow the appearance of comets. He further contends that the comet is not

[63] Henry's treatise on the comet of 1368 I have seen in a MS at Paris, BN 16401, end of the 14th century, fol. 110r *et seq.*; but I have chiefly used for it a rotograph of a MS at Vienna, 4217, fols. 38v-45r, which has already been mentioned by Roth. For these and other MSS of the treatise see Appendix 27. It was edited by Hubert Pruckner, Berlin, 1933.

caused by or associated with any particular constellation, and that it is unnecessary to invoke such astrological influence to account for the aforesaid natural accompaniments of comets. It is idle in his opinion for astrologers to base special judgments concerning rulers and regions upon comets, or indeed to make any predictions which they would not have made had the comet not appeared. Moreover, it would be impossible to make such astrological prognostication from comets, because one cannot tell exactly where the comet first appeared or connect it with certainty with any one planet or house.

The latter half of Henry's treatise leaves the question of comets' future influence and astrological significance to consider such matters as their size, shape, and motion.[94] Some of the affirmations made in this connection are intended to reinforce the previous point that it is difficult to make exact observations of comets, and therefore difficult to connect them with any particular constellation. We are surprised to hear, however, that comets derive their circular motion from the diurnal movement of the heavens or *primum mobile,* when all Henry's previous argument had been devoted to affirming that they belonged exclusively to the inferior world of the four elements and had no relation to the heavenly bodies.

In closing Henry reverts to the astrologers, of whom he makes some further general criticisms. They owe their reputation largely, he holds, to the patronage and favor shown them by kings and magnates. This reminds us of Oresme's effort to dissuade kings and magnates from their devotion to astrology. Henry grants, however, that even many persons who understand philosophy have been blinded by the ancient authority of the astrologers. He accuses astrology of too close association with such arts as geomancy, magic, and nigromancy, and inveighs against such books of magic images as those of Girgit. The catholic church holds that such images work their wonders by the virtue of demons and not of natural objects. One must be-

[94] His method of treating these matters may be seen in more detail from a list of the headings in his text which is given in Appendix 30.

ware lest such damnable superstitions are introduced in astrology. Henry also protests against the practice of regularly ascribing all unusual events to the comets, eclipses, or conjunctions which have occurred recently, although they may be quite impertinent to the following events. Finally he criticizes the *Quadripartitum* of Ptolemy for the insufficient reasoning upon which it bases the assigning of houses to the different planets.

The attitude of Henry of Hesse is very similar in another treatise, *Contra coniunctionistas,* directed against astrologers who predict on the basis of conjunctions and revolutions of the planets and eclipses. This treatise was particularly evoked by recent predictions of this sort of the year 1373, when there was a conjunction of Saturn and Mars in March. These predictions were of fatal wars and human mortalities, sterile years and excessive winds. A very cold winter was predicted, but it turned out in fact to be very warm. On the other hand, the astrologers failed to predict the great inundations throughout France and Germany in January, 1373.[65] Thus just as Pharaoh's magicians were unable to produce minute forms of life like lice, which should have been the easiest feat for them, so the astrologers failed to forecast floods which they could do without violating free will. Henry goes on to suggest a natural explanation for these floods apart from the stars. The preceding summer had been very hot and dry, rendering the earth's surface porous and hardening the walls of its caverns. A damp and rainy autumn then filled these subterranean reservoirs with water which overflowed during the winter. As proof he adduces the reputed fact that water gushed forth in many places where no springs or fountains had been known before, often in as many as four or seven places within the distance of a league. But this natural explanation from inferior phenomena seems entirely *ex post facto;* Henry did not predict the floods in advance from weather observation any more than the astrologers did from watching the stars. A Carmelite, it is true, is said to have announced to the members of his order

[65] *Contra coniunctionistas,* II, 7; Sloane 2156, fol. 220v, col. 2. The passage is omitted in Ashburnham 210, fol. 81r-v, where this chapter ends with the words, ". . . . circa hoc sibi fabricasse."

that the mountains would disgorge floods, but whether he did so from natural observation and inference or from prophetic power is not made clear.

Henry appears to write at Paris "for the sake of exercise and truth," and opens his treatise with the statement that the university of Paris hates those who observe vanities to excess and has never been the source of vain rumors and superstitions as some other universities have been, but rather the examiner and extirpator of such, and the tribunal to which all dubious opinions have been referred for approval or condemnation. Henry's treatise divides into three books. In the first, which runs to seventeen chapters, he examines and calls into question the doctrine of conjunctions. In the second book of eight chapters, he contends that, even granting the foundations of that doctrine, the astrologers could not predict accurately from it. In the third book, consisting of four chapters, he argues that pestilences and barren years could be predicted as well from the ordinary influence of the stars without having recourse to conjunctions, eclipses, and revolutions.

As in the *Questio de cometa,* Henry makes a number of criticisms of astrology in general, such as the uncertainty of its assumptions, or the difficulty of its observations, or the inconsistency of its theory and practice with natural philosophy as well as Christian theology. But all these we have heard before from himself and from Oresme before him. Thus he repeats the four generalizations concerning the action of the intelligences which move the orbs with which he had opened the *De habitudine causarum.*[66] He assails the argument of the astrologers from experience, holding that much of it is *ex post facto,* or that they confuse mere sequence with causation.[67] He questions again if such arbitrary divisions of the circle of the zodiac as signs, *facies,* and *termini* possess influential properties affecting inferiors.[68] He notes that even epicycles and eccentrics are a mere hypothesis to save appearances[69] and that the existence of a

[66] *Contra coniunctionistas,* I, 14.
[67] *Ibid.,* I, 13.
[68] *Ibid.,* I, 2 and 17.
[69] *Contra coniunctionistas,* I, 2.

ninth sphere is disputed.[70] But such arguments and criticisms do not mean that he rejects astrology entirely. He merely wishes to make it more natural and scientific. Truth lies amid the errors of the astrologers, but unless the art is purged by wholesome disputation, he fears that it will perish together with their mistakes.[71] As usual he denies any occult influence to the stars and tries to account for their effects solely in terms of the four qualities. He thinks of the influence which they exert merely as a matter of physical radiation which may be shut off by the interposition of other bodies as one excludes the moist effect of the moon by closing the window,[72] which is here probably thought of as opaque rather than transparent, wood perhaps rather than glass. Even the interposition of thick clouds would in his opinion greatly reduce the force of the celestial emanations. Yet he will not deny that in the superior bodies there are many habitudes causing or inclining inferiors to diverse dispositions and effects and from which some predictions of the future may be made.[73] He even allows the stars a certain influence over men, though less in these days of grace than when before the birth of Christ they were more carnally minded.[74]

It is the astrological doctrine of conjunctions which is the primary object of Henry's attack in the present treatise, and his other criticisms of astrology are made mainly in order to sap its foundations the more. After devoting four chapters[75] to a lucid setting forth of the theory of true and mean conjunctions, change of *triplicitas*, and so forth, he makes such objections to the doctrine as that the influence of two planets should be greater when separate than when conjoined and so interfering,[76] and a phenomenon is not to be regarded as portentous simply because it is of rare occurrence, which he stigmatizes as a popular and unscientific notion.[77] He even cavils against annual predictings from the revolution of the year or entry of the sun into Aries,[78]

[70] *Ibid.*, II, 5.
[71] *Ibid.*, I, 2.
[72] *Ibid.*, I, 9; II, 4.
[73] *Ibid.*, II, 8, closing sentence.
[74] *Ibid.*, II, 1.
[75] *Ibid.*, I, 3-6.
[76] *Ibid.*, I, 7.
[77] *Idem.*
[78] *Ibid.*, I, 10.

but in later chapters seems much more favorable to this.[79] He does not hesitate to cite as authoritative in arguing against conjunctions so extremely astrological a treatise as the *Centiloquium,*[80] nor does he appear to entertain any doubts as to the authenticity of its attribution to Ptolemy. On the other hand, he refers to one of the errors of Alkindi in his *Theory of the magic art,* and later alludes to a condemned article of the same work by Alkindi under its alternative title, *On stellar rays.*[81] These condemned errors to which he makes reference are listed with other sets of errors in a manuscript of the late fourteenth century at Erfurt.[82]

We must further notice that for an opponent of the doctrine of conjunctions Henry displays scant familiarity with the recent literature of predictions from conjunctions. The names of John of Eschenden, John de Murs, and Geoffrey of Meaux, of Leo Hebraeus and Firminus de Bellavalle, are never mentioned in his *Contra coniunctionistas,* and that although, as we are about to see, he has much to say concerning the conjunction of 1345.

Henry was especially aroused by the practice among the astrologers of recurring to past conjunctions of twenty years or more ago for the explanation of present effects.[83] In the predictions for 1373 they had gone back to the conjunction of Saturn and Jupiter in 1345 for explanation of the prevailing pestilence. Henry argues both against its being the cause of pestilence in the first instance and against its influence continuing to date, or there being any connection between it and the conjunction of Saturn and Mars in 1373. In this connection he displays a singular ignorance of the first outbreak of the Black Death and its attribution at the time to this very conjunction, for he says that had this conjunction of 1345 been the source of the pestilence, there would have been a great outbreak of plague at the time of the conjunction, but that this is disproved by experience.[84] More

[79] *Ibid.*, II, 3 and 5.

[80] Among numerous citations of it are I, 5; II, 3 and 5.

[81] The work is variously called *De radiis stellicis* or *Theoria* (or, *Theorica*) *magicae artis.* Henry's references occur at II, 4 and 6.

[82] Amplon.Q.151, fols. 17-19.

[83] *Contra coniunctionistas,* I, 8-12; III, 2.

[84] *Contra coniunctionistas,* I, 9, closing

telling from the astrological standpoint is the argument that the change in 1365 of the conjunction of Saturn and Jupiter from the aerial to aquatic *triplicitas* would end the duration of the influence of any previous occurrence of the conjunction such as that in 1345. We also have such arguments as that the beneficent influence of Jupiter should have counteracted the pestilential tendency of Saturn, while the contention that Saturn was dominant in the conjunction of 1345 because in the aux of its epicycle is branded as contrary to natural philosophy, since its influence should decrease with its distance from the earth.[85]

In addition to the theory of conjunctions Henry once more attacks the doctrine of aspects. He holds that there is no sound reason for preferring the tertiary, quaternary, and sextile aspects as more influential than others, and that anyway mathematical figures can produce no change in the natural powers of the stars,[86] although the objection that the planets may act more potently when in certain ratios of proportion or musical consonance or may lose the virtue in one position which they possess in another, like the magnet in some parts of Norway, gives him some difficulty.[87] The existence of critical days in disease which he accepts also makes it hard not to recognize that the moon at certain points in its orbit exerts a special influence, which seems analogous to the doctrine of aspects.[88]

Henry's objections to the predictions of 1373 are partly that they were made by incapable men who were not properly trained astrologers. In Henry's opinion the expert astrologer must attend to inferiors as well as superiors, and examine patient as well as agent. He must know geography and political conditions in order to be able to predict as to war and peace and the affairs of kings.[89] He should compare the figures of previous conjunctions and eclipses and have the revolution of the year well in

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words: "Item si ex parte coniunctionis tunc eo tempore quo fuit coniunctio potissime viguisset mortalitas ut apparuit ex confirmatione superius facta sed falsitas multotiens apparuit per experientiam."

[85] *Ibid.*, I, 8.
[86] *Ibid.*, I, 14.
[87] *Contra coniunctionistas*, I, 15.
[88] *Ibid.*, I, 16 and 17.
[89] *Ibid.*, II, 2.

mind in judging any present conjunction or eclipse, declares Henry[90] despite his previous objections to astrologers harking back to the conjunction of 1345 and judging of the year from the entry of the sun in Aries. He should note the ascendent of the particular region in question and the nativity of the reigning monarch and the constellations that prevailed at his coronation.[91] If Henry seems inconsistent in conceding so much to astrology, we should remember that he is now admitting the foundations of the art which he questioned in the previous part of his work. It cannot be denied, however, that this method rather weakens the first impression.

But perhaps the most startling of Henry's conclusions is that many combinations of the movements and positions of the stars are "useless and sophistical," and that it is consequently difficult to tell which constellations cause natural effects. Some are certain to come true, others are conditional, yet others are chimerical, and astrologers must distinguish between them as logicians do between sound argument and fallacies.[92] It is not so much the assertion that the sky sometimes deceives its interpreters and that its signs fail which surprises us here. For this much Henry was able to cite so stout a partisan of astrology as Guido Bonatti of the previous century.[93] It is rather the implication that nature sometimes produces phenomena in vain and does not always act for the best which amazes us in so close a follower of the natural philosophy of Aristotle as Henry of Hesse. Nature as a wastrel and sophist was not a usual ancient or medieval conception. But the meaning may be simply that certain astrological figures or relationships between the changing positions of the stars which men have devised are "useless and sophistical."

The last part of Henry's treatise is largely devoted to suggesting other possible causes of pestilence than astrological conjunctions. Recourse is had once more to diffformity and proportion,[94] and "Silvester"[95] is quoted concerning the absence of poison

[90] *Ibid.*, II, 5.
[91] *Contra coniunctionistas*, II, 5.
[92] *Ibid.*, II, 7.
[93] *Ibid.*, II, 6.
[94] *Ibid.*, III, 3.
[95] *Ibid.*, III, 4, "Silvester de mirabilibus hibernie refert. . . ." Presumably Geraldus Cambrensis is meant.

in Ireland, its superfluity in certain other regions, and the medicinal gems and virtuous roots which the orient produces. "For they (i.e. the orientals) are forced to discover many medicines by their experience of many diseases." Henry grants, however, that there is no poisonous plant or venomous animal whose deadly effect upon the human constitution cannot be exactly duplicated by some influence of the sky acting directly upon the human body.[96] He also now admits that the influence of Saturn or Mars may produce pestilence, and that the virtue of past constellations may linger a while in the air just as iron remains magnetized. He merely insists that plague may also be due to inferior causes, and that the stars produce it not by occult influence but through action of the ordinary material qualities.

Two or three further specimens of Henry's scientific caliber may be adduced from this third part of his work: they are in part of an advanced, in part of a backward character. We have sometimes been given the impression that the conception of gaseous substances other than air, as well as the word *Geist* or gas, originated in Van Helmont's time. But Henry offers a good illustration of its medieval currency when he states that the exhalations from water are aqueous, those from earth are nothing but earth reduced to a state of vapor, and those from putrefying corpses are merely flesh in a gaseous condition—*caro subtiliata*.[97] He also, as we have seen, was acquainted with the variation of the magnetic needle near the north pole. He observes that regions become rejuvenated or grow arid and old with climatic change.[98] On the other hand, he still thinks of the southern hemisphere as uninhabited and probably covered with water. God, Henry affirms, ordained the northern quarter of the earth alone as dry land, so that the influence of the stars apply only to it and are in vain below the equinoctial line where nothing would grow, even if there were dry land there.[99]

[96] *Idem.*, "Igitur non est aliqua species plante venenose vel animalis venenosi . . . quin aliquando influentia celi equivaleat virtualiter illius complexioni et per consequens ita interficit sicut si illa species veneni secundum propriam complexionem applicaret complexioni humane."

[97] *Ibid.*, III, 3.

[98] *Ibid.*, II, 3.

[99] *Ibid.*, III, 1.

Indeed Henry's attacks upon astrology would impress us more, were they not supported by such equally incorrect scientific hypotheses as spontaneous generation of lower forms of animal life from putrefaction or the explanation of comets as formed from exhalations of vapors from the earth. His criticisms of unwarranted assumptions in the art of predicting from the stars would seem more rational, were they not combined with credulous acceptance of wayfarers' and old wives' tales or such supposed manifestations of underlying sympathy in nature as instant warning of distant deaths of dear ones or the reaction of a corpse to the presence of its murderer. We cannot escape the feeling that Henry's criticism of astrology is somewhat carping and forced, wanting in whole-heartedness and complete candor. It is something of an anomaly compared to his total view of nature. It lacks a broad basis of general and consistent scepticism. It has no deep foundation in systematic scientific progress. It is largely a feat of dialectic motivated to some degree, though perhaps subconsciously on Henry's part, by Christian theology. We suspect that it is not his arguments and assumptions which have moved Henry to attack astrology, but that it is his intention to attack astrology which has led him to his assumptions and arguments. He could probably have argued as well for regarding comets as heavenly bodies or against generation from putrefaction, had he been bold enough to do so.

Despite Henry's tendency to criticize and belittle astrology or at least certain features and phases of it, he was claimed as a representative of the art by Simon de Phares at the end of the fifteenth century. Simon, who spoke of Henry under the year 1357, declared that he had shown his erudition in the science of the stars in a sermon preached before the king and princes of France, of which the text or incipit was, "Fundavit eam Altissimus." Simon added that Henry distinguished himself at the court of Rome, where he was sent with Girard Groet, a name which suggests the founder of the Brethren of the Common Life, by several successful judgments. And that some say that he predicted the capture of king John at Poitiers on the

basis of the nativity of Geoffrey de Charigni who that day bore the oriflame.[100] Henry's attitude was misrepresented in a different way by Pietro Passi in his work on natural magic of 1614 in which he quotes Henry of Hesse as denying that the magnet derived its attractive virtue from the sky and as maintaining that it was a specific property characteristic of the whole species.[100a] But we have heard Henry deny such occult virtue in the very case of the magnet.

The treatise of Henry of Hesse on distinguishing spirits (*De discretione spirituum*) contains one or two points of interest to us. It was widely influential[101] and represents a theme of which other authors treated in the later middle ages, as we shall see in the case of Gerson. A treatise on the same subject by Henry of Vrimaria was printed with that of Henry of Hesse in 1652.[102] Hartwig speaks of our work as in thirteen chapters, but there are fifteen in both the edition and the Vatican manuscript which I have used.[103] The latter chapters are largely devoted to the difficulty in discerning persons fit to be vessels of divine revelation from those who are not, and need not further detain us. The first part of the treatise is more germane to our investigation.

[100] *Recueil des plus celebres astrologues,* ed. E. Wickersheimer (1929), p. 223.

[100a] Pietro Passi, *Della magic' arte overo della magia naturale, discorso nel quale si mostra che le meraviglie che si dicono di essa possono succedere in via naturale e che il Magho può lecitamente usarla,* Venice, Violati, 1614, pp. 48-49: "magnes non habet virtutem attractivam ferri superimpressam a caelo sed illam habet tanquam secundum qualitatem a tota specie consequentem suam complectionem specificam quemadmodum est de viribus herbarum et lapidum et seminum." I have made some search for the passage, but since Passi cites no specific work and chapter, such search is difficult. Possibly the passage may be from one of Oresme's works which had been erroneously ascribed to, or associated in Passi's memory with, Henry of Hesse.

[101] Hartwig (1857), II, 20-21, speaks of it as a "sehr verbreitete Schrift" and lists several manuscripts at Vienna and others at Leipzig and Strasburg. There is one at the Vatican, Latin MS 9369, of which I have used a rotograph. It is, however, in an irregular and difficult handwriting.

[102] *De spiritibus eorumque discretione libri duo, prior B. Henrici a Vrimaria, posterior ven. Henrici ab Hassia dicti de Langhensteyn. . . . Item ven. Guilelmi Tolosani . . . tremenda visio de poenis infernis. Ex MSS exemplaribus eruti et ab infinitis mendis correcti. Accessit vita eorundem opera ac studio R. P. Cornelii Dielman,* Antwerp, 1652, 8vo, pp. vii, 209. The work by Henry is found at pp. 123-172.

[103] What Hartwig cites as cap. 10 is cap. 12 at p. 162 of the edition of 1652.

Henry begins by defining spirit, speaking largely, as "anything that is somehow suddenly and occultly motive or vehemently immutative." He distinguishes twelve kinds of spirit. Five are intrinsic or from within: namely, a strong inclination of nature following the constellations at birth or some other accidental disposition; second, habit or custom; third, the smudge which the soul contracts in its union with the body and which stirs man to evil; fourth, great consideration, contemplation, or agitation concerning some good or ill, which sometimes increases so that it leads men into ecstacy; fifth, vehement passion, but this spirit is as it were an effect of those preceding. Such internal spirits would seem more akin to the natural, vital, and animal spirits of Galenic and medieval physiology than to demons and angels. The seven extrinsic spirits are on very much the same order as the five intrinsic, being the attractions of the five senses, love of honors, and so forth. But having finished with the aforesaid twelve spirits, we come to four of a more substantial sort which "principally move and agitate man." These four are his own soul, on which the aforesaid twelve varieties act, the holy spirit, good angels, and bad angels. The last, too, often use the aforesaid twelve as instruments to overthrow and ruin mankind. Men, however, are likewise moved to thoughts and fancies by fear, by the excess of some one of the four humors, by the influence of the stars which last may manifest itself in dreams, and by the multitude and variety of phantasms or species of objects long since stored in the mind and which are apt to rush suddenly into consciousness. None of these four forces should be rashly ascribed to the agency of good or bad spirits, nor should chance mysterious noises.

Such is the tenor of this treatise in which Henry is evidently taking the same course as Oresme and attempting to show that much is ascribed to angels or demons which may be equally well or better explained as due to spirits of another sort and reduced to natural or psychical causes. Hartwig felt that some passages were too favorable to astrology for Henry of Hesse to have written, but we have seen that he is favorable to much of the astrological hypothesis in his other writings, though disputing certain

phases or extravagances of astrology. Moreover, he is hardly a paragon of consistency in any case.

In a Vatican manuscript which opens with the work of Henry of Hesse on distinguishing spirits and then contains his *Speculum anime*, there next follows a discussion whether according to natural philosophy there are any separate substances other than the movers of the celestial spheres.[104] There seems to be no sufficient reason for regarding this as a work of Henry of Hesse, but some of its arguments against apparitions of demons resemble those of Oresme. Thus it is suggested that epilepsy, apoplexy, and other illnesses, black fumes ascending from the stomach, optical illusions, mirages, hallucinations, and so forth may make men think that they have seen or heard something which they have not, and this though they have been awake and not dreaming, and even though they may be good and saintly men.[105] Besides such intrinsic deception, they may be deluded extrinsically by such devices as mirrors or by unusual meteorological phenomena or the great virtues of gems and other things. The anonymous author also advances arguments for the existence of demons, however, and finally proceeds to discuss what they are like, so that he is perhaps more influenced by Witelo than by Oresme.

In 1388, while at the university of Vienna, Henry of Hesse composed a treatise on the Hebrew language which is preserved in a manuscript at Erfurt[106] and has been described and in part edited by Dr. Bernhard Walde.[107] The first part of the work is philological, but the second treats of the mysteries of the Hebrew alphabet. In it Henry displays a cabalistic tendency which ill accords with his earlier criticisms of astrology. For ex-

[104] Vatic. 9369, fols. 26r-30v, "Queritur utrum secundum naturalem (the abbreviated term in the MS actually looks more like *materialem*) philosophiam sint alique substantie separate preter motores orbium celestium."

[105] All these explanations are likewise adduced by Witelo in the thirteenth century in his "Epistola . . . de substantia et natura demonum, utrum sint, quid sint, et quales sint:" Sloane 2156, fols. 148-154; edited by A. Birkenmajer, 1921, but this edition I have not seen.

[106] Amplon.Q.125, fols. 254r-265r: Opus M. Henrici de Hassia de idiomate hebraico.

[107] In his *Christliche Hebraisten Deutschlands am Ausgang des Mittelalters*, Münster i.W., 1916, pp. 8-30.

ample, from a numerical calculation of the value of the letters of the Hebrew and Latin alphabets he believes one can obtain the duration of the old and new covenants respectively. He therefore reaches the conclusion that antichrist will appear in 1666 A.D.[108] He also discusses the Tetragrammaton.[109]

In 1392, or thereabouts, only a few years before his own death and long after he had left Paris for Vienna, Henry of Hesse discussed the prophecies of a hermit named Theolophorus or Telesphorus.[110] This prophecy by brother Telesphorus of Cosenza enjoyed a considerable vogue as numerous manuscripts of it, some with fine miniatures, attest.[111] It was addressed to Antonio Adorno, doge of Genoa, on September 3, 1386, and is interpreted by Kampers as masking French propaganda for the annexation of Genoa.[112] It owed a good deal to the recent prophecies of Rupescissa. In an Escorial manuscript Henry's treatise against this Telesphorus is given in the form of a letter to an archdeacon of Salzburg, Gregory Schench.[113] Many such predictions, Henry tells us, had been evoked by the crisis of the Great Schism, but they were more often divinations than prophecies, or were based in large measure upon astrology[114] which thus seems to have diminished little in consequence of Henry's earlier attacks upon it. Many of these pretended prophets had been already exposed in one way or another, or their predictions had been shown by the passing years to have been false. Henry is suspicious of Telesphorus partly because he dislikes the content of his predictions, Telesphorus having forecast the end of religious orders and that the clergy would lose their temporalities

[108] *Ibid.*, p. 28.

[109] *Ibid.*, p. 29.

[110] "Incipit tractatus venerabilis magistri Hainrici de Hassia contra quendam eremitam de ultimis vaticinantem nomine Theolophorum," or, "Liber adversus Thelesphori eremitae Vaticinia de ultimis temporibus." I have seen no manuscript of it, though there is one at the Escorial, in addition to those at Vienna and Wolfenbüttel mentioned by Hartwig and those at Basel, Innsbruck, and Frankfort listed by Pastor, *Gesch. d. Päpste*, I (1886), 121, note 2, and said by him to vary from the version published by Pez, but have used the printed text in Pez, *Thesaurus anecdotorum nov.*, I, ii, 507-564. For about 1392 as the date of composition see cap. 25.

[111] See Appendix 27.

[112] Franz Kampers, *Die deutsche Kaiseridee in Prophetie und Sage*, Munich, 1896, pp. 124-125.

[113] Escorial C.IV.20; see Appendix 27.

[114] Ed. Pez, caps. 6 and 8.

to princes and powerful laymen. Henry also disagrees with Telesphorus as to the prospect of church reform, holding that there will be no notable reform before the coming of antichrist. As a prophet, whatever his methods, Telesphorus would seem to have been more successful than Henry. But another charge against the hermit is that he had represented an angel as appearing to him in a dream and directing him to read certain books. The character of these volumes makes Henry doubt if the dream was from God, since they included the prophecies of Joachim, of whom Henry does not approve, the prophetic tables of Cyril, which Henry regards as apocryphal and spurious, and astrological treatises which are rejected by the church. Telesphorus had announced the approaching advent of an emperor to be named Frederick III, who had been born under the conjunction of Jupiter and Saturn in 1365, and Henry is becoming impatient for the fulfillment of this semi-astrological prediction, since the future emperor should now be twenty-eight years of age.

While Henry opposed the prophecies of Telesphorus, he had no objection to those of saint Hildegard, if we may accept the ascription to him in two manuscripts at Wolfenbüttel of a letter to the bishop of Worms with regard to her prophecy concerning antichrist.[115] The attitude of this letter is that we should not spurn nor dismiss as fantastic the visions of the devout. The prophecy of the illustrious and holy German nun is therefore revived for the edification and correction of the present age.

Yet another proof than Telesphorus' own vaticination that Henry of Hesse's criticisms of astrology while at Paris had had little effect upon the tendency to combine that art with apocalyptic prophesying is at hand in a pro-German prophecy under the name of Gamaleon which seems to have been composed early in the fifteenth century. This vision divides world history into seven milleniums under the rule of the seven planets and places the present age in the last thousand years which fall under the domi-

[115] Wolfenbüttel 270 (cod. 237 Helmst.), c. 1453 A.D., fols. 385r, col. 1-392r, col. 2; Wolfenbüttel 402 (cod. 367 Helmst.), 15th century, fols. 31v, col. 1-38r, col. 2. See Appendix 27 for further description of these MSS.

nation of the moon and of which six hundred years have elapsed. The upshot of the prediction is that the center of the church is destined to pass from Rome to Mainz.[116]

Moreover, just as Henry's strictures upon astrology failed to prevent Simon de Phares from claiming him as a representative of that art, so his criticisms of the prophecy of Telesphorus did not keep the writers or editors of similar prophecies from placing these under his aegis. Thus at the close of a manuscript in German of a prediction for the year 1401 we read: "Do hat ain end dy weissagung die meister Heynricus von Hessen ist furchamen in seinem schlaf."[117] Or Wolfgang Lazius, the sixteenth century scholar of Vienna, lists a revelation made by God to a monk after the death of Henry of Hesse.[118] Other manuscripts make Henry the author of the prophecy[119] or state that it was found in his bed after his death.[120]

Such is Henry of Hesse's reinforcement of Oresme's attack upon occult science, marvel-mongers, demon-dreaders, and superstition. Not only is it less original than that of his master, it seems less based upon interest in science and to be more a matter of dialectical subtlety. We have already expressed our opinion of his criticisms of astrology and the conception of oc-

[116] Kampers, *Die deutsche Kaiseridee in Prophetie und Sage,* 1896, gives further details of the work at pp. 126-128, and lists the printed versions of it at p. 218, note 5. He interprets it as a reply to Telesphorus.

[117] Vienna 4764, quoted by Carl Koehne, "Die Weissagung auf das Jahr 1401," *Deutsche Zeitschrift f. Geschichtswissenschaft,* neue Folge, I (1897), 353.

[118] *Idem:* "Revelatio cuiusdam religiosi facta illi a Deo inter preces et post mortem M. Heinrici de Hassia primi theologi Academiae Viennensis et nobis super (nuper?) adeo in antiquissimo libro sub finem Apocalypseos in membrana observata." I do not quite understand Koehne's further statement at p. 350: "Mit der Annahme, dass unsere Weissagung schon vor 1401 existierte, stimmt auch die Mitteilung des Wiener Gelehrten des 16. Jahrhunderts Wolfgang Lazius überein, dass eine die Prophezeiung in der uns bekannten Form überliefernde Handschrift dem Theologen Heinrich von Langenstein (†1397) gehört habe." While the MS in which the revelation is written may have once belonged to Henry of Hesse, the revelation was not written until after his death—and so after 1397 rather than before 1401, although it of course may well have been composed between 1397 and 1401.

[119] Vienna 2820, 9042: cited by F. Lauchert, "Materialen zur Gesch. d. Kaiserprophetie im Mittelalter," *Historisches Jahrbuch,* XIX (1898), 852-853.

[120] Dresden cod. M. 63: cited *ibid.,* p. 853.

cult virtue, but there is one final adverse comment to be made. While we should hesitate to describe his works as mere exercises in dialectic, his angle of approach or attack varies so in the different treatises, and he is so ready to resort to diverse means to prove or press his point that we scarcely know just where he really stands, and sometimes it seems doubtful if he is consistent with his own arguments elsewhere. As between his various treatises there appears to be little development of his thought with time or successive treatises. His ideas, taken largely from Oresme and current conceptions, appear as fully formed in his first work as in the others.

A work ascribed to Henry of Hesse in an edition of 1503[121] comes to hand too late for proper embodiment in the foregoing chapter but should receive some mention since, if genuine, it tends to increase our respect for his science. It consists of questions on the *Perspectiva communis* of John Peckham in which a few selected problems from that text-book are discussed quite elaborately. In the last question on the rainbow, for instance, some of the conclusions reached seem an advance over those of Dietrich von Vriberg[122] who wrote between 1304 and 1311 but who is not mentioned. The maximum altitude of the iris is given as forty-two degrees, and it is stated that other colors are formed of varying proportions of white and black, light being white, and opaqueness black.[123] On the other hand, our author's much briefer discussion is inferior in some respects to that of Dietrich. For instance, he speaks simply of reflexion of sunlight from the drops of rain and

[121] *Explicit Mathematicarum opus in quo continentur Thome Brauardini Arithmetica geometriaque necnon perspectiva Pissani, Carturiensis unacum questionibus Enrici de Assia in sacra theologia magistri. Impressum Valentie per Ioannem iofre et expensis Hieronymi Amigueti XVIII Octobris anni M D tercii.* The *Questiones* of Henry occupy fols. 47r-65v. Neither Hartwig nor Roth refers to it. For a MS see p. 747.

[122] See E. Krebs, *Meister Dietrich,* 1906, and J. Würschmidt, *Theodoricus Teutonicus de Vriberg De iride et radialibus impressionibus,* 1914, both in *Beiträge z. Gesch. d. Philos. des Mittelalters,* Bde. V and XII.

[123] *Questiones,* fol. 64r, "Ratio omnium predictorum sumitur ex hoc quod lux se habet sicut albedo et opacitas sicut nigredo igitur sicud ex conventu albedinis et nigredinis secundum aliam et aliam proportionem fiunt alii et alii colores medii ita etiam secundum quod lux apparet sub tali vel tali gradu cum opacitate debent apparere alie et alie fantasie colorum."

seems not to take the double refraction of the light passing through the drop into account. The work seems to have been composed at Paris, since its author states that at Paris from the time that the sun enters Aries until it enters Libra a rainbow cannot appear in the south. These very questions were ascribed to Oresme by Amplonius Ratinck in the catalogue of his library which he drew up in 1412,[124] and the manuscript containing them is still preserved at Erfurt.[125]

[124] De mathematica 42, "Optime questiones Orem super perspectiva": Schum, *Verzeichniss*, 1887, p. 804.

[125] Amplon. F. 380, 14th century, fols. 29r-40v, opening, "Utrum lux multiplicetur per radios. . . ."

CHAPTER XXIX

OTHER OPPONENTS OF THE OCCULT

A younger contemporary of Oresme and Henry of Hesse, and like them associated with Paris, where he had pursued his education, becoming a master of arts at eighteen,[1] was Gerard Groot (1340-1384), the learned and pious founder of the Brothers of the Common Life. Throughout his life, and even after he had renounced his benefices and most of his property and assumed the garb of a penitent, Gerard continued to be an ardent book-collector. Before he entered upon the life of renunciation his library had included many books of magic. His early biographer, Ralph Dier de Muden,[2] admits that he studied magic but not that he practiced it, although some accused him of this. When he was taken ill at Deventer and the priest came to administer the sacrament, he admonished Gerard to burn his books of the magic art.[3] When Gerard would not promise to do this, the priest departed without giving him the sacrament. Gerard, who is represented by his biographer as second to no one in the world in all the sciences, liberal, natural, moral, civil, canonical, and theological,[4] then inspected his own urine and saw that he was at death's door. He therefore recalled the priest, renounced nigromancy, had his books of magic burned, received the sacrament, recovered his health, and became another man.[5]

[1] G. Bonet-Maury, *De opera scholastica fratrum vitae communis in Nederlandia*, Paris, 1889, p. 20.

[2] *Scriptum Rudolphi Dier de Muden de magistro Gherardo Grote, Domino Florentio et multis aliis devotis fratribus. Vita Magistri Gherardi Grote.* Published in G. Dumbar's *Analecta seu vetera aliquot scripta inedita*, Daventriae, 1719, Vol. I.

[3] *Ibid.*, p. 2, "venit ad eum dominus Prior curatus eiusdem ecclesie portans secum venerabile sacramentum corporis dominici ammonuitque magistrum Gherardum ut libros combureret artis magice: nam illos libros habuit et artem ipsam didicit, non tamen artem exercuit, licet a nonnullis hoc sibi imputetur. . . ."

[4] *Ibid.*, pp. 1-2, "Contulit se in adolescentia sua ad studium Parisiense ubi in tantum profecit ut credatur iuxta testimonium magistri Wilhelmi cantoris Parisiensis quod in omnibus scientiis liberalibus naturalibus moralibus civilibus canonicis et theologicis nulli secundus esset in orbe."

[5] *Ibid.*, pp. 2-3, ". . . abrenunciavit nigromancie, fecit comburi libros suos il-

Gerard now turned away even from astrology. In a letter to a master Ralph of Enteren[6] he states that he has no use for anyone who wishes to follow after curious matters or the pride of this world. His desire is to forget rather than remember many things, and much of what he collected when Ralph was with him has now become distasteful to him.[7] He admonishes his friend not to correct the errors of Albumasar or he will thereby strengthen astrology. "Don't you see that if I had not discovered such mistakes of Albumasar and others, I might still be held in the chains of the stars?"[8] Gerard further points out that persons who have no solid training in astronomy nevertheless make a great name for themselves, and that whoever chooses to assume the name of a diviner will have many hearers.[9] He affirms that the sort of persons who read Albumasar also believe in the least ligature, in characters, in images, in marvels, in the art of pyromancy, in the names of persons. "And rest assured that I never saw Albumasar, nigromancer, or astrologer who was not a thoroughgoing deceiver."[10] But it is evident that Gerard's opposition to occult arts rests on a feeling of religious revulsion rather than on any rational criticism such as Oresme and Henry of Hesse attempted.

Also contemporary with Oresme and Henry of Hesse appears to have been a Joannes de Livania mentioned in the fifteenth

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lius artis in Brincone, sacramentum dominici corporis suscepit et ad utilitatem ecclesie sue Dominus prestitit sibi pristinam sanitatem. Sanus effectus mutatus est in virum alterum. . . ."

[6] *Gerardi Magni (Groote) Epistolae XIV e codice regio hagano nunc primum editae.* . . . Joh. G. R. Acquoy, Amsterdam, 1857.

[7] *Ibid.*, p. 113, "Nullus mihi utilis est nec ego alicui qui vellet curiosa vel mundi iactantiam sectari. Ars oblivionis in pluribus mihi utilior esset quam memoriae. Multa etiam eorum quae cum mecum essetis collegi iam mihi fastidio sunt."

[8] *Ibid.*, p. 117, "Aestimatisne si non tales falsitates sicut Albumasaris et similium invenissem, adhuc forte catena astrorum retentus fuissem?"

[9] *Ibid.*, p. 120, "Numquid videtis quos noscitis omnino ignorantes nec legitime fundatos in astronomia magnum nomen in studiis reportare? Et quicumque sibi nomen divini assumere vult, multos habebit auditores."

[10] *Ibid.*, pp. 118-119, "Videmus namque hos qualiter credunt in minima ligatura, in carceribus (characteribus?) in imagine, in miris, in arte pyromantica, in nominibus personarum. . . . Et certe numquam vidi Albumasarem nigromanticum vel astronomicum quin ex se totus fuit mendax."

century *Chronicon Hirsaugiense* of Trithemius.[11] Writing of the year 1374, Trithemius states that at this time flourished at Trier Joannes de Livania, a native of the Moselle Valley and a canon of St. Simeon's church, a man of great erudition alike in sacred and profane letters. Poet, rhetorician, and orator, he was also second to no one of his time in astronomy. Besides composing a work in three books against Occam, he wrote against the prophecies of John of Rupescissa and against the quackery of the alchemists, with whose art Rupescissa had so much sympathy. While John of Liven further wrote against uneducated astronomers, he cannot be classed as a critic of astrology, since he also composed a *Defense of the Faculty of Astronomy,* an *Introduction to Astronomy* for beginners, and a book on judging nativities. Possibly astrological conclusions on the coronation of Urban VI in 1378 by a John de Lyviano are also his.

Nicholas Eymeric (1320-1399), Dominican, professor of theology, inquisitor general of Aragon, noted for his book concerning the inquisition,[12] seems to have been a stout opponent of anything that in the least wise approached unto heresy. Besides treatises evoked by the schism in the church, he wrote several against Raymond Lull and his followers.[13] Another work which appears frequently in the manuscripts is directed against the invokers of demons, while towards the close of his life and century he assailed the alchemists[14] and various forms of divina-

[11] In the St. Gall edition of 1690, vol. II, p. 267. I owe the reference to J. N. Hontheim, *Historia Trevirensis diplomatica et pragmatica,* Augsburg, 1750, II, 12. See also Dom. A. Calmet, *Bibliothèque Lorraine,* Nancy, 1751, p. 589, and Houzeau et Lancaster, *Bibliographie générale de l'astronomie,* Brussels, 1887, p. 736, No. 4214, citing a BM Harley MS without shelf-mark. It is Harl. 1006, fols. 297v-298r (now 238v-239r).

[12] *Directorium inquisitionis,* printed in 1578 and other editions. Rather oddly there is no mention of Nicholas Eymeric in the recent work of Roca on John I of Aragon, although it contains chapters on religion and superstition and a letter of the Infant Pere "fideli suo Dominico Eymerici, jurisperito Valencie," concerning a Saracen who was combining the illegal practice of medicine with nigromancy and other forbidden arts: J. M. Roca, *Johan I d'Aragó,* Barcelona, 1929, pp. 374-375.

[13] BN 1464, 15th century, items 5-7, where they follow the treatises on the schism and precede that *Contra demonum invocatores.*

[14] BN 3171, late 14th century, fols. 51v-56r, Contra alchymistas ad abbatem de Rosis decretorum doctorem illustrissimi domini comitis imperiarum cancellario (*sic*). The treatise proper is

tion.[15] It is the last named treatise, addressed to the confessor of the king of Aragon, with which we are at present concerned. Eymeric begins with a consideration of astrology. According to the astrologers and philosophers[16] the heavens are incorruptible, though material and corporeal. But according to theologians and Catholic astrologers they are created by God, for the purpose, however, of influencing inferiors and producing generation in trees, plants, and other natural objects. Thus Eymeric grants the fundamental hypothesis of astrology. He places the number of heavens at twelve: the empyrean, aqueous or crystalline, that of the fixed stars, those of the seven planets, that of fire, and that of the air. Of these the empyrean and crystalline do not move, while the others do. Some things happen of necessity from the influence of the heavens, but others do not, depending either upon human free will or upon the divine or angelic will, concerning which we cannot predict. In short, in some fifteen overlapping and repetitious conclusions Eymeric takes up the usual medieval Christian position towards astrology, that it is in part good and natural, in part bad and superstitious.

Turning to other forms of divination, Eymeric concludes that one cannot predict certainly by means of necromancy, since it involves demonic aid and the devil is a notorious deceiver. Phitomancy, named after its inventor Phiton, he condemns as equally diabolical and unreliable. Such is essentially his conclusion concerning various other varieties of divination: aertomancy, hydromancy, pyromancy, aeromancy, geomancy, ydolomancy, ymaginomancy, spatulomancy, praestigiomancy, sompniomancy, notoriomancy, auguriomancy, aruspiomancy. He seems to get a great relish out of writing practically the same column or page

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preceded both by an *Epistola* (fols. 51v-52r) and a prologue (fol. 52r-v).

[15] *Ibid.*, fols. 81r-95v, Contra astrologos imperitos atque necromanticos de occultis perperam iudicantes ad Thomam Ulzinam ordinis minorum regis Aragoniae confessorem. . . . It opens: "Sacre theologie egregio professori magne honestatis viro primi fidei Thome Ulzine minorum ordinis tam preclari serenissimi principis domini regis Aragonum confessori frater Nicolaus eymericus eiusdem facultatis indignus professor pred. ord. . . ."

[16] The MS, fol. 82r, reads, "iuxta tradicionem astrologorum et theologorum," but this would seem to be a slip of the pen.

of text over and over again concerning each of these. Chiromancy, however, he contents himself with calling uncertain and does not declare it diabolical as well. It is to be noted that he describes geomancy as making use of a circle and a mirror,[17] while the method of divining by chance marking of points or scattering of grains of sand which is usually designated geomancy is called by him geometrimancy.[18]

Towards alchemy Eymeric was much less favorable than towards astrology. He affirms that the alchemists fabricate lies, delude the great, empty men's purses, and defraud the poor.[19] They sin against God and their neighbors, readily degenerate into counterfeiting, and, like superstitious astrologers, are too disposed to invoke demons. They come under the censure of divine law as intent upon gold, and are censured also by human law in the decretal of John XXII which opens with the word, *Spondent*. This pope gathered all the alchemists and natural scientists whom he could at Avignon and diligently investigated the question whether the art of alchemy was in accordance with nature, the alchemists affirming this and the scientists denying it. The pope reached the same conclusion and accordingly issued the aforesaid decretal forbidding the clergy and laity generally to employ the art.[20]

Forlì, which in the thirteenth century had produced Guido Bonatti, perhaps the leading medieval Latin writer on astrology, in the fourteenth century had another native son of some prominence in the same field in the person of Iacobo Allegretti, described to us as "poet, physician, and astrologer," and "a man

[17] BN 3171, fol. 90v.

[18] *Ibid.*, fol. 95r. See above, Chapter 20, note 95, for perhaps a like usage.

[19] *Ibid.*, fol. 55v.

[20] *Ibid.*, fol. 56r, "Quarta questio est ars alchimista si est reprobata etiam lege humana perfecta ita unde dominus papa Johannes XXII existens in avignione habuit omnes quos habere potuit naturales et alchimistas et cunctis de arte alchimie an esset natura in re necne diligentius inquesivit. Et alchimistis stantibus ad affirmativam et naturalibus ad negativam fecit venire ad probam et tandem laborantibus et nichil invenientibus dominus papa contra alchimistas condidit decretalem que incipit spondent tenoris infrascripti in qua artem illam reprobat et reprobando inhibet ne quis illa utatur certis penis inibitione vallando quas incurrant si contra faciant religiosi clerici et layci omnes generaliter includendo."

of ardent genius."[21] He furthermore was the tutor of Carlo Malatesta. Under the name, Tozi of Antilla, he wrote upon divination and predicted war between Florence and the church. This evoked a protest from Piero Coluccio Salutati, the learned and literary secretary of the Florentine republic, in the form of a poem and a letter urging Allegretti to abstain from astrological prediction and adducing arguments against "all that art, nay rather, superstition of divination." Salutati did not deny, however, that the future might be perceived beforehand by a certain faculty or technique of conjecture, but he maintained that no one could predict the future by knowledge of the stars because their courses were not known with sufficient accuracy.[22] He courteously added that if anyone could so predict, it would be Allegretti. Salutati developed the same point of view in his treatise on fate and fortune.[23]

Salutati's strictures upon Allegretti would have been more convincing, had he not a few years before praised Paolo Dagomari for having told the Florentines the right astrological moment to attack the Pisans. Had Allegretti only predicted a continuance of peace between Florence and the church, Salutati would probably have made no complaint. However, in justice to him it should be stated that in his letters he argues frequently against astrology.[24] When Bernardo da Moglio sent him a prophecy of master Benintendi, lecturer on astrology at Bologna from 1330 to 1340, who—Bernardo said—had not made a false prediction for fifty years, Salutati admitted that he had correctly set the dura-

[21] Laur. Mehus (1750), pp. 307-308, where we are further referred to Flavius Blondus, *Italia Illustrata*, Basel, 1559, p. 347; and Geo. V. Marchesius, *Illustrium Foroliviensium vitae*, Forlì, 1726.

[22] Mehus, p. 308: "Non enim nego futura coniecturandi quadam indagine praesentiri. Sed ut hoc facias ad stellarum cursus quos pun(c)tualiter scire non possis humana traditione recurrere semper mihi perridiculum visum est. . . . Nam hoc plane sentio neminem per astrorum peritiam posse futura praedicere."

[23] FL Gaddi Plut. 90 supra, cod. 42, 15th century, fols. 1-45, Coluccii Pierii Salutati de fato et fortuna libri III ad Felicem Abbatem Monasterii Sancti Salvatoris de Septimo Ordinis Cisterciensis cum prooemio ut in codice 18, Plutei 53, 14th century.

[24] More often than is indicated by the usually full index of F. Novati's four volume edition of the *Epistolario di Coluccio Salutati*, 1891-1911, as ensuing citations will demonstrate.

tion of the rule of the Pepoli in Bologna at thirteen years but went on to argue against the possibility of accurate astrological forecasts and to conclude that faith was to be placed neither in the prophets nor the astrologers of his time.[25] When Francesco di Marano da Camerino who also taught astrology at Bologna sent him letters and a prohemium arguing *pro* astrology, Salutati wrote back *con* but nevertheless asked him to send his judgment as to the coming conjunction of Saturn and Jupiter to Malatesta of Pesaro and not merely send the prohemium and withhold the treatise.[26] Thus again there is a flavor of inconsistency in Salutati's opposition to astrology. In defending secular learning to Giovanni Dominici he might grant that there is absolutely nothing in judicial astrology and that "that nonsense" is not to be included among the liberal arts.[27] But when resisting the entreaties of his friends to flee from the pest-stricken city he could ask why they ascribed the plague merely to infected air and not to a certain position of the stars.[28]

None of the writers whom we have considered in this chapter as opponents of occult arts can be compared in that respect with Oresme or Henry of Hesse. Their opposition was, so far as we can see, much less original, more based on previous authorities. At the same time they seem to have been influenced relatively little by the writings of Oresme and Henry of Hesse. And their opposition to occult arts was more the outcome of religious opposition than of scientific or rational consideration.

[25] *Epistolario*, IV, 12-15.
[26] *Epistolario*, IV, 86-91.
[27] *Epistolario*, IV, 226-230.
[28] *Epistolario*, II, 224. "Cur aeri dementes ascribimus et non ad certam positionem siderum etsi non sensibilius longe tamen rationabilius revocamus"?

CHAPTER XXX

GUY DE CHAULIAC AND HIS CONTEMPORARIES

Born at the very close of the thirteenth century, Guy de Chauliac was a simple peasant boy who owed his education to the generosity of local lords. For feudal nobles, even in the degenerate fourteenth century, were not necessarily foes of culture, and one did not have to be a Charlemagne or Alfred the Great in order to favor education. After studying at Toulouse, Montpellier, Bologna, and Paris, Guy became a canon and prévôt of St. Just at Lyons and of the diocese of Mende. He was physician to popes Clement VI, Innocent VI, and Urban V at Avignon, where he met Petrarch. Guy, however, remained unaffected by humanism and must be classed to the credit of medieval scholasticism. His great work on surgery (*Cirurgia*)[1] completed in 1363, is the fullest medieval survey of the subject we possess. Coming relatively late in the period as it does, it gives a valuable account of earlier medieval authors in the same field. But now that these predecessors have themselves been studied, it is found that Guy was not always so superior to them as was once assumed.[2] His reproach that they followed one another like cranes was unjust, and he himself unfortunately followed Lanfranc and William of Saliceto in abandoning the pus-less treatment of wounds which Hugh of Lucca, Theodoric, and Henry of Mondeville had developed. Guy also advised against the use of complete narcotics as dangerous and handled various other matters less satisfactorily than had some of his predecessors. At the same time he was no mere compiler but had especial original merits of his

[1] It may be read in French translation with copious notes and introductory material in the edition by E. Nicaise of 1890: *La grande chirurgie de Guy de Chauliac . . .*, Paris, 1890, pp. cxci, 747.

[2] On this point see especially Walter von Brunn, "Die Stellung des Guy de Chauliac in der Chirurgie des Mittelalters," *Archiv für Geschichte der Medizin* (1921), pp. 65-106, which I follow in the remaining statements of this paragraph.

own and is the first to mention the tooth-key or pelican and perhaps the first to use the catheter to diagnose stone in the bladder. His treatment of luxations of the joints of the hands and feet is highly regarded.

In his work on surgery, Guy shows a sceptical attitude toward what he terms "the fables" of such previous medical writers as Gilbert of England and Petrus Hispanus.[3] He himself, however, does not entirely exclude remedies of an occult character. Thus he repeats the statement of Hermes which had already been quoted by Arnald of Villanova and Peter of Abano, that the image of a lion engraved in very pure gold when the sun is in the sign of Leo, with the moon not regarding Saturn and departing from it, if worn in a belt made of the skin of a lion or of a sea lion, preserves from the stone.[4] He states that when one is being bled he should remove any belt or gems which he may be carrying in his purse or ring, if they possess the virtue of arresting the flow of blood.[5] He recommends very elaborate compound medicines and such animal remedies as an unguent made of seven stewed bats or the oil made from the entire carcass of the fox,[6] or for the hair the urine of a dog kept for five or six days,[7] but he makes little or no use of words or procedures which may be regarded as magical.

On the other hand, he was a firm believer in the importance of astrology in medicine and surgery. In speaking of the Black Death of 1348 he ascribes it to the conjunction of Saturn, Jupiter, and Mars in the fortieth degree of Aquarius, on the 24th of March, 1345.[8] He connects the various parts of the human body with the different signs of the zodiac,[9] holds that the planets should be observed in the administration of purgatives,[10] and would conduct bleeding on astrological principles.[11] Egyptian days, however, like his thirteenth century predecessor, Bernard Gordon,[12] he regards as of little account and no astro-

[3] See his introductory chapter.
[4] *Cirurgia,* VI, ii, 7 (p. 537 in Nicaise's edition).
[5] VII, i, 1 (p. 568 in Nicaise).
[6] VI, i, 1 (p. 397 in Nicaise).
[7] VI, ii, 1 (p. 451 in Nicaise).
[8] II, ii, 5 (p. 171 in Nicaise).
[9] VII, i, 1 (p. 560 in Nicaise's edition).
[10] VII, i, 2 (p. 585 in Nicaise).
[11] VII, i, 1 (p. 566 in Nicaise).
[12] *Magic and Experimental Science,* I, 687-688.

logical significance, although he would continue to observe them in blood-letting because of their hold upon the popular imagination.[13]

In the passages cited above and others Guy refers to a separate astrological treatise which he had written.[14] Nicaise regarded this work as lost, but Nixon discovered it immediately following the *Cirurgia* in a Bristol manuscript of the fifteenth century. In it Guy treats of critical days; often refers to "the wise Egyptians" as a fountainhead of astrological knowledge; places chronic diseases under the rule of the sun, acute diseases under the governance of the moon; gives the properties of the planets and signs of the zodiac; and makes such generalizations as, "If anyone is wounded in the neck while the moon is in Taurus, the affliction will be dangerous."[15]

Guy de Chauliac's contemporaries in the field of medicine displayed much the same attitude as he to astrology and kindred subjects, as we may briefly illustrate by a few specific cases.

Maino de Maineri[16] was one of those to write a treatise on preservation from the pest[17] as a result of the Black Death. He combined medicine with astrology, as we may see from the facts that the opening chapter of his pest treatise is on how man and other inferiors are subject to the celestial bodies, that he composed a *Theoria corporum celestium* as well as a *Regimen*

[13] II, ii, 5.

[14] Nicaise, p. 171, note 3; "Ut dici (*sic*) in libello quem feci de astrologia." *Ibid.*, p. 566, note 1; "Ut in tractatu de astronomia declaravi," etc.

[15] J. A. Nixon, "A New Guy de Chauliac Manuscript," in *Congrès Périodique International des Sciences Médicales*, 17th Session, London, 1913, Section XXIII, History of Medicine, pp. 419-424. See also his article, "Guy de Chauliac, a new Manuscript including the 'Practica Astrolabii,'" in *Janus*, XII (1907), January.

[16] E. Wickersheimer, "Commentaires de la faculté de médecine de l'Université de Paris, 1395-1516," *Collection de documents inédits sur l'histoire de France*, 1915, xcviii, 561 pp., p. xlvii, gives the Latin form of the name as Mayninus de Maneriis: Simonini, as Maynus: whereas it seems to me that in the facsimile which he gives from MS Modena 1360 there is a mark over the y which might indicate the insertion of an er, so that the name would be Mayernus. Simon de Phares gives his name as "Magistrum Maynum de Maynariis de Mediolano," and correctly dates his *Libellus de preservacione epidimie* in 1360:—*Recueil* (1929), p. 227.

[17] R. Simonini, *Maino de Maineri ed il suo Libellus de preservatione ab epydimia*, Modena, 1923, 48 pp.

sanitatis, and that Petrarch mentioned him as the chief of a group of astrologers at the Visconti court.[18] That his period of literary productivity was a prolonged one is shown by the fact that he wrote his *De intentionibus secundis* in 1329-1330, and his *Theory of the Celestial Bodies* only in 1358,[19] while his pest tractate refers to the epidemic current in 1360.[20] Moreover, at the earlier date he was already a married clerk of the diocese of Milan, and in 1331 the pope had to give him a special authorization in order that he might practice medicine at Paris, where celibacy was imposed upon the regents of the medical faculty.[21] Simon de Phares' late fifteenth century notice of Maino is in accord with these informations.

Simon Bredon seems to have been equally interested in medicine and in the mathematical and astronomical sciences. Of the volumes in his library, which we know from the list preserved of books and instruments disposed of by him by will in 1368,[22] rather more were medical than astronomical and mathematical, but of the manuscripts of his own compositions surviving at Oxford,[23] several are mathematical and only one medical. This medical work, however, despite the fact that its author refers to it as "a little work" (*Opusculum*)—perhaps more endearingly than accurately—was apparently a long and elaborate one, entitled *Trifolium* or *Threefold.* The one hundred and twenty odd pages of the extant Oxford manuscript contain only the third of these three *Leaves,* and it is quite incomplete.[24] Macray's cata-

[18] Cited by F. Gabotto, "L'astrologia nel quattrocento in rapporto colla civiltà," *Rivista di Filosofia scientifica,* VIII (1889), 396.

[19] I derive these dates from Dr. Geo. Sarton's forthcoming *Introduction to the History of Science,* vol. III, which I have been privileged to make use of in its manuscript form.

[20] Simonini, *op. cit.,* p. 17, "Causa autem celestis epydimie nunc currentis in hoc anno M.CCC.LX. est perseverantia Martis infortunati in signo geminorum . . ." from cap. 3.

[21] See the *Chartularium Universitatis Parisiensis,* under that year. He also is mentioned under the years 1326 and 1329-1336, *ibid.,* II, i, 291, 341, 360, 663.

[22] The list has been reproduced by R. T. Gunther, *Early Science in Oxford,* II (1923), 53-54.

[23] See Gunther, *ibid.,* p. 52, and "Bredon" in the Index to Macray's catalogue of the Digby manuscripts.

[24] Digby 160, 15th century, membrane, fols. 102r-223, opening, "Intentio mea in hoc opusculo fuit iuxta triplex regimen trifolium ordinare. . . ." The use of the word *fuit* is of itself enough to warn one that this is not the beginning of the work, and a few lines farther

logue of the Digby manuscripts gives a wrong impression that most of the three *Leaves* are included in the manuscript by representing it as divided into three books. It is actually divided into four *Particulae,* of which the first subdivides into three tractates,[25] and even these have not been completed when our manuscript leaves off. This subordinate division into three tractates is not to be confused with the fundamental division into three *Folia,* of which two had been finished before the present text begins. This fundamental division was according to regimen, and the two first *Folia* dealt with conservative regimen and permutative regimen.[26] The present *Folium* deals with prognostication. The second *Particula,* which is not reached in our manuscript, was to deal with prognostications taken from the natures of times, regions, and conjunctions, and would have presumably involved considerable of the astrological theory of conjunctions. It must be confessed that the plan of the *Trifolium* is confusing, for the second tractate is divided into *Particulae* again,[27] and, although in the prologue to the third *Folium* we had been told that this second tractate would deal with signs taken from the pulse and breathing, as the first had dealt with uroscopy, its first *Particula,* in five chapters, is devoted to "universal judgments of medicines." The signs from pulse and breathing begin, however, just before the close of our manuscript.[28]

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along we read, "Tertium folium nunc aggredior in quo tractabitur de signis quibus corpus humanum a futuris morbis preservatur et in sanitate habita conservatur et ei deperdita sanitas recuperatur." In the top margin of fol. 102r is written, "Incipit opus notabile quod trifolium nominatur," but this is evidently not to be accepted implicitly. A later hand adds, "Authore Simone Bredon socio Collegii Merton in Oxonia: 1380."

[25] *Ibid.,* fol. 103r, ". . . in 4 particulas est divisum: 1 pronosticationes sumptas ab accidentibus secundum dicta medicorum; 2 pronosticationes sumptas a naturis temporum regionum et coniunctionum; 3 pronosticationes sumptas a naturis morborum et paroxismorum; 4 de crisi et creticis diebus et de pronosticatione mortis. Prima dividit in 3 tractatus quorum primus erit de signis. . . ."

[26] *Ibid.,* fol. 102v, "de quibus dictum est sufficienter in summa de regimine permutativo de particularibus egritudinibus."

[27] *Ibid.,* fol. 172v, "Explicit tractatus primus de urinarum iudiciis"; fol. 173r, "Incipit tractatus secundus. Prima particula que est de iudiciis universalibus medicinarum et continet capitula 5."

[28] *Ibid.,* fol. 220.

The mathematical and astronomical writings of Bredon comprise an arithmetic, or rather a commentary upon the *Arithmetic* of Boethius;[29] commentaries upon portions of the *Almagest;*[30] tables of chords; and a *Theory of the Planets* opening, "Circulus eccentricus, circulus egresse cuspidis . . . ," of which the authorship is disputed with him by Walter Britte and Gerard of Cremona.[31] There are also briefer mathematical notes and conclusions by him.[32] These are in his own handwriting, of which several other specimens survive in the manuscripts, including notes on his copy of the Oxford *Almanac* for 1344[33] and a solar almanac for the four years 1341-1344, calculated in 1337 and ascribed to William Rede in the table of contents of one manuscript.[34] Bredon's interest in judicial astrology as well as astronomy is further attested by the circumstance that his library comprised as many astrological titles as were devoted to other mathematics and astronomy put together. He also owned a treatise on geomancy.

Bredon is said to have become a fellow of Merton or to have received his M.D. degree, or both, in 1330,[35] and to have previously been at Balliol. His death has been variously placed in 1368, when he made his will, or 1372,[36] while an ascription in one manuscript implies that he was living in 1380,[37] but it has no especial claim to credence.

Nicholas of Lynn was another Englishman in the later fourteenth century of some importance in the history of astronomy and of astrological medicine. At the request of John of Gaunt, duke of Lancaster, he composed a calendar to continue previous

[29] Digby 147, 14th century, fols. 92-103v; and Digby 98, early 15th century, fol. 109 *et seq.* Incipit: "Quantitatum (or, Quantitatis) alia continua que magnitudo dicitur, alia discreta que multitudo dicitur. . . ."

[30] Digby 168, 14th century, fols. 21-40; Digby 178, fols. 42-87.

[31] Manuscripts are numerous: see Digby 47, 48, 93, 98, 15, 207, 168; BM Royal 12.C.IX, 12.C.XVII, 12.E.XXV; Erfurt, Amplon.F.178, F.376, F.394. A. G. Little, *Initia operum latinorum quae saeculis xiii. xiv. xv. attribuuntur,* Manchester, 1904, p. 40, repeats Tanner's ascription of the work to Grosseteste.

[32] As in Digby 178, 14th century, fols. 11v-14.

[33] Reproduced by Gunther, II, 52, in facsimile from Digby 178, fols. 12v-13r.

[34] Digby 176, fol. 71r.

[35] Gunther, II, 52 and 208.

[36] *Idem.*

[37] See note 24 above.

tables for three cycles, or fifty-seven years, which ran out in 1386. Nicholas's calendar covered four nineteen-year periods from 1386 on. Several manuscripts of his calendar are preserved in English libraries.[38] It contained such supplementary astrological information as the relation of the parts of the body to the signs of the zodiac, and of the humors to the planets, directions for finding the ruling planet for any hour of the day or night, where the ascendent is, and the dignities of the planets in the signs. A brief canon by him for bleeding and purging is possibly an extract from the longer work. At any rate its astrological character is clearly indicated by the fact that it opens with citation of the *Centiloquium* ascribed to Ptolemy.[39]

To a master Gerard du Bois are ascribed by Simon de Phares an astrological work of 1361, lesser treatises, and great skill in urine analysis and treatment of diseases.[40]

[38] BM Sloane 1110, Arundel 207, 347, and Additional 15209; BL Ashmole 5, 14th century, this MS is fully described in Black's catalogue; Ashmole 370, 1424 A.D.; Ashmole 789, viii; Rawlinson C.1218, 14th-15th century, fols. iv-29; see also Rawlinson D.238, end 14th century, fol. 15.

[39] BL Ashmole 391, V, 14th century, fols. 4-5, Canon pro minutionibus et purgationibus recipiendis fratris Nicholai de Lynne, opening, "Quia secundum sententiam Tholomei in suo centilogio . . ."

[40] *Recueil* (1929), p. 227. A suspicious circumstance is that the incipit given by Simon for the astrological work of 1361, "Cuiuslibet arcus propositi," is likewise that for one of the books of the canons of 1322 of John de Lineriis.

CHAPTER XXXI

WORKS ON POISONS

Primitive man is accustomed to ascribe any death from an unseen cause to the magical machinations of enemies. Poisoning was for a long time closely associated with sorcery and magic. Mysterious deaths might be attributed to the one or the other, and both purported to employ occult and sensational forces of nature. The same word was used in the Greek and in the Latin language for poison and sorcery, for a drug and a philter or magical potion. The fact that men actually were poisoned supported the belief in the possibility of sorcery, and this belief in its turn stimulated excessive credulity in poisons which were thought to act at a distance or after a long lapse of time. It was for the medical profession to distinguish between poisoning and sorcery, just as between disease and demons, and in our period it was gradually doing so. If, however, we may accept the account by John of St. Victor at Paris in his life of Clement V, when in 1308 the Sire d'Ulmet was arrested and brought to Paris, it was said to be the judgment of physicians that on returning from the wedding ceremony he had procured the death of his wife by poison or sorcery. His concubine and some other women who were accused of aiding him in this were burned or buried alive.[1] On the other hand, when in 1398 two Augustinians claimed power over demons and elements and affirmed that they could cure all diseases, the apothecaries of Paris ridiculed their remedies. Nevertheless they were sent to court to try to cure the mad king, Charles VI. Under the pretence of revealing the perpetrators of thefts they accused various innocent persons. Finally they went too far and charged Louis of Orléans with bewitching his brother. They were publicly degraded by the bishop of Paris and then beheaded by the secular arm.[2]

As in the attempts against the life of pope John XXII and

[1] Muratori, *Scriptores*, III, ii (1734), 457. [2] *Chroniques de S. Denis*, XIX, 10.

others we saw poisoning and image magic combined, so in medieval works on poisons we still find the theory of occult virtue and mysterious influence carried to great lengths. This may be illustrated by consideration of some treatises on poisons from the second half of the fourteenth century. It is probably not accidental that they are all by Italian authors. Not only, with the waning of Montpellier, did the medical schools of north Italy take the lead, but Lombardy had a bad contemporary reputation for sorcery and poisoning. When in 1393, during one of his spells of insanity, the French king, Charles VI, repulsed his queen but paid the duchess of Orléans frequent visits, some contemporaries interpreted this ill, hinting that the duchess had bewitched the king and adducing her Lombard origin in support of their suspicion.[3] It was also a period when popular credence was strong as to the possibility of wholesale poisoning, as in the rumors which were spread more than once of the poisoning of wells and springs by the Jews, lepers, or others. In 1390 certain persons confessed under torture that they had poisoned the wells with the nails and flesh of corpses from the gibbet, the blood of a toad, and other impurities, so that anyone drinking the water would gradually waste away and that in the course of time his hair would fall out and his skin come off at the touch of a hand.[4] Such was the background in everyday, practical life of the learned treatises which we have now to consider. The demand for them is illustrated by the translation into French in 1402, on the order of the marshal of France, Jean Le Meingre dit Boucicaut, of the *De venenis* of Peter of Abano, by the marshal's chaplain, Oger the Carmelite.[5]

In a manuscript at Metz a work bearing the title *Papal Garland Concerning Poisons,* is ascribed to a Gaspar of Sarnana.[6]

[3] *Chroniques de S. Denis*, XIV, 5: "allegantes quod in Lombardia unde ducebat originem intoxicationes et sortilegia vigebant plus quam aliis partibus."

[4] *Ibid.*, XI, 5.

[5] BN 14820, 15th century, fols. 1-41.

[6] Metz 282, 15th century, Gaspari de Sarnana Sertum papal e de venenis, opening, "Exultent et letentur iam divina consortia . . . / . . . Explicit sertum papale de venenis." The *Catalogue générale des . . . départments*, V (1879), 120, gives no account of the leaves covered by the work which is the first item in the manuscript, but says, "The author gives his name in the preface." I have not examined this manuscript.

In a manuscript at the Vatican, formerly of the Barberini collection,[7] the same treatise is attributed on the fly-leaf to William de Marra of Padua[8] and the pope to whom it was addressed is said to be Urban V (1362-1370). Since this note was addressed to cardinal Barberini by Andronico Spinelli, a scriptor of the Vatican library, it would seem that it should be tolerably well informed and reliable. It is further possible that William de Marra may be the same as a William de Mirica who addressed to pope Clement VI (1342-1352) a commentary upon the *Physiognomy* of Aristotle, now preserved in a manuscript of the Bodleian library, formerly in the collection of the abbot Canonicus of Venice.[9] That the *Papale sertum* should be attributed to two different men need not greatly surprise us, since before this chapter is over we shall have to note another instance of a work on poisons passing under two different names. For convenience we shall follow the ascription of the *Papal Garland* to William de Marra in the manuscript which we have used. In any case, the work seems from its allusions to pest and plague to have been written some little time after the first appearance of the Black Death in 1348.

The *Papal Garland* opens in a tone of exultant felicitation over the result of the recent papal election,[10] and so, if addressed to Urban V, must have been composed in 1362, the first year of his pontificate. Despite his advancement to the Holy See, there is still the danger of poison from evil persons. William therefore will endeavor as best he may with the weak powers of his scanty

[7] Vatic. Barb. 306, pp. 1-157, contents at 151-157, Gulielmus de Marra, Sertum papale de venenis: same incipit.

[8] Where we read: "Francesco Barberino S. R. E. Cardinali Bibliothecario Urbani VIII Pont. Max. fratris filio Hunc librum de Venenis a Gulielmo de Marra Patavino Urbani V P.M. medico compositum eidemque Pontifici dicatum Andronicus Spinellus Patavinus eius ex fidei commisso heres atque Bibliothecae Vaticinae scriptor latinus." The name, however, does not appear in Gloria's edition of records of the university of Padua for the fourteenth century.

[9] BL Canon. Misc. 350, paper, 15th century, quarto minori, 217 fols., "Gulielmi de Mirica Commentaria in Physiognomia Aristotelis," in 3 Distinctiones with an "Epistola ad Clementum papam," opening, "Sanctissimo etc. Guilhelmus dictus de Mirica artistarum ne dicat magistrorum in artibus minimus . . ."

[10] Vatic. Barb. 306, p. 1, "Exultent et letentur iam divina consortia maiori solito beatorum numero socianda; letentur pariter fines terre et tota machina mundialis. . . ."

intellect to pluck some choice flowers from the meadows of medical authors old and new and to wreathe from them a garland against poisons for the papal brow.[11] Galen and Avicenna are frequently cited. The work will consist of three chief parts: preventives against taking poison; means of escaping injury after having taken poison; and certain questions or problems.

Of these three parts the first is much the shortest, comprising only two chapters. The first, on taking care lest poison come near one, has two sections on the choice of pure air and the selection of a reliable servant. The second chapter, on ways of detecting the presence of poisons, has three sections: the first on observing the speech and change of color of suspected persons; the second on medicines which reveal the presence of poisons—here serpent's horn is mentioned and use is made of the fourth chapter of Peter of Abano's treatise on poisons; and the third on detecting poison by the taste.

The second part is much the longest of the three.[12] Its opening chapter takes up general remedies such as air, food and drink, simple and compound medicines. The second chapter on signs of poisons also classifies them as operating by occult or manifest form, by nature or art, in elements or mixtures, as hot, cold, dry, or moist—though some authorities doubt if there are any moist poisons. Some plants and animals are poisonous in their entire bodies, others in a part or member. Some poisons act internally, some externally. This chapter also includes a section on how poisons harm one, a question discussed in detail in the earlier treatise of Peter of Abano. The remaining *Particulae*[13] of the chapter are on more and less common signs of poisons. Chapters of the second part take up various poisons and remedies for poisons. The classification of poisons as mineral, vegetable, and animal is followed.

William sets especial store by the herb, Tormentil, as a remedy

[11] *Ibid.*, p. 2, "Conabor igitur toto nixu iuxta debiles vires mei exigui intellectus carpere precipuos quosdam flores ex pratis medicorum veterum et novorum et ex eis contra venena texere quoddam sertum vestro sanctissimo capiti . . ."

[12] Extending from page 10 to 135 of Vatic. Barb. 306.

[13] The 3rd and 4th *Particulae*.

for pest or bite of snake or sting of scorpion. He was informed of it as a great secret at Padua by master Benedict of Mantua[14] who was an excellent botanist or herbalist (*simplicista*). William saw Benedict perform "notable experiments" with it at the court of the despot of Padua, and himself later cured several persons with a powder of this tormentil, including a certain Sernanus whose name is somewhat suggestive of the Gaspar of Sarnana to whom our treatise was ascribed in the Metz manuscript.[15]

William de Marra also speaks very highly of certain pills which were revealed by a bishop to the despot of Padua at the time of the pest as a great and precious secret. At the close of the recipe for their composition it was stated that, if given in due quantity to any plague-stricken person within twelve hours of the beginning of his sickness, they would save him. While William attended the university of Padua he saw them often tested by his distinguished teacher, Balthassar of Padua.[16] They furthermore are of great aid in restoring and conserving sight and hearing, and in cases of apoplexy, epilepsy, paralysis, tremor, and so forth. William admits that he has discussed pestilential air solely in order to have an opportunity to describe them.[17]

Some themes are discussed which might not seem germane to the subject of poisons. The strange delusions and actions, almost infinite in variety, of persons afflicted with melancholy engage William's attention.[18] He sets forth the usual doctrine of vital, animal, and natural spirits, with what is perhaps a less common theory of the circulation of *spiritus,* long before Harvey's enunciation of the circulation of the blood. It is being continually dissipated and corrupted but is also continually regenerated by its circuit of the body so that new spirits supplement those which have been used up.[19] This has its bearing upon poisons, however,

[14] Benedict is not mentioned in Gloria's edition of the university of Padua records.

[15] Barb. 306, p. 30v.

[16] This name does not appear in Gloria's records for the university of Padua in the fourteenth century.

[17] Barb. 306, p. 37, ". . . unde propter earum bonam experientiam sunt mihi secrete et care medicine ac ultra alias in predictis passionibus usuales: et tetigi de aere pestifero solum ut ipsarum descriptio utilis non laterit."

[18] Barb. 306, pp. 71-72.

[19] Barb. 306, pp. 83-84, ". . . imo continua resolutio et corruptio est in ipso,

for the action of opium is explained as keeping the spirits from spreading to the various members of the body, affecting the sense of touch especially and sight and hearing and producing stupor. William says nothing of pleasant opium dreams, but only that the drug produces mental disturbance (*mentis perturbationem*).

William's lists of animal, vegetable, and mineral poisons include the usual substances, and he has details which occur in other treatises on the subject, such as that mushrooms are less likely to be harmful if cooked with pears.[20] In discussing the swallowing of a live frog, he has more to say of its bad effects than of its cure, but closely approaches a method which is found elsewhere of getting rid of the frog, when he advises to shake warm water near the mouth of the patient who should lean over, "since the frog very often moves towards such a noise."[21]

The account of the bite of mad dogs and of hydrophobia occupies more space—a dozen pages[22]—than the entire first book. The description of a mad dog is very like that by John of Arezzo in the following century which I have quoted elsewhere[23] except that it is fuller. If a person bitten by a dog wishes to ascertain whether it was mad, he should rub a piece of bread over the place bitten and see whether other dogs will eat it and if so what effect it has on them.[24] William thinks that a person afflicted with hydrophobia shuns the water because it reminds him of the dog. Indeed, some who wish to speculate more profoundly say that vapors arise from such a patient's eyes which are reflected from the water and, since they are infected with rabies, make the patient imagine that he sees the dog there.

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et propter hoc natura sagax facit quasi continuam regenerationem ipsius per ambitum corporis de ipso continue remittendo ut novi spiritus superventu iam resoluti vel corrupti fiat debitum supplementum."

[20] Barb. 306, p. 91.

[21] Barb. 306, p. 97, "Conquassatur aqua tepida prope os ipsius aliqualiter inclinati cum ad talem rumorem rana sepissime gradiatur."

[22] Barb. 306, pp. 124-135.

[23] *Science and Thought in the Fifteenth Century* (1929), pp. 116-117.

[24] This suggestion is repeated in the later works on poisons of Christophorus de Honestis, BN 6910, fol. 92v, and of John Martin of Ferrara, BN 6980, fol. 13v; BL Canon. Misc. 127, cap. 5.

Sometimes bits of flesh or fat resembling puppies appear in the patient's urine,[25] which supposed fact William tries to explain as the combined effect of the *spiritus* of the dog and of the patient's imagination, and as analogous to women being affected in conception by what their minds are intent upon. Because of this great influence of imagination William is inclined to believe that incantations and scrolls hung from the patient's neck or arms may cure the sick, and also that many make themselves sick and die by thinking that they have caught the plague or been poisoned. He recognizes that this opinion of Avicenna—that is, of the power of mind over matter—is not well received by modern philosophers.[26]

A dog may go mad because the air is too dry or intensely cold or because of eating putrid food or drinking water that was foul or too cold. William thinks that only those have hydrophobia who have been bitten by a dog which went mad from the last cause. For many die from such bites without any fear of water. As for those who do have hydrophobia, sometimes they fear water instinctively (*absolute*) as a sheep fears a wolf; sometimes they fear it because they think there is a dog in it; sometimes they shun it because they are not thirsty then; sometimes they abhor it as a pregnant woman abhors certain wholesome foods. A plaster of the dog's liver placed on the bite has a marvelous property of attracting and dissolving the poison. But in William's part of the world all who are bitten by a mad dog go to the sea within a day's time and bathe there repeatedly. "It is a good remedy and well tested cure and is mentioned by Conciliator (i.e. Peter of Abano) in his treatise on poisons."

Probably the most characteristic section of William's work is the third part consisting of fourteen problems. Not that this feature is peculiar to William's treatise but that it illustrates a leading tendency in medical writing and teaching of the period and

[25] The same point is noted in the later treatise on poisons of Christophorus de Honestis,—BN 6910, fol. 94r, col. 2, "Propter quid est quod in urina morsi hominis morsi a cane rabido apparent quandoque vestigia canum"—and of John Martin of Ferrara, BN 6980, fol. 19r.

[26] Barb. 306, p. 133, "Ista tamen opinio Avicenne a modernis philosophis aliqualiter molestatur."

in scholasticism at large with its numerous collections of *Quodlibeta*. Indeed we have already heard Gentile da Foligno put similar questions concerning poisons, some of them identical with William's. He first asks why the solution of problems delights us more than other sorts of learning.[27] The next question is why wood is made poisonous artificially. The third problem inquires how a person can transmit infection without falling ill himself. William has seen persons who had continual dealings with the plague-stricken and who buried many of them but remained safe and healthy themselves because of this immunity. A person coming from an infected region on account of the food and drink and air he has consumed there has his breath and blood and humors somewhat infected and even his clothing, and so, although he may not catch the pest himself, he transmits the contagion in another region to someone who is susceptible by means of the vapors which he exudes.[28]

Questions why a master who has been poisoned is helped by his trust in the servant who has treacherously poisoned him, and why servants who wittingly offer poison to their masters blush or grow pale, are answered by the influence of mind or imagination over the body. The explanation why a candle attached to the foot of a vulture is extinguished in the presence of poison[29] is that the bird's foot has the property of drawing the infected air to itself and that this heavy air, being unfavorable to combustion, puts out the candle. If it is objected that some poisons are too dry to emit any vapors, our author denies this, pointing out that alchemists can distil water even from dry wood, hair, horn, and

[27] Barb. 306, p. 135, "Quare notitia problematum inter alias notitias potissime nos delectet."

[28] Barb. 306, pp. 136-137. The passage seems worth quoting *in extenso* as a fairly early statement of the theory of contagion. "Videmus enim propter hanc indispositionem cum egrotantibus ipsa peste continue conversari imo etiam plurimos ipsorum mortuos sepelire qui tamen ibi vivunt incolumes ac sani unde iste veniens de regione infecta propter cibum et potum et aerem absumptos habet suum anhelitum sanguinem et humores aliqualiter infectos imo etiam vestimenta, licet ipse ut indispositus a nocumentis incolumis reservetur, superveniens tamen alteri in alia regione qui talem influxum aptus et dispositus est pati tunc ipsum sibi comunicabit mediantibus vaporibus ab ipso elevatis."

[29] The discussion of this problem runs from page 139 to 141.

like substances. If, however, the poison is perfectly covered so that the air cannot come in contact with it or the vapors escape, these safeguards will not be affected by its presence. As the magnet is said to lose its attractive virtue in the presence of adamant, so the foot of a vulture may acquire this property from the presence of poison. The question why poison is recognized with more difficulty when mixed with things having a strong taste receives the evident answer that these last distract the attention.

The strange doings and powers of persons obsessed with melancholy, although it seems to have little relation to the subject of poisons, comes up again in the third part as it had in the second part of William's treatise. The familiar medieval question is asked how they are able to speak languages unknown to them. William first affirms that the ability to hear very faint or far off sounds is a disease and affliction rather than an accomplishment or sign of good health. If a man could see all the tiny specks in the air, he would be in constant fear lest they enter his eyes, as we are of flies. William then sensibly explains the gift of tongues as due to excessive or subconscious memory—the person recording "even those things which he has least noticed at the time." If an illiterate person speaks Latin or Hebrew, it is because he has overheard learned men speaking it at some past time. William rather spoils the effect of these sensible observations by continuing, "Or it may be said that this gift comes from a peculiar property of that humor which makes him speak in this wise, for marvelous are the workings of the soul and occult. Also many illiterate persons possessed by unclean spirits speak Latin and various languages. And in my time there was a woman at Padua who disputed with subtlety in logic."[30]

In reply to the question why the heart is more affected by poison than any other member, William does not agree with certain authorities that it is the property or specific form of poisons generally to attack the heart. This may be true of some poisons, but others attack other parts of the body. Thus the brain of a cat injures the head, and cantharides the bladder. The

[30] For the contents of this paragraph see Barb. 306, pp. 143-144.

reason that all poisons are carried to the heart is rather the circulation of the spirits through the body which we have already noticed. Or the poisonous vapors enter the arteries along with the air and are thus carried to the ventricles of the heart.[31]

The reason why men die from the hiss or sight of a basilisk is because the infected air strikes the ear or eye. Tarantula bite is relieved by music, because this poison produces melancholy whose best antidote is rejoicing. The vulgar and ignorant say that the insect sings when it bites and that when the patient hears similar cadences, it is a great relief to him. William is unwilling to admit this explanation but he thinks that the joy derived from the music may attract the spirits from within the body to the periphery and so prevent the poison from penetrating to the vitals.[32] The reason why a bite in the face from a rabid dog is almost always fatal is that there is a great amount of blood and spirits in the face where so many of the organs of sense are situated.[33] The explanation why a person made mad from dog bite attacks others with his teeth rather than with stones or weapons is that his nature becomes canine.

The final problem is why dogs are more prone to rabies than other animals, although it would seem that beasts like bears, wolves, and hares, which are of colder and of more melancholy humor, ought more frequently to incur this melancholic complaint. The answer is that the dog lives a most disordered life, eating all sorts of things, and now resting indoors near a hot fire, now remaining outside in the cold. It therefore suffers from indigestion and corrupt humors. Also the dog is an irascible animal and is often provoked by the words or blows of its master to wrath and sadness which are the chief causes of rabies.[34]

In 1375 at Avignon Francis of Siena addressed a work on poisons to Philip of Alençon, patriarch of Jerusalem, and arch-

[31] Barb. 306, pp. 144-145.
[32] Barb. 306, pp. 146-147.
[33] Barb. 306, pp. 147-148.
[34] Barb. 306, pp. 148-149, whereupon the treatise closes: ". . . ideo canes sepius rabiescunt, et sic sit dictum breviter ad quesitum ac etiam totum opus. Benedictus sit igitur pius Deus qui ipsum inire dedit ipsiusque medium pertransire ac eiusdem hunc finem tandem consequi peroptatum."

bishop of Auch.[35] This information, conveyed in the rubric, is confirmed by the preceding treatise in the same manuscript concerning baths addressed in 1399 to the duke of Milan (Galeazzo Visconti) in which Francis tells him that after the work on baths will follow one on poisons which he wrote at Avignon in 1375 at the demand "of that most illustrious prelate, the cardinal of France, then patriarch of Jerusalem and archbishop of Auch. For he feared the wrath of your kinsman, king Charles of France of illustrious memory." No one has seen the treatise until this day.[36] Francis, who tells us that he was twenty-four years of age in 1367, is said by Tiraboschi to have been rector at Perugia, then papal physician, and to have lectured on astrology at Bologna in 1394, and on the practice of medicine in 1396.[37] Rodocanachi, without mentioning any authority for his statement, asserts that Francis was called to Avignon by Gregory XI in 1376 —which is scarcely compatible with his already writing there in 1375—but in vain, since the pope died the same year, whereupon Francis entered the service of the antipope, Urban VI, at Rome.[38] It was Gregory XI, however, who returned to Rome, where he did not die until 1378, and was succeeded by Urban VI, who is commonly recognized as the lawful pope. It may be,

[35] BN 6979, fols. 19v-100v, rubric: "Francisci Senensis physici liber de venenis ex philosophorum sententiis ordinatis ad excellentissimum pastorem et principem Phylippum de alenconio patriarcham yerosolomitanum et archiepiscopum auxitanum feliciter incipit factus Avinioni anno domino milleximo trecenteximo septuageximo quinto." A hooded half-figure with expostulatory fore-arm and finger occupies the large illuminated initial. Incipit: "Quante sint urbis christi pater et princeps nobilissime humane amicitie vires. . . ." Desinit: ". . . Curatio est cum exhibitione magne tyriace. Finis et Amen."

[36] *Ibid.*, fol. 2r-v, "Postquam vero tractatum de balneis iam tactis expedivero communicabo eidem vestre celsitudini copiam cuiusdam tractatus quem edidi Avinioni anno domini millessimo trecentessimo septuagessimo quinto ad postulationem illius clarissimi prelati cardinalis francie tunc patriarce yerosolomitani et archiepiscopi ausitoni in materia venenorum. Timebat enim ille indignationem clare memorie regis karoli francorum cognati vestri licit sperem quod divina bonitas a venenorum et venenantium malitiis personam vestram illustrem ac natorum misericorditer preservabit. Cuius quidem tractatus copiam usque in hodie nemo vidit set merito primus estis. Cumque iam sermo fuerit quod velletis balneum petrioli personaliter visitare ab ipso incipiam quod forsan suis virtutibus primatum recipit inter illa."

[37] Tiraboschi, V (1823), 404.

[38] E. Rodocanachi, *Études et fantaisies historiques*, 2e série, 1919, p. 48.

nevertheless, that Francis was for a time in his service. In the extant rolls of the faculties at Bologna a Franciscus de Camareno or Francischus de Chamarino is listed as lecturing on astrology in 1392-1393 and on medicine in the afternoon in 1395-1396,[39] but his identity with our Francis of Siena would seem dubious. The positions in question appear to be minor chairs which it is doubtful if Francis would have held at the age of fifty and fifty-two. In Chapter 29 we found Salutati corresponding with Francesco di Marano da Camerino in 1405, while in a letter of May 4, 1400 to Malatesta di Pandolfo Malatesta he referred to "your doctor and my brother, Francis of Siena."[39a] But whether this last reference applies either to Camerino or to our author on poisons seems doubtful.

In the preface to the treatise on poisons Francis expresses his abhorrence of plagiarism and declares that in this work he will repeat what has been discovered long since rather than attempt what is not in him. Avicenna will be his chief authority.[40] His treatise will be in two parts, the first general (*communis*), the second dealing with particulars. Of the five chapters of the first part, in the first he will declare the *quidditas* of poison and the ways in which poisons injure; in the second what safeguards those should use who fear poisons; third, the common medicines which are useful for all poisons; fourth, he will enumerate poisons; and fifth, will give weights and figures which will be employed in the present treatise. In the second part a chapter will be devoted to each poison, except that some poisons are so closely related that they may be considered in a single chapter. In all he enumerates 142 poisons of which some divide into species, and he treats of these in 139 chapters; taking up first minerals, then plants, and last animals just as William de Marra had done. In each case is given a definition or description or identification (*notificatio*) of the poison, then the signs to show if a person has been injured by it, then *Complexio*, *Pronostica-*

[39] Dallari, *I rotuli dei lettori legisti e artisti dello studio bolognese dal 1384 al 1799*, IV (1924), 17 and 19. The rolls for the intervening years, 1393-1305, are missing.

[39a] *Epistolario*, ed. Novati, III, 390.

[40] BN 6979, fols. 20v-21r.

tio, and *Curatio*. Since originality is not claimed for the work, we may content ourselves with giving its statement of the signs that a dog is mad for purpose of comparison with that of William de Marra. Francis' description follows that of Avicenna closely.

The eyes of a mad dog are darkened. It seeks solitude. It will not drink water, especially clear water, nay it flees from it and sometimes fears it so that it dies. Furthermore it will not eat, or eats corpses and other putrid matter. It does not recognize its master. It has red eyes of harsh or horrible and timorous aspect, its tongue hangs out, and foaming saliva flows therefrom, and its nose runs. Head and ears droop down, and the back is bent to one side so that it seems crooked. And it walks fearfully, stumbling and acting as if drunk, sad, worried, and headlong at every step. It is squalid in appearance. It attacks every form it meets as an enemy. Its barking is slight, and when it does bark, other dogs flee from its path, and if they are unable to do so, but have to meet it, they render themselves obedient to it and fawn upon it until they can escape.[41]

The work on baths which precedes that on poisons in our manuscript[42] is also of some interest, especially as a precursor of the fuller treatise on baths by Michael Savonarola which we shall consider later. Francis begins with the bath of Petrioli since he has heard that the duke intends to visit it personally. After describing others in Sienese territory he passes to "your Pisan baths,"[43] and then to those of Viterbo. In this connection he states that when Urban V led the papal court back to Italy thirty-two years ago—which gives 1399 as the date of writing—he sent Francis with seven other physicians to investigate the virtues of the baths of Viterbo.[44] At that time Francis was only

[41] BN 6979, fol. 90r-v.

[42] BN 6979, fols. 1r-19v, "In nomine omnipotentis dei Patris et Filii et spiritus sancti. Hii erunt tractatus duo, primus de balneis et secundus de venenis, ad illustrem dominum Ducem Mediolani missi per servulum suum Franciscum de Senis. Dux illustrissime, potentia magna sed virtutibus magis . . . / . . . Finitis igitur hiis pertractionibus balneorum veniam ad tractatum de venenis supra promissum quem incipiens ad illum olim reverendissimum dominum sic exhorsus fui." I have not seen this treatise in print; only a brief *Consilium de balneo* by Francis appears in the collection, *De balneis*, Venice, 1553.

[43] BN 6979, fol. 6r.

[44] BN 6979, fol. 8v.

twenty-four years old. The papal commissioners bathed in the baths but, mistrusting their own conclusions, called in the local medical men. Among these was one, Jerome by name, who had written a treatise on the baths of Viterbo for pope Innocent VI.[45] Francis accordingly repeats Jerome's account of ten different baths of Viterbo. He then describes those of the Papal Patrimony and Naples, and closes with the baths of St. Mary on the confines of Tuscany and Romagna, "in the territory of your vassal, count Guido, called Of the Baths." These last baths are part alum, part sulphur, and part iron, as alchemists have proved by distilling the waters and as their effects on the bathers show.[46]

A third work on poisons from the second half of the fourteenth century is by Christophorus de Honestis (Cristoforo degli Onesti)[47] who was born at Florence and died at Bologna in 1392. The faculty lists of the university of Bologna show him giving the morning lecture in medicine there in the years 1379-1386 with a salary—at least in 1384-1385—of three hundred pounds Bolognese.[48] Besides the work which we are about to consider he wrote a commentary on the *Antidotarium* of Mesuë which was later printed and questions on the first two fen of Avicenna which remain in manuscript.[49] He was mentioned by Salutati, writing in 1399, in a list of recent physicians of note.[50]

Whereas William de Marra had devoted his third book to special problems, Christopher couches his entire work in this form. He states his plan as follows. First, he will put the problem. Second, he will answer it explaining any obscure terms that may be involved. Third, he will speak of preservatives from the poison in question and means of arousing suspicion before taking it. Fourth, of the method of curing injuries already received and

[45] BN 6979, fol. 9r.

[46] BN 6979, fol. 19v.

[47] BN 6010, paper, 15th century, double columns, fols. 87r-112v (a table of contents follows to fol. 113r); writing very abbreviated. "Appolinis greci primi medicine repertoris . . . / . . . et hoc de ultimo problemate et sic sit finis deo altissimo gratia amen."

[48] Dallari, IV, 6, 7, 9, 11.

[49] Christ. Georg. de Honestis, *Expositio Super Antidotario Mesue*, Ferrara, Andreas (Belfortis) Gallus, 1488. Fol. Goth., 2 col., 48 fols. No copy in CFCB. Also in later editions, as Venice, 1562.

For the *Questiones* see Florence Riccard. L.II.xxxv (Lami, p. 123).

[50] See my *Science and Thought in the Fifteenth Century*, 1929, p. 51.

the bezoar for each poison. Finally, if any questions arise he will take them up and will solve problems, first those of a more general nature, then the more special ones. Thus the real problems would seem to come last with him as with William de Marra. On turning to the text itself and to a table of contents at its close, we find, however, that this is not quite the case. The work begins with five problems; why poison is wholly contrary to the human constitution (*complexio*), why it runs to the heart more than to other members, why serpent's horn sweats in the presence of poison, why a person infected by pestilential and windy air infects others, and why in pestilential regions are multiplied venomous animals like serpents. The remainder of the text, however, falls into the three usual divisions of poisonous animals, poisonous plants, and poisonous minerals, which constitute respectively Christopher's second, third, and fourth tractates.

First in these tractates come four chapters concerning the bites of animals which are not entirely poisonous, such as the bites of a fasting man, dog, fox, or wolf which is not mad, of a cat, mouse, or monkey, of mules, horses, and asses, of a weasel, lion, leopard, and wounds made by their claws. Here are involved such problems as why the bite of a fasting man is more dangerous than that of the same man when not fasting, and why the bite of a cat causes such sharp pain in the place bitten and turns the whole body green.[51] Then follow fifteen chapters on the bites of poisonous domestic or better known animals beginning with those of a man afflicted with rabies and of a mad dog. It is asked why a person bitten by a mad dog does not recognize his reflection in a mirror and fears water, why he has a hoarse voice, and why he tends to bite other men.[52] After inquiring why the effect

[51] Other problems are: BN 6910, fol. 91r, col. 2, "Propter quid est quod in morsu mulorum accidet punctio et ampulle plene humiditatibus sanguinolentis circa locum et dolor fortis et velocitas putrefactionis et stranguria et sudor siccus et tortio." It is added, however, that all of these results seldom happen in a single case. Fol. 91v, col. 1, "Propter quid est quod ex morsu mustele accidit color in loco morsure declivis ad offuscationem." Another MS is Cortona 110, membrane, fol. 101.

[52] Also, BN 6910, fol. 95r, "Propter quid est quod morsus a cane rabido quandoque involuntarie sperma emittit."

of the bite of a mad dog sometimes does not become apparent for a long time, and why some poisonous animals leave their teeth or sting in the wound, successive chapters treat of the bite of wasps, bees, and ants, spiders, scorpions, lizards, and so forth.[53] Five chapters are devoted to wild venomous animals[54] such as the basilisk, asp, and other serpents. A section of fourteen chapters (30 to 43) is given to animals or parts of animals which are poisonous if eaten and taken internally such as a cat's brain, stag's tail, or the tongue and heart of a bat. Christopher is somewhat independent in denying that a frog can live in the human stomach[55] and, to get rid of it, prefers vomiting with head bent to suspension of the patient by his feet, while he says nothing of placing water near his mouth to attract the frog.[56] Twenty-three or twenty-four chapters[57] concern poisonous plants.[58] Of problems concerning mineral poisons there are fourteen,[59] making eighty chapters in all.

These medieval works on poisons have features in common, such as their dependence upon Avicenna, and repeat one another a good deal. But a fifteenth century treatise on the subject was to show a closer resemblance to the work of Christopher de Honestis than any of the fourteenth century works which we have been describing displayed to one another. Indeed the treatise of John Martin of Ferrara, or, de Ferrariis of Parma, is guilty of shameless plagiarism from that of Christopher de Honestis, whom it never mentions. This John Martin dedicated his work to two different princes: in one instance to Francesco Sforza,[60] in the other to Lodovico di Gonzaga, marquis of

[53] Caps. 14-24 of the table of contents, but in the text I did not see cap. 21, "de morsu tarantule."

[54] "De problematibus animalium venenosorum magis silvestrium."

[55] This particular denial I failed to see in the treatise of John Martin on poisons in FL Ashburnham 1117, although it contains what follows.

[56] BN 6910, fol. 102v; cap. 31.

[57] BN 6910, fol. 112v, col. 2: "De problematibus venenorum plantarum tam frigidarum quam calidarum que sunt 24." But the numbered chapters run only from 44 to 66 inclusive.

[58] BN 6010, fol. 103v, col. 1: "Modo sequitur 3° tractatus de venenosis (?) plantarum. Tractatus de venenis plantarum et sunt 24. Postquam est dictum de venenis animalium nunc in hoc 2ª parte principali dicam de venenis plantarum. . . ."

[59] Caps. 67-80.

[60] Of this version there is a manuscript copy at the Bibliothèque Nationale, Paris: BN 6980, 15th century, mem-

Mantua, on February 2, 1455.[61] John Martin states in the preface to this second version that it had been elicited by his indignation at the presumption of those who during the past year had predicted from the stars the death of a potentate whom he designates as "A. p. noster," and whose physician he appears to have been, since he represents himself as thoroughly acquainted with his state of health. He therefore resolved to protect this prince's life by composing this treatise on poisons.

As has been said, the work of John Martin resembles that of Christopher de Honestis very closely. There are divergences, it is true. The work of John Martin states its plan and arrangement differently at the beginning,[62] but this is mostly a pretense.

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brane, 63 fols.: It has an illuminated title page and is written in a clear round hand with relatively few abbreviations and wide margins. "Ad illustrissimum ac excellentissimum dominum d. franciscum fortiam ducem mediolani papie anglerieque comitem ac cremone dominum magistri Iohannis Martini ex Ferrariis de Parma inclari militis et phisici peritissimi de venenis evitandis et eorum remediis libellus et exquisita preceptio. Quom tam excelso loco sita sit virtus tua princeps illustrissime et excellentissime ut eam et admirentur et vereantur omnes. . . ." It ends at fol. 63r, ". . . et ideo amplius non opportet recapitulare etc. Deo gratias. Amen."

A second copy of this version exists at the Laurentian library in Florence: FL Ashburnham 1117 (1046), membr. quarto, in a legible Italian humanist hand, "con piccolo miniature e lo stemma del Re di Francia sul primo foglio", fols. 2r-97v, "Ad illustrissimum principem et excellentissimum dominum dominum Franciscum Sfortiam vicecomitem, Mediolani ducem, Papie Anglerieque comitem ac Cremone dominum magistri Iohannis Martini ex Ferrariis de Parma clari militis et peritissimi physici de vitandis venenis et eorum remediis libellus et exquisita preceptio feliciter incipit. Cum tam excelso loco . . ." etc. At the close the date 1456 is given as that of writing the manuscript: "Exscripsit Paganus Raudensis anno a natali christiano M°CCCCLVI pridie nonas Decembris."

[61] BL Canon. Misc. 127, Feb. 2, 1455, membr., quarto minori, 67 fols., "Ad illustrem et excelssum principem dominum dominum Lodovicum de Gunzago millittem ac Mantue marchionem Magistri Iohannis Martini phyxici peritissimi ac millittis clarissimi de evitandis venenis et eorum remediis libellus et exquisita preceptio." The preface opens: "Quoniam superiore anno princeps illustris ex astrorum motu ac cognitione. . . ." The text begins: "Prime partis principalis duo sunt tractatus. . . ." The work ends like BN 6980, but adds the date, February 2, 1455. There is a table of contents at fols. 1r-5v.

[62] BN 6980, fol. 1v; Canon. Misc. 127, fols. 7v-8r; FL Ashburnham 1117 (1046), fol. 3r. I quote from the last: "Bipartita erit igitur hec institutio nobis. Primum a quibus in genere cavendum et quibus utendum ne venena sumantur et ab eis non ledantur. Et de eorum generali curatione ubi iam assumpta lederent precepta tradentur. Dehinc quia venenorum et vim veneni habentium diversa sunt genera ut testantur auctores et comprobat experi-

Chapters may begin differently but usually close identically. The *dubia* which Christopher raised frequently are duplicated, and the classical style which John had affected at first is dropped for Christopher's scholastic wording in arguing these *dubia* pro and con. At the close of each cure is added a particular bezoar in the same words as Christopher had employed.[63] Five columns devoted to the discussion of opiates in the treatise of Christopher are omitted by John Martin.[64] But he adds little. As an example of numerous other identical passages we may quote that concerning the signs by which a mad dog may be recognized. These are stated in the same order and practically the same words in both works, but vary considerably from the corresponding passages in other works on poisons.

I say therefore first, as all say, that when a dog is mad it walks with slow steps with head turned towards the ground and protrudes its tongue from its mouth. And sometimes it foams at the mouth and is shortened in length and height and holds its tail between its legs and seeks solitary places and, with the appearance of looking backward, keeps close to the wall. And sometimes it murmurs like a maniac or melancholic person and abhors its accustomed haunts and habits, and if it meets its master, sometimes does not recognize him but bites him like anyone else whom it meets whether men, dogs, or other animals, on which account other dogs flee from it.[65]

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entia, unumquodque vel saltem a maioribus positum particulare venenum et eius accidentia et accidentium causas et rationes adducam et singulorum curationem pro ingenii et mea in te voluntate et maiorum doctrina exponam unicuique suum bezar subiciendo." The passage reads exactly the same in BN 6980, fol. 1v.

[63] Thus at the end of the chapter on arsenic we read in both authors: "Bezoar horum venenorum est oleum de nuchis pinni statim vel primo die datum in potu. Dosis est 3. iii, etc."—BN 6910, fol. 112v, col. 1: BN 6980, fol. 63r. Christopher then adds the closing sentence quoted above in note 47, while John Martin adds a paragraph or brief "Capitulum de bezar."

[64] Compare BN 6910, fol. 108r *et seq.* with BN 6980, fol. 54r.

[65] BN 6980, fol. 13r-v; BN 6910, fol. 92v; FL Ashburnham 1117, fol. 20v, "Dico igitur primo ut dicunt omnes quod quando canis est rabidus ambulat lentis passibus cum capite versus terram et linguam ponit extra os. Et spumat os suum quandoque et abreviatur secundum eius longitudinem et eius altitudinem et caudam portat iuxta coxas et loca queritur solitaria et quasi respiciendo parietibus adheret et quandoque murmurat ut maniacus vel melancolicus et aborret conversationes suas consuetas et si domino suo obviat aliquando non eum cognoscit et eum sicut alios mordet quibus obviat homines et canes et alia animalia unde ab eo fugiunt alii canes." The passage occurs also in Canon. Misc. 127, cap. 5.

Both Christopher and John Martin straightway follow this passage by a story from Gentile da Foligno of a man who had been bitten by a rabid wolf, and, feeling madness coming upon himself, implored his friends to bind him so that he might harm no one. They had scarcely done so, when he became raving and finally died.

An even more impressive instance of how closely John Martin follows Christopher is a passage on the common belief in the curative property of a hair of the dog that bit you. It is the more impressive because not merely are the passages worded alike in both authors,[66] but also it occurs in both not in the chapter on dog bite, as one might expect, but in that on the bite of a fasting man. The passage is also of some intrinsic interest. It is said that the people place hairs of the dog on the bite because they think that they have a certain likeness with the dog's saliva and teeth and therefore draw the poison to themselves and prevent its spreading internally. Christopher, followed by John Martin, thinks that this amounts to saying that they act by their specific form. If someone should argue that the similitude of the hairs to the dog's teeth and saliva ought rather to increase the injury, since like aids like, the reply is that their action is comparable to that of the magnet which attracts iron by a certain likeness, though the iron does not draw the magnet.

John also follows Christopher word for word through a long discussion[67] which starts with the question whether poison operating by property, i.e. its specific form or occult virtue, is worse than that which operates by quality, i.e., hot, cold, dry, or moist. This discussion then drifts off into another disputed problem whether a human being can be nourished on poison. Averroes, the second of the *Colliget,* chapter two, is cited to the effect that a man cannot be so nourished, which he proves in his treatise on theriac by the argument that one who exceeds the latitude of humanity is not human. But a person fed on a poison which

[66] I have found the text identical except for such slight variations as the opening words in each case suggest, in BN 6910, fol. 91r, col. 1, "Set mirandum . . .;" BN 6980, fol. 8v, "Sed unum est notandum . . .;" FL Ashburnham 1117, fol. 13r.

[67] BN 6910, fols. 108v, col. 1-109r, col. 1; FL Ashburnham 1117, fols. 78r-81v.

kills other men exceeds the human latitude. Therefore he is not human."[68] Christopher adds that this opinion of Averroes is not commonly accepted, and that authorities like Aristotle, Gilbert, Rasis, and Avicenna would not tell us of a girl who was fed on *napellus* without good evidence or experience.

It is noteworthy that our authors of the second half of the fourteenth century do not continue the scepticism expressed by Guy de Vigevano in the first half of the century as to substances supposed to denote the presence of poison, which he had convinced himself by repeated experiment possessed no such virtue. Guy thought that it might be well, however, to continue the practice of having serpents' tongues, the dragon stone, and such things before one, since would-be poisoners might still be deterred thereby for fear lest they be detected.[69] But our later authors merely repeat the old theories or beliefs in safeguards against poisons without troubling themselves to test them. Herein we seem to have evidence of a decline in experimental method as the century wore on and especially after the Black Death as contrasted with the medicine of the preceding period.

Although all the writers on poisons of the fourteenth century of whom we have treated in this chapter were Italians, only one of them, Christopher de Honestis, was utilized in the elaborate

[68] The argument that such a person is not human occurs in the *Tractatus de theriaca*, cap. 2, edition of 1560, fol. 248r-v, where the word *complexio* is employed rather than *latitudo*. The latter word occurs in the *Colliget*, II, i, edition of 1560, fol. 17v. I quote the passage, since it is interesting to see Averroes employing two centuries earlier this conception which was to have such currency and influence during the fourteenth and fifteenth centuries: "Sed dabimus pro exemplo huius, quod sicut complexio equi est diversa a complexione hominis, ideo quia mensurae elementorum sunt mixtae in eo super latitudinem diversam commixtionis mensurarum earum in homine. Et ideo, quod illa forma complexionalis, quae est propria in unaquaque specie, invenitur in ipsa eadem specie in aequalitate et distemperantia media inter multum et parum, et etiam habet latitudinem, quae recipit plus et minus intra extremitates. . . ."

[69] Élie Berger, "Guy de Vigevano et Philippe de Valois", *Journal des Savants*, January, 1914, pp. 5-14; especially p. 13, note 2, citing BN 11015, fol. 41r, col. 1. On Guy de Vigevano see further E. Wickersheimer, "*L'Anatomie* de Guido de Vigevano, médecin de la reine Jeanne de Bourgogne (1345)," Extrait de l'*Archiv für Geschichte der Medizin*, Leipzig, VII (1913). We have already said something of Guy's treatise in our second chapter on John XXII and the occult arts.

compendium on poisons in eight books which Sante Ardoini of Pesaro compiled in the years, 1424-1426, from Greek, Arabic, and Latin works on medicine and nature, and which was printed at Venice in 1492, and at Basel in 1518 and 1562.[70] Christopher seems to be the latest author cited by Ardoini, although he uses various medical writers earlier in the fourteenth century like John of Gaddesden and William of Varignana. Although Ardoini quotes previous authors at great length, his work is no mere compilation, since he does not hesitate to disagree with such medical authorities as Peter of Abano and Gentile da Foligno, and refers to his own medical experience or observation of nature at Venice and to what fishermen or collectors of herbs have told him. He also seems to have known some Arabic, and his occasional practice of giving the names of herbs in several Italian dialects is of some linguistic value.

[70] I have used the edition of 1562, in which the work fills 514 large pages: *Santis Ardoyni Pisaurensis medici et philosophi praestantissimi opus de venenis,* Basileae per Henricum Petri et Petrum Pernam anno salutis humanae MDLXII. There is prefixed to the work a preface by Theodorus Zuingger, dated at Basel in the same year, while bound with it is a treatise on poisons by Ferdinando Ponzetti.

CHAPTER XXXII

ENCYCLOPEDIAS OF THE FOURTEENTH CENTURY

Such works of the thirteenth century as the *De natura rerum* of Thomas of Cantimpré, the *De proprietatibus rerum* of Bartholomew of England, and the *Speculum naturale* of Vincent of Beauvais had their successors in the fourteenth and fifteenth centuries. Then appeared such general compilations and works approaching encyclopedic scope as the *Septiformis de moralitatibus,* the *Lumen animae,* the *Repertorium* of Petrus Berchorius, the *Dittamondo* of Fazio degli Uberti, the *Fons memorabilium universi* of Domenico Bandini, and the *De rebus expetendis et fugiendis* of George Valla. I have given some of the main facts concerning these books elsewhere;[1] I shall now examine two of them in more detail, one from the early and the other from the closing years of the fourteenth century.

In 1477 brother Matthias Farinator, a Carmelite of Vienna, styling himself "the least of the lecturers in sacred theology," issued a printed edition of the *Light of the Soul* (*Lumen animae*)

[1] *Science and Thought in the Fifteenth Century,* 1929, pp. 13-16. In addition to the MSS of the *Lumen animae* mentioned there I may list CLM 7245 and 8970, 1422-1424 A.D.; Prag 413, 14th-15th century, fols. 132v-152v, also 702, 948, 1811, 1846; Klagenfurt Studienbibliothek Pap.-Hs. 139, 1419 A.D., fols. 1-181, and 164, 1440 A.D., fols. 1-127, where it is ascribed to "Valentinus, magister Claravallensis." There are doubtless many others.

Yet another encyclopedia was the *Multifarium* compiled at Bologna in 1326 in ten books on the signs and planets, parts of the human body, its diseases, volatile animals, terrestrial animals, herbs and plants, stones, stories of the poets, sayings of the philosophers, and other histories: Wolfenbüttel 4504, fol. 1r, col. 1, rubric, "Incipit prologus in libellum qui intitulatur Multifarium"; incipit, "Multipharie multisque modis creaturarum conditiones . . ."; col. 2, rubric, "Incipit libellus qui intitulatur Multifarium et fuit extractus Bononie de diversis anno domini M°CCC° vicesimo sexto." At fols. 71-80 occur tables of moralities for the first six books, in whose margins were numbers referring to these tables. At fol. 131r, col. 2, the seventh book resumes after intervening matter from Albertus Magnus and the *Thesaurus pauperum* of Petrus Hispanus. The *Multifarium* itself seems largely indebted to the *Speculum* of Vincent of Beauvais.

or *Book of the Moralities of Great Natural Things* which he described as a book of things natural and moral, a most precious pearl which after a long concealment was now at last brought to light and printed for the first time—at Augsburg by Anton Sorg. Other editions followed speedily on December 31, 1477, in 1479 at Reutlingen and 1482 at Strasburg.[2] The actual author, as to whose name there is disagreement, is said to have addressed his work to pope John XXII, and himself states that he had worked on it day and night for twenty-nine years without intermission, and that pope John—no numeral is given—had encouraged him to go on with it and had supplied him with three helpers, Leo, Amundus, and Severinus by name, who were masters of three languages and had translated some books on nature from Greek into Latin for him which had not been translated before.

The *Lumen animae* consists of two books of 75 titles and 267 chapters respectively. These chapters are arranged in a roughly alphabetical order from such topics as Abjection, Abbot, Abstinence, Friendship (*Amicitia*), Adolescence, and Anxiety, to Will (*Voluntas*), Pleasure (*Voluptas*), Vow, Utility, Usury, Wife (*Uxor sive coniugium*), Christian and Christ (*Xpianus, Xpistus*). The materials collected in them are chiefly from patristic or moral writers with few items of natural science. But they are for the most part brief apothegms or familiar quotations, so that this second book despite its large number of chapters occupies less than one third of the volume in the editio princeps of 1477. The seventy-five titles of the first book also bear such captions as "Of the Passion of Christ" or some moral virtue like "Humility," but a good deal of natural science or what passed therefor is gathered under them. Thus many properties of the sky, the dew, and light are compared with the virgin Mary. Or Galen

[2] For descriptions of these four incunabula see A. W. Pollard, *Catalogue of Books Printed in the Fifteenth Century Now in the British Museum*, II, 345, 325, 577; I, 07. I have seen all four at the British Museum, while the library of Princeton University very kindly sent to New York for my use a copy of the Augsburg edition of December 31, 1477. The citations in the following notes apply equally well to all four editions.

A portion of the work was printed at Augsburg, 1518, under the name of Berengarius, archbishop of Compostela (1317-1330).

is quoted to the effect that if a person who has been sick is struck by a draught while convalescing he will suffer a relapse. By which we are given to understand how Christ who suffered for humanity is crucified afresh when struck by the wind of our ingratitude.

So much must suffice to illustrate the moralities and religious examples of the *Lumen animae*. What will occupy our attention henceforth is the scientific information and misinformation which the author has gathered and the books from which he has derived it. We may consider the latter point first. In the prologue, like Thomas of Cantimpré, he gives some account of the books he has read. They include some unusual and little known titles, as the following will illustrate:

Hermes de corporibus transmutandis
Algafel de quatuor transcendentibus
Palemon de signis naturarum
Morientes de zonis et climatibus mundi
Belinus de inventione artium
Publius Celsus de mirabilibus nature
Centobius de giro orbis
Evax de sigillis lapidum
Aristoteles de dimensionibus terre
Nestorius de occiani circulo

Of this list the ascription to Hermes is apparently an alchemical tract on transmutation; Algafel probably should be Algazel or Al-Gazzali, the Arabic theologian; but he does not seem to be cited again, while Algazel *de forma speculi* which is cited a great deal presumably refers to Al-Hazen's work on perspective. Palemon is one of the ancient writers on physiognomy. Morientes perhaps should read Morienus, but no work on zones and climates is commonly associated with that alchemical author, and the title is later ascribed to Fontinus. Belinus, cited a number of times by Albertus Magnus, is a corruption from Apollonius of Tyana, but the title ascribed to him is less familiar. In the text reference is made rather to his works on seals in stones, judgments of the future, and book of natural things. Celsus suggests the Roman medical writer, but his name was A. Cornelius not Publius, and again the title is strange. If he is cited in the subsequent text, I

did not note it, but a Julius Celsus' fifth book on the deeds of the ancients is cited as to four peculiarities of the elephant. Neither Centobius nor *The Whirl of the Orb* is familiar, and while Evax usually means the poem of Marbod on gems, it does not treat primarily of seals or images carved on gems. Moreover, in the body of the work statements are credited to several other treatises by Evax: the eighth book on events in nature, of the virtues and effects of nature, of the virtues of liquids, and Evax and Aaron on the hidden things of nature.[3] There is no work now extant by Aristotle on the dimensions of the earth, and Nestorius on the circle of ocean is quite unknown.

Our author then, if he is not simply hoaxing us, has utilized some out-of-the-way sources, whether then or since. From a monastery in Germany he claims to have procured Architas Tharentinus—also cited in the *De mirabilibus mundi* ascribed to Albertus Magnus—not, however, the mathematical fragments of the Greek philosopher, Archytas of Tarentum, of the fourth century B.C. but what was probably a supposititious work on events in nature, a title which later he alters to effects of nature; Alcabitius on perspective, Theophilus on diverse arts; and Fontinus' *Description of the Universe*. In the body of the text not only does Fontinus contend for the treatise on climates and zones with Morientes, as we have seen, but there are further ascribed to him books on the machine of the universe, the mixtures of elements (also attributed to Alfarabi), the equalities of things, and a *De elementis et elementatis*.[4] Such topics somewhat resemble the work of John Fontana in the first half of the fifteenth century, and one wonders if these citations can refer to him and, if so, whether they were interpolated by Farinator or are signs that the *Lumen animae* was not composed as early as the time of John XXII. Or, were we to admit a date later than the pontificate of John XXII for the *Lumen animae*, we might interpret the name Fontinus as a derivative from *Fons memorabilium universi*, the title of Domenico Bandini's encyclopedia, which we consider in the latter part of this chapter. Otherwise there seems no name

[3] *Lumen animae*, Tituli 22G, 23G, 33D, [4] *Ibid.*, Tit. 13C and G, 40F, 50V. 42S, 74B.

of a known author resembling Fontinus except Frontinus, the ancient writer on military matters. Or it might equally well be derived from the French *Fontaine de toutes les sciences* of the thirteenth century or book of the philosopher Sidrach, whom, however, we would expect our author to mention by name. Alcabitius is a well known author, and there are plenty of medieval books on perspective, but none of them seems to be by Alcabitius; perhaps Al-Hazen was meant. Of the work of Theophilus we shall have more to say presently.

Later someone told the author that there were rare books to be had at Cahors (*in Cathurco*) and he went there and bought a Constantius on the natures of liquids and an Evenus on the contents of the orb. But in the text itself he attributes to Eventinus a treatise on the nature of liquids, to Eventius a *liber rerum,* and to Evencius a work on the effect of dreams. It seems probable that the original spelling of names by our author has become corrupted in successive manuscript copies and the printed editions. From England he obtained the *Liber amphites* or book of Amphites on the edicts of the philosophers and a Pandulphus on the passages of the earth. These works seem no longer extant, although a Pandulphus is one of the philosophers cited in the alchemical *Turba philosophorum.* Better known are his Isidore, Solinus, Avicenna, Mesuë, and Philaretus. But he seems to have found the two last none too easy to consult, procuring copies by the favor of certain physicians. Whether "Pliny in his Natural Mirror" is a slip for the *Historia Naturalis* or the *Speculum Naturale* of Vincent of Beauvais is a question. At Paris these books were then in circulation: Theophrastus *de parte sensitiva* —a work I fear no longer to be had even at Paris, Alfarabi *de differentia regiminum,* and Albertus commentator *de impressionibus aeris*—presumably the *Meteorology* of Albertus Magnus. He also found a certain book at Palencia called the *Summa* of Themistius on natural entities distinguishing them from incorruptible and supernal entities. Commentaries of Simplicius and Zeno, Hippocrates with Johannitius, and Chalcidius on the nature of the fifth essence as well as on the *Timaeus* are other

authors and works included in his preliminary bibliography. It makes one's mouth water, but we shall have to content ourselves here with such excerpts therefrom as the *Lumen animae* vouchsafes. If its author had as much difficulty as he says in finding them in his time, however, it is little wonder that some of them have totally disappeared since, and perhaps had already vanished when Farinator brought him forth from his long concealment and perpetuated him by the printing press.[4a]

An odd thing is that the less familiar of these names are hardly mentioned again in the body of his book by the author, as we have already noted in certain cases, and as is further true of Centobius, Nestorius, Pandulphus, and Zeno.

Other puzzling citations occur in the text itself. Apoloyus might well be a misspelling of Apuleius, but there is no book on the compositions of things by the latter. And he is cited by his own name for a book on the death of Plato—perhaps a slip for his *De doctrina Platonis*. Guido in his medicinal *Summa* is another riddle, for the *Lumen animae* was supposedly written before the time of Guy de Chauliac. When Albertus Magnus is quoted from a treatise on the ways of art and nature, the work of Roger Bacon on the marvels of art and nature and nullity of magic may be meant. The phrase, *Turma* or *Turmae philosophorum* is used more than once,[5] but it is dubious if the alchemical treatise *Turba philosophorum* is meant, or if it is a title at all.

[4a] E. Wickersheimer, "Notes sur deux manuscrits provenant du monastère de Frenswegen," *Bulletin de la société française d'histoire de la médecine,* XIX (1925), 369-375, published from the end of a collection in 114 chapters, arranged by subjects alphabetically, to furnish preachers with illustrations, a list of profane writers and titles largely identical with those of the *Lumen animae,* although he was not aware of this striking fact and so did not raise the question whether these chapters are a fragment of the *Lumen animae* or are a work which has borrowed therefrom. The list of writers occurs in Strasburg 59, written before 1423 A.D., fol. 367.

[5] *Lumen animae,* 25B, "Amphites de turmis (terminis?) philosophorum", but Amphites is not one of the philosophers named in the *Turba;* 72P, "ut recitat Theophilus super iii de anima dicens, Quidam reperti sunt in turma philosophorum qui conati sunt dicere animam tanta et tam insolubili connexione fore corpori organisque corporis constricta quod ipsa nec in presenti quidem nec in futuro absque corpore intelligere quidem possit."

Plato is cited not only through the *Timaeus* and Chalcidius but "in Phedrone," book five and book ten.[6] The passages cited, however, sound more like perversions of the *Timaeus* than of either *Phaedo* or *Phaedrus*.

All the citations in the *Lumen animae* which can be surely referred to works of known date and authorship have to do with books written before the close of the thirteenth century. Among the latest authors cited are Albertus Magnus who died in 1280, and John of Procida, the medical writer connected with the Sicilian Vespers and who died in the same year, 1282. Also the unidentified citations are of the type which we find in other works of the thirteenth century. Therefore, so far as its recognizable citations are concerned, there is no reason for dating the *Lumen animae* later than the early fourteenth century or even the closing thirteenth.

While some of the authors listed in the preliminary bibliography are hardly mentioned again in the body of the text, others are cited frequently. One of these is Archytas of Tarentum or Architas Tharentinus. The *De mirabilibus mundi*, current under the name of Albertus Magnus, had cited Architas twice without title for medicinal suspensions of parts of animals as a cure for quartan fever.[7] Our author makes an entirely different and apparently independent use of the work by Architas which he calls *Of Effects* (or, *Events*) *in Nature* and which consisted of at least five books according to his citations. From it are derived the assertions that feathers placed on hot gold are soon resolved into water; that voices carry farther in groves, at night, in time of grief or pain, and under water; that the stars alter the interior more than the surface of the earth; that rain immediately follows the sweating of lead vessels; that the stars are visible in daytime from the bottom of a well; that the sky is reddened by a great

[6] *Ibid.*, 35A, "Plato in phedrone libro quinto. Hec est natura aeris infimi et supremi ut aer qui infimus est semper sursum ascendat. Aer autem excelsus deorsum semper cadat. Cuius causam ibidem Plato assignans dicit. Aer inquit qui circa terram est frigore sursum iacitur pellitur et fugat." 61A, "Plato in phedrone libro x, Miram ergo sidera atque astra scintillationem sue transmittunt intelligentie et motrici."

[7] See the edition of Amsterdam, 1740, pp. 185, 186.

conflagration on earth; that a sweet liquid grows sweeter in a gold or silver vase, but becomes bitter in any other kind; that a dying man emits fiery rays from his eyes; that the resistance of the air often breaks a falling body; that when a great stone is hurled from a machine the air makes a hole for it before it strikes the earth; and that when the elements divide the qualities equally between themselves, health and prosperity prevail, but strife and pestilence when the distribution of first qualities between the elements is unequal.[8] These passages with their alluring combination of scientific curiosity and observation together with fondness for the paradoxical, the marvelous, the astrological, make us regret indeed that the work of Architas or the pseudo-Archytas on effects in nature has not survived. It would seem to have been a work somewhat on the order of the *Problems* of Aristotle.

Another work often cited in the *Lumen animae* is Theophilus in the *Breviary of Diverse Arts*. One would naturally suppose this to be the well known work of Theophilus *De diversis artibus* or *Diversarum artium schedula* in three books. But the passages of the *Lumen animae* are not to be found in it, and they are scarcely in accord with its usual content but sound more like Pliny's *Natural History*. Thus we are told that a perforated tree is more fecund; that a rod dipped in hot ashes is bent easier; that snakes swim across waters which flow slowly; that dogs in the chase, as they become hungry and hear the voices of the hunters following them, abandon their slowness and torpor and pursue the game more swiftly; that horses are girthed for two reasons, so that the rider may keep his seat better, and so that the horse may run faster.[9] Less obvious is the information that, if a mirror is set opposite a basilisk or other serpent at sunrise, the splendor from the mirror will extract the animal's venom or at least its virtue.[10] But this statement is elsewhere credited to Algazel, *De forma speculi*.[11] To Theophilus in his work on

[8] *Lumen animae*, 2Aa, 3V, 7R, 49B-O, Cg, Ec, Ga, 50Da, 57B; other citations of Architas Tharentinus at 19A, 21G, 41A, 73L.

[9] *Ibid.*, 3R, 3Ra, 14D, 14-O, 15B.

[10] *Ibid.*, 7Ta.

[11] *Ibid.*, 55Ca.

the arts are further ascribed the statements that blind persons are always fatter, of stronger body odor, and more astute; that all metals sound better when mixed with gold and silver, as bells and cymbals illustrate; that a man with oil in his mouth can remain under water for an hour, since the oil divides the water so that he is able to breathe through it; and that a person whose hand has been amputated always feels cold on that side of his body.[12] Wise engravers bury the magnet three days in the earth and wrap it in goatskin and anoint it with linseed oil, that it may recover its lost power. From Amphites and Belinus it is added that, worn in gold, the magnet comforts weak hearts and, worn in silver, clarifies the sight or other senses.[13]

Even a statement which sounds as if it might come from the known work of Theophilus, namely, that ivory is softened in five ways, by cooking it in wine, anointing it with oil, wrapping it in leather, heating it by fire, and soaking it in vinegar,[14] does not seem to be there. Once Theophilus on the third book of the *De anima* is cited,[15] but everywhere else it is the treatise on diverse arts which is professedly at least used. It is even cited on the subject of dreams and sleep. Theophilus is represented as making the usual statement that dreams near morning are more significant than those earlier in the night because then the process of digestion is complete and the head is no longer occupied by many vapors. It is difficult to awake a man who has been hypnotized by the magic of enchanters and thieves, because such magic changes the entire virtue of the sensitive part and takes it away and totally destroys it so far as organic actions are concerned.[16] Such is the mixture of magic and science which the *Lumen animae* offers us under the name of Theophilus. One passage which is something like a place in the work of Theophilus is not attributed to him but to Albert on the ways of art and nature. It states that salvia—perhaps saliva is meant rather—buried in a glass vase in manure for thirty days is changed into a bird with a serpent's tail and otherwise resembling a black-

[12] *Ibid.*, 36H, 41C, 41-I, 57A.
[13] *Ibid.*, 25B.
[14] *Ibid.*, 49-Xe.
[15] *Ibid.*, 72P.
[16] *Ibid.*, 72Aa; 73.

bird.[17] Thus practically all our author's citations of Theophilus seem incorrect, increasing our suspicion as to his reliability. But if he has invented some of his authorities, it seems less likely that he has merely imagined the supposed facts of nature for which he cites them.

It of course should be remembered that the author of the *Lumen animae* is not selecting his bits of natural science primarily for their scientific value, but rather for some striking quality which will catch the reader's interest and drive home the spiritual lesson which it is intended to inculcate. Such a basis of selection does not reflect the science of the time at its best or its soberest, but does indicate what sort of presentation of nature was then acceptable to the ordinary reader, and how much of the marvelous and paradoxical he liked to have accounts of nature flavored with. Since, however, truth is stranger than fiction, this need not mean that a considerable amount of scientific fact would not be offered.

Pursuing a classification appropriate to the period, let us note some passages with reference to the four elements, and first fire. No less than thirty conditions and effects of fire are listed but some repeat the same idea and on the whole they seem to be made up for the sake of the author's spiritual and moral comparisons rather than to reflect scientific distinctions and classification. Thus fire is described as causing mobility in all bodies, as the origin of lightness and levitation, as the cause of life in transitory and mundane things, as removing impurities, hostile

[17] *Ibid.*, 1-E. Compare Theophilus, III, 48, or *Magic and Experimental Science*, I, 771.

R. E. Raspe in *A critical essay on oil-painting*, London, 1781, added at pp. 121-148 an Appendix containing a review of the *Lumen animae*, an alphabetical list of its less familiar citations, and a copy of the fragments of *Theophili Tractatus diversarum artium*. In the body of the essay at page 45 he remarks: "Nor does it appear that the *Tractatus diversarum artium* mentioned in the *Lumen animae* belongs to our Theophilus; for having examined this dull performance and all the passages of the *Tractatus diversarum artium* which are contained therein, I am fully satisfied that none of them are taken from that work of Theophilus which we are speaking of here, and that the book from which they are taken being different, its author might be so likewise." These fragments were reprinted in Ilg's edition of 1874.

to venom, softening hard things and hardening soft substances, as extinguished by itself or by three other things, lack of fuel, water, and cold. The flame goes up but reflects down, and so on. Other scattered passages deal with particular fires. Avicenna in his fourth book on floods states that certain regions in the north flame with perpetual fire. In those regions there are fountains of bitumen, swamps full of grease, and meadows of honey and burning sulphur. Pliny in the *Speculum naturale* says the same and that there are mountains to the north which appear to be inflamed with perpetual fires. In the same fourth book on floods Avicenna accounts for the fires at night in the vicinity of gallows, graveyards, and valleys by viscous grease from putrefaction. When a candle is continually dipped in ashes, it burns faster and flames more brightly.[18]

The assertion that still air burns quicker and better makes a good transition from fire to that element.[19] The lower air is always ascending and the upper air descending, the reason for this being, according to Plato in "Phedro," that the cold near the earth expels the air there while the sphere of fire expands the upper air next to it and so forces it earthward.[20] Concerning the action of falling bodies we have already heard something on the authority of Architas Tharentinus. We are further informed that light or flat or burning bodies fall with difficulty and not in a straight perpendicular line. Men falling through the air are suffocated before they reach the ground.[21] No body, however light, can rise into the region of air unless it is transformed into very subtle vapor. Our author attributes to Ptolemy in the fourth book of the *Almagest* as well as to Avicenna in the eighth book on floods—a favorite source with him—the assertion that worms, frogs, and snakes are drawn by the sun up into the sky, because they are seen to fall with the rain. But our author's explanation is that only seeds or a seminal viscosity of these animals is attracted by the sun and afterwards changed into the animals in the clouds.[22]

[18] For the statements of this paragraph: *Lumen animae*, 49-Ia, 55A, 41S, and 13C.
[19] *Ibid.*, 13G.
[20] *Ibid.*, 35 and again at 60A.
[21] *Ibid.*, 35D-E.
[22] *Ibid.*, 38Da, 9A, 61M, 5V.

As for the two remaining elements, the theologians say that the earth rests on water, while the philosophers contend that water is above earth. Our author solves the controversy by granting that in site water is above earth but that virtually it supports the earth, because without water the earth would dry up and be dissolved into powder.[23] Instead of the more usual estimate that one-fourth of the earth's surface is dry land, our author holds that the sea is a thousand times the extent of habitable regions and claims that astronomers have proved this. He believes in a gulf or abyss in the sea which causes the tides by sucking in and pouring forth the waters, and which swallows ships too, if they come near.[24] From Aristotle he repeats that a ship sinks deeper in still than in flowing water, that snow is never seen on the ocean because the tossing waves send up a hot vapor, that all fish naturally seek the sources of waters as their sweetest part, and that waters toward the south produce gold and noble pearls.[25]

At sunset and nightfall every fountain and body of water is naturally augmented. All springs are naturally cold in summer and warm in winter. Often when a large stone falls from a height a fountain gushes forth at the spot where it strikes. Solitudes and valleys attract rain and floods.[26]

Contradictory hypotheses are attributed to the *Almagest* and to Avicenna as to the state of the earth's center. Ptolemy holds that it is inflammed—and various doctors contend that hell or purgatory is there, for the rays of the stars concentrate on it. But Avicenna says it is stone.[27] There is also considerable confusion in our text as to whether mountains or valleys and the surface of waters are more luminous and susceptive of celestial light, and Avicenna is cited for both views. The purity and peculiar odor of mountain air is remarked, and we are told that mountains are fumigated by some stars attracting vapor, by the

[23] *Ibid.*, 39H.
[24] *Ibid.*, 1-O, 25E, 49Hb.
[25] *Ibid.*, 7Ab, citing the *Problems;* 34B, citing the fourth book of *Meteorology,* and again at 22F where it is cited on the authority of Alfarabi and Avicenna, and at 53D; 25C and D.
[26] *Ibid.*, 55Ha and Xa, 49E and Rf, 13S, 16B.
[27] *Ibid.*, 55N.

heat of the air, and by the opening of the pores of the mountains.[28]

A few supposed facts about animals may be noted. Frogs in time of pain eat the stone that grows in their heads—no small feat unless they submit their scalps to mutual surgery. When the dove's throat is cut, it bleeds more than other birds. The bat normally flies in irregular circles but rushes to a sword in a straight line. When a bear is skinned it is seen to have human hands and feet, but this is not true while it is alive. Lightning is by its nature hostile to venomous animals.[29] There is less said of vegetation, and nothing so startling. Trees that lose their leaves quicker in autumn will bear more fruit in summer and garden trees are more fruitful than wild trees. Fruit is produced only from the element earth.[30] Something is said as to how gems lose their virtues and how these may be restored.[31] Iron quenched in honey is readily softened and more quickly liquefies in fire. Every liquor in which a hot iron is placed burns more vehemently than fire itself. Fire mixed with human blood and preserved in a copper vase cannot be extinguished. Cords of gold and silver are sweetest if they have been well stretched, or if the metal has hung in the air. Burning coals extinguished in water harden and are rekindled with difficulty. All bitter liquids, if enclosed in a hot vase, grow sweet because bitterness is due to indigestion of humidity.[32] Such is the chemistry of our treatise.

To generate life in any body it must be resolved into a jelly or softness, the former life must be totally corrupted, it must be moved sedulously, and must be warmed strongly by natural heat.[33] The medical passages of our treatise are not noteworthy. One is that bleeding under the tongue cures apoplexy.[34] But there is a good deal on sleep, dreams, and divination in sleep.[35] According to the *Problems* of Aristotle timid persons sleep soundly because the heart is soaked in blood, and we sleep sounder at sunrise because the humors rise to the head following the

[28] *Ibid.*, 7S, 47A, 47C, 63-O, 55Ba, 7-I.
[29] *Ibid.*, 5V, 9H, 14M, 25F, 7Mb.
[30] *Ibid.*, 13R, 10Ma, 9E.
[31] *Ibid.*, 41Ba, 49Xd, 55S.
[32] *Ibid.*, 42F, 23G, 39E, 42L, 13H, 42A.
[33] *Ibid.*, 49-Ib.
[34] *Ibid.*, I, 37Ba.
[35] *Ibid.*, 72 and 73.

sun. John Proscida says that it is healthier to sleep sitting than prostrate on the pavement. The usual reasons are given why the human soul can divine the future better in sleep than waking. Dreams may not only excite and illuminate the intellect but alter the whole body. The dreams that are hardest to remember are also those most likely to come true, the reason being that such dreams are caused by the constellations and slip away easily from memory just as the heavenly bodies move lightly and smoothly. When a kinsman dies even if a hundred miles away, or if any ill or grief or danger threatens him, we sense it at once in dreams "from the nature of the world soul and order of the universe or celestial fate." To see high mountains in a dream indicates future humiliation and depression.

A large use of astrological concepts is made by the *Lumen animae* for its purposes of spiritual comparisons and analogies, nor is any doubt cast upon the influence of the stars. Divine providence has so disposed that to every thing is deputed its appropriate virtue of the sky, and this celestial virtue has constituted all things in due number and measure. Moving intelligence is joined to the sky inseparably and eternally. Even the light of the sun comes to us affected by the other stars, but for which it would be constant. The earth is sustained in midspace by the equal pull of the stars from all sides. Inferiors play chiefly a passive rôle in the administration of the universe. When the elements are quiet and in concord, the constellations make a greater impression, and corruption is not caused by the stars but is a natural tendency of compounds, if the stars exert no counteracting influence. The heavenly bodies are incorruptible because they have such union with and obedience to their moving intelligences, while the corruption of worldly bodies results from their contrary ingredients. But fate and the constellations can transport bodies beyond their nature and condition and quality. For example, the influence of the stars may raise water in a solid wall, and some give such an explanation for the miracles of the Red Sea and crossing of Jordan. Or floods ensue when the planets are in watery signs, or, according to Avicenna, when

a star sets. Where no seeds are carried by wind or bird, vegetation may spring up merely by the virtue of the constellations. A solar eclipse renovates the soil, attracts a great amount of vapor, and produces pestilence. There are also other celestial signs of pestilence. Snakes have no bones during the full of the moon, while the peacock grows a stone in its head, assertions put forth on the authority of Aristotle. Physicians should regard the courses of the stars right diligently. The stars also influence dreams, and dreams while the moon is waning and there are fewer vapors are especially efficacious and significant. Each man, says the commentator on the *De pomo* of Aristotle, has his own star which dominates his qualities and with which he should bring his life into accord, for so long as he does so, he will live in health. But if he fails to conform to the qualities of his star, he dies. Those who are sick of ordinary diseases may be cured by medicine, but, as Galen says in the book of secrets, there is a kind of death that is impressed by the celestial bodies, and against this no medicine avails.[36]

The huge, encyclopedic *Fons memorabilium universi* of Dominicus Bandinus of Arezzo was divided into five parts in honor of Christ's wounds.[37] In a manuscript at the Vatican which itself includes only a portion of the first book of the fifth and last part of the ponderous work,[38] there is on the reverse of the fly leaf, a full page picture of a font with a haloed Christ in an urn on the top of a column which rises from the fountain. Perhaps the intention is to typify the

> . . . fountain filled with blood
> Drawn from Immanuel's veins,

but this is not explicitly stated or depicted. From the fountain also sprout several boughs with circular leaves on which are the titles of the various sections of the entire work, each bough

[36] *Ibid.*, 8A, 61A, 7S, 8D and 0E, 55B, 8A, 55Fa, 7-I and 55Q, 10-O, 16B, 65C, 3T, 8F, 0F and 30F, 72, 8B and 72-X-Ba, 8G, 10-X.

[37] Mehus (1759), I, pp. cxxxiv-cxxxv. I have verified this statement from the introduction of the work as contained in Oxford, Balliol College 238: "in 5 partes ad honorem 5 magnorum vulnerum Ihesu Christi."

[38] Vatic. Urb. 300. For the MSS see further Appendix 33.

representing a part and the leaves its books. In the manuscripts the work is sometimes referred to as the book of the column of the fountain instead of merely as the fountain of memorable things of the universe.[39] The first part[40] divides into four books on God, the angels, the soul, and hell with its demons. The five books of the second part[41] deal with the universe, heavens, fixed and erratic stars, and seasons. The third part[42] on the elements has eight books on 1) the elements in general, 2) fire, 3) air, 4) impressions of the air or weather conditions, 5) birds, 6) seas, 7) rivers, lakes, and fountains, and 8) fish. The next part on the element earth and geography has twelve sections on provinces and regions, islands, cities, notable buildings, peoples and customs, mountains, trees, herbs, quadrupeds, serpents and reptiles, stones, and metals. The last part is given over to human considerations, its first book being devoted to famous and illustrious men, the second to philosophical sects, the third to heretical sects, the fourth to virtues, and a fifth book on famous women on a separate second bough emanating from a lion's mouth in the fountain. Mehus spoke of the third book as devoted to virtues and the fourth to heresies, and this is also the case in the Balliol College manuscript.[43]

In the section devoted to famous men Bandini manifests the growing influence of humanism and classical interest with distaste for the medieval and scholastic period and a narrow partiality for recent Italian or Tuscan culture and personages as against men of other nationalities and languages. Agathocles is given nearly two pages, while neither Abelard, Adelard of Bath, nor Albertus Magnus is so much as mentioned. Bede is treated, but if Aquinas or Roger Bacon were included, it must have been under Roger and Thomas; they do not figure in our manuscript which goes only to P. Many Cornelii and Crassi and Creons and

[39] FL Ashburnham 1279, fol. 11r, col. 1: ". . . operis huius columpne fontis memorabilium universi."

[40] Called Pars III by mistake in the MS.

[41] Called Pars IV in the MS.

[42] Called Pars V in the MS, but from what it says at fol. 2v, col. 1, it would seem that the parts numbered III, IV and V in the figure should be I, II, and III.

[43] Oxford, Balliol College 238.

Demetrii and Fabii are discussed, but the only Bernard is Saint Bernard. Biblical personages hold their own, but the Arabic writers and leaders receive scant treatment, although such astrologers as Albumasar and Messahala are not entirely passed over. Much the longest single article is that on Caesar, all whose wars are gone over. Hannibal, too, is made the theme of a long article, while Galen gets less than half a column and both Hermeses together only a column. Archimedes occupies a full page, however, and Aristotle, too. Nectanebus, here spelled Natanabus, is allowed over a page, and Martianus Capella and Marbod receive unexpectedly generous treatment. In the medieval period, as in the classical, warlike and romantic personalities are apt to be allotted more space than sages and intellectuals. King Arthur fills a page and Attila the Hun, more than that. Guido Bonatti and Marco Polo are dismissed in three lines each, perhaps because they were back in the thirteenth century or because while Italians they were not Tuscans or Florentines. Brunetto Latini has a column; Dante two pages; Dinus de Moysello and Dino del Garbo, over half a column each; Petrarch, between two and three columns; Giovanni Andrea, a column; and Boccaccio, the same. Cimabue and Giotto are not forgotten.

Possibly Bandini devoted less space in his biographical section to some of the past learned writers because he had already cited them so much in other parts of his encyclopedia. Albert of Saxony, distinguished from Albertus Magnus by being called Albertus novus, is utilized as well as Guido Bonatti and Cecco d'Ascoli in the book on the sky, signs, and celestial images. Cecco's burning at the stake as a relapsed heretic seems not to have prevented citation of him as an astronomical and astrological authority. Albertus Magnus, "that Catholic philosopher," is also cited for the control of inferiors by the sky.[44] Bandini saves free will but believes that the sky inclines men,[45] and that the signs of the zodiac may dispose an individual to be pusillanimous or a violator of women. He also details the

[44] Vatic. 3121, fol. 5r, for Albert of Saxony; fol. 5v, Albertus Magnus; fol. 6r, Cecco, Guido, and Albert of Saxony again.

[45] Vatic. 3121, fol. 6v.

influence of the signs on cities and countries.[46] But he abhors the notion that the spirit of life can enter an astrological image and make predictions.[47] In his next book he distinguishes the planets as fortunate or unfortunate and outlines their influences at length, citing such authors as Alchardianus, Haly ben Ragel, and Andalò di Negro.[48] He also discusses whether the sun is fed with humors. At about this juncture a perturbed disciple is represented as trying to dissuade Bandini from his work, but he refutes his detractors and proceeds with it,[49] citing Alkardianus and Andalò again and also Nicolas Oresme and Petrarch.[50] He predicts solar eclipses for October 20, 1399, June 16, 1406, October 19, 1408, April 15, 1409, June 7, 1415, April 6, 1418, and March 20, 1419. He cites the work of Michael Scot on astrology which he sent to the emperor Frederick, and later lists future eclipses of the moon on June 21, 1396, April 10, 1399, and so on into the year 1417. The mansions of the moon are next considered, after which Michael Scot is cited again concerning the angels associated with the spheres of the planets.[51] Thus Bandini's astronomy and astrology, unlike his biographies, remain medieval.

In his book on the universe Bandini is more specific in the matter of his detractors, mentioning a man at Florence who was more puffed-up than learned but of pompous name among the students of arts, although he preferred the title of a medical man. He poured derision on Domenico's encyclopedia, while he was working at it, and was full of sophisms. Domenico and his son, John, non-plussed him by asking him whether a man died while still living or rose from a chair while still seated. Bandini uses this as a text or pretext for inveighing against the physicians of his time who engage in puerile logic, thus criticizing one feature at least of scholastic learning. As for this detractor, he suppresses his name for the present but threatens to broadcast

[46] Vatic. 3121, fol. 17v *et seq.*
[47] Vatic. 3121, fol. 7r.
[48] Vatic. 3121, fols. 26v, 34r.
[49] Vatic. 3121, fol. 37v.
[50] Vatic. 3121, fols. 38v-39v.
[51] Vatic. 3121, fol. 40v, solar eclipses; fol. 50v, lunar eclipses; fols. 45r and 53r-v, citations of Michael Scot; fol. 51v, mansions of the moon.

it, if he does not desist "from his innate envy and accustomed garrulity."[52]

As for the universe, Bandini holds that it is not eternal, and that Epicurus was the first to say that it was.[53] He asks in how much time God created, distinguished, and adorned the world, where God was before creation, whether there are several worlds. He sets forth the work of each of the six days of creation, the parts and climates and the seven ages of the world according to the poets and to the astrologers.[54] Alcardianus is once more cited, and Gismondus in the book on the beginnings and ends of things. Gismondus says that at the creation of the world Aries ruled with Mars for twelve thousand years, then Taurus with Venus for eleven thousand, then Gemini with Mercury for ten thousand, then Cancer with the moon for nine thousand, then Leo with the sun for eight thousand years. In our age, which begins from Adam, comes the reign of Virgo with Mercury and because these have human form, men should rule other things. This dominion will last six thousand years, after which Libra will begin to reign, and Christ will come to judge and settle all, and that age will endure to eternity.[55] Bandini adds some other conjectures as to the duration of the present age and the end of the world. Earlier he had agreed with the church fathers that the star of the magi was a new creation.

Bandini accepts the usual view then which he repeats on the authority of Campanus that one quarter of the earth's surface is uncovered by water in the northern hemisphere where there are stars of greater virtue.[56] His treatment of provinces and regions of Europe is scanty compared to that in the thirteenth century encyclopedia of Bartholomaeus Anglicus. Anjou and Austria have barely a line each, stating that one is a part of Gallia Lugdunensis, the other of Germany. All we are told of Saxony is that it is a region of Europe. One sentence from Gervase is all Flanders gets, and a sentence from Guido of Ravenna suffices for Gascony. Burgundy is dismissed with equal

[52] FL Gaddi reliq. 126, fols. 4r-5r.
[53] FL Gaddi reliq. 126, fols. 2r-3r.
[54] *Ibid.*, fols. 5v-9r.
[55] *Ibid.*, fol. 13v.
[56] FL Ashburnham 1279, fol. 13r, col. 2.

brevity. But there is nearly a column on Campania, and Italy is described as the pleasantest region in the world.[57] In the section on islands England receives three columns, but most of it is quotation from Gervase. The voyage (in 1341) of Angelinus de Corbetis of Florence "with several Genoese ships" to "another Canary" is described with about the same details that we get from other sources.[58] In the section on cities Cecco d'Ascoli is again quoted as to the influence of the stars on Bologna.[59]

The section on herbs of the *Fons memorabilium* is not of much independent value. It especially follows Albertus Magnus, also quotes most of Macer's poem, and makes liberal use of Pliny, Dioscorides, Isidore, *Circa instans,* Avicenna, Isaac, Serapion, Rasis, Almansor, and Galen. Among other authors cited are Vergil and Ovid, Servius, Gervase of Tilbury, Peter Crescentius on agriculture, and Peter of Abano on poisons. The latest authority mentioned appears to be Nicholas of Florence in his book on poisons. On the other hand, no acquaintance is shown with the important botanical work of Rufinus, contemporary of Albertus Magnus and fellow Italian of Bandini.[60] Some of the works cited are of a supposititious or superstitious sort: Hermes in his alchemical experiments for the notion that a sword, tempered in juice of a radish mixed with the juice of earthworms cut up and strained through a cloth, will cut all iron as if it were lead; *Flos florum* for the statement that *assidios* is an herb of India whose root not only preserves its bearer from demons but compels the spirits to tell their names and powers; Alcardianus in his physical experiments; the book of physical ligatures.

The section opens with a few chapters on gardens and then treats in alphabetical order of two hundred and sixty-five herbs and vegetables. Bandini is more interested in listing their virtues, medicinal and marvelous, than in botanical description,

[57] *Ibid.*, fol. 30v.

[58] *Ibid.*, fol. 54r, col. 2: Bandini's account is not noted in Beazley, *Dawn of Modern Geography,* 1897-1906, III, 423, in connection with this voyage.

[59] FL Ashburnham 1279, fol. 92r, col. 2.

[60] On Rufinus see my paper in *Isis,* XVIII (1932), 63-76: "Rufinus: a forgotten botanist of the thirteenth century."

but sometimes gives agricultural as well as medical details. The marvelous properties are drawn from Dioscorides and Albertus Magnus as well as from less reputable sources.

Although mainly a compilation, the section on herbs is not without occasional contemporary or personal touches. In discussing cucumbers Bandini mentions a sweeter variety "which we at Florence call *cuccherini,*" and whose seeds before planting are soaked for two days in honied milk or sheep's milk and honied wine. Noting the assertion of "experimenters" that the masculine and feminine varieties of the root mandragora enable barren women to bear child of the corresponding sex, Bandini declares, "But I would never believe that anyone could be generated by an herb." He grants, however, that the root might remedy some ailment of the womb. He also does not credit the tradition that the mandragora emits a cry when pulled from the ground, although the experimenters aver that dogs are employed in this uprooting because men would die on hearing the cry. *Experimentatores* are indeed, often cited by Bandini, and sometimes from hearsay rather than a book, since he once repeats what an experimenter from India had told him. He also notes what herbalists have said to him or quotes certain cultivators of gardens. To the last named class he himself belonged. Having remarked that Lactantius called the herb *santureia pulegium* (penny-royal), that Pliny gave as the Greek equivalent for it *tinbra* (i.e. thymbra),[61] and that Leontius (Pilatus), the translator of Homer who lectured at Florence in 1360, identified it with vervain, Bandini expresses surprise at such disagreement, "since *santureia* is a species of herb distinct from all the others named and a favorite with me, for there is a lot of it in my garden." By *santureia* Bandini means *satureia* or savory.

Such are some specimens of the content of the *Fons memorabilium universi* of Domenico Bandini. It impresses one as a rather wooden work of a cut-and-dried order, not distinguished by much thought or originality. It is marked by partiality for Italy and Italians rather than by world-wide outlook and sympathy and

[61] Pliny, *Nat. Hist.* XIX, 8 (50), sect. 165.

appears to have been intended primarily for home consumption. For our investigation its chief interest lies in the prominence of astrology in its pages and its association of the word, "experimenters," with incredible statements and magical practices.

A little earlier in the century than the work of Bandini had appeared the much slighter but in some ways similar *De originibus rerum libellus* of William da Pastrengo of Verona. Its main feature is an alphabetical bibliography of past writers, chiefly classical, but it also comprises lists of inventors, founders of cities, famous men, and various cities and regions. Many names of Arabic astrologers appear in its bibliography.[62]

[62] *De originibus rerum libellus authore Gulielmo Pastregico Veronense in quo agitur de scripturis virorum illustrium, de fundatoribus urbium, de primis rerum nominibus, de inventoribus rerum, de primis dignitatibus, deque magnificis institutionibus,* Venice, 1547.

CHAPTER XXXIII

AN ANONYMOUS TREATISE IN SIX BOOKS ON METAPHYSICS AND NATURAL PHILOSOPHY*

The intellectual interests of the fourteenth century and the state of knowledge at that time are presented as it were in bird's-eye view by an anonymous compendium of six books on metaphysics and natural philosophy preserved in a Latin manuscript at Paris.[1] The handwriting, in the opinion of the Director, M. Omont, is of the second half of the fourteenth century, or perhaps even the beginning of the fifteenth. But of course this manuscript may be a later copy and not the original composition. The name of the author is unknown, and his abstention from citing recent writers by name makes it difficult to place him chronologically with any nicety. He sometimes gives a personal detail, as when he speaks of wishing to prove to a Jew by natural reason that God could be incarnated.[2] But such passages are insufficient to identify him. Not improbably he was a doctor of theology, since in other passages analogous to that just mentioned he rather leaves the impression that he could discuss theological questions, did they not lie outside his present scope.[3]

Apparently the work was composed after 1323, the date of the canonization of Aquinas, since he is called St. Thomas,[4] although this title might be a later insertion of a copyist. In connexion with the question whether individuals of the same species may differ essentially, allusion is made to an article con-

* Revised from *The Philosophical Review*, XI (1931), 317-340.

[1] BN 6752, 14th century, membrane, written in a large legible hand, 239 leaves, of which the first three are left blank.

[2] BN 6752, fol. 20v, "Unde cum dudum cuidam Hebreo probare vellem deum incarnari potuisse et hoc per rationem naturalem."

[3] *Idem*, "quia licet deum esse incarnatum sit catholicum et theologice inquirere ipsum tamen posse incarnari presentis speculationis apparet." *Ibid.*, fol. 46v, "Et licet articulum Parisiensem investigare sit potius catholicum quam philosophicum, quia tamen articulus favere videtur opinioni predicte que philosophica est investigatione non tamen veritate, ideo ad articulum Parisiensem respondere convenit."

[4] *Ibid.*, fol. 214r.

demned at Paris which involved the problem whether the soul of Christ was nobler than the soul of Judas. This appears, however, to be a reference to the 124th of the 219 articles condemned by Stephen Tempier, bishop of Paris, in 1277, and so affords little clue to the date of our treatise.[5] On the other hand, the discussion of certain doctrines seems to place our compendium fairly well along in the fourteenth century. Thus, while the conception of the latitude of forms, as indicating their intension or remission, has been traced back to Henry of Ghent (1217-1293),[6] Duhem regarded the phrase, "uniformiter difformis," which we shall find our author further refining, as introduced by some unknown person about the time of Albert of Saxony, or the middle of the fourteenth century.[7] But we have heard it used by Suiseth as if already a common expression.

When our author states that the moderns have discarded the definition of *maximum quod non* given by the older philosophers,[8] he evidently is not referring to those of classical times but to two periods of scholasticism, and is already making the distinction which is found from 1425 on in the German universities[9] in the *via antiqua,* meaning the philosophy of the time of Albertus Magnus and Aquinas, and *via moderna,* indicating the teaching of men like Jean Buridan, Marsilius d'Inghen, and their followers.

Primarily our work is an exposition of the philosophy of Aristotle, and serves to emphasize his great influence on later medieval thought and science. But it manifests a different attitude towards Aristotle from that when the *Metaphysics* and the works

[5] The passage itself may be of some importance, however, as indicative of later opinion about the condemnation of 1277 and the particular question involved in the 124th article. I therefore reproduce it in Appendix 35.

[6] See Pierre Duhem, *Études sur Léonard de Vinci,* troisième série, *Les précurseurs parisiens de Galilée,* Paris, 1913, p. 319.

[7] *Ibid.,* p. 309: "Bientôt, on vit apparaître un vocable dont il nous serait impossible de nommer l'inventeur . . . *uniformiter difformis.* Nous trouverons cette expression dans l'usage commun de maîtres de l'École d'Oxford qui furent contemporains d'Albert de Saxe ou qui furent même plus anciens que lui."

[8] See below, note 44.

[9] Gerhard Ritter, *Studien zur Spätscholastik,* II. *Via antiqua und via moderna auf den deutschen Universitäten des XV. Jahrhunderts,* Heidelberg, 1922, especially page 39.

of natural philosophy were first introduced at Paris and elsewhere, or from that when Albertus Magnus and Thomas Aquinas commented upon or paraphrased, expounded and pieced out, the known writings of Aristotle, and reconciled them as best they might with the Christian faith. Where Albert had expounded and amplified the extant Peripatetic body of fact and theory, our author would boil it down and simplify it for the benefit of students.

Because the text of Aristotle by its too great prolixity and the difficulty of its wording often uselessly retards youth in the prosecution of their studies and detains them overlong, therefore it has seemed fitting to collect in summary fashion the opinions of Aristotle himself and of other philosophers so that those matters which were previously drawn out may be readily comprehended under the form of a brief compendium.[10]

Our work is more than a mere abbreviation, however. Two other considerations have moved the author: first, that many passages in Aristotle's works are in contradiction to religious dogmas; second, that many persons in philosophy in modern times treat of matters of which Aristotle wrote little or nothing. Thus the history of modern philosophy has begun for our author. He believes that this new thinking should be included, and also some other points of which he has found slight or no mention elsewhere. He therefore lays claim to a certain amount of originality as well as modernity. Instead of adding to the Peripatetic philosophy a further body of fact in essential harmony with it, as Albertus Magnus had done, he interlards it with various recent theories of a different sort. Moral philosophy is left for a separate treatise, and is not treated in our manuscript.

The scope of the six books of our compendium is briefly as follows. The first, after discussing the character of metaphysics and of natural philosophy, treats of universals and individuality.

[10] BN 6752, fol. 4r, the *Praefatio* opens: "Quia textus Aristotelis nimia prolixitate verborumque difficultate sepius inutili iuvenum proficientium studia retardant temporaque detinent nimium, ideo congruum apparet ipsius Aristotelis aliorumque philosophorum sententias summatim colligere ut sub brevi compendio que prius extensa erant facilius comprehendantur."

The second deals with form and matter, but especially with the subject, so much discussed in the fourteenth and fifteenth centuries, of the latitude of forms. The third book, covering the ground of Aristotle's *De anima* and such related treatises as *De somno et vigilia* and *De memoria et reminiscentia,* takes up the soul, senses, substantial forms, ideas and species. The fourth has to do with transmutation and motion, and somewhat corresponds to Aristotle's *Physics* and *De generatione et corruptione.* Book five treats of the earth, of the animals upon it, including man and the pseudo-science of physiognomy, of metals and minerals, winds and waters, and varied meteorological phenomena. The last book leads us through the spheres to the Intelligences and First Cause. On the whole, as will become more apparent upon examination of the full table of contents by chapter-headings (reproduced in Appendix 34, below), the work is economically arranged and skillfully put together, blending the various subjects treated of by Aristotle and a large amount of more recent discussion and theorizing into a reasonably well-knit whole. It is a better synthesis than such earlier compilations as Alexander Neckam's *De naturis rerum,* Thomas of Cantimpré's *De natura rerum,* Bartholomew of England's *De proprietatibus rerum,* or Vincent of Beauvais' *Speculum naturale.*

Some illustrations may be offered of our author's readiness to disagree with Aristotle. Having mentioned the view of certain persons that the perfection of anything should be judged according to its approach to or recession from the first being, which is God, he adds that this argument would not be conclusive against the followers of Aristotle because they would say that God was of finite vigor and hence of finite perfection. "In this nevertheless they would err."[11] In another passage Aristotle's definition of place or space is criticized as too metaphysical and mathematical.[12] In a third passage our author grants that Aristotle did not use the word 'qualification,' but holds that it is necessary to use it if we would have a general name for transmutation of quality made in the present.[13] On a fourth occasion he contends

[11] BN 6752, fol. 36r.
[12] *Ibid.,* fols. 146v-147r.
[13] *Ibid.,* fol. 117r.

that intension of forms is not caused by getting rid of contraries, though Aristotle and his Commentator may seem to have said so.[14]

Albertus Magnus is used extensively for the natural science of our treatise, especially for the discussion of metals and gems, where there was no Aristotelian work to follow. Albert's work on minerals is therefore excerpted practically verbatim, including its references and citations.[15] In other connexions, however, our author sometimes disagrees with Albertus, opposing his arguments for the existence of Antipodes, for instance. Our work embodies not a little from Arabic astronomy, such as the theory of Thebit ben Corat of access and recess of the eighth sphere,[16] or the attempt of Alpetragi, in his treatise on the sphere opening "Revelabo tibi secretum pectoris . . .", to explain all irregularities of the orbits of the planets by mere differences of movements.[17] Use is made of such a post-Aristotelian and Platonic work as the *De deo Socratis* of Apuleius, and such a representative work of the earlier scholastic period as the *Sex principia*[18] of Gilbert de la Porrée, who died in 1154.

While recent writers are not cited by name individually, their views are often referred to collectively. Sometimes our author approves of them, as when, discussing the proper subject of natural philosophy, after two other opinions he presents that "of

[14] *Ibid.*, fol. 128r (lib. IV, cap. 24). See also fol. 120r (IV, 19), "Aristoteles tercio Topicorum innuere videtur quod intensio qualitatis fieri habet per depurationem a contrario . . ."; and fol. 123r, where we are told that this is false, "ut deducunt aliqui moderni."

[15] Compare BN 6752, fol. 170r, with Albertus, *Mineralium* III, i, 4; fol. 171r with *Mineralium* III, i, 7-8; fol. 172r with *Mineralium* I, 13; fol. 172v with *Mineralium* I, i, 6; fol. 173v, on Avicenna's explanation of fossils, with *Mineralium* I, ii, 9; fols. 173v-174r with *Mineralium* II, 2; etc.

[16] BN 6752, fol. 171: "Thebit astrologus in suo tractatu de accessu et recessu octave spere negat motum primi mobilis super polis zodiaci compleri, imo imaginatur duos parvos circulos, unum in capite arietis et alium in capite libre, secundum quos dicit octavam speram moveri aliquando procedendo et aliquando retrogradiendo, ut predictum est. Nec oportebat secundum istam imaginationem res corruptas renovari. . . . Poli mundi moventur circa polos zodiaci et poli zodiaci moventur circa polos mundi. Et quia motus sunt valde differentes videtur igitur quod polorum distantia mutetur quia impossibile est aliqua duo semper equaliter distare quando quodlibet eorum continue movetur motu dissimili secundum velocitatem et tarditatem."

[17] *Ibid.*, fol. 17v.

[18] *Ibid.*, fol. 128r.

the moderns who hold that this whole moving universe is the adequate subject of natural philosophy, which opinion seems to be true."[19] On other occasions he speaks disapprovingly of the inept or undigested subtlety of certain moderns.[20] Many moderns have thought that the perfection of anything arose from replication of the first degree of being or of the same degree, but this our author denies.[21] He does not hesitate to disagree even with doctors of theology, at least when they enter the field of philosophy. Some of them, "in this thinking to philosophize," said that the infinite can be produced. Their arguments are at first sight formidable, but it seems to our author that their opinion does not contain the truth.[22] The very subtlety, however, of the opinions with which our author disagrees reinforces our impression that he is writing well along in the fourteenth century.

An opinion of which our author believes that he has disposed or of which he heartily disapproves is commonly branded as false by him. Another milder term which he sometimes applies, *voluntaria,* occurs sometimes in other late medieval works. It does not seem to mean quite the same as "optional," but to imply a certain amount of condemnation on his part.[23] Possibly "wilful" would be a fair translation for it.

Our author denies that matter is the cause of the multiplicity of individuals[24] in the same species, holding that the matter of one individual is of the same character as that of another.[25]

[19] BN 6752, fol. 7v, "Insuper tertia est opinio modernorum ponentium quod hoc totum ens mobile est subiectum adequatum philosophie naturalis que opinio videtur vera."

[20] *Ibid.,* fol. 17v, "De quorundam inepta subtilitate . . ."; fol. 84r, "De quorundam modernorum indiggesta subtilitate . . ."; fol. 127r, "De quorundam modernorum inepta subtilitate in eadem materia."

[21] *Ibid.,* fols. 37r-38v.

[22] *Ibid.,* fol. 140r; "Et de hoc inquirentes aliqui doctores theologi in hoc credentes philosophari dixerunt infinitum posse produci." Fol. 140v, "Unde licet eorum argumenta prima facie difficilia videantur, mihi tamen apparet quod eorum opinio non continet veritatem."

[23] Thus at fol. 95v, after arguing that those who suppose a third factor in the composite besides matter and form make an unnecessary and superfluous assumption, since form and matter suffice to explain everything, he concludes that "predictam opinionem fore voluntariam." In his closing sentence at fol. 235v he says that to correct one's mistaken views "laudabilius est quam favorabiliter opinionem falsam licet voluntariam tueri."

[24] BN 6752, fols. 11v-12r; "causa plurificationis individuorum."

[25] *Idem,* "eiusdem rationis."

Matter is therefore not the cause of individuality, "but rather individuals are distinguished by themselves and consequently by their essences individually."[26] Moreover, the variety of inferiors depends on the motion of the stars.[27] Since he denies that anything else than matter and form enters into the composite,[28] individuality must result from form, and this depends on the celestial movements. This is further shown when our author follows Albertus Magnus in ascribing the effects produced by precious stones to their substantial forms, and goes on to say that the substantial form is a sort of mean between the celestial influences and the matter which receives form. "Therefore form is caused by the influences, provided matter is found disposed, and according to the disposition of the form operations are introduced."[29]

As has been said already, the latitude of forms receives much attention from our author. Certain moderns had formed the hypothesis that the perfection of any species was of a certain latitude and consequently divisible infinitely.[30] Individuals of that species would all have differing degrees of specific perfection and exceed one another in essential perfection without differing in species. It would also be impossible for several individuals of the same species to be identically perfect. But our author rejects the whole hypothesis as false,[31] although it would seem to have much to commend it. In the second book he returns to a more protracted discussion of latitude. For that of all creatures some have set the two exclusive limits of absolute non-being and of God, while others have posited two inclusive terms, first matter at the bottom of the ladder and supreme Intelligence at the top.[32] He raises many questions as to this scale of creatures: whether

[26] *Ibid.*, fol. 12v: "Ex his ergo concluditur quod materia non est causa individuationis seu distinctionis individuorum eiusdem speciei sed potius individua se ipsis et consequenter suis essentiis individualiter distinguuntur."

[27] *Ibid.*, fol. 13r-v.

[28] See note 23.

[29] BN 6752, fol. 174v; "Itaque forma ab influentiis causatur dummodo materia disposita inveniatur et secundum dispositionem forme operationes introducuntur."

[30] For, as is stated at fol. 41v, "quodlibet continuum est infinitum secundum divisionem."

[31] *Ibid.*, fol. 17v.

[32] *Ibid.*, fol. 35r (II, 14).

the supreme degree of being is attainable,[33] how the latitude of creatures is uniformly difform,[34] whether it is continuous or interrupted,[35] and concerning its genera,[36] of which some have distinguished six, others ten or twelve, while certain persons have placed man midway in the series.[37] Our author distinguishes eight: what is potential like first matter, corporal accidents, spiritual accidents, inanimate forms, vegetable forms, sensitive forms, rational forms, and intelligences. The last genus includes angels "and generally anything that understands without phantasy."[38] In the latitude of not-being four degrees of privation are distinguished. Examples of the first are antichrist and Adam, "because they are not, but were or will be." An instance of the second degree is a mountain of gold, which might exist but neither is nor has been. The third degree is represented by the proposition, Man is an ass, which is impossible but can be imagined. But no example of not-being to the fourth degree can be given, since it is not even imaginable.[39]

The subtlety of late medieval scholasticism is further evidenced in the exceedingly fine point to which are developed the distinctions of uniformity and difformity. Thus latitude which is difformly difformly difform is twofold, one variety being uniformly difformly difformly difform, while the other is difformly difformly difformly difform. This last in turn may also be distinguished into its uniform and difform varieties, and so on *ad infinitum*.[40] Our author gives several opinions as to how the intension of forms is produced, including that of the author of the *Sex principia*.[41] He does not believe that mean qualities come from the

[33] *Ibid.*, fol. 41r (II, 20).
[34] *Ibid.*, fol. 46r (II, 23).
[35] *Ibid.*, II, 24-25.
[36] *Ibid.*, fol. 47v (II, 26).
[37] *Ibid.*, fol. 48r; "humaneque perfectioni applaudere cupientes quidam in orizonte creabilium hominem constitutum dixerunt ipsum dicentes in medio dicte latitudinis huiusmodi fore constitutum."
[38] *Idem;* "et universaliter quecumque res intelligens sine fantasmate."
[39] BN 6752, fol. 88r.
[40] *Ibid.*, fol. 45v; "Insuper latitudo difformiter difformiter difformis est duplex quia quedam est uniformiter difformiter difformiter difformis, alia vero est difformiter difformiter difformiter difformis, et ita potest distingui de latitudine difformiter difformiter difformiter difformis, et sic in infinitum."
[41] *Ibid.*, fol. 128r; "Videre igitur restat qualiter huiusmodi intensio fiat et de hoc multi fuerunt opiniones."

extremes, but since many moderns think so, he will not omit their reasons, so that the reader may form his own opinion.[42]

In connexion with another favorite topic of late scholasticism, that of maximum and minimum, our author introduces a discussion of *maximum quod non* and *minimum quod non,* although he admits that Aristotle never used either expression.[43] The moderns have proved rationally that the definition of *maximum quod non* given by the older philosophers is not valid,[44] but their substitute is prolix and obscure, and our author tries to restate it more clearly.[45] In the case of homogeneous things he is inclined to prefer to use as the lower limit of their latitudes the greatest quantity or intensest quality that they fall short of reaching, rather than the least that they do touch, but he is willing to let the reader follow his own preference.[46] For vision, however, he contends that it is not possible to give a minimum distance at which it will operate, because this could always be divided into

[42] *Ibid.,* fol. 122r *et seq.* (IV, 20).

[43] *Ibid.,* fol. 111v. Duhem, *Études sur Léonard de Vinci,* Seconde série, Paris, 1909, page 25 *et seq.,* has noted that Aquinas, in his commentary on *De celo et mundo,* I, 25, said: "De même que l'on détermine la puissance que quelqu'un possède en indiquant le maximum de ce qu'il peut accomplir, de même on détermine ce qui lui est impossible par l'œuvre minimum parmi celles qu'il ne peut accomplir." Jean de Jandun, however, in his commentary on the same work, written before 1323 (Venice, 1574, I, 2; fols. 78-80), held: "Il est vrai qu'à une vertu naturelle donnée correspond un maximum des œuvres qu'elle peut accomplir; il n'est pas vrai qu'il lui corresponde un minimum des œuvres qu'elle ne peut pas accomplir." Albert of Saxony, on the contrary, *Questiones in libros de celo et mundo,* lib. I, quest. xiv, affirmed: "potentia activa non terminatur per maximum in quod sic; terminatur per minimum in quod non." Marsilius d'Inghen also spoke of "maximum in quod non." For Buridan's discussion of the same matter see Duhem, II (1909), 383-384. Richard Suiseth, *Calculationes,* Tractatus decimus de maximo et minimo, edition of 1520, fol. 34r, writes: "Et primo notande sunt significationes terminorum. Ut maximum significat sic, scilicet tantum et non maius: et minimum, aliquantum et non minus. Et maximum quod non, id est non tantum sed omne maius, et minimum quod non, id est non tantum sed omne minus."

[44] BN 6752, fol. 109v: "Maximum quod non est illud in quo talis res non potest esse sed in quolibet maiori. Hec autem diffinitio data est ab antiquioribus philosophis, moderni tamen ipsam non valere rationabiliter probant."

[45] *Ibid.,* fol. 110r.

[46] *Ibid.,* fol. 111v: "Ex quibus omnibus concludi potest quod si volumus presentem responsionem tenere, habemus in rebus omogeneis a parte inferiori dare maximum quod non et non minimum quod sic. Eligat tamen lector quam partem voluerit quia utramque probabilem puto."

smaller portions; but that it is possible to suppose a maximum distance at which it will not operate because it is too small to be seen.[47]

A touching faith in nature is displayed by our author in laying down the following five propositions, derived no doubt from Aristotle:

1. Nothing is idle in nature.
2. Of possible courses nature always does what is best.
3. Nature is the principle of the thing of which it is the nature; art, however, is the principle in another.
4. Nature always acts for some reason or towards some end.
5. Nature rejects infinity and confusion.[48]

Nine similar propositions concerning art are expressly ascribed to Aristotle:

1. The human race lives by art and reason.
2. No art considers the particular because particulars are infinite and unknowable.
3. Science and art come through experience.
4. Invention of the arts was necessary for living well.
5. Artificial operations are deliberative and thereby differ from natural operations.
6. No one of himself can discover speculative or practical arts.
7. Art is better than experience.
8. Art ought to employ organs.
9. If anything can be done without art, much more so by art.[49]

But this last principle our author has just before refused to admit in the case of alchemy, holding that alchemists try to accomplish by art what can be done only by nature.[50]

Some of his opinions in physics are of interest. He holds that local motion cannot be distinguished from the moving object, although some regard it as a flexible and successive accident distinct from the thing moved.[51] Velocity is defined as follows: "That is said to be moved more swiftly which in equal time cov-

[47] *Ibid.*, fol. 112v (IV, 14).
[48] *Ibid.*, fol. 100r (IV, 4).
[49] *Ibid.*, fol. 137r.
[50] *Ibid.*, fol. 136v.
[51] *Ibid.*, fols. 144r-146r.

ers a greater space."[52] He agrees with Aristotle that the heart is the seat of motion in the body,[53] and that "natural motion"—i.e. of a falling body—"is swifter in the end than in the beginning."[54] The possibility of perpetual motion is discussed. If we do not experience it in inanimate objects, nevertheless many say that it has been invented artificially. Our author has performed the experiment of keeping a wheel filled with quicksilver rotating by applying heat to the lower part, and understands the reason, that mercury rises with heat.[55] This device is probably the same as that for perpetual motion which Drebbel showed to James I. It does not seem to occur to our author that it might be utilized as a thermometer, or that it is not really perpetual motion. On the other hand, when he inquires whether there can be motion in a vacuum, this does not mean that he entertains the possibility of the existence of a vacuum. But he believes that it sometimes assists the investigation of truth to presuppose the impossible.[56] Something approaching the conception of mass seems involved in the statement that many ancients and moderns distinguish *quantitas continua seu molis* from *res quanta*. Our author, however, rebuts their arguments.[57] Some suggestion of the modern conception of inertia is perhaps discernible in the utterance, "As is the proportion of active power to the resistance, so is that of the lifting force to the weight."[58]

If there were several worlds, would the earth of one be moved towards the center of another? It seems so, because earth tends towards the center. To this it is replied that if the worlds were concentric, the earth of the superior or outer world would tend towards the center of the inferior, but would be detained by violence above the surface of the last sphere of the inferior world. If, however, the worlds had different centers, the earth of each would tend towards its own center.[59] Duhem, without using or

[52] *Ibid.*, fol. 115r; "illud dicitur velocius moveri quod in equali tempore maius spatium describit."
[53] *Ibid.*, fol. 99r.
[54] *Ibid.*, fol. 115r; "motus naturalis velocior est in fine quam in principio."
[55] *Ibid.*, fol. 52r-v.
[56] *Ibid.*, fol. 153r.
[57] *Ibid.*, fol. 133r.
[58] *Ibid.*, fol. 114r; "qualis est proportio potentie active ad resistentiam, talis est potentie levative ad pondus."
[59] *Ibid.*, fol. 163r.

knowing of our work and manuscript, has traced the earlier history of this problem, especially in fourteenth-century thought.[60] It goes back to the Aristotelian argument against the plurality of worlds, that the element earth can have only one natural place, namely, in the center of our world. Jean de Jandun, in his commentary on the *Physics* written soon after 1323, maintained the same position, and opposed the theory that a certain virtue of the natural place attracted the earth, because it would weaken the Aristotelian argument against the plurality of worlds.[61] But William of Ockham, contending in his commentary on the *Sentences* that God could make more than one world, argued that the earth in each world would collect at its own center, and adduced the analogy of fire, which even in our world—if kindled at opposite poles—would move upward in opposite directions.[62] Albert of Saxony, writing probably between 1351 and 1362, denied the natural possibility of several worlds with different centers, but granted that if there were such, the earth in each case would tend towards the center of its own world.[63] Nicholas Oresme, in 1377, in his commentary in French on *De celo et mundo,* defended the possibility of many worlds and held that weights in each world would move towards its center.[64]

St. Thomas Aquinas made local motion the cause of heat, but this is not so when there is no friction of the parts of the thing moved. Thus the iron shaft of a millstone does not grow hot, and, if a heavy body were moved in a vacuum, it would not become heated because there would be no friction from the air. Our author therefore adopts the opinion of Albert that the friction or collision of bodies is the cause of heat.[65] Yet the nature

[60] Duhem, II (1909), 58-96.

[61] Duhem, II (1909), 84; Ioannis de Ianduno, *Super octo libros Aristotelis de physico auditu subtilissime quaestiones,* Venetiis apud Iuntas, 1551, VIII, xi, fol. 116r: "Item, si virtus naturalis loci esset causa effectiva motus gravis, sequitur, si ponerentur plures mundi quod grave secundum naturam suam haberet tantam convenientiam cum medio alterius mundi sicut cum medio huius mundi. . . . Nec istud intendit Arist. sed intendit quod grave illius mundi esset natum moveri ad medium huius mundi: et hoc bene sequeretur cum esset eiusdem rationis cum gravi huius mundi."

[62] Duhem, II (1909), 76-77.

[63] *Ibid.*, p. 82; see also Duhem, I (1906), 34.

[64] Duhem, III (1913), 370-371.

[65] BN 6752, fol. 214r.

of heat was not thoroughly understood until the middle of the nineteenth century.

If earth is heavier than water, why is not the sphere of earth entirely submerged under the sphere of water? Some explain the dry land or habitable earth as a sort of mountain or excrescence, but our author prefers the explanation that the earth's center of gravity is not the same as the center of its circumference. The heavier half of the sphere sinks the deeper below the surface of the water, while a portion of the lighter hemisphere projects out of the water, just as the heavy scale of the balances falls and the lighter rises.[66] This hypothesis of overlapping or intersecting surfaces of earth and water saves the sphericity of the earth, and God was more likely to make a round and perfect than a hump-backed and deformed earth. Moreover, sailors find that the sea grows deeper in parts more remote from the land. And we find by experiment that earth subjected to water is commonly denser and heavier than dry earth. Furthermore, with mathematical instruments it is easy to demonstrate that the earth is spherical except for some mountains which count for little in comparison with its surface as a whole.[67]

This view, that part of the sphere of earth was not covered with water because the center of gravity was not identical with the center of the sphere, was also held in the fourteenth century by Albert of Saxony, Themon Judaeus, and Nicolas Oresme.[68] Our author, however, appears to have offered some arguments for it which we do not find in Duhem's exposition of their views. Of another explanation, current at least since Ristoro d'Arezzo in the thirteenth century, that the dry land was uncovered by the force of the stars which also held the displaced masses of water in check elsewhere,[69] our author says nothing.

One reason why our author opposes the arguments of Albertus

[66] *Ibid.*, fol. 159r-v.

[67] *Ibid.*, fol. 160r; "Item cum instrumentis mathematicis faciliter possumus experiri quod terra semper tendit ad rotunditatem demptis fortassis aliquibus montibus qui respectu totius terre parum debent computari."

[68] Duhem, III (1913), 361-367; also I (1906), 11.

[69] For Ristoro's theory see my *Science and Thought in the Fifteenth Century*, New York, 1929, p. 202.

Magnus for the existence of Antipodes is that this theory requires that more than half of the earth's surface be under water, for the sphere of water exceeds that of earth in diameter and circumference. He grants, however, that habitation is possible under the tropics, because the first clime is only 12 and ¾ degrees from the equator, while the Tropic of Cancer is 23 degrees and 51 minutes north thereof.[70]

In discussing earthquakes he suggests that the earth might in certain parts be so condensed by the action of water or cold as to displace other parts by its greater weight. Such condensation would take place so gradually as to be imperceptible.[71] This notion of a slow shifting of the earth's crust and interior, which he says is not found in the writings of Aristotle, almost entitles him to be ranked among the forerunners of modern geology—a place, however, which he must share with other fourteenth century thinkers like Albert of Saxony.[72]

The idea that the earth revolved instead of the sky was also already in men's minds, but is branded as "most false" by our author, who argues that such velocity of the earth would bring buildings down in ruin and would not serve to explain why such planets as the sun and moon are nearer at some times than others, or to explain phenomena like eclipses, conjunctions and oppositions.[73]

From consideration of terrestrial phenomena our author at the close of the treatise wings his way aloft to the angels, of whom his account seems somewhat novel, at least in terminology. Angels have a twofold cognition, matutinal and vespertine—perhaps analogous to the Pauline "seeing darkly" and "face to face." Morning knowledge is what they have by intuition of the First Cause, in which they know things more directly than in their proper genera, which is the method of evening knowledge. As a very skillful artisan can achieve results with few tools, or a learned man can draw infinite conclusions from one principle,

[70] BN 6752, fol. 219v.
[71] *Ibid.*, fol. 160v.
[72] Duhem, III (1913), 361; "En outre, les parties centrales de la terre, au bout de longs siècles, parviendront à la surface"; also p. 366.
[73] BN 6752, fol. 160r.

so to a more perfect angel a single species suffices for knowledge of many things. Some persons think that angels have universal species or ideas, dating from creation and not derived from things; others hold that they derive their species or ideas from things. Others, taking the middle ground, say that they have some universal species and some particular ones. They think that angels from the moment of their creation had universal species of all things, but afterwards received particular species in twilight knowledge from things. As we are first acquainted with particular phenomena and later form universal concepts, so conversely angels first possess universal knowledge and afterwards particularize.[74]

Although our author accepts astrology in large measure, he shows a good deal of scepticism as to occult arts, sciences, and influences. He is, indeed, inclined to ascribe importance to the number eight in the universe, music, and geometry.[75] But at the theory of the *magnus annus* he looks askance. Not only is it against human liberty of action, but, since the moon does not fit into the solar year, it is impossible that after the great year of Plato everything should be the same again.[76] Thus he approaches Oresme's argument from the incommensurability of the celestial movements. He holds the usual orthodox view that the eclipse at the time of the Passion was not natural but universal.[77] He has a chapter on what comets signify. Noting that Seneca spoke of a comet in the time of Nero which was not a sign of any evil, our author objects that it was a sign of great evil since Nero was the worst ruler of those times.[78] Leopold of Austria is cited as quoting Damascenus to the effect that a comet is produced by God to signify the deaths of kings.[79] But, after noting Leopold's list of nine varieties of comets with as many different significations, and his stress upon the sign of the zodiac in which the comet appears, our author adds: "But while all these matters may seem curious, yet in my judgment they are very superstí-

[74] *Ibid.*, fols. 231v-232v.
[75] BN 6752, fol. 48r-v.
[76] *Ibid.*, fols. 13 and 16r.
[77] *Ibid.*, fols. 226v-227r.
[78] *Ibid.*, fol. 206r.
[79] *Ibid.*, fol. 206v. This citation of Damascenus is common in medieval works on comets.

tious."[80] Similarly, after he has finished excerpting Albertus Magnus on the operations of gems, he qualifies: "But here it should be noted that those things which were said above about stones are to be understood without superstitious credulity, because those which concern divinations and magic arts I believe are superstitious and worthless. Yet because the philosophers and notably Albertus Magnus wrote the aforesaid, therefore I have added them to this work more as a curiosity than for utility."[81] This, however, seems a weak excuse for their inclusion. Our author grants that Aristotle seems to think that some dreams are presages of the future, but for himself doubts if this can be the case with dreams produced by natural causes. For it is not likely that the work of nature should be a presage of works of liberty, *i.e.* of human free will.[82] He does not mean to deny that God or angels may induce prophetic dreams, however.[83] For the same reason of human free will he thinks it rash to judge a man according to the art of physiognomy.[84] The rejection of such beliefs on the sole ground of human freedom of the will cannot, however, be regarded as manifesting a high degree of rational scepticism or criticism. It is rather a moral or theological attitude.

In the fourth book is a curtly hostile reference to alchemy. The alchemists are said to fall into a great delusion, since they think by the heat of fire to produce gold, which can be generated only by the virtue of the sun, and think to produce in the furnace what has to be generated in the bowels of earth. It may be that many say gold has been made by alchemy; so far they have failed to convince our author.[85] In the ninth chapter of the fifth book[86] he again considers at greater length the question "whether by aid of any art one species of metal can be transmuted into another, which the alchemists attest can be done." He regards

[80] BN 6752, fol. 207r; "Hec autem omnia licet videantur curiosa, iudicio tamen meo sunt valde superstitiosa."
[81] *Ibid.*, fol. 183r-v.
[82] *Ibid.*, fol. 89v.
[83] *Ibid.*, fol. 90r.
[84] *Ibid.*, fol. 166v.
[85] BN 6752, fol. 136v; ". . . Et licet plures referant per alchimiam aurum factum fuisse, nihilominus mee credulitati pro nunc non occurrit."
[86] *Ibid.*, fols. 168v-170r.

it, however, as difficult, because the works of nature are secret, nor are the causes of such operations fully known to us. He then details the doctrine of the composition of metals from sulphur and quicksilver. Transmutation of metals may be possible, but if the art of alchemy has any truth he still thinks that it can have no utility, because the labor and time required more than overweigh the profit of the conversion accomplished.[87]

In closing his work our author piously ascribes all the glory to God, by whose aid, not his, it reaches its conclusion. He has written certain things imitating the opinions of Aristotle and other philosophers. He asks the reader to ascribe what is good to God and kindly to correct what is wrong, for he desires no favor except where reason approves. He may express opposite views somewhere else, but he sees no harm in changing one's opinion for the better when an argument previously ignored occurs to one. Nor should a man be thought to contradict himself under such circumstances, since it is more praiseworthy to correct oneself than to hold a false opinion.[88]

[87] *Ibid.*, fol. 170r: "Unde si ars alchimie aliquid habeat veritatis, credo tamen quod nihil potest habere utilitatis, quia difficultas operis atque tempus requireret ut estimo sumptus maioris ponderis quam foret commoditas conversionis facte."

[88] With this may be compared the attitude of Agostino Nifo in his commentary on Aristotle's *De generatione et corruptione*, as given by Duhem, II (1909), 36-37: ". . . toujours, à ce sujet, je me suis montré hésitant; sans cesse, j'ai varié dans ce que j'ai écrit. . . . À titre donc de solution des difficultés qui se présentent en ce moment à nous, je vais formuler certaines propositions; mais je proteste qui je m'exprimerais tout autrement si les circonstances venaient à changer."

CHAPTER XXXIV

ASTROLOGY OF THE LATER FOURTEENTH CENTURY

Some optimistic writers have inferred from Oresme's treatise against princes devoting themselves to astrology that it could not be true that his patron, Charles V the Wise, for whom he translated works of Aristotle into French, employed so many astrologers at his court as we have been told, or really believed in their predictions if he did. We fear that this is as much of a *non sequitur* as the assumption that the king did not depreciate the coinage because of Oresme's severe arraignment of that common failing of governments, whether of yesterday or today. Equally mistaken is the argument that because Charles V was called the Wise, he must have been too intelligent to believe in astrology. The case of Alfonso X, or the Wise, of Castile should have warned anyone against such an assumption. Indeed at this period wisdom and astrology were considered almost synonymous. When we reflect that a person as given to extreme magic, astrology, and alchemy as Thomas of Bologna equally enjoyed the favor of Charles V, we realize that it is well to abstain from hasty inference from a single instance. Thomas and Oresme perhaps appealed to different sides of Charles' nature and intellectual interests. But on the whole there appear to have been more persons like Thomas than there were like Oresme in that monarch's employ.

The Hundred Years war provided the astrologers with as happy a predicting ground as did the Black Death. The pages of Simon de Phares' review of celebrated astrologers teem with the names of those who had predicted this or that battle through the long struggle, or the popular seditions, civil strife, and dynastic change which had accompanied it. More than one was said to have foretold the disaster at Poitiers, and though king John had failed to profit by their warnings, he whiled away the hours

of his captivity afterwards with the discourse and society of one of them, whom the English had summoned from Bourges because of his skill.[1] Jaques de Saint André, a canon of Tournai, who was sent to bring king John back in 1360, predicted the victory of Cocherel by du Guesclin in 1364.[2] It was Thomelin de Turgof, an English captain in Brittany, however, who had first predicted the rise of du Guesclin from the stars and from the prophecies of Merlin.[3] It was still a third astrologer, Yves de Saint Branchier, who accompanied the constable of France on his forays and campaigns and selected the fortunate hour for attack.[4] To a fourth, Jacques de Montciclat, fell the double distinction of forecasting the deaths both of du Guesclin and his royal master.[5]

Among the astrologers in the service of Charles V himself were Pierre de Valois of Coucy, who had forecast the Jacquerie of the preceding reign and also made predictions in England,[6] and Gervais Chrestien, who foretold the death of king John.[7] André de Sully predicted the battle of April, 1366, in Spain to Charles V and drew up the nativities of his three sons, Charles, Louis, and John in 1368, 1369, and 1370 respectively.[8]

Simon does not mention Pelerinus de Prussia, or Pelerin de Prusse, Pruce, or Pousse,[9] who addressed a work of astrology in French in three parts to Charles while he was yet dauphin on July 11, 1361,[10] and completed a work on the use of the astro-

[1] *Recueil* etc. (1929), p. 226: "Maistre Guillaume de Toury, residant à Bourges, fut envoyé querir pour son grant sens et singulière experience de la science des estoilles par les Anglois, et y ala voulentiers, pour ce que c'estoit pour desenuyer le bon roy Jehan qui fut prins à Poictiers, le lundi 19e de septembre 1356, comme il avait predit." The form, "Toury," is perhaps a misprint, since the name is given as Guillaume de Louri in Jean Lebeuf, *Collection des meilleurs dissertations relatifs à l'histoire de France*, XV, 209-210, 397-408; in HL XXIV, 485; and in Charles Jourdain, *Excursions historiques*, 1888, p. 565.

[2] *Recueil*, pp. 227-228.

[3] *Recueil*, p. 225.

[4] *Ibid.*, p. 229.

[5] *Ibid.*, p. 235.

[6] *Ibid.*, p. 227.

[7] *Ibid.*, pp. 223, 228.

[8] *Ibid.*, p. 232. For horoscopes of Charles and Louis see note 19 below.

[9] Steinschneider, "Die europäischen Uebersetzungen aus dem Arabischen," *Vienna Sitzungsberichte*, 149 (1905), p. 45, uses this form, but I do not know on what authority.

[10] Oxford, St. John Baptist College 164, 14th century, fols. 33-111. The prologue opens, "En nom du tres misericors et piteos . . ."; chapter one opens, "Par quelle maniere ceste partie introductoire. . . ."

labe, also in French on May 9 of the following year.[11] In the astrological treatise Pelerin treats of elections, astrological medicine, and matters affecting kings and princes especially. He speaks very humbly and modestly of his astrological equipment and implies that he writes only at the dauphin's command.[12] His work will be so written as to require the use of no other book than the almanach.

Another astrologer whom Simon de Phares does not mention was Dominicus de Clavagio or Clavasio (Chivasso in Piedmont), who was active at Paris from 1349 on. In 1349 there incepted under him as master, Themon, son of the Jew, or possibly of Jude, of the monastery,[13] whose commentary on Aristotle's *Meteorology* was printed in 1516 and 1518 between the commentaries of Albert of Saxony and Jean Buridan,[14] and who the following year is found disputing astronomical questions at Erfurt "apud Scotos."[15] Schum, in cataloguing these manuscripts, by

[11] *Ibid.*, fols. 111-119, the prologue opening, "La science du firmament et du mouvement des estoiles . . ."; the text beginning, "Devant les proffis devant dis faut il monstrer. . . ."

[12] *Ibid.*, fol. 33v: ". . . Et pour ce ie pelerin de pruce existant come i. des mendres et plus petits professeurs de ceste science et ne suy pas digne de touchier les fortes racines et parties et la parfondesce de la dite science pour mectre en enscript par moy non seulement pour les causes devant dites mais pour ma ieunesce et ignorance et tres petite experience.

Touteffois le tres excellant et puissant prince et mon tres redoubte seigneur Mon seigneur Charles ainsne filz du Roy de france duc de normandie et dalphin de viennoys du quel ie estoie come indigne et de ces mendres serviteurs pour le temps moy commanda que ie escrisisse briement et clerement en la langue francoise de la quelle ie ne say gueres aucunes riules et choses plus necessaires en la partie des ingeniens de astrologie des eleccions."

[13] "Dominus Themo Jude de Monasterio" in *Auctarium Chart. Univ. Paris.*, I (1894), 138. Mittarelli, *Bibliotheca codicum manuscriptorum monasterii s. Michaelis Venetiarum prope Murianum*, Venice, 1779, describing MS 136, 14th century, Questionum Metaurorum libri duo Timonis Judei, wondered that Timon was called a Jew when he taught at Paris and showed a Christian standpoint in some passages of this work. Duhem (see Index to vol. 3 of his *Études sur Léonard de Vinci*) takes Themon or Temo Judaei as the nominative form of his name and calls him Themon, the son of the Jew, but Themon Judaeus would seem more likely. Perhaps he was a converted Jew. In the manuscripts of his disputations at Erfurt he is simply called "master Themon."

[14] *Questiones et decisiones physicales insignium virorum Alberti de Saxonia, Thimonis, Buridani*, Paris, Jodocus Badius Ascensius et Conradus Resch, 1516; 1518.

[15] Amplon.F.313, fols. 121r, col. 1-142v, col. 2, "Anno gratie 1350 fuit disputata questio apud Scotos per magistrum

rendering the word *theoricarum* as *theologicarum,* suggested that there might be in Themon's disputation a conflict between theological truth and astrological necessity, but examination of the questions themselves show that they deal purely with matters of astronomical theory. As for Dominicus, he was still a master at Paris in 1350, and in 1356-1357 his name appears on the faculty of medicine there.[16] In 1368 he became an astrologer at the royal court. He also wrote commentaries on the *Sphere* and *De coelo et mundo* and a *Practica geometriae* which has won him praise from modern historians of mathematics.[17]

On August 31st, 1358, following the revolutionary movement in Paris, the future Charles V, then dauphin, accused Charles of Navarre of magical practices against him. Rings, powders, and other detestable paraphernalia of sorcery had been found in the hostel of a physician or astrologer of Charles of Navarre named Dominic.[18] One wonders if this Dominic could have been Dominicus de Clavasio whom Charles V was later to take into his own service. That Charles should resort to charges of magic indicates that there were at least certain limitations to his enlightenment.

Themonem cuius tytulus est talis (*clericus* in Schum): utrum supposita veritate theoricarum (*theologicarum* in Schum) necessarium sit lunam vel aliquem planetarum . . . / . . . Explicit determinatio pulchra nimis."; fols. 159r, col. 1-165v, col. 2, Alia questio astronomica a magistro Themone determinata apud Scothos. "Incipit determinatio magistri themonis apud Schotos. Ad honorem sancte marie virginis. . . ." Amplon.F.380, 14th century, fols. 42r, col. 1-48r, col. 1, Optima questio de uniformi vel difformi motu planetarum: "Anno gratie 1350 fuit questio disputata apud Scotos in Erfordia per mag. Themonem, cuius titulus est talis: Utrum necessarium sit supposita veritate theoricarum . . ."—the same as the first question in the other manuscript, but incomplete. See also Vienna 5337, 14th-15th century, fols. 179v-184v, magister Thiemo, Disputatio habita Erfordie a. 1350 apud Scotos de motu lune: "Utrum necessarium sit. . . ."

[16] *Auctarium,* I, 141; *Chartularium,* III, 45, 48-49.

[17] M. Curtze, "Ueber den Dominicus Parisiensis der *Geometria Culmensis,*" *Bibliotheca Mathematica,* 1895, pp. 107-110; J. D. Bond, "The Development of Trigonometric Methods," *Isis,* IV (1923), 319-320. Concerning Dominicus see further my "Vatican Latin Manuscripts in the History of Science and Medicine," *Isis,* XIII (1929), 69-70.

[18] M. F. Combes, *Mémoires lus à la Sorbonne, Histoire, Philologie et Sciences morales,* Paris, VII (1868), p. 241, from "Relation de la conjuration d'Étienne Marcel et de Robert le Coq, addressée aux comtes de Savoie par le Dauphin Charles."

Besides his library he owned a collection of talismans, including a stone on which were engraved a figure of a king and Hebrew characters, and another to aid women in child-birth.

Of his trust in astrology further proofs may be given. Before marrying he made an astrological examination of his intended.[19] He had various astrological treatises translated into French, such as the *Quadripartitum* of Ptolemy and the *Centiloquium* ascribed to him, Hali Abenragel, Abraham Avenezra, and the Latin writer of the thirteenth century, Guido Bonatti. Simon de Phares even states that Charles had the *Cosmography* of Ptolemy translated into French, but this is probably a mistake, since it appears not to have been translated into Latin until 1406. Charles V further showed his esteem for astrology by founding at the university of Paris with papal confirmation a college for the study of astrology and astrological medicine, equipped with various astronomical instruments, a library of works on astrology, and royal scholarships. It was called "le collège de maître Gervais" after the above mentioned royal astrologer and physician, and was still in existence in the time of Simon de Phares, who had used its library.[20] When Philippe de Maisieres in 1389 in *Le songe du vieil pélerin* made dames Providence and Truth descant on the state of affairs under Charles V and the early years of the reign of the young king, Charles VI, among abuses that should be reformed was mentioned blind confidence in astrologers.[21]

Although medieval chroniclers, like the ancient Roman historians, were prone to recount supposed omens, portents, and marvelous occurrences, they sometimes recorded the failure of predictions made by astrologers. Thus the chronicle of the reign

[19] *Recueil,* pp. 228-229. In an Oxford college MS, St. John Bapt. 164, at the very close are five illuminated and very neatly written horoscopes, each occupying a page, of Charles V, Charles the Dauphin born 1368, Marie de France daughter of Charles, Louis count of Valois born 1372, and Isabel daughter of Charles born 1373. The birth of Charles V is dated thus: ". . . a. d. 1338 post meridiem 20° diei Ianuarii hora 17 Ma. 36 diebus equatis in nocte sequente diem martis que fuit nox saturni hora 10 artificiali noctis que fuit hora martis."

[20] *Recueil,* pp. 4, 37, 135, 228.

[21] See the account of French MS 183 at Geneva in J. Senebier, *Catalogue raisonné des MSS conservés dans la Bibliothèque de la Ville et République de Genève,* Geneva, 1779.

of Charles VI of France by a monk of S. Denis tells how the astrologers ordered the arms of one of the participants in a duel to be fabricated at an elect time when they would receive virtue from the course of the planets, and predicted that fine weather would prevail on the day set for the encounter, and that the adversary would fall. On the contrary, there was pouring rain, and the king and princes forbade the quarrel to proceed further.[22]

The reigns of Charles VI and Richard II saw no diminution in the number of astrologers at the French and English royal courts or in their supposedly successful prediction of military and political events. Anyone interested in further details on the subject will find an abundance of them in the work of Simon de Phares.[23] We may turn instead for a moment to Germany and Bohemia, regions of which he has less to say, especially for the period now under discussion. But first we may note in passing that John I of Aragon took umbrage in 1391 at the report that a master Francesch had predicted the universal rule of the king of France before 1400. The astrologer, however, denied this.[24]

That Wenceslaus or Wenzel, Holy Roman emperor from 1378 to 1400, and king of Bohemia until 1419, was among the number of rulers devoted to astrology is indicated by a finely illuminated manuscript preserved in the national library at Vienna.[25] It bears the dates, 1392 and 1393[26]; has an illuminated initial W with a man in stocks in it; and the pictures of tubs and bathing girls which characterize Wenzel's Bible and other manuscripts. It was accordingly described as adorned with pictures commemorating the imprisonment of Wenzel and his liberation by aid of the bath-keeper Susanna,[27] but this supposed release of Wenzel

[22] *Chronique du religieux de Saint-Denys,* Paris, 1839, I, 394-396.

[23] Or for an elaborate astrological geomancy compiled for Richard II in the fourteenth year of his reign see BM Royal 12.C.V. and CLM 1697, p. 246.

[24] J. M. Roca, *Johan I d'Aragó,* Barcelona, 1929, p. 385. In the pages following Roca gives further evidence of John I's attachment to astrology.

[25] Vienna 2352 (Philos. 201), 14th century.

[26] The date 1303 occurs in an illumination at fol. 1r, while at fol. 34r the date 1392 is given in this way: 1000
300
9 2

[27] "Codex mandato et impensis Imp. Wenceslai anno 1392 aut 1393 ut videtur exaratus, literis aureis et picturis memoriam carceris ac liberationis ope Susannae balneatricis repraesentantibus exornatus est," according to the catalogue.

by feminine assistance has been shown to be a late unwarranted inference from such illuminations in his manuscripts and to have no basis in the written sources.[28] Indeed, our manuscript would seem to antedate Wenzel's imprisonment by the Bohemian nobles in May, 1394.

The manuscript is made up of a treatise on the constellations,[29] the Alfonsine Tables, a beautifully illuminated geomancy[30] in which form of divination Wenzel, like Richard II, would thus appear to have been interested as well as in astrology, a list of fixed stars, and some superstitious notes concerning portents. The opening treatise is not merely a description of the constellations but contains astrological matter. Thus we are told that when any image comes into direct aspect above the earth and to its own clime, there can immediately be noted a change from bad to worse, good to better, or from good to bad or vice versa.[31] We are also told for each sign and constellation that the person born under it will be rich and happy, or whatever other fate the stars may have in store for him. Even the subject of astrological necromancy is touched upon, although scarcely in a favorable manner, since it is stated that from the time of Noah to the present day it has been proved that angelic spirits reside in the figures of the celestial images, and that they suffer no less pains than do those in hell, just as a man may have the fever while walking about as well as in bed. These spirits tempt men's souls in infinite ways and are divided for this purpose into legions of 6666. Those who take unto themselves bodies of the elements by the violence of conjunctions and come in response to incanta-

[28] See A. Horcicka, "Die Sage von Susanna," *Mittheil. des Instituts f. Oesterreichische Geschichtsforschung*, I (1880), 105-120. Horcicka seems not to have known of our manuscript, although he mentions others at Vienna, but they are merely the romance of William of Orange, the German translation of the Bible, and the Golden Bull.

[29] Vienna 2352, fols. 1-31. It is headed by five lines in blue as follows: "de notitia ordinum stellarum fixarum celi seu ymaginum 48 que a philosophis veraciter dinoscuntur multo intellectu experimentorum in arte stellarum que aliter constellatio nominatur et que in nocte serena patenter apparent licet non simul omnes nec una et eadem hora."

[30] *Ibid.*, fols. 83-96 (rather than 83-99 as stated in the catalogue). Fols. 97-98 are blank and 99r is occupied by an elaborate circular representation of the twelve signs and seven planets.

[31] *Ibid.*, fol. 3v.

tions give false and deceptive responses, and never speak the truth "unless it be from the virtue of a powerful conjunction."[32]

From the association of astrology with kings and emperors we may revert gradually to the exclusive consideration of its pursuit by men of science, using as a stepping stone, medium, or halfway house John of Legnano, the distinguished jurist who in 1377 was made papal vicar of Bologna and upon his death in 1383 received a state funeral. His celebrated treatise on the laws of warfare, *De bello,*[33] composed in 1360 as an exercise for his students while the city of Bologna lay under siege, was presented to cardinal Albornoz. At the end of the following century Garzoni in his work on the city of Bologna[34] looked back upon John of Legnano as the only person he could remember as having combined astrology and oratory with civil law. As a matter of fact, however, John's contemporary, William Pastrengus of Verona, similarly combined humanism and a love of classical authors with legal studies and interest in Arabic astrologers.[35]

Two astrological treatises are extant by John of Legnano. One, which we shall presently describe at greater length, was occasioned by the comet of 1368, and is preserved in manuscripts at the Vatican, Prag, and Cracow. In three of these it is definitely attributed to John of Legnano.[36] In the other manuscript[37] it, to-

[32] *Ibid.*, fols. 3v-4v.

[33] *Tractatus de bello, de represaliis et de duello by Giovanni da Legnano,* edited by Thomas Erskine Holland, 1917, Oxford University Press. This edition comprises a collotype of the text in a fourteenth century manuscript, Bologna, Biblioteca Comunale dall'Archiginnasio, Miscell. B. 1303, fols. 99r-127v; the same printed in unabbreviated Latin and in English translation; and a facsimile of the less complete editio princeps of 1477. Other editions are listed at p. xxix. Text and translation at times suffer from the editor's unfamiliarity with astrological technique and other details of medieval thought.

[34] *De dignitate urbis Bononiae:* Muratori, *Scriptores,* XXI, 1161. Cited by Tiraboschi, *Storia d. letteratura italiana,* Milan, V, ii (1823), 551.

[35] *De originibus rerum libellus authore Gulielmo Pastregico Veronense,* Venice, 1547.

[36] Vatican 2639, fols. 212r, col. 2-214v, col. 2, neatly written with 81 lines to a column in a Gothic hand of the late fourteenth or early fifteenth century, with finely executed decorative designs for the initial letters; a beautiful manuscript. At the end we read: "Explicit tractatus de cometa compillatus per dominum Iohannem de Ligniano Iuris utriusque doctorem In civitate Bononie M°ccclxviii completus xx^a^ Aprilis quo mense apparuit cometa. deo gratias. Amen." Univ. of Cracow 584 (DD.III.54), 15th century, fols. 270-274. Prag 1432, paper, 14th century, fols. 199r-203v; the colophon is similar to that of Vatican 2639.

[37] Vatican 989, fols. 70r-81r, in a hand which I should judge to be of the later

gether with another work concerning astronomy and astrology, is ascribed on the fly leaf to an Andreas de Sommaria, but the author's citation of his *De bello* shows that the other manuscripts are correct in making him John of Legnano. The other work, described by the abbot Ximenes in the eighteenth century from a codex in the Gaddian library at Florence,[38] was on a conjunction of Saturn and Jupiter in Scorpion on October 22. The year of the conjunction has been given as 1355 by Ximenes, Tiraboschi, and the recent editor of John of Legnano's *De bello*. But there was no such conjunction in 1355, and the conjunction of 1365 is evidently meant. Perhaps the figures for the day of the month have been miscopied, too, since John de Murs and John of Eschenden placed this conjunction on October 30.

As a matter of fact, John of Legnano's *De bello* contains a brief prediction based on the coming conjunction of 1365 which it merely places in October without naming a day of the month.[39] This prognostication is the final touch to five *Causae* which John has prefaced to his treatise and which combine a figurative statement of the political position of the city of Bologna on July 8 and October 24, 1350, September 7, 1352, October 11, 1354, April 17 and September 27, 1355, and April 12, 1357, with exact description of the positions of the planets at those dates. The figurative statement also wears an astrological dress, the pope being designated as Jupiter, Giovanni Visconti da Oleggio as Mercury, Bologna as Taurus, and so on. This astrological introduction was

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fifteenth century. The incipit of the text in all the MSS is: "Quia sicut Ptholomeus in centiloquio verbo quinto ex iudiciis astrologicis prohiberi potest multum malum quod secundum stellas est venturum. . . ."

[38] Leonardus Ximenius, *Introduzione istorica al vecchio e nuovo gnomone fiorentino,* Florence, 1757, p. lxvii: citing "Codice Gaddiano al numero CCCXLII, 'Figura della grande Costellazione overo Congiunzione di Saturno e di Giove nel segno dello Scorpione l'anno dall'Incarnazione di Cristo MCCCLV a di XXII del Mese d'Ottobre secondo la considerazione di Messer Giovanni di Lignano sopra quella dando el giudizio suo.' "

It is a good example of the way in which historical information deteriorates with repetition that in Tiraboschi, V(1823), ii, 551, this MS becomes vaguely "un codice MS. che conservasi nella Gaddiana in Firenze," while by T. E. Holland in the Oxford, 1917, edition of *De bello,* p. xxii, it is described as MS 343 (*sic*) in the Laurentian library at Florence. I have failed to find it in the available catalogues for the Gaddi and Gaddi reliq. MSS now in the Laurentian.

[39] *De bello* (1917), p. 77.

meant to serve as a foreword to other treatises besides *De bello*. John intended to write *De Iove* and *De Saturno,* that is, concerning the church and the empire, as well as this first part *De Marte*.[40] He promises in the future work on temporal dominion to explain how governments vary according to the climes in which they are located, or, even if situated in the same clime, vary with the changing motions and aspects of the superior bodies.[41] This shows how his political thought was impregnated with astrology. This astrological introduction to *De bello* resembles numerous astrological predictions before and after it in adopting a figurative prophetic style reminiscent of the *Book of Revelation* and other apocalyptic literature. In alluding to the coming conjunction of 1365 John of Legnano says that he sees the two first counselors of the sky hastening to a great colloquy —language which reminds us of the incipit of one of the predictions ascribed to John de Murs concerning the previous conjunction of 1345. In the text proper of *De bello* John of Legnano's astrological attitude continues to be manifest. Thus he explains that wars are caused here below by "the virtual opposition of the motions and aspects of the celestial bodies," and that so long as this diversity of the planets continues, wars will continue to vex the world.[42]

Similarly in his treatise on the rights of the Roman church over the city of Bologna and patrimony of St. Peter on the occasion of a communal revolt in Bologna, John of Legnano discussed seven main points, of which the last was an examination of how it came about at this time that ecclesiastical government had received such a patent, though momentary, set-back, whether forsooth by divine judgment or the celestial council of the stars or both.[43]

In opening his treatise of 1368 John of Legnano explains that

[40] *De bello* (1917), p. xiii.
[41] *Ibid.*, p. 213.
[42] *De bello* (1917), caps. V and VI; pp. 81-82, 219-220.
[43] S. Marco IX, 58, 15th century, paper; see the catalogue of Valentinelli, III, 42-43, for the Latin text of the seven points, and Luigi Rossi, *Dagli Scritti inediti giuridico-politici di Giovanni da Legnano,* Bologna, 1898, pp. 25-51, for further extracts.

the recent appearance of a comet has produced a demand from his students and men of rank whom he cannot decently refuse that he write a treatise concerning it, and although he is now on the faculty of law, he decides to revert to the "sights and fancies of his boyhood school days" and compose a brief and succinct treatment "with the suffrage of the Saviour and the intercession of his mother."[41] First he considers what a comet is, second the different kinds of comets, third he gives a natural physical explanation of them and afterwards treats of their astrological significance in relation to the signs and planets. Fourth he gives an astrological interpretation of the present comet. Fifth and last, he lists some notable comets from ancient chronicles and histories.[42] Indeed he begins to draw upon such sources before this final chapter is reached.

John of Legnano's treatise on the comet of 1368 is less considerable and shows less scientific observation on his own part than either that of Geoffrey of Meaux on an earlier comet of which we have already treated, or that of Jacobus Angelus on the comet of 1402 which we shall discuss later. John's slighter work is more of a compilation and academic exercise. However, it offers some points of interest. He adopts the usual and Aristotelian view that a comet is neither a star nor a part of the sky. He holds that the effects of comets in general are to be explained in two ways: the former naturally after the fashion of Aristotle's meteorology, the latter astrologically according to the signs and planets to which they relate. Even by the former method he argues that it can be demonstrated that violent winds and floods,

[41] Vatic. 2639, fol. 212r, col. 2; Vatic. 989, fol. 70; ". . . idcirco propter apparitionem comete que apparuit his diebus requisitus a diversis meis scolaribus et maxime ab illustribus quibus denegare non potui honeste ut aliquid scriberem de cometa, proposui tractatum de ipsa brevem et succinctum facere licet hoc tractare sit valde alienum a iuris facultate ad quam etiam vero accedo. Tamen recurrens ad visa et fantasiata tempore pueritie scolastice in primitivis primo salvatoris suffragio et matris ipsius intercessione dirigam tractatum in hanc formam."

[42] The distribution of space between these chapters may be roughly indicated by the number of columns each occupies in MS Vatic. 2639: Prohemium, one third of a column; cap. 1, four columns; cap. 2, one third of a column; cap. 3, four columns; cap. 4, one column; cap. 5, one column.

wars and deaths of princes, and even religious changes are natural results of comets. The line of argument is somewhat as follows: Comets make men choleric, and this temperament inclines them to wars. Princes are more apt to die than other men because they live luxuriously and dissipate, which makes them especially choleric, and because they engage so much in wars and so are exposed to death. History shows that such changes as the Norman conquest have been preceded by comets. John doubts if a comet is ever wholly or primarily beneficent in its signification, though sometimes a benevolent aspect may bring good in one locality. He sets down such delicate determinations from the movement of a comet as whether a plotter against the king comes from afar or from some place within the state. On the other hand, in the case of the present comet of 1368 he is none too certain whether it is of the sign Taurus or Gemini and so he gives alternative predictions of its effects in either case. He also at first was inclined to place it under the planet Mars which was itself in Taurus, but as its color indicated that it belonged under Saturn he so regarded it, although Saturn was then in Sagittarius. Such hesitancy bears out the objection of the fourteenth century critics of astrology that it was almost impossible to tell in what sign or under what planet a comet was.

While we have heard John argue that changes of laws and sects were natural results of comets, he presently hedges on the relation of astrology and religion. If it appears from ancient histories that three comets under Nero marked the spread of Christianity under Peter and the other apostles, nevertheless it should not be believed that this was by the force of the planets but only by supernatural divine virtue. "Yet so it was." His authorities for astrological technique, which he sometimes cites precisely by book and tractate, are the *Quadripartitum* and *Centiloquium,* works of Haly and Albumasar among the Arabs, or Michael Scot and Leopold of Austria among the Latins. But in closing he disowns them, protesting that true Catholics should place little faith in these, and citing Augustine's *De doctrina christiana* and *Confessions* against astrology, and the laws of Justinian *de maleficiis et mathematicis*. But this belated caution appears to be little

more than a pious formality. Such scruples did not keep him from penning the treatise. John of Legnano's treatise on the comet of 1368 may have been slighter than those of Geoffrey of Meaux and Jacobus Angelus. But, perhaps because of its author's reputation in other respects, it was not to be soon forgotten. As late as 1431, it is cited in an annual prediction for that year.

The other work, attributed to Andreas de Sommaria, which precedes the treatise on the comet of 1368 in one of the two Vatican manuscripts containing it, appears to have been composed shortly after the death of John of Legnano in 1383. It speaks of the present year as 2136 according to the era of Nebuchadnezzar,[46] and informs us that the astronomical observations of Ptolemy were made about the year 880 of that era.[47] Since Ptolemy's observations date from 127 to 151 A.D., our treatise would be written between 1383 and 1407 A.D. Or, if we take 747 B.C. as the beginning of the era of Nebuchadnezzar, it may be dated more exactly as composed in 1389 A.D. Since other evidence of its authorship is lacking, we may accept its attribution on the fly leaf of the manuscript to Andreas Sommaria. He seems to be a person otherwise unknown and unmentioned, except that Pico della Mirandola twice cites him in the ninth book of his work against astrology.[48]

In the catalogue of manuscripts the work of Sommaria is described as "Concerning the Stars and Their Motion" (*de stellis et motu earum*) but on the flyleaf it is entitled, "That astrology (*i.e.* astronomy) cannot be known" (*quod astrologia non possit sciri*), and the opening leaves of the treatise bear out this description.[49] The author begins by stating that he does not know whether the movement of the stars is knowable but that he is

[46] Vatic. 989, fol. 65r.

[47] *Ibid.*, fol. 64r.

[48] The name does not appear in Fabricius or Chevalier, in the *Rotuli* of the university of Bologna, or the published records of the universities of Padua and Pavia. Pico, *Disputationes in astrologiam*, IX, 8, writes: "Andreas Summarius gravis mathematicus suum ita librum exorditur: Motus stellarum an sciri possint nescio, nondum esse scitum, certissime teneo." Andrea is also mentioned by Pico's nephew, Giovanni Francesco Pico della Mirandola, *Examen vanitatis doctrinae gentium*, 1520, III, 8, fols. xciir, xciiir-v.

[49] It occupies fols. 57r-60v of Vatic. 989 and is preceded there by Claudianus, *De statu animae*.

positive that it has not yet been apprehended.[50] He points out that conditions are not the same at different times, and that the human senses are too weak to follow the action of instruments.[51] Despite this sceptical beginning as to even astronomy, he presently decides to "say something concerning judgment of the effects of the motion of the heavens because of the obedience which inferiors observe."[52] He advances various arguments in favor of astrology and is not moved by the argument from freedom of the human will against it. "For if the infallible prescience of God does not take away freedom of the will, why should the fact that the stars signify be denied?"[53] He does not approve the practices of Hermes Trismegistus and other fabricators of images who, in order to conceal the detestable workings of demons, pretend that these images were constructed from observation of the movements of the stars by honest investigation and true science.[54] He also does not approve of the many uneducated persons who make judgments concerning anything and everything where the learned astrologer would maintain a discreet silence. He holds that it is safer to limit oneself to universal as against particular judgments, that one should be slow to predict and should take many things into consideration. But although he shifts and qualifies his position not a little and endeavors to preserve an unimpeachable attitude from the religious standpoint, his thought and sympathy are really decidedly astrological.

Matthaeus Guarimbertus of Parma became a doctor of liberal arts at Padua in 1370,[55] and succeeded in 1377 to the archdeaconry at Parma which Petrarch had held until his death in 1374.

[50] *Ibid.*, fol. 57r, "Motus stellarum an sit scibilis nescio, quod ipse nondum sit scitus certissime teneo. . . ."

[51] *Ibid.*, fol. 58r, "Postquam demonstratum est fore impossibile acquirere scientiam motus celi propter debilitatem sensus non valentis comprehendere habitudinem partium instrumenti."

[52] *Ibid.*, fol. 65v, "Vacatio studii honestioris occasionem tribuit loquendi aliquid de iudicio effectuum motus celi propter obedientiam quam inferiora observant. . . ."

[53] *Ibid.*, fol. 67r, "Et si infallibilis dei prescientia non tollit libertatem arbitrii, cur astrorum significatio tolletur?"

[54] *Ibid.*, fol. 68r, ". . . admoveamus operationes hermetis trimegisti et aliorum fabricantium imagines qui ut detestandas demonum operationes occultarent observatione motus astrorum eas honesto studio et vera scientia finxisse mentiti sunt."

[55] Gloria, *Monumenti della Università di Padova*, 1318-1405, I (1888), 453.

He tried to possess himself of Petrarch's house, too, but was dispossessed by legal process.[56] Guarimbertus was still alive in 1401 but died at some date before 1412.[57]

Besides a discussion wherein human felicity consists[58]—a favorite theme of the humanists of the so-called Italian renaissance—he composed a treatise on the rays and aspects of the planets of which several manuscripts are extant,[59] and which was printed at Nürnberg in 1535 with Ptolemy's *Quadripartitum* and again at Rome in 1557 with an astronomical work by Luca Gaurico. The treatise is in eight chapters,[60] of which the fourth is the chief, taking up more than one-third of the whole work. The main purpose of the work is set forth in its opening paragraphs which form a prohemium. It opens, "Through the aspects and rays of the planets are known their accidents and qualities; by directions are known and determined the times when the accidents are going to happen." It follows that an astrologer who ignores or neglects directions, aspects, and rays cannot make satisfactory judgments as to the future. But the labor of projecting aspects and rays and the task of directing are both tedious and difficult matters. Matthaeus therefore provides tables which he has compiled to save others this trouble—a good example of the close relationship between such astronomical tables and astrological predictions. Regiomontanus in one of his letters alluded to this work of Guarimbertus whom he called "the archdeacon," and further composed *De directionibus contra archidiaconum Parmensem.*[61]

In a Vatican manuscript are two figures of the revolution of the year in which the great Schism originated, but then two dates are given, 1368 and 1376.[62] In another Vatican manuscript of the

[56] Affò, *Memorie degli scrittori e letterati Parmigiani,* Parma, 1789, II, 105.

[57] *Ibid.,* II, 106.

[58] *Ibid.,* II, 107. A MS is BL Canon. Misc. 179, described more fully in Appendix 36.

[59] For a discussion of them see Appendix 36.

[60] A table of contents of them is reproduced in Appendix 36.

[61] Maximilian Curtze, "Der Briefwechsel Regiomontan's mit Giovanni Bianchini, Jacob von Speier und Christian Roder," *Abhandlungen zur Geschichte der mathematischen Wissenschaften,* XII (1902), 295, and XIII (1902), 337, *Vorwort,* where he says, "Wer dieser Archidiaconus gewesen, war mir nicht möglich zu bestimmen."

[62] Vatic. 4153, circa fol. 24, Figurae duae

Barberini collection is an astrological judgment in the form of a letter sent by a brother Nicholas on November 19, 1352, at the end of the first hour.[63] In a Munich manuscript is a prediction for 1377 by Conrad Stoll.[63a]

On September 21, 1393, before the twentieth hour someone completed another commentary on the work of Alcabitius on judicial astrology. Writers earlier in the century such as John of Saxony and John of Eschenden are utilized.[64] A later note suggests Nicolaus de Comitibus as author but then recognizes that this would scarcely be possible, since he died only in 1464. A Nicolaus who would better fit our date is Nicholas of Erfurt, who in 1392 added tables to the canons of John of Saxony on the Alfonsine Tables,[65] or the brother Nicholas whose prediction for 1392 was mentioned in our previous paragraph. Yet another suggestion may be made. The incipit of the so-called commentary on Alcabitius is essentially the same as that of Blasius of Parma's commentary on the *De coelo et mundo*,[66] and the date 1393 would fit very well into his career. Perhaps therefore we have here an autograph copy of a work by Blasius, of whom we

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revolutionis anni quo supradictum schisma ortum fuit 1368 et 1376.

[63] Vatic. Barb. 343, fols. 55-58v, Iudicium astrologicum missum ad instar epistolae anno domini 1352 mense Novembris die 19 hora prima completa. Explicit: "Accipe ergo magne hoc opus exiguum breve corpore viribus amplum a fratre Nicolao de ————, licet defectuose tamen fide sincera discussum."

[63a] CLM 7662, fols. 216-220v.

[64] S. Marco VIII, 30 (Valentinelli XI, 109), paper, autograph copy, 1393 A.D.: "Obmissis multis consuetis declarari in principiis huius libri communibus et aliorum librorum principiis . . . / . . . Complevi 1393 die dominica 21 Septembris ante horam vigesimam."

[65] Naples VIII.D.31, 14th century, mostly membrane, double columns: Canones tabularum Alfonsinarum compilati per Ioannem Danekon de Saxonia et Nicolaum de Erefordia.

[66] Compare BL Canon. Misc. 422, 15th century, fols. 1-52: "Obmissis causis aliis que consueverunt inquiri in principiis aliorum librorum condescendam ad textum . . . / . . . Explicit Summa super libro de celo et mundo compilata per famosissimum artium doctorem magistrum Blazium de Parma de Pelacaniis in Bolonia." It must be added that this was a common type of incipit then. Thus a Novus computus ascribed to John of Saxony in FL Plut. 30, cod. 24, fol. 76, opens, "Omissis preternecessariis quum intentionis sit in hoc epilogo . . ."; an abbreviation of Guido Bonafors (Bonatti?) on judicial astrology by a brother Hugolinus de Faventia opens, "Omissis multis que spectant ad philosophiam naturalem . . ."; and the Lapidarius attributed to Raymond Lull begins, "Omissis preambulis necessariis in theorica. . . ."

shall say more in another chapter. As for astrologers named Nicholas, we may mention one more, a Nicolaus Alamannus who wrote on equations of the twelve houses of the sky at Florence. His date is uncertain, but the brief work or excerpt is found in a manuscript of the fifteenth century.[67]

In a manuscript at Bruges which seems to be of the late fourteenth century is a scholastic discussion of such questions as whether the study of astrology is licit and whether the celestial bodies are the causes of the effects which are produced in these inferiors.[68] The anonymous author is on the whole favorable to astrology. He states that the stars act in seven ways on inferiors: by their own virtues, according to their size, nearness or remoteness, velocity or slowness, the diversity of their aspects towards inferiors, the intention or remission of their light, and the diversity of their aspects and conjunctions with one another.[69]

A work on nativities by a Peter of Limoges perhaps belongs to this period, since it occurs in a manuscript of the fifteenth century and seems to include a nativity for the year 1389.[70]

[67] Vatic. Barb. 350, fols. 91-92.

[68] Bruges 300, membrane, fol. 41r, "Utrum licitum sit studere in astrologia"; fol. 43r, "Utrum per aliquam scientiam possint futura presciri"; fol. 49r, "Utrum corpora celestia sint cause effectuum qui producuntur in istis inferioribus."

[69] *Ibid.*, fol. 46r, "Que sunt generales actiones astrorum in istis inferioribus."

[70] Oxford, Hertford College 4, fol. 159r *et seq.* (formerly Aula B. Mariae Magd. 2, fols. 147-160): at fol. 160v, "Opus M. Petri de Lemovicis (?) super nativitate predicta. Si scis gradum astri. . . ." The nativity for 1389 occurs at fols. 166v and 168r.

CHAPTER XXXV

ANTONIUS DE MONTE ULMI: ASTROLOGICAL NECROMANCER AND MAGICIAN

It has seemed best not to include the author to whom we now come in the chapter on the astrology of the later fourteenth century but to accord him separate treatment, because he has so much to say of magic and necromancy as well as of astrology.

Antonius de Montulmo or Monteulmo or Monte Ulmi[1] was a doctor of arts and medicine who is said by Mazzetti to have flourished at Bologna between 1384 and 1390[2] and whose name we find in the extant rolls as published by Dallari as teaching astrology in 1387-1388 for a salary of fifty pounds or lire and in 1388-1389 for seventy-five pounds or lire Bolognese.[3] In his work on nativities, which he completed at Mantua in January, 1394,[4] he refers to those of the emperor Charles IV, of Francesco, son of Ludovico, despot of Mantua, and of Francesco the younger of Carrara, despot of Padua (1393-1406), as if he had had personal relations with these men.[5] Francesco Gonzaga of Mantua was born in 1363 and succeeded his father, Ludovico, on the latter's death in 1382, dying himself in 1407. In the same work Antony mentions 1396 as the present year in connection with an astronomical observation which he made on July 26 with regard to the death of the infant son of Ludovico de Libertis,

[1] Montulmo is the spelling in the printed editions, Monteulmo in the salary rolls of the Bologna faculty, and Monte Ulmi in the Paris MS, BN 7337, of one of Antony's works.

[2] Serafino Mazzetti, *Repertorio di tutti i professori . . . di Bologna,* 1847, p. 185.

[3] Dallari, *Rotuli,* IV, 14; I, 7.

[4] This date is given in a MS where the work occurs anonymously but is identifiable by its incipit. Klagenfurt, Bischöfliche Bibliothek XXIX.e.12, 15th century, paper, fols. 110r-236r: Astrorum iudicia, "Ille reverendissimus philosophus qui naturali calle in suis iudiciis processit . . . / . . . Et considerato labore meo et multis scripturis aliis studioque et aliis factionibus occupatus pro nunc ulteriora scribere non procedo. Vale 1394 Ianuarii Mantue." Another MS is Vienna 5335, 15th century, fols. 61r-96v: "Ille reverendissimus philosophus . . . / . . . signo cui predominatur."

[5] See caps. 2 and 9.

a councillor of Florence.[6] This statement in the printed text does not quite agree with the year 1394 for completing the work given at the close of a manuscript copy. Presumably a figure has been miscopied in one or the other. But as Charles IV died in 1378, Antony's career would date back for two decades at least, if we accept the implication that he served the emperor astrologically. Perhaps, however, Antony's examination of his nativity was posthumous. Antony speaks of himself as a very busy man at the close of this work on nativities.

This work on the judgments of nativities was honored in the following century by additions at the hands of Regiomontanus—who also in his oration at Padua on Alfraganus and the history of mathematics referred to Antony as having left "an eternal name"—and then was printed at Nürnberg in the course of the sixteenth century.[7] It is in eleven chapters which instruct how to cast nativities and rectify genitures and to determine such matters as the time of life, the form and complexion of the body, the intellect and character, wealth and poverty, and death. Ancient astrologers such as Ptolemy and Dorotheus, or Arabic astrologers like Haly, Omar, and Alcabitius, are cited, while such technical astrological terms as *almuten, hyleg,* and *alcocoden* are retained in their Arabic form untranslated, although definitions of most of them are given. But later Latin medieval writers on astrology are also liberally cited: Guido Bonatti, Leopold of Austria, William of England's *De urina non visa,* Albertus Magnus's *Specu-*

[6] Cap. 2.

[7] Antonius de Montulmo artium ac medicinae doctor, *De iudiciis nativitatum liber praeclarissimus.* Additionibus Johan. de Monteregio illustratus, nec unquam ante hac aeditus. Norimbergae apud Johan. Petreium, anno salutis MDXL mense Augusto. 49 unnumbered leaves. Bound in the British Museum copy with Lucas Gauricus, *De nativitatibus.* In the Columbia University copy of the same work—*Tractatus astrologiae iudiciariae de nativitatibus virorum et mulierum compositus per D. Lucam Gauricum Neapolitanum ex Ptolemaeo et aliis autoribus dignissimis cum multis aphorismis expertis et comprobatis ab eodem. Addito in fine libello Antonii de Montulmo de eadem re cum annotationibus Ioannis de Regiomonte hactenus nusquam impresso.* Norimbergae apud Iohan. Petreium anno salutis MDXL—the work of Antonius de Monte Ulmi is missing. The printed version opens, "Ille reverendissimus Ptolemeus qui naturali caelo in suis iudiciis. . . ."

For the "Oratio de Alfragano et mathematicis disciplinis Ioannis Regiomontani," *Corpus reformatorum,* ed. C. G. Bretschneider, XI (1843), col. 537.

lum astronomiae which is definitely ascribed to him. The medical *Summa* of Thomas del Garbo seems to be the latest work mentioned.

Regiomontanus mentioned another work of Antonius de Monte Ulmi on revolutions in a letter of 1465 from the baths of Viterbo to James of Speyer, astrologer at the court of Urbino. James had put questions regarding the conjunction which "predicted and signified" the birth of Christ, and Regiomontanus referred him to the treatises on conjunctions of Albumasar, Messahala, John of Eschenden, and Pierre d'Ailly. "But more illuminating than all others is Antonius de Monte Ulmi" in his second and fourth *particulae*. Such copies as Regiomontanus had seen, however, were incomplete for the fourth *particula*, and he asks James to let him know, if he finds a complete copy of Antony's treatise on revolutions.[8]

Another astrological work which was printed under Antony's name is a prognostication in English for the year 1555.[9] Obviously our Antony cannot have been alive then, and his name has perhaps simply been borrowed from the publication in 1540 of his treatise on nativities. Or possibly some annual prediction which he made for a much earlier year has been revised and translated into English to serve for the year 1555. But the former alternative seems the more likely.

The work of Antonius de Monte Ulmi entitled, *Of Things Occult and Manifest* or *The Book of Intelligences*[10] is an exposi-

[8] For the Latin of the passage see Maximilian Curtze, "Der Briefwechsel Regiomontan's mit Giovanni Bianchini, Jacob von Speier und Christian Roder," *Abhandlungen zur Geschichte der mathematischen Wissenschaften*, XII (1902), 305-306.

[9] Two forms of title appear in the work. "An almanacke and prognostication for the yere of our Lord God D.CCCCCLV (*sic*) made by Master Antonino de Montulmo, an Italian, Doctoure of phisicke, and astronomy. Imprinted at London, by Thomas Marche, dwelling in flete strete, at the sygne of the princes armes." And again, "A Prognostication, made for the yeare of our Lord God, M.CCCCCLV, declaring also what weather, and diseases, warres, pestilence, dearth of victuals shall happen for this yere, made by Master Antonius de Montulmo, an Italian, Doctour of Phisick, and astronomy. Imprynted at London, by Thomas Marshe."

[10] BN 7337, 15th century, paper, page 1, col. 1-page 9, col. 1. Rubric, "Incipit de occultis et manifestis artium et medicine doctoris liber intelligentiarum Antonii de Monte Ulmi." Incipit, "In scibilibus minimum est quod creature infime speculantur quoniam eorum que ignoramus minima pars est que sci-

tion of astrological necromancy and the performance of magic by invoking spirits which goes to surprising extremes for the composition of either a Christian author or a doctor of medicine. Yet Antonius was both. In the first chapter Antony treats of the constellations in which the intelligences or spirits dwell and under which they operate. There are four chief orders of intelligences for the four points of the compass, and their power over inferiors depends in part upon their astrological position and connexion, although they also specialize in certain sins and temptations thereto, some being deputed to luxury, others to guile, and so on. In the third chapter Antony notes that there are twelve altitudes of angels for the twelve signs and that they have relations to one another corresponding to the sextile, quadrile, and triune aspects of the planets in the signs. When a child is born, the chief intelligence of the sign of the zodiac then in the ascendent appoints one of his subordinates having greater or less virtue in operating according as the child is of high or low estate. Antony professes that this assertion is supported by the Christian faith which says that every person from birth has his opposing angel.[11] In the fifth chapter he relates the spirits to the planets and explains that he does not mean the intelligences appropriated to the orbs of the planets—*i.e.* the Aristotelian movers of the spheres, but "intelligences deprived of divine grace"—*i.e.* the fallen angels. In the same chapter he even suggests, although pretending that he finds it incredible, that good angels also operate under celestial influence and are divided into twelve altitudes like the signs of the zodiac. Meanwhile in the second chapter he has stated that magicians especially observe the sun and spirits of the east, that the first hour of the night is reputed the most favorable for necromancy, and that Christians ought to pray to God at that hour to protect them from the plottings of such intelligences. Other astrological rules are given, but we are

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mus. . . ." Presently the author himself states the title of the treatise in these words: "Et quia liber iste erit de occultis et manifestis ideo hoc titulo debet appellari."

[11] BN 7337, page 5, col. 1: ". . . prout et nostra fides retinet et dicit quod unusquisque natus suum habet angelum adversantem."

warned that the word horoscope has a different significance in astrology, chiromancy, and magic. While for the astrologers Aries is the initial sign, Cancer takes its place in magic. Astrological times must be observed in magic, as Aristotle was informed by a demon whom he consulted, as is stated in his work on magic.

Various questions or *dubia* are raised as to the apparition of spirits. That they often appear tumultuously and in a fury is because they come from opposing parts of the sky or are angry at being exorcized. Those of the oriental signs are of a nobler grade and more placable and appear more quickly and with less fury and in a more beautiful form and are more readily controlled by the exorcizer. Antony abstains from revealing the exact hours at which it is best to summon them, partly lest he imperil souls but partly because he has already stated them elsewhere and to do so now would be in the nature of a digression.[12] Why are only certain persons able to perceive the presence of these spirits, while others hear and see nothing? The answer is that the greater scientific attainments of the intelligences enable them to feign objective appearances so that these meet the senses of one person and not of another or are near one person's eyes and not visible to those of a bystander. The intelligences appear more often to persons in a virgin state because they themselves are incapable of sexual intercourse. They manifest themselves more in water and highly polished surfaces than elsewhere because they can produce their feigned appearances by reflexion better in water or mirrors than in air.[13] Nor can they achieve their colors and figures as well when wind and rain disturb the air as when it is clear and bright. Antony has found by experience that they make apparitions even in rainy weather but not with such facility.[14]

The difference in the suffumigations which are employed in invoking spirits, fetid substances being burned for some and

[12] BN 7337, page 2, col. 2: ". . . propter indignos ne cadant in animarum discrimine, et alibi declaravi quia non presentis speculationis nec ut facerem magnam digressionem."

[13] BN 7337, page 3, cols. 1-2.

[14] BN 7337, page 8, col. 1: "Licet expertus sim quod etiam tempore pluvioso apparentias faciunt sed non cum tanta facilitate."

odiferous ones for others, are explicable by the planets and constellations with which the intelligences are associated. When spirits of the south are imprisoned in bottles or crystals, these should be kept in fetid places like dunghills. When the intelligences are impelled to a good work they require odiferous suffumigations, while fetid suffumigations are in order for a bad end, since they enrage the demons and make them the readier to commit evil, especially since it means in the end a severer penalty for the exorcist or conjurer. It will be noted that Antony employs the term, exorcist, for anyone invoking spirits and not merely for an ecclesiast driving out evil spirits. The reason why the spirits are influenced by suffumigations although they have no sense organs is partly astrological and partly because they wish to seduce men into sacrificing to them and offending against their Creator.

The ancient sages used various images, some to overcome others, some for love. As to such images there is much uncertainty both among the vulgar and the learned. Some are astronomical, some are magical, and some are both astronomical and magical. Antony illustrates astronomical images by one for acquiring one's desires from some prelate. He explains that as every child at birth when his limbs are tender receives a virtual quality of the sky, and as a wood flask can be scented when new, so the celestial influence received in the wax of the image affects the constitution of the prelate, especially if the person making the image exerted strong volition so as to affect his own body and multiply emanations from its pores. Even when an astrologer oversees the construction of the image, such personal participation of the person interested is very important. Some persons have stronger personalities than others and so can work greater effects, like those who cure quartan fever by incantation, though the mere words are idle. Or persons with proportionate and disproportionate qualities, by sympathy or antipathy may make others well or sick, so harmonious or contrary are their personal constitutions (*complexiones*). Antony therefore thinks that there is something in the popular belief that, if one meets an unfortunate man or enemy in the morning, the day will be unlucky.

To be a successful magician one must be born under the proper constellation, and not every person can be an experimenter, for an experiment which will work for one person will not do so for another. Magic images involve the intelligences more directly. Their names must be written down, suffumigations must be offered them, and they must either be induced by paying honors to them or coerced by the word of God. Women are successful in operating with magic images because they have such strong confidence in them.

The place for invoking spirits should be secret because they dislike to be coerced by divine virtue publicly. And they can affect our senses more readily when these are not occupied with other things. The spirits further prefer secrecy that they may not be detected and their malice exposed by those whom they have previously deceived or whom they hope to deceive in the future. The place of invocation should further be clean and pure because these spirits are clean and pure, since they are angels who have been deprived only of the grace of our Creator. If, however, an evil end is sought, a fetid place should be used for the reasons given above.

The magician must not only be specially endowed by the stars and of firm faith and will, but acquainted with the dodges and illusions of the spirits and not alarmed by their terrors. He must be perfect in astrology and eloquence, have a biting tongue, be pure of life, a Catholic in faith, and duly bathed and suffumigated.

The magic circle is made to safeguard the invoker and his associates from the attacks of spirits. The circle is so employed because it is the most perfect and capacious figure and a symbol of the prime mover. It keeps off the spirits because the names of God are written on it by the exorcizer with great devotion and contrition. Although Antony previously stated that women were especially successful with magic images, he warns that they be not admitted within the magic circle, since they are of weak nature and easily believe in appearances, while their impurity is detested by the pure spirits. The circle and those within it

should be suffumigated with consecrated words and Christian prayers, but not if the suffumigations are intended as a sacrifice to the spirits. In that case everything should be done in their names with prayer to them. Otherwise the exorcizer will not attain his object.

Such is the rather amazing treatise of Antonius de Monte Ulmi *On Things Occult and Manifest*. While professedly at least recognizing that the spirits in the constellations are evil, it coolly gives elaborate directions for invoking and utilizing and even honoring them, and the author admits having experimented with the invocation of spirits himself. In the main, however, his treatise seems based upon previous literature on the subject. He cites such astrological and magical authorities as Messahalla—whom he calls Messallach, the work of Hermes on fifteen stars, stones, and so forth, Apollinarius or Apollonius, a book of magic attributed to Aristotle, and the *Almadel* of Solomon. Such is Antony's discussion of astrological necromancy and magical invocations of spirits which seems to exceed in boldness the writings of Cecco d'Ascoli.

In the same manuscript is a gloss by Antony on the images of Hermes for the twelve signs of the zodiac,[15] some of which he says he tested at Bologna and Padua and found marvelously efficacious. While astronomical phenomena are observed in the construction of these images, they are also to be inscribed with the names of the angels of the sign in question and of the sun. Good and odiferous suffumigations are to be made, and the exorcizer is to conduct himself as Antony advised in his treatise *De occultis et manifestis*, when something is to be sought from spirits "according to their pleasure and love." The procedure to be followed to cure an infirmity includes a very subservient prayer to the spirits which opens, "O ineffable angels of immense and marvelous virtue . . ." The same form may be employed with the images of Thebit. For conscientious Christians, however, An-

[15] BN 7337, page 26, cols. 1-2: rubric, "Incipit glosa super ymagines 12 signorum Hermetis secundum Antonium de Monte Ulmi"; incipit, "Ecce quid adnecto operi ymaginum quarum alias expertus fuisti ut ipsarum opus reddatur perfectius. . . ."

tony gives a more orthodox form of prayer with directions for blessing of the image by a priest and contrite confession by the operator.

A work on judicial astrology in a manuscript of the fifteenth century, where it breaks off unfinished without naming its author, indulges in a good deal of digression concerning the spirits invoked in necromancy and the practices of magicians, all of which seems copied from Antony's *Book of Intelligences*. Two chapters on images and rings also appear largely indebted to him notably for the account of the image to win the favor of a prelate. Possibly this anonymous astrological treatise may be by Antony himself, but it seems more likely that a later writer has used him.[16]

[16] BN 7273, fols. 100r-163v, col. 1. For its necromantic and magical digressions see fols. 128v, col. 1-130r, col. 2; 132v, col. 2-133v, col. 1; 140v-141r. The chapters on images occupy fols. 138r, col. 1-141r, col. 1.

CHAPTER XXXVI

THE ALCHEMICAL CORRESPONDENCE OF THOMAS OF BOLOGNA AND BERNARD OF TREVES

In the second half of the fourteenth century there resided in France a physician of Italian origin, Thomas of Bologna, father of the historian and poetess, Christine de Pisan (1363 or 1364 to about 1431), who wrote a history of the reign of Charles V the Wise and urged the cause of feminism in her *Cité des dames* (1405). Her father, if we discount his daughter's picture of him as naturally likely to be a flattering one, appears to have been something of a charlatan, and dabbled not a little in the occult. He seems to have been the sort of man who was more likely to impress a court or men of affairs with his pseudo-learning than to succeed at a university before the critical eyes of colleagues and students. I have already described the magic images which he buried in four quarters of the realm with the object of driving the English troops from French soil.[1] It is not surprising that he should have also tried his hand at alchemy. As evidence of this there is extant a letter by him on the philosophers' stone addressed to Bernard of Treves. Bernard has commonly been called Trevisan, which led many later writers to assume that he originated from the March of Treviso in northeastern Italy.[2] But early manuscripts of his works give his place of provenance as Treves or Trier, and in Thomas's letter to him he is called *Trevirensis*.

What is known of Thomas or Tommazo da Pizzano is derived in large part from his daughter's writings. She states that he

[1] *Magic and Experimental Science*, II, 802.

[2] Chevalier lists an alchemist named Bernard, born at Padua in 1406, count of the Trevisan march, and died in 1490. I know of no such person. There was a Bernardinus Trivisanus, a Franciscan and astrologer, who addressed a commentary on Aristotle's *Meteorology* to Ludovico, duke of Milan: see BU 863 (1664); Borsetti, *Hist. almi Ferrariae gymnasii*, II (1735), 95. Ruska, *Tabula Smaragdina*, 1926, p. 203, and *Turba philosophorum*, 1931, p. 10, also calls Bernard "von Tarvis" and dates him 1406-1490.

received the doctorate at Bologna, where, according to Alidosi, he taught astrology from 1345 to 1356. He there made the acquaintance of a son of the famous writer on anatomy of the early fourteenth century, Mundinus or Mondino of Forlì, and later, at Venice, married his daughter. It was of this marriage that Christine de Pisan was born at Venice in 1363 or 1364. Thomas soon returned to Bologna and thence was called to France as astrologer and surgeon to Charles V. His wife and daughter followed him to Paris when Christine was about four or five years old, or around the year 1368. Charles V paid Thomas a salary of one hundred francs a month and he enjoyed the royal favor and confidence. But after that monarch's death in 1380 his reputation declined, perhaps because of an incident which was a main reason for his letter to Bernard of Treves. However, on May 23, 1384 Charles VI made a grant to Thomas of two hundred gold francs for his services to his father, Charles V, and further spoke of him as "our beloved surgeon, Thomas of Bologna."[3] Christine de Pisan reports on the word of her father who was continually present during Charles the Fifth's last sickness, that as the death of Bucephalus, his favorite horse, presaged the early death of Alexander the Great, so the death of the constable Du Guesclin on Friday, July fourteenth, preceded that of Charles in the September following. Such loose as well as magical inference and association of ideas, putting the horse before the chevalier, to say nothing of the stable and constable, hints what we may have to expect from Thomas, even though we be tempted to dismiss it as a piece of feminine logic on Christine's part.[4]

[3] On the career of Thomas see Jean Boivin, "Vie de Christine de Pisan et de Thomas de Pisan," *Mém. acad. des inscriptions et belles-lettres* (1717), II, 762; (1736), II, 704-714; Tiraboschi, V, i (1823), 318-321, and, more recently, Marie-Josephe Pinet, *Christine de Pisan 1364-1430, Étude biographique et littéraire*, Paris, 1927, Ch. I.

For the grant of 1384 see E. T. Hamy, "Thomas de Boulogne, chirurgien de Charles V et de Charles VI," *Bulletin de la Société academique de l'arrondissement de Boulogne-sur-Mer*, VI (1900), 29-33. But Hamy was mistaken in assuming that Thomas hailed from Boulogne-sur-Mer.

[4] *Le livre des fais du sage roy Charles*, in *Collection des mémoires relatives à l'histoire de France*, VI (1825), 136-137, chapter 70. The passage is cited by Rodocanachi, *Études et fantaisies historiques*, 2e série, Paris, 1919, p. 52, but none too exactly.

Thomas's letter evoked a long reply from Bernard of Treves which is found in many manuscripts, sometimes without Thomas's letter, and was later printed. The epistle from Thomas was not printed and is so much less known than Bernard's reply that in a recent catalogue of alchemical manuscripts both letters are ascribed to Bernard.[5] Thomas has hitherto been known chiefly as an astrologer at the court of Charles V and father of Christine de Pisan. Now we learn of him as a physician or surgeon and alchemist during the next reign of Charles VI. I have examined the epistle from Thomas in a manuscript of the Bibliothèque Nationale, Paris,[6] where it is the first treatise and is immediately followed by Bernard's reply which in its turn becomes more intelligible when one has read the letter of Thomas, to whose various points it alludes and responds.

The composition by Thomas impresses the reader as a genuine letter, albeit a sufficiently curious one, and not as an alchemical forgery. It opens with a gushing flood of rhetorical epistolary amenities and other generalities in the best—or worst—style of such exponents of the medieval *Ars dictandi* as Boncompagno. Amid all these big words and superfluous adjectives, with which he struggles like a very small kitten trying to worry a football,

[5] D. W. Singer, Vol. I, No. 317, Bernardus Trevirensis (comes Trevisanus), Epistolae duo ad Thomam de Bononiae (*sic*) medicum. The reply of Bernard is then listed, and the letter which really belongs to Thomas comes second—the reverse of the true order. The source of this error seems to be CU Corpus Christi 99, pp. 195 and 208, where the letters occur in that order, and notes imply that both are by Bernard. This misapprehension was repeated in the catalogues of Nasmith, M. R. James, and now of Mrs. Waley Singer.

[6] BN 11201, fols. 1r-13v, written in the top margin in a different but not very much later hand, "Epistola magistri Thome de Bononia ad Bernardum Trevirensem de lapide philosophico ad magistrum Bernardum Trevirensem." The text proper opens, "In altissimis laudibus micat amicitia et in fidelitatibus ignotis floret reverentia et in veritatibus constantibus arguitur omne fidele. . . ." It closes, ". . . quia ista puncta secreta vobis scribo tamquam nature secretario mihi intimoque fideli. Explicit epistola Thome de Bononia ad Bernardum Treverensem."

Pinet, *op. cit.*, p. 9, states that Thomas's relations with "Bernard d'Allemagne" are known from a French manuscript at the Bibliothèque Nationale, BN fr. 2018, fol. 39, "Traité responsif de Bernard de Trèves à Thomas de Boulongne en 1385." But he does not refer to Latin MS BN 11201, and is not aware that the letter of Thomas to Bernard is extant.

Thomas presently endeavors to set forth his sense of the importance of "experiment in nature" and of the superiority of experiment to opinion as a means of attaining and determining truth. God shines forth in natural experiments, while opinion generates disputations. The medical man should sweat after two objectives. First, he should investigate the elemental *quiditas* and its proportion to the thing to be cured. Second, he should similarly investigate the thing that cures, "and this in wise proportion of the medicaments of which experiments flourish in human beings and in vegetation and are included in the four common states of health."[7] Such is a fair specimen, somewhat amended to make intelligible English, of Thomas's obscure and disjointed mode of expression. Genuine experimenters, he says later in the course of his letter, are very few.[8] But he would deal in real, and not verbal philosophy,[9] and find such "confirmation of truth as befits an experimenter of nature."[10] For the wise man deals out praise and blame according as a matter measures up to the truth of experience.[11]

It is not, however, these praises of experimental method which make the letter seem really by Thomas of Bologna, but rather the account he gives of sending a medicine to the king of France and dukes of Burgundy and Berry and the fears he expresses of having incurred their displeasure thereby.[12] This "medicine" which he had concocted was somewhat in the nature

[7] BN 11201, fol. 2v, "Tenetur igitur medicus iuxta duo insudare ut studium suum teneat apicem et florem experimenti. Primo de quiditate elementali et eius proportione rei curande. Secundo ad idem rei curantis et hoc in sagaci proportione medicaminum quorum in humanis seu vegetabilibus vigent experimenta et in communibus quatuor complexionibus includuntur."

[8] *Ibid.*, fol. 5r, "paucissimi sub orbis splendore orbem inhabitent veridici experimentatores."

[9] *Ibid.*, fol. 11v, ". . . in philosophia reali et non verbosa que philosophia communiter non nota in experimentis collaudatur."

[10] *Ibid.*, fol. 5v, "Magister egregie, doctor fidelis, in lumine vestri intellectus altam inveni considerationem veritatisque confirmationem sicut decet nature experimentatorem."

[11] *Ibid.*, fol. 1v, "Nam sapiens diiudicando laudem et vituperium imponit secundum quod res veritati fuerit experientie exhibita."

[12] See fols. 5v-6r, the passage beginning, "Domine mi doctor egregie laicis ut laico clericis ut clerico opportet intentiones reserare. Accidit quod regi excellentissimo Francie illustrissimisque principibus domino duci burgundie ac domino duci bithurie ob amoris causam aliquod munus medicinale . . .;" also fols. 9r-v, 12r-13r.

of an elixir or philosophers' stone, but had brought him scandal and vituperation instead of thanks because it was found to be other than he had intended and "was reputed something sinister." Possibly he was suspected of having tried to poison the king and dukes.[13] He protests that his medicine, which his messengers had tested on their own bodies, was meant only to reform sick bodies and expel poison and should not have been put to the proof of fire. He is anxious that Bernard should sound out the princes as to their attitude towards himself and defend his medicine if necessary. He explains that it was made of gold, and that as blood is essential in living bodies, so quicksilver was necessary in this medicine, but he adds that its effect is different than that of the crude variety. If mercury was really and not merely hypothetically present in his medicine it may well have damaged Thomas's reputation, but would be about the sort of blunder that one might expect from his erratic genius.

While there appears to have been this practical reason and personal predicament for the composition of Thomas of Bologna's letter to Bernard, he also makes it the vehicle for a considerable amount of alchemical theorizing. The fifth essence, that special, marvelous, and occult gift from God, claims the attention of Thomas as it had that of Rupescissa. He would seek it not from the potency of combustibles but from the force of things indissolubly joined.[14] The first imposition of nature is in minerals where the elements first join and assume form. The second

[13] The chronicle of S. Denis for the reign of Charles VI records under the year 1385 an attempt to poison the dukes of Burgundy and Berry by an Englishman named John Delstein, which remotely suggests the name of the English alchemist, John Dastin. Under torture he confessed that had they tasted his poison, they would have had burning sensations both internally and externally, their hair would have fallen out, their skin would have torn off at the touch of the hand, and they would have died within three days. Such effects appear to have been commonly ascribed to poisons, for five years later—as we note in another chapter—the persons suspected of poisoning springs and wells are made to confess that they had used a powder compounded of the nails and flesh of corpses from the gibbet with blood of toads and other impure animals, which had the effect of making men languish for a year, gradually lose their hair, and have their skin detach itself from the flesh at the slightest touch. *Chronique du religieux de Saint-Denys*, Paris, 1839, I, 354-356, 682-684.

[14] BN 11201, fol. 2v.

imposition is seen in herbs, plants, and trees. These are subject to combustion and dissipation. The third, fourth, and fifth impositions of nature are quadrupeds and reptiles, birds, and man. The resolution or corruption of mineral matter nourishes herbs and trees, which in turn serve as food for sensitive animals.[15] Minerals do not grow and decrease as vegetables do, but remain the same in quantity although varying in quality. "Vegetable life is nothing else than the action of proportional elements."[16]

Whereas Thomas asserts that false alchemists are justly prohibited by law because of their fallacious experiments,[17] he speaks in exaggerated terms of praise of his own alchemical medicine in which solar sperm is as it were a masculine agent in its feminine sperm which is quicksilver.[18] His medicine is most efficacious and noble above other medicines of the world. It is the miraculous gift of Christ and the virgin. It is made of the substance of gold by a process philosophical though occult, in order to conceal it from evil men and prevent the unworthy from penetrating to this special gift of God. Again in closing the letter Thomas adjured Bernard to keep "this process secret." In such passages we see some stock traits of alchemical treatises: the religious tone, the veil of secrecy or enigmatic utterance, the belief in the sovereign medical value of gold, the notion that all natural generation requires masculine and feminine, father and mother, and that chemical action is analogous to sexual intercourse.

With regard to the color of metals and, more generally, the

[15] BN 11201, fols. 2v-3v.

[16] BN 11201, fol. 5v, "Cum vita vegetabilis non sit aliud quam actio proportionalium elementorum." See also fol. 11r-v, "Cum vita vegetabilis non aliud sit quam elementorum coactio postulans cuilibet elemento pro substare sibi ad agendum et patiendum nutrimentum."

[17] BN 11201, fols. 10v-11r, "Et hii alchemiste dicuntur ab alchimo rege qui per minora mineralia invenit metalla accidentaliter et false colorari nescius quod fixus color nativitatis eris ex digestione habet evenire quare tales iure scripto merite prohibentur quia experimento fallaces."

[18] BN 11201, fol. 7r, "Est igitur huiusmodi medicine initium ut corpus naturaliter fixum et coagulatum quod enim corpus solum anagiticam tenet proportionem et efficiatur sperma solare tamquam quoddam agens masculinum in spermate suo feminino quod est argentum vivum."

relation of colors to the elements Thomas appears to diverge more boldly from the beaten trail. He affirms that the color of gold is nothing else than gold and that gold is nothing but its color—a stony element mixed homogeneously in diaphanous translucence. Moreover, the red of gold is only yellow intensified: pure yellow is nothing but whiteness washed off: and white is merely black purified. "And these colors are in the elements and are elements."[19] But then Thomas proceeds to say that innumerable erratic colors arise from their mixture, "for sometimes water covers earth and hides it and makes what is essentially black appear white." And so fools are fooled and impostor alchemists falsify substances and deceive the senses.

In closing Thomas urged Bernard to be bold to write to him "as your constant and faithful friend," if any doubtful point occurred in his letter. Indeed, he further suggested that the matters discussed in it might furnish the basis for many other interchanges of view.[20] So far as we know, their correspondence did not go to this length, but there is extant a reply by Bernard which is fuller and more elaborate than the letter of Thomas. To it we next turn our attention.

Thomas of Bologna's exhortation to Bernard of Treves not to be afraid to raise questions concerning anything which the latter did not understand in his letter proved quite unnecessary and superfluous. For Bernard, although opening his reply politely enough and, in closing, asking Thomas to take what he had written in good part, did not hesitate to express his disagreement with almost everything in the other's letter. Moreover, if Thomas had seemed a trifle patronising in begging Bernard in his reply not to hesitate to raise any difficulties that occurred

[19] BN 11201, fol. 10r, "Et auri color non est nisi aurum et aurum non est nisi eius color eo quod color auri non est aliud quam lapidea elementa omogenee commixta diafane translucentia. . . . Et rubedo solis non est aliud nisi intensa citrinitas et citrinitas munda non est aliud nisi abluta albedo et albedo non est aliud quam mundificata nigredo. . . . Et isti colores insunt elementis et sunt elementa."

[20] BN 11201, fol. 13r-v, "Si quid sermonis istius vobis dubium fuerit audacter michi rescribatis tamquam amico vestro constanti et fideli"; ". . . super hiis essent infinite collationes que inter me et vos (eos in the MS) si cupitis possent in futurum evenire."

to him, the tone of the adept of Treves in his response is still more superior. He writes like a past master reproving and instructing a neophyte from the great stores of his experience and knowledge. And while Bernard refers to the letter from Thomas as "copious," his own in reply is more than twice as long and at times becomes tiresomely repetitious.

Little appears to be known with certainty of the life of Bernard of Treves. Not only has he been called Trevisan or of Trevisa; he has also been misplaced in time in the fifteenth instead of the later fourteenth century. Thus Chevalier affirms that he was born at Padua in 1406 and died in 1490, that he was count of the march of Treviso and an alchemist.[21] We hope in the ensuing account to throw a little more light upon his life by a consideration of some of his writings. That he was contemporary with Thomas of Bologna locates him definitely in the second half of the fourteenth century. Some, however, have interpreted this contemporaneity in a different way, assuming that Bernard was of the fifteenth century and that therefore Thomas must be too. Hence Orlandi in his *Notices of Bolognese Writers*[22] made Thomas of Bologna the physician of Charles VIII instead of Charles V of France.[23] As a result of this Thomas becomes two persons in Chevalier.[24] In an English manuscript of about 1579, what is really a translation of *De chimico miraculo,* another treatise ascribed to Bernard, is incorrectly represented as dedicated by "Lord Bernard, Earle of the marsches of Treviers in Germanye," to "the noble doctor, Thomas of Bononye, governour of France, and philosopher most learned, the 12 of Maij 1453."[25] Bernard Trevisan has even

[21] U. Chevalier, *Répertoire des sources historiques du moyen âge, Bio-bibliographie,* I (1905), col. 565.

[22] Orlandi, *Notizie degli scrittori bolognese* (1714), p. 251.

[23] Mazzuchelli, *Scrittori d'Italia,* 1762, II, iii, 1479, noted that the Thomas of Bologna "che ha scritta una Lettera copiosissima a Bernardo Conte di Treveri" on the philosophers' stone was not the same as the Thomas of Bologna to whom Filelfo wrote two letters about 1440 or the Servite who lived in 1346; but did not settle the problem of his correct date, still representing him as physician to Charles VIII.

[24] *Bio-bibliographie,* II (1907), 4498, 4513.

[25] BL Ashmole 1487, II, fols. 182-196. The incipit, "To the ende that all true searchers of this noble science and arte may be withdrawn from comon errours . . .," shows that the work is a

been placed in the sixteenth century by Antonio Maria Iosa who, in cataloguing a work on the philosophers' stone ascribed to him in a manuscript of the seventeenth century,[26] further states that, after teaching logic at Salerno, Bernard was recalled to Padua where he held several professorial chairs.[27]

The following works—and doubtless others—have been printed as by Bernard. In 1564 his reply to Thomas was published with the work of Morienus but without Thomas's letter.[28] In 1583 at Basel was printed *De chymico miraculo* as a work of Bernard,[29] although as we shall see it purports to have been written after the middle of the fifteenth century. Meanwhile in 1567 had appeared what was represented as a Latin translation of a work by Bernard from the French,[30] and a few years later in the same city of Strasburg a work in German was printed under his name.[31] *A Treatise of the Philosophers' Stone* by

translation of *De chimico miraculo*. Perhaps this is also the case with a MS which I have not seen: Cassel Landesbibliothek Chem. Quarto 47, "The Booke of the Dr. Allemonte Lord Barnard Earl of Trevisane of the Philosopher's stone."

[26] Padua, Antoniana XXIII, 609, 17th century, 24 carte, De lapide philosophorum, opening, "Prisca philosophorum dogmata de metallorum transmutatione. . . ."

[27] P. M. Antonio Maria Iosa, *I codici manoscritti della biblioteca Antoniana di Padova*, Padua, 1886, p. 227.

[28] *Responsio ad Thomam de Bononia*, Paris, 1564 in 4to. This edition will henceforth be cited as "Ed. of 1564." Other editions and translations followed.

[29] Bernard le Trevisan, *De chymico miraculo*, Basel, 1583, 198 pp. The title in the text, however, is, "De secretissimo philosophorum opere chimico per naturam et artem elaborando." The text opens: "Quo veros inquisitores huius artis a communibus erroribus retraham in veram semitam. . . ." Bernard in this work is called "Comitis Marchiae Trevisanae." This work will henceforth be cited as "Ed. of 1583." It was reprinted at Basel, 1600, and by Zetzner, I (1613), 748-776, and by Manget, 1702, II, 388-399. A MS of the work which I have not seen is Cassel Landesbibl. Chemica Quarto 37. It purports to present different versions of the work by various translators: "Collatio plusquam aurea quae commentarii loco esse poterit quae inter se conferuntur diversa exempla a diversis translatoribus aedita generosissimi comitis Bernhardi Trevisani de miraculo chemico sine lapide philosophorum." As noted above, there is an English translation in BL Ashmole 1487, II, fols. 182-196.

Ruska, *Tabula Smaragdina*, 1926, p. 203 *et seq.*, using the Latin text in Manget, II, 388-399, discusses the account of the *Emerald Tablet* in its first chapter. Bernard's reply to Thomas follows in Manget, II, 399-408.

[30] *De chemia opus historicum et dogmaticum ex Gallico in Latinum*, Strasburg, 1567. Ruska, *op. cit.*, p. 203, mentions a French edition at Antwerp, 1567. This was reprinted at Lyons in 1574 and 1612.

[31] *Von der hermetischen Philosophia*, Strasburg, 1574, and later.

Bernard, earl of Trevisan, was printed at London in 1683.[32] Another title appeared in French in the seventeenth century[33] and in German in the eighteenth.[34] In a rather late manuscript collection of over thirty volumes is a brief tractate on the transmutation of metals which Bernard, count of Treves, is represented as addressing to the archbishop of that city.[35]

Bernard states that he received Thomas's letter through their common friend, Alderico Interminelli of Lucca.[36] In closing he describes Thomas of Bologna as "the most learned physician of the king of France and count Palatine," refers to himself as "for the nonce a citizen of Treves," and seems to give the date of completing his reply as St. Denis's day, 1385.[37] If these figures are correctly given in the manuscript,[38] Thomas would have sent his "medicine" to Charles VI and have written to Bernard shortly after receiving the royal grant of May 23, 1384. Following Bernard's reply to Thomas in the same manuscript is another work by Bernard, a *Summa,* "collected from the books of the philosophers and their sayings concerning the secret part of philosophy," which is said to have been completed on December 1, 1366. Bernard is, however, referred to as "the venerable philosopher" and is said to be called *Maior* by contrast, since he is small of stature.[39] In the reply to Thomas,

[32] It was reprinted in *Collectanea chymica,* London, 1684, pp. 83-94: incipit, "Considering the long desires and hopes of the students in the chymick art, I will in the present treatise briefly and openly declare this art. . . ."

[33] *Traicté de la nature de l'oeuf des philosophes,* Paris, 1659.

[34] *Abhandlungen von der Natur des Eyes,* Hildesheim, 1780.

[35] BU 270 (457), 15th-16th century, XXVI, 4: "Pateat universis . . . / . . . sine fractione."

[36] The incipit of Bernard's reply to Thomas is: "Obsequiis mihi possibilibus premissis, egregie doctor et domine honorande, noveritis me per nobilem Aldericum de Interminellis de Luca utriusque amicum predilectum recepisse copiosam litteram vestram. . . ." For it, as for Thomas's letter, I have chiefly used BN 11201. For MSS in British libraries see DWS No. 317.

[37] BN 11201, fol. 43r: "Explicit tractatus responsorius missus egregio doctori et domino magistro Thome de Bononia regis Francorum doctissimo phisico atque comiti palatino per me Bernardum pro nunc civem Treverensem Anno domini 1385 finitus in die Sancti Dyonisii."

[38] Pinet, *op. cit.,* p. 21, misquotes Molinier as accepting 1385 as the date of Bernard's *Traité responsif.*

[39] BN 11201, fol. 44r: "Incipit somma colecta ex libris philosophorum et dictis eorum super parte philosophie secreta per venerabilem philosophum Bernardum Petri (?) Treverensem maiorem per antifrasim dictum quia

Bernard cites previous writings of his own, a *Philosophia*[40] and "my other book sent to you."[41] Thus it seems clear that the letter to Thomas is not his earliest alchemical work.

Bernard of Treves indeed attained a ripe old age, if we accept as genuine the *De chimico miraculo*. It contains what purports to be an autobiography recounting his long and romantic quest after the philosophers' stone. According to this screed he first spent four years and eight hundred crowns in testing out a book by Rasis, and then over two thousand crowns on books of Geber, being led into this by numerous impostors. Three years more and three hundred more crowns were wasted in following the writings of Archelaus, Rupescissa, and John of Sacrobosco. After twelve or fifteen years of this sort of thing, during which he tried out a long list of substances and processes, at the age of thirty-eight he was merely some six thousand crowns poorer. But he kept praying to God for success. He then fell in with a certain prefect of his native land or city who was intent on the same investigation and who was endeavoring to construct the philosophers' stone from common salt which he dissolved in the air and congealed in the sunlight. He also had many other elaborate schemes. Bernard lost a year and a half collaborating with him, "because we did not work with the right material." They observed other alchemists dissolving fine silver, copper, quicksilver, and other metals in a very strong "water" or acid. After each had stood for twelve months, all were combined in one vase, a third of the water was allowed to evaporate over hot ashes, and the remainder exposed to the sun's rays to crystallize. Of twenty-two phials half-filled with liquor of this sort they gave three to Bernard and his associate, but they waited in vain for five years without seeing crystals form in the bottom of the vases. Finally, at the age of forty-six, Bernard

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stature minoris est, completa anno 1366 prima decembris." The ensuing French text opens: "Souverain est celluy qui est createur de tout le monde. . . ." It seems probable that this is the work of which the Latin translation was printed in 1567.

[40] Ed. of 1564, fol. 45r-v, "ut fusius declaravi in philosophia mea."

[41] *Idem.*, "ut in altero meo libro ad te misso diffusius disserui."

formed another partnership with a monk and doctor named Godfrey Leporis, "for we knew that any other work than the philosophers' stone was idle." They spent a year and a half on an unsuccessful experiment with the shells, yolks, and whites of two thousand hen's eggs, and eight years in all in other equally unsuccessful efforts. Then came a theologian and learned protonotary who suggested that they use vitriol, the fumes of which laid Bernard up for fourteen months with quartan fever. The next step of these three associates was an expenditure of two hundred crowns in order to make the acquaintance of a master Henry, confessor of the emperor, who was reputed to know the secret of the stone. But his process, too, was a failure. Of ten silver marks contributed by Bernard and thirty-two put in by his two associates, they recovered only four and twelve respectively instead of making one hundred and thirty marks as they had expected.

Bernard's family beseeched him to abandon alchemy, and for a short time he did so, but its lure soon proved too strong for him to resist. He was now fifty-eight years of age. He wandered far and wide in search of sound processes but without success. He heard of a few persons who knew the secret but was unable to make their acquaintance. Ten thousand, three hundred crowns had now vanished; Bernard had been forced to sell an estate worth eight thousand florins in German money and was reduced to poverty. At the age of sixty-two, broken in health, he went to Rhodes where he met a man of religion and borrowed eight thousand florins. All this was of no avail, but the man of religion had an excellent alchemical library. Bernard spent eight years in reading, study, and pondering, abstaining from experiments during that time, and finally saw that all his previous efforts had been misdirected. Ultimately, we are given to understand, he became an adept and in the latter part of the work is supposed to give the reader the benefit of his insight, veiled largely, however, under the form of an allegory. The reader will probably have observed already that the sums of the periods of years spent on this and that process which Bernard records do not quite agree with his occasional state-

ment of his entire age. Thus if he went to Rhodes at sixty-two and spent eight years in study, he would appear to have been at least seventy before he became an adept. But later in the same work he says that his labors, expenses, and errors lasted from his eighteenth to sixty-fourth year, "before I became an adept in the art."[42]

Bernard's narrative, which at times reads more like a satire upon alchemy than a section of an alchemical treatise, probably, like Chaucer's *Canon's Yeoman's Tale,* is true to life in a general way in its depiction of the varied efforts, failures, and persistence of the alchemists. Whether it can be applied to Bernard in particular is much more dubious, although it has a naïveté and verisimilitude about it which tend to disarm criticism. "First," says the author, "I will recount my mistakes."[43] The circumstance that the work itself is in the form of a dialogue before the church of St. Peter, while awaiting the election of a new pope to succeed Pius II of Vienna and Cracow makes us suspicious, since Bernard could not possibly have lived that far into the fifteenth century. The fact that he is represented as reading Rupescissa, an author of the middle of the fourteenth century, when still a young man, and that he cites Raymundus, whereas it is doubtful if the Lullian alchemical collection was yet in circulation during the life of the genuine Bernard of Treves, suggests a later date. There also are other alchemical authorities and titles listed which sound like fabrications. This printed text thus seems at least to have suffered later interpolation, and, while it may contain a kernel of truth concerning Bernard's life and may somewhat resemble his doctrine, is very possibly a later forgery. It is probably this work which is responsible for the notion that there was a fifteenth century alchemist named Bernard Trevisan.

At any rate we do not get the impression either from the letter of Thomas to Bernard or the latter's reply that the alchemist of Treves is far advanced in years or has undergone repeated failure and loss at his art. He seems rather to be an

[42] Edition of 1583, p. 39.

[43] *Ibid.,* p. 1.

alchemist of standing who already has written other treatises, who is almost cock-sure of his principles and generalizations, and who does not hesitate to criticize sharply such past authorities on alchemy as the Arab, Geber,[44] and more recent Latin, Arnald of Villanova.[45]

The leading idea in Bernard's reply he owed, however, to Arnald's *Rosarius*. It is that gold is not to be made by use of animal or vegetable or other extraneous matter or by waters and inferior minerals or by astrological influence or even by a mixture or interaction of sulphur and quicksilver, but solely from quicksilver itself, except that the process may be hastened by mixing a little gold with the quicksilver.[46] The explanation is that quicksilver itself contains all the four elements,[47] and that the supposed action of sulphur as the male or agent on the quicksilver should be interpreted as the action of the fire and air latent in the quicksilver upon its watery and earthy parts.[48] Bernard therefore criticizes Thomas of Bologna for having affirmed that gold is nothing but quicksilver congealed naturally by the force of sulphur, yet so that no sulphur remains in the substance of the gold just as no sperm of the male remains in the foetus. Bernard holds that "sulphur and quicksilver" are merely the four elements disposed in such and such proportions in the mercury itself,[49] air and fire representing sulphur, earth

[44] BN 11201, fol. 39v; ed. of 1564, fol. 63v. Bernard asserts that Geber hid truth under falsehood, "quia innumerabiles trufas ponit et falsitates."

[45] BN 11201, fol. 40r, "Is enim Arnoldus (in the *Rosarius*) licet in aliis fuerit reverendus doctor, hic tamen forte experimenta sine causis habuit"; fol. 42v, "Hoc autem non in scandalum Arnoldi prefati pronuntio sed in nature veritatem et in experimenti ostensionem." In the ed. of 1564, fols. 64r and 66r-v, the same thought is expressed but in different words. See also BN 7149, fol. 31r-v.

[46] Ed. of 1564, fol. 44r, ". . . admiscendo mercurio aurum maturum." See also fols. 46v-47r.

[47] This thought is repeated in the ed. of 1583, p. 18, "sed iste sunt materia prima primae materiae id est ex elementis quatuor constant argentum vivum et sulphur quae tandem sunt prima materia metallorum."

[48] Ed. of 1564, fol. 43v, "Sed, ut notum est, quando illa, aër et ignis, in mercurio mundo deducuntur de potentia ad actum, scilicet ad debitam digestionem et proportionalem decoctionem, tunc fit aurum." So in the ed. of 1583, pp. 31-32, it is asserted that no vulgar sulphur is involved in transmutation but only the action of hot and dry in the Mercury itself over cold and wet, "Gebro sic attestante. In profundo (inquit) naturae mercurii est sulphur."

[49] Ed. of 1564, fol. 50v, "Quoniam sulphur et argentum vivum tantum modo

and water, Mercury. The air and fire do not recede as the mercury turns into gold, but all four elements remain in the gold also.

Those persons are mistaken who think that the philosophers' stone is composed of various things or of all things.[50] When the philosophers say that the stone is made from everything, they really mean that it is composed of the four elements in due proportion.[51] It cannot absorb anything extraneous because it does not vegetate and take alien nourishment, but is of Thomas's first imposition.[52] Fools make corrosive waters from the lesser minerals and put metals therein and corrode them.[53] But the more they are corroded, the more they depart from the species of metals.[54] Fire merely liquefies the metals and does not transmute them.[55] Medicines like that of Thomas are all very well in their way but are irrelevant and useless in the work of transmutation.[56] Bernard classes the medicine which Thomas had sent to the king of France as a tincture, "and not a medicine of metals." As soon as mercury is turned into a powder of any sort except that of its own body being dissolved, it becomes useless for the work of transmutation.[57]

Thomas of Bologna is also criticized by Bernard for stating that the form of gold is impressed by the virtue of the celestial bodies and especially of the sun.[58] The sun's rays reach only the earth's surface and cannot account for the generation of metals within its bowels.[59] Nor is it correct, in Bernard's opinion, to hold that each metal is generated by the planet with which

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sunt quatuor elementa in ipso mercurio sic aut sic proportionabiliter disposita."

[50] Ed. of 1564, fol. 53r.

[51] *Ibid.*, fol. 54v.

[52] *Ibid.*, fol. 53r-v, see also fol. 58v; BN 11201, fols. 35v-36r, "Lapis enim noster non habet formam formabilem ut vegetativam vel sensitivam sed solum habet formam formatam."

[53] Ed. of 1564, fol. 38r.

[54] *Ibid.*, fol. 39r.

[55] *Ibid.*, fol. 40r.

[56] *Ibid.*, fol. 59r; BN 11201, fol. 36v; "Illud tamen oleum sensitivis ad medicinam prodesse potest quia auri species in eo soluta est, impertinenter tamen et inutiliter ad opus nostrum philosophicum." Ed. of 1564, fol. 62r; BN 11201, fol. 38v, "Errant quoque illi qui sic putant aquam limpidam transparentem ex mercurio extrahere et ex illo multa mira operari." See also ed. of 1564, fol. 61r; BN 11201, fol. 37v.

[57] BN 11201, fol. 41v.

[58] Ed. of 1564, fol. 42r; BN 11201, fol. 21r.

[59] Ed. of 1564, fol. 47v; BN 11201, fol. 26r.

it is associated by name and perhaps agrees in some property or in its nature.[60] He admits that the subterranean movements of the elements come in the first instance from the motion of the sky but not from its rays of light or its heat. Indeed, he holds that the celestial rays, which are hot in themselves, produce no heat until reflected and refracted in the inferior spheres of fire, air, and water.[61] Like Thomas, Bernard refers a good deal to false alchemists, sophistical alchemists, and triflers in alchemy.[62] But this was a stock feature in most alchemical writings of that time.

Whether an alchemical treatise "of the most excellent philosopher, brother Bernard," is meant to be attributed to our Bernard of Treves is difficult to say. It is found in a manuscript of 1472 A.D.[63] Such matters are discussed in it as the preparation of bodies and spirits before their conjunction, the order of preparations by which the bodies are reduced to first matter, the three kinds of things which concur in generation of the philosophers' stone and the three kinds of virtue which reside in it, the operations of sublimation, reiteration, ablution, and the relations between active and passive qualities. Among the authorities cited are Geber, Avicenna, Aristotle to Alexander, Alexander Grecus, Morigenes to king Calid, Hermes, Plato, Rosarius, and various names which seem drawn from the *Turba*, Arnald of Villanova's medical *Speculum* for the milk and sperm passage, and Albertus, *De regimine perfectionis*. In other manuscripts the same work seems to be regarded as the *De intentione alchimistarum* of Raymond Lull.

[60] Ed. of 1564, fol. 48r; BN 11201, fol. 26v.

[61] Ed. of 1564, fols. 48r-49r; BN 11201, fol. 27r-v. Similarly in the ed. of 1583, pp. 29-30, it is argued that heat is not from the sun but produced by reflection in the lower spheres. "The sun is not hot but its motion is naturally hot."

[62] See BN 11201, fol. 41v, "alchimiste trufatores"; Ed. of 1564, fol. 39r, "imposturae alchimistarum sophisticorum."

[63] S. Marco VI, 214, fols. 102r-137r: "Incipit liber excellentissimi philosophi fratris Bernardi. Non obstante quod hec ars sit philosophie naturalis est tamen speciale donum dei . . . / . . . revelavit et panem celestem ad manducandum suis solis fidelibus postulavit." In the bibliography of Vatic. Barb. 273, fol. 258r, this incipit is assigned to "Bernardus Magnus de Avernia civis Treverensis."

That the *Correctorium fatuorum* was sometimes attributed to a master Bernard we have already seen in our chapter on Perscrutator. Bearing some relation, perhaps, to the correspondence of Thomas of Bologna and Bernard of Treves is an exchange of letters upon alchemy between a brother Nicholas and a brother Bernard of Verdun, said to have been translated from Latin into French in May, 1410.[64]

Christine de Pisan, who states that all went happily with her family until the death of Charles V, informs us that soon thereafter her father, Thomas of Bologna, who was growing old, fell into a long impotence and malady, and they were in financial straits. When, however, he at last died at the hour which he had predicted, he was in full possession of his faculties, and was esteemed among clerks as of superior understanding to anyone of his time or more than a century before.[65] Christine also remembered the relations of her father with Bernard of Treves, but the impression left upon her thereby was that all alchemists were deceived or deceivers. Such was one from Germany named Bernard who kept great state and gained great renown and sent letters to her father and found many followers. "But in the end it was found that all was emptiness and deception."[66] It is noteworthy that Christine should find indications of her father's astrological skill even in his death, but should make no claims of success or merit for him as an alchemist.

[64] DWS Nos. 219-220: BL Digby 164, 15th century, fols. 119-122v-134.

[65] See the quotations from Christine's works in Pinet (1927), p. 21.

[66] The passage is quoted from her *Vision* by Pinet (1927), p. 9, note 3: "Ce que l'Ombre disoit des arquemistes. . . . Les uns sont trompés, les autres trompeurs . . . arquemistes qui la science cuident trouver par les termes entendre de aucuns livres obscurs de faire l'or. . . . Si comme d'un en Alemaigne, que on nommoit maistre Bernard, qui tant se faisoit renommer par l'estat qu'il tenoit et meisme a ton père envoya il lettres et tant fist que trop de gens foy y adjoustoient et aloient de toutes parts clers devers lui et toutevoie, au derrain, fu trouvé que tout estoit neant et tromperie."

CHAPTER XXXVII

OTHER ALCHEMY OF THE LATER FOURTEENTH CENTURY

Somewhat resembling John of Rupescissa in his attachment to alchemy and in certain other respects was another friar of the fourteenth century named William Sedacerius[1] or Sedacianus[2] or Sedacensis. Or rather, in the last case, it is his work on alchemy which is called *Sedacina*.[3] He seems to have flourished a little later than Rupescissa. Chevalier gives his date as 1370; Antonio as 1378.[4] He belonged to the Carmelite order. As John of Rupescissa wrote from prison, so William from exile. He speaks feelingly of "the lions, serpents, and dragons" of his order who made things so difficult for him that he "gave place to the devils, snakes, and dragons," abandoned his living, and withdrew from association with them. Indeed, the similarity of this situation to that of Rupescissa and even Roger Bacon raises a doubt in one's mind whether Sedacerius is a genuine person. If not, the resort to such a device suggests that such alchemical works as those of Rupescissa and Bacon had attained a sufficient popularity to evoke imitators. For purposes of convenient presentation we may take Sedacerius at his face value. Zuretti noted the close resem-

[1] FL Gaddi reliq. 181, 15th century, 70 fols., Frater Guillelmus Sedacerius de alchimia, in two books. Rubric, "Incipit Sedacina totius artis alkimie edita a fratre Gillielmo Sedacerii ordinis fratrum beate Marie de Monte Carmelii existente in exilio sui ordinis electa de medullis veracissimis approbatorum philosophorum alkimiae." Incipit, "Omne datum optimum et omne donum perfectum desuper est descendens a patre luminum. . . ." See also Escorial g. II. 5, 16th century, fols. 274-410.

[2] Florence, Riccard. 2187, 17th century, paper, Guglielmo Sedaciano, Trattato d'Alchimia.

[3] Thus while his name is given as Guilelmus Sedacerius in Escorial g. II. 5, the title of the work appears as "Sedacina totius artis alchimiae." In Gaddi reliq. 181, fol. 54r, we read, "Incipit secundus liber Sadacine (*sic*) totius artis alkimie editus a fratre Guillielmo Sedacerii ordinis fratrum beate marie de monte carmelli electus de medullis veracissimis approbatorum philosophorum et alkimistarum existente in exilio sui ordinis sacri prolongius."

[4] *Répertoire bio-bibliographique*, Article, "Sedacer" (Guillaume): *Bibl. Hisp. Vet.* (1788), II, 162.

blance between his work and a late anonymous alchemy in Greek.[5]

The prologue to the work of Sedacerius opens with the verse from the *First Epistle of James* that "Every good and perfect gift is from above, descending from the father of lights." Works of alchemy with this incipit also both appear anonymously[6] and under the names of other authors, like John Dastin,[7] James of Siena the German,[8] and Merlin.[9] The tracts thus ascribed to James of Siena and Merlin and one of the anonymous tracts are, however, all much shorter than the treatise attributed to William Sedacerius. Since they furthermore all end with the same words, they appear to be one and the same work, only a few pages in length and different from our treatise of two or more books.

Sedacerius soon observes that many persons have wasted and misspent their youth over alchemy, and that he himself for a time despaired of it. He has read repeatedly such authors and works as Hermes, Aristotle, Avicenna, Abohali, *Turba philosophorum,* Rosarius, Rudianus, Richard—presumably of England and author of the *Correctorium alchimae,* Albertus, Damascenus, Ortulanus, Archelaus, Mary sister of Moses, Gilbert the cardinal, Vincent, Thomas Aquinas, Jacobus de Sancto Saturnino, Roger Bacon, and Raymond Lull, and believes that by the grace of the

[5] C. O. Zuretti, *Cat. des mss alchimiques grecs,* VII (1930), Anonymi de arte metallica.

[6] BL Ashmole 759, late 15th century, fols. 1-33v, "Omne datum optimum et omne donum perfectum . . ."; BU 1062 (2082), membrane, 14th century, fols. 7-10, "Omne donum optimum . . . / . . . ad deum te commendo, Amen"; Oxford, Corpus Christi 175, 16th century, fols. 9-17, "Omne donum perfectum," etc. "Igitur suppliciter invoco et exoro. . . ." Deficit in parte secunda a verbis, "omnes calces corporum et spirituum."

[7] BU 270 (457) XXVII, 3, 15th-16th century, "Omne datum . . . / . . . mundanorum victoriam."

[8] Naples XV.F.54, 1462 A.D., fols. 89r-92v: "Incipit liber magistri Iacobi de Senis Alamanni qui loquitur de pretioso lapide philosophorum. Omne datum optimum et omne donum perfectum desursum est descendens a patre luminum . . . / . . . seu mercurio. Intellige igitur quid dico quare ad deum te commendo."

[9] DWS No. 373, citing BM Sloane 2327, 15th century, fols. 11v-12v, and BL E Musaeo 63, 15th century, fols. 88-90: "In quodam tractatu qui incipit: omne donum optimum sic querit. Dic mihi an sit propinquior lapidi res fortis non fugiens aut horum oppositum . . . / . . . quoniam omnia metalla generantur in terra ex sulphure et mercurio. Intellige que dico quia ad deum te commendo. Explicit liber Merlini."

Holy Spirit he has at last solved the knots of the philosophers' enigmatic language. If we can accept Sedacerius' date of writing as 1378, his citation of Raymond Lull would show that the ascription of alchemical compositions to him had already begun then. Some of the authors in the above list Sedacerius later cites repeatedly, notably Saint Thomas in his *Floridium*—a title which I do not remember to have seen ascribed to him elsewhere, and Gilbert the cardinal. But he does not seem to cite any particular work of the Lullian alchemical collection. Authors not included in the foregoing list are also cited later, such as Geber and Arnald of Villanova. Attributing to the latter an operation with tin, Sedacerius quotes him as saying in his *Summa* of alchemy, "What we have done we bear witness to and we know that our testimony is true." But a *Summa* is not among the alchemical titles usually ascribed to Arnald, although one is attributed to Geber.

Sedacerius a number of times refers ahead to matters of which he will treat in his third and fourth books, but only his first two books are found in the manuscripts, although an alchemical bibliography in a manuscript of the later sixteenth or seventeenth century lists his work as having four books.[10] His first book comprises thirty-six chapters; the second nineteen. After setting forth "the intention and composition of this book," the foundation and the general precepts of this art, "the general methods required in the practice of this science," and the nature, generation, properties, and condition of all metals in general, he comes in the sixth chapter to the definition of alchemy. It is an art bringing the essence of all metals to perfection artificially. It is a secret method. It heals the sick, cures paralytics, purifies lepers, restores youth, and shows to skilled practitioners the way to the first cause. Of all pursuits none is nobler, more useful, more secure.[11] Nine precepts laid down for its practitioners which we

[10] Vatic. Barb. 273, fol. 282v, "Gulielmi Sedacine libri quatuor de lapide philosophico scilicet de theorica et practica." In BL Ashmole 759, late 15th century, fols. 1-33v, is an "Opus alchemicum in quatuor libros divisum," with our incipit, "Omne datum optimum et omne donum perfectum . . ." but from the small number of leaves it occupies it is doubtful if the text is any fuller than in the MSS I have examined.

[11] FL Gaddi reliq. 181, cap. 6, fol. 9r-v, ". . . et ideo est perquirendum, est studendum, est pertractandum, est operan-

may note are fear of God, knowledge of the natures of things and of modes of operating, perseverance, the superiority of experience to meditation, the proper proportioning of ingredients by measure and weight, continued study and incessant reading, knowing the right time to operate, which is from March to September, having a suitable and secret laboratory with associates and assistants who can be trusted, and not revealing the secret to the uninitiated.[12]

After devoting a chapter each to lead, antimony, tin, iron, gold, copper, sandarac, and silver, Sedacerius treats of alloys and such processes as calcination. Successive chapters then deal with talc, gypsum, coral, crystal, glass, *ematites,* the magnet, the bloodstone, *bolum Armenicum,* ochre, vitriols, the nature and properties of spirits, mercury, sal ammoniac, sulphur, arsenic, marcasite and magnesia, *albecon,* tutia, and the clays required for crucibles and vessels in alchemical processes. In fact, all these chapters are largely composed of recipes looking towards transmutation. The substances just listed are classified in the order in which they occur as metals, bodies having a metallic appearance like talc and gypsum, "earthy bodies which represent the species of sun and moon"—in which group belong those from coral to vitriols inclusive, and spirits.

The second book which is much shorter than the first opens with a chapter on alums and then treats of various salts such as common salt, rock salt, saltpeter, and their separation from minerals and so forth. Other chapters are concerned with borax and certain oils[13] and the work closes with three chapters on man, the tortoise, and the cock respectively. Man is looked upon as a microcosm (*minor mundus*) and recipient of celestial impressions. The tortoise is described as "an earthy and watery animal pertaining to this science (of alchemy) by reason of its temperate complexion." Human blood is valued as an alchemical ingredient. The astrological side of the work may be further il-

dum ut ab ipso, genere tamquam a generalissimo bibant et reficiantur qui huius archane scientie digni fuerint faciandi" (*sic*).

[12] *Ibid.*, cap. 3, fols. 3v-5r.

[13] While caps. 14 and 15 are "de pinguedine recta salis" and "de anticaribus."

lustrated by its characterization of alchemy as "inferior astronomy"[14] and by the statement that just as in superior astronomy Saturn is loftier and nearer the sphere of fixed stars, so in inferior astronomy lead is called loftier and nearer in tincture.[15] The chapter in the second book on *sal compos*[16] may be described as one of the few which are practically free from recipes for transmutation. This salt is also called *sal agritinum* or *agrum*. It is very strong and penetrating. It is long but small and minute. When dissolved in a dewy place it congeals into diaphanous crystals. Melted on the tongue it tastes like vinegar rather than salt. When heated it liquefies and moulds like wax. Great philosophers have much commended it. The Saracens bring it from Alexandria and call it Baurach and think it is alum. It also is found in Spain in a mountain in the region of Tarragona and near the sea. Finally comes the alchemical assertion that from it are made the best gold and perfect silver, if it is rightly prepared and worked.

Benvenuto of Imola, who died in 1391, in his commentary on the *Divine Comedy* accepts the doctrine that metals differ only in their accidental form and degree of perfection, and not in their substantial form, since they are all generated from quicksilver and sulphur. All metals except gold and silver are corrupt and imperfect. If the alchemist aims to correct this condition by reducing the metal to its constituent first parts of sulphur and quicksilver by calcination and distillation, he commits no sin. Certain waters or juices of herbs may assist in such reduction. But while the art may be true, it does not seem possible for moderns, who all make a failure of it and, whether they operate licitly or illicitly, incur the same penalty of vain labor and poverty.[17] Benvenuto further represents alchemists as the most chummy of artificers so that if there were only two in a country they would straightway find each other and enter into partnership.[18]

Because of the propinquity of the dates of the works as well

[14] Gaddi reliq. 181, fol. 1r.
[15] *Ibid.*, fol. 10r-v.
[16] *Ibid.*, II, 5, fol. 57r.
[17] Muratori, *Antiquitates Italiae*, Arezzo, 1774, III, cols. 472-473. Benevenuti de Rambaldis de Imola, *Comentum super Dantis Aldigherij comoediam*, nunc primum integre in lucem editum, Florence, 1887, II, 403.
[18] *Ibid.*, II, 401.

as the similarity in the names of the authors it would seem that the John Bombelen or Bumbeles—the former spelling has the sanction of older manuscripts—who addressed a *Stella alchimiae* in 1384 to some bishop and dear lord of his must be identical with the John Dombelay who wrote concerning the views of Ortulanus and the *Practica* of Paris of 1358 for the archbishop of Trier in 1386. The person at whose command the *Stella* was composed is not named in the Wolfenbüttel manuscript but he is called "my most gracious lord,"[19] and it is stated that it is to him alone that the author intends to reveal the secrets which past philosophers have hid.[20] In the final chapter he seems to be addressed as "reverend bishop."[21]

John Bombelen or Dombelay refers to the title of the *Star of Alchemy* both at the beginning and at the close of that treatise. Announcing that the work will be in twelve chapters, he adds that, because that number is complete and perfect in the arts of the astrologers, therefore he has called his book the star of the completion of the perfect mastery of the secret art of alchemy.[22] The allusion is presumably to the twelve signs of the zodiac and twelve astrological houses. In closing he expresses the hope that as the star of Bethlehem led the three Magi to the king of kings, so his book may lead toilers in alchemy to the king of metals.[23] The *Rosary* of Arnald of Villanova is cited in the *Stella* several times and, so far as I have checked up, accurately, whereas no alchemical work attributed to Raymond Lull seems to be mentioned. This fact suggests, though it is of course no sufficient proof, that the *Rosarius* was older and better known and more authentic than the works ascribed to Lull, and that in 1384 the Lullian collection was not yet generally known. Furthermore, if we are right in identifying John Bumbeles or Bombelen, the author of the *Star of Alchemy,* with John Dombelay, the compiler from works of Ortulanus, it would seem that

[19] Wolfenbüttel 3282 (cod. 23. 17 Aug. 4o), fol. 224v (old numbering 194v), "ex mandato gratiosissimi domini mei." For fuller description of this and other MSS of the work see Appendix 37.

[20] *Ibid.*, fol. 225r (old numbering 195r).

[21] *Ibid.*, fol. 243v (old numbering 213v), "O reverende episcopus" (but the last word is somewhat illegible).

[22] Wolfenbüttel 3282 (cod. 23. 17 Aug. 4o), fol. 224v (old foliation, 194v).

[23] *Ibid.*, fol. 244r (old foliation, 214r).

Arnald of Villanova may be accepted upon his testimony as author of the leading treatise then current under the title, *Rosarius,* to which his citations conform. And possibly we may infer further that Ortulanus was not the author even of a *Rosarius minor,* or our author who commented on another work by Ortulanus would have distinguished the *Rosary* of Arnald of Villanova from his.[24] Whether, however, we may infer that all the lesser Rosaries other than Arnald's were written later than the *Star of Alchemy,* i.e., 1384, because John Bumbeles does not allude to them, is more questionable.

Apart from its title there is little originality to the *Star of Alchemy,* which reiterates many platitudes that we have heard from other lips. In the first chapter the assertion that first matter is water is supported by the passage from *The Book of Genesis* on the spirit of God moving over the face of the waters at creation. Mercury is described as homogeneous in its nature so that it either remains fixed in the fire or turns entirely to a gaseous state, "since it is incombustible and aerial."[25] The gentle heat requisite in the process of transmutation is described as that which one could expose one's finger to. Bumbeles' remarks as to the vessels to be employed display more independence of attitude. Remarking that it seems impossible to accomplish the great work of transmutation without an abundance of vessels, he interprets freely the direction of the philosophers that the operation should be performed entirely in one vase, namely a *cucurbita* with an alembic. His opinion is that sometimes one ought to employ an alembic and sometimes lay it aside. Moreover, if one *cucurbita* should break, it would be necessary to substitute another. He therefore holds that the philosophers merely meant that all the vessels employed should be of the form of the *cucurbita.* He prefers to calcinate the fourth element earth in two *cucurbitae*

[24] Perhaps, however, the expression "Egregius doctor Arnaldus de nova villa in suo rosario" (see fols. 199v and 207v, opening words of caps. 3 and 9), may be taken as implying that there are other Rosaries than his (*suo*). For there does not seem to be much doubt that the *Rosarius* which opens, "Desiderabile desiderium . . ." is by John Dastin.

[25] *Ibid.,* fol. 105v, ". . . aut remanet totum in igne fixum aut totum ex eo evolat in fumum, cum sit incombustibile et aereum."

or even in an earthen *scutella* with three openings to permit the humidity to escape. He also thinks that if the calcination is attempted in a glass *cucurbita,* the glass will become fused by the heat with the earth and cause great annoyance and loss of labor. He further prefers calcination in a furnace of reverberation, which keeps all parts of the vessel at an even heat. He thus diverges sharply from the author of the *Desiderabile desiderium,* whom we have identified with John Dastin.

Morelli has surmised,[26] and Valentinelli repeated,[27] that the author of an alchemical treatise which opens, "Pateant universis philosophis . . ." and closes with expression of reverence to "my lord, the archbishop of Treves,"[28] is no other than our John Dombelay or Dumblerius Anglicus who wrote in 1386 for Cuno de Falkenstein. But the work is also attributed to Bernard of Treves.[29] Mrs. Waley Singer suggests that a fragment from the fourth book of Dommytton may be by our John Dombelay.[30]

Of Dombelay's work of 1386 we have already treated in so far as it illustrated the influence of Ortulanus or bore on the problem of a *Practica* at Paris in 1358. It also to some extent reflects Dombelay's own views.[31] For he does not always agree with the work which he is expounding, preferring ashes, for ex-

[26] In his catalogue of 1776 describing item ii in Nani 55, now S. Marco VI, 214, 1472 A.D., fols. 12-20.

[27] Valentinelli, V, 150 (MS XVI, 3).

[28] "Et hoc totum ob reverentiam domini mei archiepiscopi Trevirensis."

[29] See our chapter on his alchemical correspondence with Thomas of Bologna.

[30] DWS No. 171.

[31] Besides the printed text in Zetzner, *Theatrum chemicum,* 1659, IV, 912-934, opening, "Quatuor sunt species . . .", I have examined the following MS: CLM 25104, fols. 1r-10v (numbered independently), slovenly written in various inks with marginal headings and notes, "Summa compilationis Io. Dumbaley super textum alchimie practice." Near the bottom of fol. 10v is written the word, *Finis,* and the rest of the page is blank, but a text in the same hand continues on fols. 11r-12r. Fol. 12v is then blank, but at fols. 13r-14v is more text headed, "Distillatio vini secundum Io. Dumbaley F.Fr."

A MS which I have not seen is Cassel Landesbibliothek Chem. Quarto 10, (1), "Practica vera alchemica per magistrum Ortulanum Parisius probata et experta sub anno domini 1358."

The work is listed in the alchemical bibliography of Vatic. Barb. 273, fol. 210v, as: "Practica seu alchimia seu operatio lapidis mineralis benedicti tam in via particulari quam universali secundum magistrum Ortulanum excepta et compilata per dominum Ioannem Dumbaley de Anglia ex mandato illustrissimi principis et archiepiscopi sancte Treveriensis anno 1386. Quatuor sunt species. . . ." See further Appendix 13.

ample, to manure as a means of warming slowly.[32] He also notes that gold "is dissolved much more readily" by means of a little sal ammoniac, but that "the author of this book" absolutely forbids sal ammoniac to be applied in the process in question because he says that it kills and consumes all bodies, for it destroys and corrupts their basic humor.[33] Other authors than Ortulanus are cited, however, though some of these may come indirectly through Ortulanus: Hermes, Geber, Alphidius, the *Turba philosophorum,* and Arnald of Villanova.[34] Dombelay also alludes to other writing of his own, such as a *Garden of Love*[35] (*Ortum amoris*), which serves further to confuse him with alchemical *hortulani,* and he promises to gather in another book the opinions of all true-speaking philosophers.[36]

The present treatise opens with the statement that there are four species which pertain to the work of the elixir: quicksilver, sulphur, vitriol, and saltpeter.[37] Soon the direction is given to take twelve ounces of choice vitriol, saltpeter, and cinnabar. Ortulanus also labored long with arsenic and sulphur but with less happy results, since whereas he completed his first work in seven days, he was hardly able to repeat it in eighty, and then spent seven years without result. His procedure, however, as reflected in Dombelay's exposition, seems free from superstition and other frills. It is simply a question of what ingredients are to be used and in what quantities, with what apparatus, and how long they are to be distilled, calcinated, and so on until such and such a condition or state is reached. Of sexual analogy and pious

[32] Zetzner, IV, 929.

[33] Zetzner, IV, 914.

[34] Zetzner, IV, 925, 930.

[35] Zetzner, IV, 926. What pretended at least to be that work was printed in *Harmoniae chymico-philosophicae,* Decas II, ed. Ioannes Rhenanus, Frankfurt, 1625, pp. 3-79, "Hortus amoris. Incipit liber de arte alchymiae quem composuit Iohannes Dumbeleii de Anglia super universis omnium philosophorum opinionibus ex mandato illustrissimi principis et reverendissimi domini ac domini Cimonis [i.e. Cunonis] de Falckenstein divina providentia sanctae Treverensis ecclesiae archiepiscopi . . ." As in the *Stella alchimiae* there are twelve chapters of which eight are devoted to theory, propounding the mercury-alone doctrine, and four to practice. Again "Arnald of Villanova in his *Rosarius*" is cited but Raymond Lull never. Some of the citations are unusual: p. 32, "Constantinus in libro qui dicitur clavis secretorum"; p. 49, "Et Homerus subdit super Gratiano dicens."

[36] Zetzner, IV, 927.

[37] Zetzner, IV, 912.

phraseology there is only a little—chiefly towards the end of the treatise. There is some astrology. The stages in the alchemical process are compared to the four seasons of the year or associated with the seven planets.[38] We are told that nothing in the world can be made anew from the elements (*elementari de novo*) except by the mediation of divine grace and the rule of the planets, signs of the zodiac, and four seasons.[39]

In 1399 is dated a work of alchemy entitled *Phoenix* addressed to Martin, king of Aragon. It is in eleven chapters. Pious professions, injunctions of secrecy, and empty language characterize considerable portions of it. Pythagoras and Bonellus in the *Turba,* Moses, Solomon, Aristotle in the *Lumen luminum,* Alfidius, and Rosinus to Eustasia represent its authorities. It adheres to the theory that quicksilver and a fire are all that are needed to produce silver and gold.[40] We know that a Blascus or Blasius, "physician of the king of Aragon," addressed to Martin a pest tract which he compiled at Barcelona in 1405.[41] But that does not seem a sufficient reason for identifying him with the author of the *Phoenix.*

[38] Zetzner, IV, 917-918.

[39] Zetzner, IV, 913.

[40] S. Marco VI, 214 (Valentinelli, XVI, 3), 1472 A.D., fols. 1r-12v: rubric, "Tractatus compositus super lapidem philosophorum per quendam philosophie discipulum et per eundem fuit mixus sacratissimo domino Martino regi Aragonum anno vero M°CCC° nonagesimo nono et vocatur fenicis." Incipit, "Cum tanta dierum prolixitate absque divortio non sine variis cordis angustiis laboribusque et expensis. . . ." It closes, ". . . que dicta sunt observentur. Explicit liber seu tractatus super lapidem philosophorum ut in principio habetur qui liber fenicis intitulatur. Deo gratias, Amen."

Other MSS are: FN Palat. 885, 16th century, fols. 314r-323v, "Post diuturnam operis fatigationem tum laboris et expensarum temporis . . . / . . . sive fixione que dicta sunt observetur. Deo gratias, Finis." Rome, Vitt. Emanuele, fondi varii, 753-133, "Liber Phaenicis missus regi Aragonum Martino 1399." BU 270 (457), II, 3, fol. 101r, "Cum tanta . . . / . . . observantur."

The work has sometimes been incorrectly ascribed to Arnald of Villanova; see HL 28, 110. In Vatic. Barb. 273, fol. 209r, its opening and closing words are given as, "Phenix vocor ego moriens . . . / . . . cum tanta dierum prolixitate." In Berlin Q. 584, 14th century, fols. 24-27, the incipit, "Cum in tanta etatis prolixitate," is given for *Septem tractatus Hermetis.*

In BU 143 (110), 16th century, fols. 81r-100r, we seem to have a different *Phoenix:* "Diva ego sum Phenix. Profecto foret . . . / . . . beatus et felix."

[41] BM Sloane 428, fols. 145-155v: Blascus regis Aragoniae medicus de pestilentia, "compilatus in civitate Barchinona a.d. 1405." See also Sudhoff, *Archiv,* 17, 103-119, based on FN XV, 150.

The remainder of this chapter will consider several writers of uncertain date. Of the first, John of Vienna, or possibly Vienne on the Rhone,[42] there are two fourteenth century manuscripts, so that he may belong earlier in the century than the other writers considered in this chapter. His citation of the *Turba* suggests that he is later than the thirteenth century, and the character of his discussion seems to indicate a date fairly well along in the fourteenth.

The *Mirror of the Elements* of John of Vienna or Vienne first disposes of false opinions as to modes of transmutation, then sets forth certain truths, and finally clears up certain obscurities. False are the opinions of those who would begin by separating the elements from such substances as hair, eggs, blood, and urine; or who would operate with the four "spirits," mercury, sulphur, arsenic, and sal ammoniac; or who would work with salts; or who would make the philosophers' stone of gold and silver. All these methods neglect the fundamental principle that mercury is the sperm of the metals. Those, however, who work with mercury alone are also at fault because sperm alone is insufficient unless it is deposited in a fitting matrix. Those who employ a water of mercury combined with a water of gold and silver are more subtle but still fall short of the true method.

Turning to truths, John contends that every metal can be resolved and converted into quicksilver and that therefore quicksilver is the sperm of the metals, and the metals can be made from it. Therefore they can be made from one another. He also holds that they may be augmented and multiplied, if they are first reduced to first matter. Next he gives directions for mixing one pound of any imperfect metal with three pounds of quicksilver, treating them with salt and vinegar, and then with *aqua vitae*. These ingredients are subjected to about the usual pro-

[42] DWS Nos. 304-306. I shall consider only the *Speculum elementorum* for which I have used a rotograph of BL Fairfax 22, 14th century, fols. 13r-17r: "Tractatus magistri Iohannis Vienensis de perfecta et infallibili arte alkimie qui dicitur speculum elementorum. Incipit prologus. Gloria laus et honor . . . / . . . per infinita seculorum secula, Amen. Explicit speculum elementorum."

cedure, and later are combined with a ferment of gold and silver which is to be one-fourth of their quantity.

In the final section John explains that first the metallic body is to be reduced by solution to quicksilver or first matter or water. Next earth is obtained and purified. Then air is sublimated, and finally the element fire is reached. In this section Morigenes and the *Turba* are much cited.

The alchemical author whose name is given as Petrus de Silento in Zetzner, and as Petrus de Zalento by Schmieder,[43] is in the manuscripts[44] variously spelled Petrus de Zelence, de Zelento, de Zolento, and de Zeleuco. These are but slight variations, since c and t are of course constantly confused in the manuscripts. Many forms are also suggested for the title of Peter's work: *Of the Occult Things of Nature, Epistle of Occult Philosophy, Method of Occult Philosophy, Book of the Occult Philosophy of the Major Work,* and yet others. The work cites the *Turba philosophorum* as well as Geber and the *Book of Perfect Administration,* and from its content also seems clearly of the closing medieval centuries. Ruska suggests the fourteenth century for it.[45] Most manuscripts of it are late, and I have seen only one as early as of the fifteenth century. Therefore I place the treatise tentatively in the later fourteenth century, with the possibility that it may not have been penned until the fifteenth.

The text of Peter's treatise as printed in Zetzner's *Theatrum chemicum* is very faulty and corrupt, as becomes the more apparent upon comparison of it with a manuscript version of the fifteenth century. In the first place, the printed text is partly couched in the form of a commentary, as is shown by such passages as, "Note that Peter said above . . .; Here Peter speaks of the soul extracted from sun and moon . . ., The author says, Are vivified, that is, are made spiritual . . ., According to the author, the sun and moon are the mountains of India . . ." Second, the printed text inserts words, phrases, and clauses which are

[43] Zetzner, IV, 985-997, "Opus Petri de Silento," opening, "Attendite doctrinae filii eloquiis meis. . . ." Schmieder, *Geschichte der Alchemie,* Halle, 1832, p. 127.

[44] For the MSS see Appendix 38.

[45] J. Ruska, *Turba philosophorum,* Berlin, 1931, p. 337.

not found in the manuscript, or omits those which are. Third, and most ruinous to the sense of the original are alterations and misspellings of important words. Arisleus becomes Aristotle, *sol et luna et brumazar* are corrupted into Soloma and Brumazar,[46] or salt (*sal*) is transmuted into gold (*sol*) without alchemical process. Such divergences seriously affect both our conception of Peter's authorities and of his own content, coherency, and sanity. Thus a citation of Rasis in the manuscript[47] is not paralleled in the edition, which elsewhere introduces a reference to Albertus Magnus[48] which is not in the manuscript. Or instead of the manuscript's citation of the *Vision* of Arisleus[49] the printed text quotes Aristotle in *The Vision of the Soul*[50]—a work scarcely heard of even among the supposititious writings of Aristotle. In Zetzner we read that he who works without gold accomplishes nothing. But the manuscript states that he who works without salt accomplishes nothing, and the ensuing context shows that salt is the theme.[51] While the manuscript usually gives a reading preferable to that of the printed text, it also appears to contain some readings which require emendation and would profit by collation with other manuscripts.

The treatise of Peter of Zelence opens with pious exhortations to fear God. Undue haste is deplored. Requisites in alchemy are genuine and pure materials joined in due proportions and weights, a vessel, a fire, a mode of procedure and long enduring patience. The philosophers and invidious have used many names and disguises and concealments. Peter soon makes it clear that the main thing is to combine mercury with gold and silver so that it like them may resist the fire. Salt, however, is also essential, and Peter regards the best volatile *sal nitri* as nobler than sal am-

[46] Compare Zetzner, IV, 986, with John Rylands 65, fol. 146v.

[47] John Rylands 65, fol. 148r.

[48] Zetzner, IV, 986.

[49] Ruska, *Turba philosophorum*, 1031, pp. 323-328, gives the Latin text of the *Vision* of Arisleus from Berlin, Q, 584, as well as Manget, I, 495.

[50] John Rylands 65, fol. 146r, "Unde Arisleus ex visione. Animadvertite igitur inquisitores . . ."; Zetzner, IV, 985, "Aristoteles in visione animi dicit, Advertite inquisitores . . ." but at IV, 993, "Arisleus in visione," like the manuscript.

[51] John Rylands 65, fol. 147r-v; Zetzner, IV, 988-989.

moniac and more efficacious than anything produced from hairs, blood, excrement, urine, waters or powders. The elixir is not complete without it.[52] Later we are told, "If you wish to get rich, prepare salt; unless you convert the whole into salt, you will have nothing."[53] Peter dwells upon the necessity of observing due proportion between spirit and body and in the ingredients employed which are somewhat mystically stated and include a "right sulphur." Later we are instructed to take sulphur and quicksilver for the universal work, and nothing is said of including silver and gold in that connection.[54] Meantime a short space has been given to a discussion how errors occur and how to remedy them. Presently Peter tells of testing personally three methods of admixture by fire and solution, by solution alone, and by fire only.[55] The opinions of others and of Peter as to the vase, the fire, and the time required are given. It is advisable to begin operations under a favoring constellation. The comparison of degrees of heat in the fire to spring, summer, and autumn, or the presence of the sun in Aries, Leo, and Sagittarius, which we find in other alchemical writings, is repeated and also the common metaphors of the dragon, the woman, the sepulcher, and the venom, and many other alchemical commonplaces.

In the same fifteenth century manuscript with the work of Petrus de Zelence is another of about the same length by an even less known master Vemaldus.[56] Possibly they were contemporaries. Although this Vemaldus is also called Wenaldus, he seems to be a different person from Winandus, Wimandus,

[52] John Rylands 65, fol. 147v; Zetzner, IV, 989.

[53] John Rylands 65, fol. 149r; Zetzner, IV, 992.

[54] John Rylands 65, fol. 150r; Zetzner, IV, 994.

[55] John Rylands 65, fol. 148v; Zetzner, IV, 991-992.

[56] DWS No. 340: John Rylands 65, fols. 158v-164: "Incipit textus magistri Vemaldi de operationibus et preparationibus veris. Recipe mercurium extractum artificialiter de Iove . . . / . . . preparatis et in aquam reductis etc. Finis deo gratias." There is also at least one continental MS of the 15th century: Klagenfurt, Bischöfl. Bibliothek XXX. d.6, paper, fols. 82v-85v: "Incipit textus magistri Wenaldi. Recipe mercurium extractum artificialiter a Iove . . . / . . . fit processus per omnia sicut in sequenti gradu qui dicitur septimus." This is the same incipit as the Rylands MS, but a different ending. Probably the text is incomplete in the Klagenfurt MS, which I have not examined. I have used a rotograph of the Rylands MS.

or Weygandus de Ruffo Clipeo, author of the alchemical treatise entitled *Gloria mundi.* A citation of Albertus Magnus seems to be from one of the alchemical tracts ascribed to him.[57] Another citation is of Senior in the book of divisions, twentieth chapter,[58] and introduces a list of questions to put to an alchemist to determine whether he is a deceiver. Despite this digression of a page in length, the treatise is primarily in the form of a *Practica* with directions as to the ingredients and procedure to be employed in transmutation. There is implied, however, an underlying theory of degrees and orders. Thus there are three degrees of white and four of red, of which the first degree of red is called fourth, and the fourth degree of red seventh. Besides this "doctrine of white and red degrees," there are fifteen signs and tinctures of successive orders. The tincture of the first order colors ten parts of each body or twenty parts of mercury. That of the second order colors fifty parts of each body or one hundred of mercury. And so on.

John Tecenensis or Ticinensis or Teczinensis or Tessinensis or Teschmensis, or Tetynensis or of Teschem or Teschin, is another alchemical writer who seems to be either of the later fourteenth or fifteenth century. He would seem to be a different person from the William Tecenensis of whose *Lily torn from thorns* we treated in the chapter on Arnald of Villanova, since William was a Dominican friar, while John who swears by the holy gospels in his clerical order to the truth of his art[59] is represented rather as a priest.[60] In one of his works, written in prose,[61] this John cites such authorities as Albertus, Senior,

[57] John Rylands 65, fol. 160r, "dicit Albertus Magnus ascendit mulier super virum. . ."

[58] *Ibid.,* fol. 160v.

[59] Geneva 82 (151), 16th century, fol. 49v.

[60] *Idem,* "Venerabilis doctor Ioannes et presbyter de Teschin cognomine prohibet ne quis certam viam laborantium alicui indigno revelet scilicet secreta divinae artis. Ideo hortatur nos in suis doctrinalibus dicens. . . ." This text, covering fols. 49v-55v, seems to be an exposition of John's teaching rather than his original work. In the table of contents he is called Tessinensis. DWS III, 957, suggests for Tectinensis, "Ticinensis (i.e. of Padua on the river Ticino)," but of course should read "Pavia."

[61] CLM 25114, 16th century, fols. 52r-93r: "Ioannis Tecenensis opus. Charissime non abhorreas supra nomine lapidis tibi non nominabo quem sub clave silentii albi tibi nominabo. Nullus unquam potuit nec in posterum poterit

Gratian, the *Turba,* Arnald and *Rosarius minor,* indicating that he is at least later than the early fourteenth century, while his use of the phrase, "Nigrum nigrius nigro,"[62] suggests that he is acquainted with works of the Lullian alchemical collection which scarcely took form until the later fourteenth century. To John is also attributed a metrical exposition of alchemy.[63]

A work on the philosophical method of distillation probably belongs to the late fourteenth or early fifteenth century since it is found in a manuscript of the fifteenth century,[64] while it cites the alchemical writings ascribed to Raymond Lull.[65] It also obviously refers to the work of John of Rupescissa when it cites the first book, Canon 1, Chapter 2, of the *Fifth Essence* and states that this philosophical method of distillation was dis-

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tingere aurum nisi cum auro . . . / . . . Reduc ergo aurum in vaporem quod est prima materia sed quomodo hoc habet fieri si es philosophus nil tibi occultatum est etc. Finis."

Florence Riccard. 925, fol. 262, is also 16th century.

The work also occurs, but anonymously, in an earlier MS, S. Marco VI, 215 (Valentinelli, XVI, 4), 1475 A.D., fols. 175r-187r.

[62] CLM 25114, fol. 76r, "Item vocatur Nigrum nigrius nigro."

[63] S. Marco VI, 214 (Valentinelli, XVI, 3), 1472 A.D., fols. 174v-179r: Liber carminum Ioannis philosophi, opening, "Ocultas artes inquirentes. . . ." Florence, Riccard. 1165, No. 11, fol. 93, Johannes Teschmensis, Alchimia metrice exposita. Cassel Landesbibl. Chem. Folio 13, Johannes Teczinensis in expositionem totius artis occulte nature scilicet quatuor elementorum scientia metrica compendiosa. Geneva 82 (151), 16th century, fols. 56r-61v: Carmina Ioannis Tessimen., opening, "Ocultum artis inquirentes, Sint inprimis sic dicentes. . . ."

Other treatises ascribed to him in the alchemical bibliography in Vatic. Barb. 273, are: fol. 290r, Ioannis Tecenensis Opus breve una cum aliquibus eiusdem enigmatibus, opening, "Perchè come dice il fiore dei filosofi . . .;" fol. 291r, a treatise opening, "Charissime non abhorreas summi (?) nominem . . .;" fol. 292r, Ioannis Trecenensis (alias de Theclin) super lapidem philosophorum opusculum, opening, "Occultum artis inquirentes . . ."; and Ioannis Thegensis et secundum quosdam Tecenensis super lapidem philosophorum, opening, "En pulchra lapis multiplici fulcitus acie. . . ." In Vatic. Palat. 1329, fol. 170v, is found the "Occultum artis inquirentes," which continues, "sit primo sic dicentes. In Ihesu Christi nomine qui est filius. . . ." It rehearses the common processes of alchemy and ends at fol. 174r, "Explicit Johannes Teczenensis." In BU 303 (500), 15th century, fols. 291r-304r, is the Latin equivalent of the first work listed by the bibliography: "Tractatus Iohannis Tetynensis. Quoniam ut ait philosophus . . . / . . . tibi domine."

[64] Wolfenbüttel 3284, 15th century, fols. 23r-31v, written in a tiny hand: Libellus de distillatione philosophica contra vulgarem modum, opening, "Corpora mortalium cum ex quatuor composita sint elementis. . . ."

[65] *Ibid.,* fol. 30r, "de qua melius refert magister Raymundus Lulli. . . ."

covered in very recent times about the year 1371 (1351?) A.D. by a certain student of nature at the university of Toulouse.[66] The work first discusses the origin of diseases, their variety, the virtues of herbs, "the discretion of degrees by visible experiment," and expresses its approbation of the medicaments "of our clime." The main point of this preliminary discussion is that whereas some herbs are potent only at one time of year, this method of distillation in alcohol will preserve them all the year round, so that apothecaries need not sell stale and outworn drugs. Herbs should not be distilled in lead vessels nor allowed to lose their fragrance in the process of distillation.[67] Successive chapters deal with the furnace, vessels for distillation, the receptacle called a pelican, the distillation of vernal and juicy herbs, the erroneous popular distillation of *aqua vitae* and the philosophical *separate* distillation of "the root of life."[68] Spaces left blank suggest that it was intended to illustrate the text with figures of chemical apparatus.[69]

[66] *Ibid.*, fol. 24r, "Novissimis tandem temporibus. . . ."

[67] *Ibid.*, fol. 23v.

[68] *Ibid.*, fol. 25r, "De luto sapientie et furni adaptatione capitulum primum;" 26r, "De vitreis vasis distillatoriis aptandis et imponendis capitulum secundum;" 26v, "De dispositione et compositione pellicani capitulum tertium;" 27r, "De vernalibus et in succo habundantibus herbarum distillatione capitulum quartum;" 29r, "De erronea ac reproba populari distillatione aque vite capitulum quintum;" 30r, "De philosophica separatoria distillatione radicis vite capitulum sextum."

[69] The *Phoenix* mentioned above at p. 637 does not appear in the catalogue of the library of king Martin of Aragon which was drawn up after his death in 1410, although other alchemical works are listed; see *Revue hispanique*, 12 (1905), 430 *et seq.*

APPENDICES

APPENDIX I

MAGISTER ROMANUS

A certain master Romanus, who is further described as a citizen of Rome and a physician of the city expert in the profession of astrology, wrote a treatise on this latter theme of which there are two different versions preserved in manuscripts at Erfurt in the collection of Amplonius[1] and at Munich.[2] In the Erfurt manuscript of the middle of the fourteenth century, his treatise is combined with works of Jean de Murs, John of Saxony, and Arnald of Villanova. Either Romanus himself or some third person informs us that he wrote this treatise at the request of "my master, Peter Philomena, a canon of Rothschild," in the island of Seeland, Denmark. The allusion is probably to Petrus de Dacia, or Peter of Denmark, to whom in the manuscripts we find attributed a table called *Philomena*,[3] whose purpose is to show what sign and degree the moon is in on each day.[4] He also was the author of an astronomical and ecclesiastical calendar for seventy-six years extending to 1369, which therefore would seem to have been composed in 1293 or 1294.[5] Black in his catalogue of the Ashmolean manuscripts states that he was prior of a Dominican convent in Gothland

[1] Erfurt, Amplon.Q. 368, middle of 14th century, fols. 63r-70v, "Tractatus de xvi impedimentis in astronomia. Iste liber quod ad instantiam mei magistri Petri philomena Canonici rolkendensis (for *Roskildensis*) composuit magister Romanus, civis Romanus et urbis medicus in magisteriis iudiciorum astrorum expertus. Scito quod omne quod stelle significant . . . / . . . ita quod oportet quod sol prius iungatur Iovi quam marti. Explicit etc. de xvi impedimentis."

[2] CLM 25005, 15th century, fols. 50v-68r, "Iste est liber quem ad instantiam mei magistri petri phylomena canonici rolkendensis composuit magister romanus civis romanus et urbis medicus in magisteriis iudiciorum astrorum expertus. Scito quod omne quod stelle significant. . . ." This MS continues for over two pages beyond the point where the other closed, and ends, ". . . et perfecta erunt omnia qui fiunt per querentem etc. Finis."

[3] A different Philomena was the poet, John of Hoveden, who died in 1275. See BL Digby 41, 13th century, fols. 93-101, "Hoc Philomena sonat quod filia lucis amena . . . etc."

[4] MSS are Lyons, Bibliothèque du palais des arts, 45 (Delandine, 933), 14th century, fols. 71-72v; BL Ashmole 1522, early or middle 14th century, fol. 16v; CU Corpus Christi 347, pp. 150-163; BM Arundel 20; Erfurt, Amplon.Q. 387, middle of 14th century, fol. 1r.

[5] It is found with the aforesaid table in the above-mentioned Ashmole and Arundel MSS, while CLM 19414, fol. 181, Canon super Calendarium magistri Petri Daci, is dated as 13th century.

and was still living in 1312.[6] If so, he can hardly be identified with the Petrus de Dacia who was rector at Paris in 1327,[7] as Cantor held, Gesch. d. Math., II(1892), 114. While our MSS of the work of Romanus are of the fifteenth and middle of the fourteenth century, it would not appear that he wrote much later than the beginning of the fourteenth century, and he might have written before 1300.

Romanus first explains sixteen terms descriptive of various relations between, and positions of, the planets from which can be forecast "all that the stars signify, forsooth whether things will be done and carried through or what prevents" this. These technical terms are Advance (*Profectus*), Deterioration, Communication, Separation, Translation, Congregation or Collection, Prohibition,[8] Reception, Irreceptibility, Evacuation, Course, Return, Pulsation of virtue, Pulsation of disposition, Fortitude of nature, Weakness, and the condition of the moon. Astrological figures accompany the explanations in both manuscripts. The weakness of a planet is manifested in ten ways which are duly listed[9] and which act as impediments in nativities, interrogations, "and in all things which we intend to do." Other impediments are faults of the moon which are sixteen in number. The obsession of a planet is next discussed,[10] and then begin fourteen considerations. But after the seventh of these the Munich manuscript goes off on another tack, returning to a resumption of the eighth consideration only after nine or ten leaves[11] devoted to stating the effect on men when each planet is elevated above each of the others, to an exposition of the influence of the twelve houses, and to instructions how to take a horoscope or to answer anyone who consults the astrologer as to a journey. After this long interpolation and the completion of the fourteen considerations, both manuscripts go on with the discussion of astronomical and astrological terminology: conjunction, translation of light, return of light, prohibition, pulsation, reception, return of nature, restraint, contrariety, frustration, cutting off of light. The Munich manuscript continues for two pages after the explicit of the treatise in the Erfurt manuscript,[12] and ends with a table of the "years of the

[6] W. H. Black, *op. cit.*, col. 1426.

[7] *Chart. Univ. Paris.*, II, 300-301.

[8] The discussion of *Prohibitio* is reached at fol. 64v of Amplon.Q. 368 and at fol. 52v of CLM 25005.

[9] Amplon.Q. 368, fol. 65v; CLM 25005, fol. 53v.

[10] Amplon.Q. 368, fol. 66r; CLM 25005, fol. 54r.

[11] CLM 25005 resumes at fol. 63v the same discussion as occurs at Amplon.Q. 368, fol. 67r. From 63v-67r it is again practically identical with Amplon.Q. 368, fols. 67r-70v.

[12] Amplon.Q. 368, fol. 70v, ". . . a sole ita quod oportet quod sol prius iungetur Iovi quam marti. Explicit etc. de XVI impedimentis."

planets, greater, mediocre, and minor."[13] In the Erfurt codex the treatise is entitled, "Of sixteen impediments in astronomy,"[14] but this seems to apply to only a portion of it, nor are the things which it considers impediments merely to the influences of the stars.

APPENDIX 2

MANUSCRIPTS OF THADEUS OF PARMA, EXPOSITIO THEORICAE PLANETARUM

I have used the Ashburnham and Columbia University MSS.

FL Ashburnham 131 (205-137), Fasc. A, 14th century, membrane, double columns, 24 fols. "da mano non italiana": "Est enim sapientia rerum que sunt . . . / . . . in instrumento valde magno quare etc. Explicit Expositio Theorice planetarum edita ab inclito magistro Thadeo de Parma et completum in 1318 anno domini die 12 Iulii ad communem utilitatem scolarium Bononie studentium in scientia medicine."

FL Laurent. Plut. XXIX, cod. 7, membrane, early 15th century, fols. 105-152: seems to be the same work without mention of Thadeus of Parma. Bandini says of it, "Magistri Gherardi Cremonensis ut ex fine eruitur Theorica planetarum cum glossa." He gives the same incipit as above but the different closing words, ". . . plene et non corporaliter iuncti."

Erfurt, Amplon. Folio 380, middle and second half of the 14th century, fols. 1-28: Item commentum Thadei de Parma super theorica planetarum (Campani). "Est enim sapientia rerum que . . . / . . . nisi instrumento valde magno. Explicit expositio theor. plan. a Thadeo de Parma; deo gr." The suggestion in parentheses that the theory of the planets commented upon is that of Campanus rather than Gerard of Cremona appears to come from Schum.

S. Marco XI, 84 (Valentinelli), 15th century, has the closing statement dating the work on July 12, 1318, "ad communem utilitatem scolarium Bononiae studentium in medicina."

New York, Columbia University X.510.H.74, 1476 A.D., fols. 46r-114r: "Notandum quod Hugo de Sancto Victore in quodam suo libro . . . / . . . conciliet cuius noster existens virgo eternaliter nos defendat. Finit expositio Thadei de Parma super theoricas planetarum magistri

[13] At fol. 68r.

[14] Both in the explicit—see note 12 above, and at the head of the treatise where we find the titulus, "Tractatus de XVI impedimentis in astronomia."

Iohannis (*sic*) Cremonensis anno 1476 octavo kalendas Septembris." The preliminary matter including the bibliography and classification of forbidden mathematics is much less full than in the Ashburnham MS.

Affò, II, 57, alludes to a MS Ambros. I, 90, of 1441 A.D. where the Expositio theoricae planetarum of Thadeus follows the Perspective of Blasius of Parma.

APPENDIX 3

ANALYSIS OF ALCHEMICAL MSS BN 6514 and 7156

BN 6514

fols.

1r–32v Albertus Magnus, *De mineralibus,* in four quires of 8 leaves each. On fol. 32v there is no signature for the following work of Marbod or "Evax rex." Possibly these 32 leaves were originally a distinct MS. Berthelot, I, 68, incorrectly states, "Au commencement des manuscrits, on recontre de petits vocabulaires arabico-latins (fol. 8 et 40)." This statement holds true only of the other MS, BN 7156. The next or fifth quire consists of only 6 leaves occupied thus:

33r–37r Marbod on gems.

37v some notes in prose.

38r-v blank.

The sixth and seventh quires are of 8 leaves each (39-46 and 47-54), the eighth has 6 leaves (55-60). Aside from the titles noted below, these quires are occupied by a succession of alchemical recipes, most of which Berthelot does not note specifically.

39r *Emerald Tablet* of Hermes.

I do not know why Berthelot, I, 68, says: "Le manuscrit 6514 débute par le livre d'Hermès."

40v *Incipit liber xii aquarum* (their names are listed by Berthelot, I, 70).

41v–51r *Liber sacerdotum* (text printed by Berthelot, I, 187-228).

55v–56r Names of owners of alchemical books (see Berthelot, I, 75-76).

58r Names of contemporary alchemists (see Berthelot, I, 76).

The ninth and tenth quires are of 8 leaves each (61-67, there being two fol. 66's, and 68-75); the eleventh, of 10 leaves (76-85).

58v–59r Recipes in a smaller hand.

59v–60v blank except for some bits of geomancy in another hand.

61r–83v Geber de summa collectionis complementi occulte secretorum nature (analyzed by Berthelot, I, 344-349).

84–85. blank.

The handwriting now changes but henceforth remains the same. The quires are all of ten leaves except one of twenty. As a result of trimming the margins the signatures have disappeared except at fols. 135v and 183v.

86r-v *Emerald Table* of Hermes with commentary of Rasis.

86v–87 *Expositio Merellyeris* (or Merelieris or Moahan) *ad Flandion* (or Fledium).

88r–101r Plato, *Liber quartus* (Berthelot, I, 247-248).

101v–112v *Secrets* of Bubacar (analyzed by Berthelot, I, 306-310).

113r–120v "Incipit liber Raxis qui dicitur lumen luminum magnum," opening, "Cum de sublimiori atque precipuo rerum effectu . . .," but at fol. 120v, "Explicit liber auctoris invidiosi." (Berthelot, I, 311-312.)

120v–125r "Hic est liber utilior qui dicitur Lumen luminum perfecti magisterii editus per Rasis. Capitulum primum de rebus convenientibus huic arti," opening, "Cum studii solertis indagine universarum rerum . . ." and closing, ". . . fac modo quid vis quia ego ultra consilium non possum. Explicit liber Raysis minoris translationis." (Berthelot analyzes, I, 312-317.)

125r-v Opening chapters of Rasis, *De aluminibus et salibus* (edited by R. Steele, *Isis*, XII, 1929, 14-21).

126r–129r Latter part of Roger Bacon, *Breve Breviarium*. "Explicit liber fratris Rogerii Bachonis. Incipit liber Alithy filii Iacith in opere alk. admuza."

131r–133r "Incipit liber mundane felicitatis sive operis et complementum elementorum quo nullum maius (?) opus invenitur . . . / . . . Explicit liber trium verborum edictus per Rudiannum."

133r–135r "Hic est liber methaurorum Alphidii philosophi. Primum huius libri O Theophile constat eulogium . . . / . . . per-

cipe et invenies si deus voluerit." (Brief description by Berthelot, I, 69.)

135r–137v Morienus to Kalid, incomplete text.

138–143 blank leaves.

144r–171v Avicenna, *De anima* (analyzed by Berthelot, I, 293-305).

172–173 blank leaves.

174r–186v Geber, *Summa collectionis,* or, *Liber perfectionis.*

187r–191v *Turba philosophorum.* (Berthelot, I, 253-268, has a chapter on the *Turba* and other scattered references through his volume, but he seems to use only the printed text for it and to make no allusion to its inclusion in this MS).

192r-v blank leaf.

193r at the top of this last vellum leaf is written in a hand probably of the fifteenth century:
"Albertus de mulieribus (*sic*) de lapidibus Evander de lapide maiori in archimicis Yeber in archimicis."
"L. auctoris invidiosi archimicis et alii plures tractatus in archimicis et turba philosophorum."
This divided table of contents confirms our contention that there were originally two distinct manuscripts.

193v near the top is written:
"Albertus de mineralibus Hermetis in alkimia Yeber de collectione secretorum nature Verba Hermetis Expositio Raxis super eiusdem verbis Virtutes lapidum metrice liber Albuhali Turba philosophorum."

BN 7156

fols.

1r–8v *Liber utilitatis:* "Incipit liber utilitatis nature secreta floridis verisque tectoriis . . . / . . . et funde in oleo proice et fiet. Explicit liber quartus et ultimus. deo gratias."

8v vocabulary of alchemical terms in Arabic, Latin, etc.
There is no signature on fol. 8v, but 9r is numbered 2 in pencil in the lower lefthand corner. Quires of 12 leaves follow with signatures at 20v, 32v, 44v, and 56v, when a quire of 6 leaves follows.

9r–39v Albertus Magnus, *De mineralibus* (Berthelot, I, 68).

40r–42v Arabic-Latin alchemical vocabularies.

42v–48v "Incipit liber Alpharabii. Quoniam terra sperica est vapor ascendens de terra spericus erit . . . / . . . ad occulum

appareret secundum similitudinem picture fenestre cuius oppositum videmus sepe. Explicit liber Alpharabii." (Berthelot, I, 143.)

48v–49v miscellaneous alchemical and astrological notes and recipes.

49v-52v "Incipit liber de tribus verbis et est liber utilitatum et divitiarum. Principium autem huius operis est cum sol fuerit in ariete . . . / . . . et totius negotii efficax satis ut sequentia docent usque ad complementum. Explicit."

52v–64v Rasis, *Lumen luminum:* "Incipit lumen luminum Rasis philosophi regis Persarum. Cum de sublimiori atque precipuo rerum effectu sermo habendus sit. . . ."

65r The seventh quire begins. It and the two following are of 8 leaves each. A different kind of signature is employed at fols. 72v and 80v.

65r–66v Marcus Grecus, *Liber ignium* (text and translation by Berthelot, I, 100-120).

66v–83v "Liber de septuaginta Io. translatus a magistro Renaldus Cremon. de lapide animali. Liber divinitatis qui est primum de septuaginta. Laudes sunt deo habenti gratiam et bonitatem . . . / . . . in congelatione similiter multa signa. Explicit." (Berthelot, I, 69-70.)

88v There is no signature on this blank leaf. Quires of 12 leaves each follow marked by signatures, of still a third type, at fols. 100v, 112v, 124v.

89r–113v Geber, *Summa perfectionis magisterii.*

114v–124 *Secrets* of Bubacar.

125–126 These leaves are missing; fol. 127 is marked as quire 13.

127r *Liber turbe* begins.

133–134 Leaves are missing.

135r *De croco ferri* and other notes and recipes. This leaf is marked as quire 14.

137 blank.

138r marked as quire 15.

138r–142v Jacobus Theotonicus, *Practica alkimie,* opening, "Quoniam ars imitatur naturam in quantum potest et ars alchimie pre ceteris artibus . . . / . . . et hec tibi sufficiant quantum ad sublimationem spirituum." (Analyzed by Berthelot, I, 155-163.)

The signature at the bottom of fol. 142v, "Incipit ordinatio," does not correspond to the opening words on 143r but

	to a paragraph half way down its second column. Quires of 8 leaves follow with signatures at 150v, 158v, 166v.
143r	"Ut opus durum dulce fiat. . . ."
143v–145r	including fol. 147 which is misplaced, *Liber xxx verborum.*
145r–v	"Accipe sanguinem humanum et capillos. . . ."
145v–146r	*Liber xii aquarum.*
146r–148v	without fol. 147 which is misplaced. "Tractatus Martini Ortholani. Morienus de opere capillorum loquens . . . / . . . aliquando in una die fit. Explicit Martinus Ortolanus." (Berthelot, I, 72-73.)
148v–153r	*Lilium,* opening, "Naturam circa lunam et solem ceterosque planetas. . . ."
153–173	Miscellaneous.
174	blank leaf without signature, fol. 175 being numbered as quire 19. Quires of 12 leaves each follow with signatures at 186v and 198v.
175r–192r	"Tractatus de nominibus lapidum et eorum proprietatibus. Habete celi silentium et ingratitudinis immane scelus. . . ."
192v–196r	"Modo dicam tibi de preparatione et separatione iiii elementorum . . . / . . . cum dissolutum fuerit coaguletur ad ignem lentum."
196v	"Incipiunt secreta Hermetis. Considera avem nobilem. . . ."
197r–204	Morienus to Calid. Quire 21 and last has six fols. (199-204) only.

APPENDIX 4

MANUSCRIPTS OF ALCHEMICAL TREATISES ASCRIBED TO ARNALD OF VILLANOVA

The main purpose of this appendix is to describe some manuscripts found in continental libraries of alchemical treatises attributed to Arnald of Villanova. For manuscripts in British libraries the reader may refer to the catalogue of Mrs. Dorothea Waley Singer and for printed editions to the twenty-eighth volume of the *Histoire littéraire de la France.* The preliminary chart indicates if a title is included in either of these works, in the early modern alchemical bibliography of Vatican Barberini 273, or in the present appendix, and gives its opening words. As a rule I have not examined late manuscripts of the sixteenth and seventeenth centuries and do not include them here.

INDEX CHART TO THE ALCHEMICAL TREATISES ASCRIBED TO ARNALD OF VILLANOVA

Brief form of title	*HL 28 Item*	*DWS Item*	*Barb. 273*	*MSS*	*Incipit*
Aqua mercurii		238			Recipe mercurium
Aqua puri solis		239			Recipe igitur in
Aqua vitae	74	1003		x	Humanum corpus
Aquae	38			x	Sed quia aquarum
Artis divisio	99			x	Ars dividitur in
Carmina	68				Mercurium retinens
Compilation from Rosarius		234			Arnoldus de Villa
Compilationes philosophorum			x	x	Unitas est secundum
Compositio lapidis		240			Quia plures phi-
Defloratio philosophorum	106			x	Incipit liber ma-
Elucidarium	104			x	Practica huius
Epistola ad Bonifacium VIII				x	Clementissime pater
Epistola ad proprium filium				x	Matrem puram
Epistola ad regem Neapolitanum	52		x	x	Scias, tu rex,
Errores alchimiae				x	Venerande pater,
Exempla	69		x	x	Incipiamus exempla
Fixatio elixiris				x	Illumina corpus
Flos lilii		120		x	Exemplum scientie
Liber efficax de arte				x	Ratio precepit
Liber lapidis vitae	79	236		x	Intendo componere
Lucidarium			x	x	Quoniam rogasti me
Magister Hospitalis		224		x	Recipe vitrioli
Medicina Hermetis		241			In principio omnium
Metaphora				x	
Nova doctrina			x		In nomine domini
Novum lumen	49	326		x	Pater et domine
Novum testamentum	63	249		x	?
Opus lunare				x	Recipe marchasitam
Opus simplex				x	Recipe solis
Opus solis				x	Accipe mercurii
Perfecta medicina		242			De perfecta
Perfectum magisterium	51		x	x	Scias charissime
Practica roris madii	65	228		x	?
Questiones	67	235	x	x	Primo queritur
Quomodo elementa sunt corrigenda				x	In coniunctione
Recepta de compositione			x		Primo recipe
Recepta magistro Hospitalis		225			Recipe salis
Receptae	97(?)			x	Recipe limature
Retardanda senectute, De	87		x	x	Domine Raymunde
Rosa aurea			x	x	Secundum philo-
Rosa novella	105		x	x	Divina potentia or Non negligas
Rosarius	48	233, 286	x	x	Iste namque liber
Sanguis humanus	70	230	x	x	Magister Iacobe
Secretis naturae, De	54	229	x	x	Scito, fili, quod
Secretum				x	Accipe in dei

Brief form of title	*HL 28 Item*	*DWS Item*	*Barb. 273*	*MSS*	*Incipit*
Semita semitae	66			x	Reverende pater
Solutio dubiorum	95				
Specularium				x	Cum in secretariis
Testamentum	62		x	x	?
Verba commentatoria		243		x	Cum consonantia
Visio mystica	61	227	x	x	Vidi senem nimia

Aqua vitae

Vatican 5377, late 15th or 16th century, fols. 84r-103r: "Incipit liber aque vite editus per Arnaldum de villa nova. Humanum corpus cum sit compositum per ingressum contrariorum scilicet elementorum non est permanens . . . / . . . Explicit liber aque vite." In a preliminary table of contents for the entire MS our treatise is listed thus: fol. 2r, "Incipiunt capitula libri de aqua vite per magistrum Arnaldum de villa nova editi prout per ipsam aquam morbi curantur in humano corpore et quolibet eius membro." Our treatise is preceded in this MS by an anonymous medical work consisting largely of recipes, to which later additions have been made in Italian.

I do not know if Cambrai 919(818), 14-15th century, fol. 143, "Sequitur tabula supra tractatum aque philosophice qui magistro A. de Villanova imponitur," has reference to the same work.

Aquae

HL No. 38 lists BN 7817, 76r-83v, and CLM 257 but not the following MS:

CLM 666, 1456 A.D., fols. 81v-107v: "Sequitur tractatus de aquis Arnoldi de Villanova. Dictum est sufficienter de urinis. Sed quoniam aquarum nonnullus est usus in medicina et de aquis sunt nonnulla dicenda . . . / . . . separatur exinde. Hoc Arnoldus de Novavilla. Et sic est finis huius."

Artis divisio

BN 7161, 1407 A.D. (see fol. 8r), fol. 24v: "Incipit artis divisio secundum Raymundum (*sic*) de Villanova. Ars dividitur in 7 partes. . . ." This is the incipit of the preface. The text proper opens and closes: "Denigratio est signum solutionis . . . / . . . Fiat ignis fortissimus. Deo gratias, Amen."

Aurea rosa

See *Rosa aurea*

Commentum super Rosarium suum

See *Verba commentatoria*

Compilationes philosophorum

Venice, S. Marco VI, 214 (Valentinelli XVI, 3), 1472 A.D., fols. 139-152, has the same incipit, "Unitas est secundum philosophos . . ." as is given for this title by the bibliography of Vatic. Barb. 273, fol. 245v.

Defloratio philosophorum

BN 6749B, fols. 59v-60r: "Incipit liber magistri Rainaldi de Villanova dictus liber deflorationis philosophorum in opere alkimie sub compendio cum quibusdam aliis spectantibus ad artem ymaginum. Potest dici etiam liber occultationis secretorum antiquorum in quo sunt multa ardua varia et diversa secundum opinionem eorum qui precesserunt modernos. . . ."

Florence Riccard. 119, fols. 182r-183r.

Elucidarium

BN 12969, 1501 A.D., fols. 30v-33r: "Sequitur practica artis alkymie vera et probata secundum Arnauldum de Villanova ut in suo Elucidario continetur capitulo 4° folio 90(96?). Practica huius artis in sex partes dividitur. . . ." There is a fuller version in French in 53 caps. at fols. 35r-68v. See also *Lucidarium.*

Epistola ad magistrum Iacobum de Toleto

See *Sanguis humanus*

Epistola ad papam Bonifacium VIII

S. Marco fondo antico 324 (Valentinelli, XVI, 1), large folio in membrane with wide margins and 33 lines to the page in not very abbreviated writing, 14th century according to Valentinelli, I should say 15th: fols. 9r-10v, "Incipit epistola missa a Rainaldo de Villanova pape Bonifacio. Clementissime pater litteras vestras paterna devotioni suscepi quarum tenor est talis quod me ad vos dirigere debeam. Sed ob hoc parcat mihi sanctitas vestra quia ad presens quibusdam medicinarum studiis que apud modernos difficilia sunt preoccupatus existo . . . / . . . quam humana possit ratione partiri. Vale pater omnium vale pater alme et me peccatorem dono tue benedictionis illustra. Deo gratias, Amen. Explicit epistola Rainaldi de Villanova missa ad papam Bonifatium super artem solis et lune."

Vienna 5509, 15th century, fols. 259v-263r: "Sanctissimo in Christo patri et domino Arnoldus de Villanova devotissima pedum oscula beatorum mutatio dextere dei excelsi. Dico tibi pater alme quod oportet primo corpora in primam materiam reduci ad hoc ut fiat generatio seu multiplicatio in eisdem. Intellige ergo et inclina aurem tuam et accipe cupri nostri lb. 1 et commisce cum quatuor lb. argenti vivi . . . / . . . elixir cuius utilitas maior est quam possit percipi ratione. Vale domine pater alme et me peccatorem dono tue benedictionis illustra."

BN 7161, 15th century (at the top of fol. 8r the date is given as 1407—"Anno domini M°CCCC°VII anni prime indictionis"), fols. 17r-18v: "Dixi tibi pater sanctissime seu clementissime quod ostenderunt preterita tempora in primam materiam reduci ad hoc quod fiat multiplicatio seu generatio in eisdem. Intellige et inclina aurem tuam et accipe cupri li. 1 et fac limaturam . . . / . . . elisyr cuius utilitas maior quam non posset percipi ratione. Vale pater sanctissime et mihi largam benedictionem infunde. Raynaldus de Villanova."

Klagenfurt Bischöfl. Bibl. XXIX.d.24, 1421-1423 A.D., fols. 191r-197r: "Dixi ergo tibi pater clementissime quod oportet. . . ."

Wolfenbüttel 3282, late 15th century, fols. 39r-41: "Sanctissimo in Christo patri et domino Arnoldus de Villanova devotissima pedum oscula beatorum dextro dei excelso. Dico tibi pater alme quod oportet primo corpora. . . ."

Cassel, Chem. 8vo, 20, 15th century (?), fols. 162r-163v, has the titulus, "Sequitur Epistola Arnoldi de nova villa ad papam Bonifacium octavum," but from its incipit, "Reverende pater, gratias ago deo qui scientiam istam sua propria bonitate . . ." would seem rather to be the *Errores alchimiae* or the *Semita semitae*.

Florence Riccard. L.II.xiii (Lami, p. 46), Epistola de alchimia quam misit papae Urbano (*sic*).

Epistola ad proprium filium de vegetabili

Naples V.H.134, 15th or 16th century, fol. 34r-v: "Epistola Arnaldi ad proprium filium de vegetabili loquitur. Matrem puram accipias et in lecto cum filio . . . / . . . si intelligis que dico habebis totam artem, fili benedicte." This seems an extract from the *Secreta naturae*.

Epistola ad regem Neapolitanum

Naples XV.F.54, written at Valencia in 1462 A.D., fols. 92v-95r: "Epistola magistri Arnaldi de Villanova missa ad regem Robertum

Neapolitanum. Scias, tu rex, quod sapientes posuerunt in opere multas res et multos modos operandi . . . / . . . videlicet paulative augmentando ipsum ignem donec dictus lapis fiat albus et ultimo rubeus."

S. Marco lat. VI, 214 (Valentinelli, XVI, 3), parchment, 1472 A.D., fols. 137-139: "Epistola Arnoldi de Villanova missa regi Ruberto Neapolitano de lapide philosophorum etc. Scias tu rex quot . . ." etc. as in the Naples MS.

BU 138(104), 1476-1477 A.D., fols. 124r-125v, with a different and brusque incipit, "Rex, numquam sapientes denuntiaverunt opus sub veris verbis. . . ."

BU 303(500), 15th century, fols. 126r-129v; and at fols. 129r-133v, "Alia eiusdem epistola que dicitur gloriosissima margarita. O quam gloriosissima. . . ."

BN 11202, 15th century, fols. 147r-150r: "Incipiunt flores regis facti a magistro Arnaldo de Villanova. Scias, tu rex, quod sapientes in opere multas res et multos modos . . . / . . . albus fiat et ultimo rubeus. Expliciunt flores magistri Arnaldi de Villanova." But the text is that of the *Epistola ad regem.*

The following sixteenth century MSS may be based simply on the printed text which appeared in the Lyons, 1520, edition of Arnald's *Opera,* fols. 304v-305v.

CLM 2848, 1531 A.D., fols. 159r-161v: Incipit epistola magistri Arnaldi de Villanova super alchimiam ad regem Neapolitanum. "Scias, o tu rex, quod sapientes posuerunt in opere. . . ."

CLM 25115, 16th century, fols. 20-24.

Oxford, New College 294, 16th century, fol. 44v.

Wolfenbüttel 3282, late 15th century, fols. 41v-44v: "Scias o tu rex . . ." Heinemann catalogued fols. 41v-125v as the *Flos regis* of Arnald, "praemissa epistola ad regem Neapolitanum et Arragonensem." But at fol. 83r comes some of Arnald's letter to the pope and at 102r-v a "Fixatio domicelli Henrici" and "Fixatio Nicolai militis."

BN français 2012, fol. 89 *et seq.*: "Epistola Arnaldi de Villanova," with the usual opening and closing words.

Errores alchimiae

Vatic. Palat. 1330, 15th century, fols. 127r-135r: "Hic incipit alius liber tractatus de diversis erroribus alchimie. Venerande pater gratias deo qui scientiam istam sua propria bonitate ad tuas et tuorum

manus pervenire fecit. . . ." Fol. 129r, ". . . Ostendi tibi pater omnes errores communiter operantium cum suis causis et affirmant hoc magisterium esse verum per demonstrationem. Sequitur practica veri magisterii. Nunc cum dei adiutorio ad practicam accedamus vel descendamus. . . ." But the explicit is different from any of the MSS listed in DWS No. 226. ". . . Et est pabulum omnium spirituum desiccatorum et attinkar (?) perfectum. Expliciunt errores et opiniones alchimie magisterii veri et experti. Finiuntur libri philosophorum."

Cues 201, 15th century, fols. 28r-33v, no title: "O venerande pater gratias age deo qui istam scientiam ad manus tuas . . . / . . . huc usque retinetur donum dei quod verum est."

Exempla

S. Marco VI, 214 (formerly Nani 55; Valentinelli, XVI, 3), 1472 A.D., fols. 164r-168v: rubric, "In nomine domini nostri Ihesu Christi et matris sue virginis Marie incipiendum Exempla in arte philosophorum secundum magistrum Arnaldum de Villanova." Incipit, "Incipiamus exempla in arte philosophorum in dictis prophetarum ac parabolis eorum de adventu Christi. . . ."

Vatic. Barb. 273, fol. 243v: Parabolarum liber, "Incipiamus exempla in arte philosophorum . . . / . . . et hoc est elixir verum et perfectum."

Fixatio elixiris

Naples VIII.D.17, 17th century (?), no pagination: "Arnoldi de fixatione elixiris in compositione ad album et de reductione aque," opening, "Illumina corpus antequam imponas animam. . . ."

Flos florum

See *Perfectum magisterium* and *Visio*. In the alchemical bibliography of Vatic. Barb. 273, fol. 245v, a "liber alius sub titulo Flos florum" is listed with the incipit of a section of the *Semita semitae*, "O reverende pater, gratias deo ago. . . ."

Flos lilii

BU 138(104), written at Vienne, 1477 A.D., fols. 126r-129r: "Flos lilii magistri Arnaldi de villa nova Incipit": opening, "Exemplum scientie nostre senex supra montem . . .," which somewhat suggests the incipit of the *Visio*. It ends, ". . . mille millia quod est in infinitum procedere, Amen. Explicit flos lilii magistri arnaldi de villa nova."

I have used a photograph of this MS. The text is practically identical with that printed in *Artis auriferae,* I (1593), 389-392, as "Authoris ignoti philosophici lapidis secreta metaphorice describentis opusculum."

Flos regis

See *Epistola ad regem Neapolitanum.*

Liber efficax de arte nostra dignissima

BU 270(457), 15th-16th century, XIV, 155-212: "Ratio precepit . . . / . . . praesens sufficiat." Not seen, very likely a late fabrication.

Liber lapidis vitae philosophorum

BN 7817, fols. 42r-56v, a beautiful illuminated copy: rubric, "Liber de vita philosophorum magistri Arnoldi de Villanova medicorum gemma"; incipit, "Intendo componere rei admirabilis Ypocratis Galieni Haly et Avicenne . . ."; ends, ". . . ad omnes egritudines corporis vitandas et ideo in puteo etc. Explicit liber vite philosophorum magistri Arnoldi de Villanova deo gratias. 1469." The text appears roughly identical with that printed by Little and Withington in *Opera hactenus inedita Rogeri Baconi,* Oxford, 1928, pp. 120-143, so far as the latter extends, but has more rubrics. Despite the colophon at fol. 56v, it would appear that the work ends or should end at fol. 53r, where we read, "Et nota quod corpus auri solutum in aquam que dicitur aqua permanens perpetua congelatione congelat servum fugitivum. Et laudetur deus creator omnium per immensa secula qui servis suis indignis sapientiam tribuit. Amen." This passage is not in the printed text of Bacon's *Liber de conservatione iuventutis* which seems to break off uncompleted. The subsequent rubrics in BN 7817 are: "De confectione vini in quo aurum ambigue abstractum est extinctum"; fol. 54r, "De compositione solis potabilis seu de auro potabili"; 54v (in margin), "Perle quomodo fiunt potabiles"; 55r, "De epistola continente virtutes lapidum."

BU 303(500), 15th century, fols. 142r-157v, contains what purports to be an extract from it.

Lucidarium

Vatic. Barb. 273, 16th or 17th century, fols. 165r-172r: "Arnaldi Lucidarium metris compositum," opening, "Quoniam rogasti me, frater charissime, ut librum tibi scriberem occulte scientie philosophorum . . ." Presently a Prefatio opens in verse:

Omnipotens Deus sit nobis auxiliator
In nomine cuius fiat principium nostrum,

and at fol. 167r we read, "Nunc incipit liber qui Lucidarium dicitur."

Lumen luminum

See *Perfectum magisterium.*

Magister Hospitalis

Vatic. Palat. 1330, 15th century, fol. 140v, covering only half a page, has a different titulus or incipit from either DWS No. 224 or 225: "Opus quod magister Arnoldus de Villanova dedit magistro Hospitalis sancte Iohannis Ierusalem. Recipe cupri viridi sive vitrioli salis armoniaci salis petri. . . ."

Metaphora

CLM 25114, 16th century, folio, fols. 26r-29r.

Novum lumen

S. Marco VI, 215 (Valentinelli, XVI, 4; once Nani 56), 1475 A.D., fols. 169r-175r: Novum lumen, here anonymous, with the usual incipit, "Pater et domine reverende, licet liberalium. . . ."

BU 138(104), at Vienne, 1477 A.D., fols. 167v-170r; "Liber iuvenis experti qui dicitur novum lumen," opening, "Pater et domine reverende, licet liberalium. . . ."

BU 303(500), 15th century, fols. 107r-115v.

CLM 2848, 1531 A.D., fols. 143v-150r (following the *Rosarius* ascribed to Arnald and preceding the *Perfectum magisterium,* also here ascribed to him): "Pater et domine reverende, licet liberalium existam scientiarum ignarus . . . / . . . nos pervenire faciat ad optatum. Explicit liber experti iuvenis qui vocatur novum lumen."

Novum testamentum

Wolfenbüttel 3076, 15th century, fols. 45r-51r: "Incipit liber novi testamenti Arnoldi de Villanova. Incipit liber novi testamenti et dividitur in tres partes principales. . . ." This preface runs to fol. 45v, but the text which opens at 46r seems that of the *Lilium intelligentie* and not that printed as the *New Testament:* "Ad compositionem uniuscuiusque opusculi divinum invocandum est auxilium . . . / . . . Et promitto priori sub iuramento tua semper adimplere mandata et dominus deus sit tibi mites in eternum gloria ut una mecum merearis vitam eternam, Amen."

CLM 455, 15th century, fols. 116r-119r: "Excellentissimo principi ac nobilissimo philosopho dei gratia Francorum regi et omnibus de eius sanguine progenitis . . . / . . . et postea debet presentari soli ut lapis completus efficiatur pretiosissimus ut est sol purissimus naturalis. Explicit liber modernus de inferiori astronomia que irrationabiliter (*sic*) novum testamentum appellatur."

BU 138(104), 15th century, fol. 309v, is probably an extract: "Summa estracta de novo testamento cuiusdam philosophi ad Philippum regem Francorum. Lapides sunt duo . . . / . . . novi testamenti."

Opus lunare

Cambrai 919(818), 14-15th century, fols. 126-143: "Sequitur opus quoddam lunare a P. de Villanova, ut dicitur.—Probatio mei Petri (*sic*) de Villanova: Recipe marchasitam albam. . . ."

Opus magisterii

See *Secretum ad regem Aragonum.*

Opus simplex

Vatic. Palat. 1330, 1463 A.D., fols. 112v-114v (former numbering 104-106): "Hic incipit tractatus magistri Arnuldi (*sic*) de Villanova de arte alchimica de opere simplici opus primum. Recipe solis foliati partem unam mercurii distillati per alembicum partes xii et fac amalgama . . . / . . . et in tertia vel in quarta sublimatione non ascendet plus de mercurio vivo. Explicit hoc opusculum magistri Arnoldi de Villanova in die Clementis anno domini Millesimo quadringentesimo sexagesimo tertio."

Opus solis

BU 164(153), 15th century (at least for the alchemical portion of the MS, and not 14th century as catalogued by Frati), fols. 75v-76r, "Incipit opus solis magistri Arnaldi de Villanova. Accipe mercurii puri partem unam . . . / . . . cum ista dissolve atramenta. Explicit opus secretum et completum magistri Arnaldi de Villanova."

Parabolae

See *Exempla.* Different are medical aphorisms or *Parabole* ascribed to Arnald: CLM 666, fols. 15r-81r, "Incipiunt meditationis parabole secundum instinctum veritatis eterne que dicuntur a medicis regule generales curationis morborum. . . ." For other MSS see HL No. 11.

Parvum rosarium

See *Perfectum magisterium.*

Perfectum magisterium

In the alchemical bibliography in Vatic. Barberini 273, fol. 243r, it is called, "Perfectum magisterium et gaudium ad Aragonum regem sub titulo Flos florum," while the title of the work as printed in the Lyons, 1504, edition of Arnald's *Opera,* fols. 395v-397r, reads: "Incipit perfectum magisterium et gaudium magistri Arnaldi de villa nova, transmissum per eum ad inclytum regem Arragonum quod quidem est flos florum thesaurus omnium incomparabilis margarita, in quo reperitur veri compositio et perfectio elixir tam ab album quam ad rubeum componendum, videlicet ad solem et lunam sub compendio declaratum." At the close: "Explicit tractatus Flos florum nuncupatus magistri Arnaldi de villa nova."

Klagenfurt, Bischöfl. Bibl. XXIX.d.24, 1421-1423 A.D., fols. 262v-269v.

Wolfenbüttel 3076, 15th century, fols. 150r-160v: "Incipit perfectum magisterium et gaudium magistri Arnoldi de Villanova translatum per eum ad inclitum regem Arragonum quod quidem est flos florum thesaurorum omnium incomparabilis margarita in quo reperitur veri compositio et perfectio elixiris tam ad album quam ad rubeum componendi videlicet ad solem et lunam sub compendio declarata. Scitis karissime quod in omni re . . . / . . . maior est quam posset percipi ratione. Vale pater serenissime. Explicit."

BU 138(104), 1477 A.D., fols. 129v-134v: Secretum ad regem Aragonum. "Cum ego de voluntate divina de regione. . . ."

BU 164(153), 15th century, fols. 71r-74r: in a long rubric the work is called *Gaudium* and *Flos florum.* It has the usual incipit of the text without the dedicatory letter, "Scias, carissime, quod in omni re . . ." and ends, ". . . ut possit secreta nature intueri. Explicit perfectum magisterium et gaudium magistri Arnaldi de Villanova. Deo gratias, Amen."

BU 169(181), 15th century according to Frati, No. 12: "Arnaldus de Villanova, Tractatus qui dicitur perfectum magisterium." But it opens, "Venerande pater . . ." (see DWS No. 226) and is wrongly dated 1216.

BU 303(500), 15th century, fols. 115v-125v.

BN 7162, 15th century rather than 16th as stated in the old catalogue of the Bibliothèque du Roi, fols. 1r-7r: "Incipit opus magisterii magistri Arnaldi de Villanova loquentis familiariter cum clerico

rege Arogonum in hec verba (*sic*). Cum ego de voluntate divina de regione in regionem . . ." (the incipit of the dedicatory epistle). At its close the work is incorrectly called the *Rosarium philosophorum* and ends differently from BU 164, ". . . quod elixir fuerit preparatum etc. Deo gratias. Explicit opus magisterii Arnaldi de Villanova philosophi." At fol. 51r is another first page of the work which has subsequently been cancelled: "Incipit opus magistri Arnauldi de Villanova loquentis familiariter cum clerico rege Arogonum in hec verba. Cum ego de voluntate divina de regione in regionem. . . ."

BN 7147, 1535 A.D., fol. 13 *et seq.*, is, despite its date, according to HL No. 51, a better version than the printed text, including the dedicatory letter and opening, "Serenissime rex, cum ego divina voluntate de regione in regionem. . . ." The copyist, Oronce Finé, did not clarify matters much, however, by calling it *Parvum rosarium* instead of *Flos florum:* "Parvum Rosarium mag. Arnaldi de Villanova super arte secreta, missum regi Aragonum pro dono singularissimo; et vocatur in impresso et adulterato opere Flos florum."

CLM 2848, 1531 A.D., fols. 150r-158v, on the other hand, lacks the dedication. "Incipit perfectum magisterium et gaudium magistri Arnoldi de Villanova transmissum per eum ad inclitum regem Arragonum . . ." and called Flos florum, Thesaurus thesaurorum, etc. "Scias charissime quod in omni re . . . / . . . cuius utilitas maior est quam possit percipi ratione. Explicit tractatus Flos florum . . . magistri Arnoldi de Villanova."

Oxford, New College 294, 16th century, fols. 48-54v: "Incipit perfectum magisterium et gaudium magistri Arnaldi de Villanova . . ." etc. "Explicit tractatus Flos florum nuncupatus magistri Arnaldi de Villanova."

Naples VIII.D.17, 17th century (?), fols. 1r-15r: "Lumen luminum Arnaldi," but with the usual opening and closing words of the *Perfectum Magisterium,* "Scias carissime quod in omni re . . . / . . . cuius utilitas maior est quam possit ratione percipi." Later in the same MS it occurs again, mutilated at the beginning and closing, "Expedit tractatus Flos Florum magistri Arnaldi de Villanova."

Practica roris madii

BN 7162, 15th century, fols. 56v-59r (second numbering in the MS), "Incipit liber de practica roris madii datus Bonifacio pape VIII°. Dico vobis quod oportet primum corpora in primam materiam re-

ducere ut ad hoc fiat multiplicatio et generatio in eisdem. etc. Re." This much is set off as if a heading. After another "Re." in the side margin, the text proper then opens: "Ergo in nomine domini dei omnipotentis in opere simplicis solis. . . ." This has rather the appearance of a wrong text's having been associated with another titulus and incipit, and that instead of opening, "Ergo etc." the proper text would have opened, "Recipe etc." There is perhaps some connection with the *Opus simplex*. The incipit suggests the letter to Boniface VIII.

In another MS, BU 168(180), 15th century, fols. 5r-11v, the work is ascribed to John, nephew of Boniface VIII: Liber de pratiqua aquarum roris madii datum pape Bonifatio VIII a domino Iohanne filio sororis carnalis dicti domini pape, "Cum animadverterem . . . / . . . in secula seculorum."

Preparatio lapidis

See *Secreta naturae.*

Questiones

Copenhagen Gl.kgl.S.3498, 15th century, paper, fols. 95-102v, Questiones tam essentiales quam accidentales magistri Arnoldi de Villanova super compositione lapidis, opening, "Primo queritur si compositio (instead of *operatio* as in DWS and Zetzner) lapidis potest fieri. . . ."

Venice, S. Marco VI, 215 (Valentinelli, XVI, 4; formerly Nani 56), 1475 A.D., fols. 146r-155r: "Incipiunt questiones tam essentiales quam accidentales magistri Arnaldi de Villanova de arte transmutationis declarate pape Bonifacio VIII ab eo petite super compositionem lapidis philosophici et primo essentiales. Non sublimantur corpora sublimatione vulgari. . . ." Only after a page more of text do we meet at fol. 146v the usual incipit, "Queritur si operatio. . . ." The work ends, ". . . cum fermento scilicet cum sole vel luna, etc. Expliciunt questiones accidentales magistri Arnaldi de Villanova."

BU 169(181), 15th century according to Frati, No. 13: "Questiones facte a reverendo archiepiscopo Remensi ad predictum magistrum. Primo queritur . . . / . . . diligens investigator."

Vatic. Palat. 1329, fols. 93v-104v, "Incipiunt questiones tam essentiales quam accidentales magistri Arnaldi de Villanova declarate a reverendo archiepiscopo petite ad considerandum (?) per compositionem lapidis. Primo queritur si operatio lapidis potest fieri ex sub-

lunaribus et aqua vite . . ."; fol. 100r, "Incipiunt questiones accidentales huius artis" (13 instead of 12 in number in this MS).

In Vatic. Palat. 1330, fols. 115v-119v, a copy made by Henry Walpod, friend of the cardinal Nicholas of Cusa, in 1463, the questions are unnumbered and not distinguished as essential and accidental. They do not include the thirteenth accidental question of Vatic. 1329, but end a little before the close of its discussion of the twelfth accidental question. They are not themselves connected with Boniface VIII but are preceded by *Recipes* of master Arnald of Villanova which he is said to have given to pope Boniface IX (!). These end at fol. 115v, ". . . in solem optimum et dulcissimum." Then follows the rubric, "Modo sequuntur questiones eiusdem magistri Arnaldi de Villanova" and their incipit, at fol. 116r, "Queritur primo si operatio. . . ." The questions end at fol. 119v, ". . . et est maximum quesitum et inventum per artificium huius artis alchimie. Et sic finiuntur questiones magistri Arnolde (*sic*) de Villanova in pro festo beate Katerine virginis per familiarem domini Cardinalis sancti Petri ad vincula nomine Heinrici Walpod anno domini M°CCCC°LXIII."

In Vienna 5230, 15th century, fols. 37v-39r (old numbering 31v-32r) the questions are numbered consecutively, reaching only to 38.

Wolfenbüttel 3170, 15th century, fols. 13v-14v, 15r-18r: "Incipiunt questiones tam essentiales quam accidentales magistri Arnoldi de nova villa declarate a reverendo magistro eo petite (?) super compositionem lapidis. Primo queritur si operatio lapidis . . . / . . . si fueris de predictis perfectissimus in arte indagator."

CLM 2848, 1531 A.D., fol. 99, was preferred by Diepgen to Vienna 5230, for the *Questiones*.

Quomodo elementa sunt corrigenda

Naples VIII.D.17, 17th century (?), no pagination: "Arnaldi. Quomodo elementa sunt corrigenda et quomodo acquiritur fusio medicine non fundentis. In coniunctione lapidis attende tres. . . ."

Receptae

Vatic. Palat. 1330, 1463 A.D., fols. 114v-115v: rubric, "Incipiunt Recepte magistri Arnoldi de Villanova quas pro maximo dono dedit pape Bonifatio nono et reperte in loco latebro." Incipit, "Recipe limature eris bene lote et mundo cum aceto. . . ."

I do not know if this is the same as "Recepta de arte chimiae," which HL No. 97, lists from MS 448 of the school of medicine at Montpellier, since it does not quote its incipit.

Retardanda senectute

HL No. 87 gives the incipit of *De retardanda senectute* from MS Metz 281 as "Domine Raymunde, quia ex nobilissima stirpe . . ." and therefore suggests that it may be a different work from the medical *De conservanda iuventute et retardanda senectute* addressed to king Robert of Naples and opening, "Serenissimo ac sapientissimo principi inclyto. . . ." The alchemical bibliography in Vatic. Barberini 273, fol. 244v, lists under Arnald's name a tract entitled, "De retardanda senectute ad serenissimum principem," for which it gives as incipit, "Domine mundi qui ex bina stirpe nobili. . . ." This is the *De accidentibus senectutis et senii* of HL No. 73, but the work with this opening is really that of Roger Bacon addressed to Innocent IV: *Opera hactenus inedita Rogeri Baconi,* Fasc. IX (1928), 1-83.

Rosa aurea

S. Marco VI, 214 (Valentinelli, XVI, 3; Nani 55), 1472 A.D., fols. 168v-174r: Aurea rosa, "Secundum philosophos patet quod res non afferant nisi similia sibi nec fructificant nisi fructus suos. . . ."

Vatic. Barb. 273, fol. 245v: "Rosa aurea, licet aliqui putent non esse opus Arnaldi. 'Secundum philosophos patet quod res non afferunt nisi similia sibi. . . .' "

The following seems to be a different work. In fact, its opening words are those of the *De gradibus magnae medicinae,* a work ascribed to Raymond Lull:

Wolfenbüttel 3721, paper, 1467 A.D., fols. 97-137: "Ex quolibet non fit quodlibet sed determinatum de determinato . . . / . . . Explicit rosa aurea anno domini MCCCClxvii in crastino Thome apostoli per me Heinricum Traub presbiterum et plebanum in Hausen in Valle Lachin sita."

Rosa novella

Two incipits are distinguished in the alchemical bibliography of Vatic. Barberini 273, which under Arnald of Villanova, at fols. 243v-244r, lists the title *Rosa novella* twice, once with the incipit, "Divina potentia composuit mundum . . .," and again with the opening words, "Non negligas ergo homo nobilissime. . . ." Then under the letter

R at fol. 225r, the *Rosa novella* is listed once more, this time without mention of an author and with the incipit, "Non negligas, homo nobilissime. . . ."

The first form of incipit occurs in two continental MSS.

Venice, S. Marco VI, 214 (Valentinelli, XVI, 3), 1472 A.D., fols. 55v-60v, "Incipit rosa novella magistri Raynaldi de Villanova ad comitem Petrum Flandrie comes. Divina providentia composuit mundum . . . / . . . donec figatur deorsum et quiescat in igne levis. Laus omnipotenti. Expliciunt."

BU 164(153), 15th century, fols. 126r-127r, "Incipit rosa novella magistri Arnaldi. Divina potentia composuit mundum . . . / . . . et figitur tanto melius operatur. Explicit Rosa novella deo gratias, Amen."

HL 28, 111 (No. 105) does not mention this incipit or these MSS but seems to know only the following with the second form of incipit: BN 6749B, fols. 58r-59v, "Incipit Rosa novella magistri Arnoldi de Villanova. Non negligas homo ergo nobilissime hoc archanum rationis et veritatis quia ornat moribus, ditat beneficiis, exaltat pauperem, et corporum incolumem conservat sanitatem. Istum autem librum nominavi rosa novella eo quod est novus et verissimus. . . ."

Rosarius

For MSS in English libraries see DWS No. 233 and also No. 286 which seems to be the same text, although here represented as the *Speculum philosophie* of John Dastin and addressed to cardinal Napoleon Orsini.

In continental libraries:

FL Ashburnham 1451 (1374), paper, 15th century, fols. 22r-42v (unnumbered in the MS): "Incipit liber Rosarii philosophorum cuius premittitur prologus in quo agitur de modo procedendi cum exortatione ad legendum philosophorum libros. Liber abbreviatus exprobatus verissimus thesaurorum thesaurus de certissima naturalis philosophie compositione qua omne diminutum reducitur ad perfectum solificum et lunificum. Iste namque liber nominatur Rosarius . . . / . . . quamvis intelligentibus sint satis prolixa. Explicit liber rosarii editus a magistro Arnoldo de Villanova philosophorum eximio. Laus creatori, Amen."

FN Palat. 758, 15th century, fols. 110-147.

Florence Riccard. L.III.xxxiv (Lami, p. 46).

BU 138(104), fols. 109r-123v, itself written at Vienne in 1476 or 1477, professes to use an earlier copy made at Lyons in 1376.

BU 303(500), 15th century, fols. 65v-107r.

BU 270(457), X, 2, 116r: "Summa super lapide philosophorum. In nomine domini . . . / . . . Rosarii Arnoldi." I have not examined the MS and cannot say if this is the Rosarius which we have ascribed to Arnald. *Ibid.*, XXI, 1, is identified more explicitly by Frati with Manget, I, 662.

BN 7149, folio, paper, 15th century, fols. 3r-10v: "Incipit liber quondam abbreviatus Verissimus, thesaurus thesaurorum Rosarius philosophorum et omnium secretorum maximum secretum de verissima compositione naturali philosophie qua diminutum reducitur ad perfectum solificum vel lunificum. Capitulum 1. Iste liber nominatur compositor alchimie Rosarius eo quod ex libris philosophorum breviter abbreviatus est . . . / . . . secretum secretorum rosarium omnium philosophorum. Explicit Rosarium Arnauldi de Villa nova Deo gratias." In this MS the first book has nine chapters and the second, twenty-seven.

Copenhagen GL.kgl.S.2366F., 15th century, fols. 144-153, has the incipit, "Scribitur in libro perfecti magisterii: qui in legendis libris deses extiterit . . ." The last words occur in the proemium of Arnald's *Rosarius*.

CLM 457, 15th century, fols. 132r-154v (fol. 148r-v is for the most part left blank, but there is no break in the text). "Incipit quidam liber abbreviatus rossarius aprobatus verissimus thezaurus thezaurorum Rosarius philosophorum ac omnium secretorum maxime de verissima compositione naturalis philosophie qua omne diminutum reducitur ad perfectum solificum ac lunificum. Et nominatur Rosarius eo quod ex libris philosophorum . . . / . . . Explicit Rosarius a magistro Arnaldo editus de Villanova."

CLM 2848, 1531 A.D., fols. 114v-143r. "Sequitur prooemium. Iste liber qui vocatur Rosarius . . . / . . . de numero sapientium antiquorum. Explicit Rosarius a magistro Arnaldo de Nova villa compositus."

Vienna 5510, 15th century, fols. 1r-20r, "Incipit quidam liber abreviatus approbatus verissimus thesaurus thesaurorum rosarius philosophorum ac omnium secretorum secretum maximum de verissima philosophie naturalis compositione(m) que omne diminutum corpus reducit ad perfectum lunificum et solificum. Prohemium, Iste namque liber nominatur rosarius eo quod ex libris . . . / . . . quamvis intelligentibus sint satis prolixa. Deo gratias."

Wolfenbüttel 3586, paper, 15th century, fols. 47-78: Liber rosarii philosophorum.

Wolfenbüttel 3721, 15th century, fols. 155-196: Rosarius (Puch der Alchimei genannt der Rosengart der Philosophorum), "Anno MCCCClxvii feria secunda post Bartholomaei." The author is not "Iohannes Rupiscissa," as Heinemann's catalogue suggests.

Cassel Chem. Folio 10, 15th century, fols. 46r-62r: "Incipit liber abbreviatus verissimus thesaurus thezaurorum philosophorum." The name of Arnald of Villanova as author has been inserted by a later hand.

Vienna 5509, fols. 319r-324v, Breviarium Rosarii, is a digest of Arnald's work, chapter by chapter.

Yet other MSS are BN 11202, 15th century, Cues 201, and Cambrai 919(818), fol. 91v *et seq.*, while Cambrai 918(817), 1426 A.D., is a French translation.

Sanguis humanus

BM Sloane 3124, membrane, 15th century, once at Montpellier, fols. 187v-191v: "Incipit Epistola magistri Arnauldi Cathalani ad magistrum Iacobum de Toleto per eundem missa de separatione elementorum sanguinis humani. Magister Iacobe, amice karissime, dudum me rogastis ut vobis secretum meum de sanguine humano. . . ." I list this British MS because it is omitted by DWS No. 230 and gives the fullest text. Another British MS which seems to bear some relation to our treatise is BL Digby 164, fol. 21 (DWS No. 1099): 'De humano sanguine,' sive de compositione medicamenti cuiusdam e sanguine per separationem quatuor elementorum.

S. Marco VI, 214 (Nani 55; Valentinelli, XVI, 3), 1472 A.D., fols. 52v-55v: "Tractatus magistri Raynaldi de Villanova. Epistola ad magistrum Iacobum de Toledo. Magister Iacobe, amice carissime, dudum me rogasti ut vobis secretissimum medicine de s.h. . . ." Rimini 77(D.IV.19), 15th century, fol. 61.

BU 169(181), 15th century, item 6: "Epistola magistri Arnaldi de Villanova ad magistrum Iacobum de Tholeto. Magister Iacobi (?) . . . / . . . potuerint invenire."

Copenhagen Gl.kgl.S.1713, quarto, 15th century, fol. 1, Epistola ad magistrum Iacobum de Tolleto.

Wolfenbüttel 3070, 15th century, fols. 228r-229r, without titulus or name of author: "Magister Iacobe amice carissime dudum me rogasti . . . / . . . in hiis distillationibus ultimis alchamie." A "Nota de sanguine isto humano" follows.

Secreta naturae

Although no MSS are listed in DWS, Oxford, New College 294 being 16th century, they seem to be fairly widespread on the continent, being found at Venice, Bologna, Naples, Vienna, and Paris. With the exception of the New College manuscript, they do not support the statement in the Lyons, 1520, edition of Arnald's works that he composed the *Secrets of Nature* for a servant whom he greatly loved: fol. 303v, "Incipit liber quem composuit magister Arnaldus de villa nova pro quodam famulo suo quem multum diligebat."

S. Marco fondo antico 324, folio, 14th or 15th century, fols. 11r-13v, "In nomine illius a quo cuncta bona et omnium virtutum dona procedunt et a quo est omne datum optimum et omne donum perfectum descendens a patre luminum incipit liber de secretis nature editus ab Arnaldo de Villanova. Inquit Arnaldus, Scito fili quod in hoc libro loquimur de secretis nature. . . ." These last words constitute the real incipit. The treatise ends, ". . . et fiet rex VI nationum. Intellige dicta philosophorum et habebis totum magisterium. Deo gratias, Amen. Explicit liber Arnaldi de Villanova super secretis nature."

In Naples VIII.D.20, 1523 A.D., fols. 119r-123r, most of the first leaf has been torn out but "Scito fili . . ." remains of the incipit. The text breaks off in the fifth chapter, ". . . ut per patientiam et consolationem spiritum habeamus scripturarum. Finit liber Arnaldi de Villanova de secretis nature. Deo gratias. Amen."

BU 138(104), 1477 A.D., fols. 135r-138r; 139(105), pp. 121-138, dated 14th century by Frati; and BU 164(153), which is 15th century rather than 14th century as dated by Frati, fol. 79r-v, "Liber magistri Arnaldi de Villanova. Scito fili quod in hoc libro nostro loquar . . . / . . . Si intelligis quod dico habebis totum magisterium. Finitur opus totum. Deo gratias, Amen."

BU 303(500), 15th century, fols. 133v-141v: "Liber magistri Arnoldi de Villanova de secretis naturae. Scito fili . . . / . . . hamet et theber."

Florence Riccard. L.III.xxvii (Lami, p. 46).

BN 6749B, fols. 55v-58r, "Incipit thesaurus secretus operationum naturalium Arnoldi de Villanova. Capitulum primum, Quid est lapis? Scito fili quod in hoc libro loquimur de secretis nature et primo dividendum istum librum in sex capitula . . . / . . . Iam igitur implevi intentionem meam in hoc libro. Explicit thesaurus secretus operum nature Arnoldi de Villanova."

Vienna 4751, 15th century, in a large plain hand, 25 lines to the page, fols. 255r-262r: "Incipit tractatus Arnoldi de Villanova. Scito fili quod loquar in hoc libro de secretis nature et primo dividam . . . / . . . quia alias derideres. Iam ergo complevi intentionem meam in hoc libro deo sit laus in perhenni gaudio."

Vienna 5509, 15th century, fols. 230r-234v (165-169), "Ihesus dei Marie filius Incipit Tractatus Magistri Arnoldi de Villanova de secretis nature. Scito fili quod in ipso libro loquitur . . . / . . . ut in Rosa novella dicitur etiam per me . . . pro quo deus sit benedictus trinus et unus in secula seculorum, Amen." The sixth chapter is longer in Vienna 4751 than in Vienna 5509 but does not include this reference to the *Rosa novella.*

BN 7162, 15th century, fols. 59r-63r, "Incipit thesaurus secretus operationum naturalium Arnauldi de Villanova Capitulum primum Quid est lapis. Scito fili quod in hoc libro loquimur de secretis nature . . . / . . . Iam igitur perfeci intentionem meam in hoc libro. Deo gratias. Explicit thesaurus secretus operationum naturalium magistri Arnauldi de Villanova."

Cues 201, 15th century, fols. 19r-22v or 26v (not 43v as catalogued).

Oxford, New College 294, 16th century, fols. 56-62: Liber de secretis naturae quem composuit Arnaldus de Villanova pro quodam famulo suo quem multum diligebat, opening, "Ars igitur ista non est nisi de occultis philosophorum. . . ." This appears to be a different work.

Secretum

BU 164(153), 15th century, fols. 127v-128r: "Incipit Secretum magistri Arnaldi. Accipe in dei nomine istud donum et extrahe oleum . . . / . . . omnipotens qui cuncta creavit." Headings within the text are: "De oleo, De igne, De terra, Quid sit hoc donum?"

Secretum ad regem Aragonum

See *Perfectum magisterium.*

Semita semitae

HL No. 66 lists no MSS and states that it knows of none with Arnald's name as author. In neither of the following is the work specifically ascribed to him, but other works of alchemy attributed to him accompany it in both manuscripts.

Vatic. Palat. 1329, 15th century, fol. 48r, "Nunc pater et domine reverende audiatis et intelligatis . . .;" fols. 79r-87v: "Reverende pater,

aures inclina et intellige . . . / . . . Et iste sunt partes proprie spectantes ad artem. Explicit Semita semite bene detecte." At fol. 83v, "Nunc revertor, pater reverende, ad prius dicta singulariter applicando super perfectiones philosophorum antiquorum et verba eorum obscura . . .;" fol. 85v, "O reverende pater, gratias deo agamus qui scientiam istam . . .," which is almost identical with the incipit given by Vatic. Barb. 273, fol. 245v, for *Flos florum.*

BU 164(153), 15th century, fols. 83r-90r: "Semita semite bene detecte. Nunc, pater et domine reverende, audiatis et intelligatis, et deus vestrum illuminet intellectum . . . / . . . generantur similes illis."

BN 7173, 16th century, fols. 207r-210r: "Incipit prologus semitae bene detectae. Nunc pater et domine reverende audiatis et. . . ."

Other MSS which I have not seen are Cassel Chem. Octavo 20, 15th century, fols. 163v-169v: "Reverende pater, aures hic inclina . . . / . . . ecce sic habes verum magisterium in arte nostra et hec dicta sufficiant; laudemus deum in excelsis." Prag 1765, 14th-15th century, fols. 68r-82r: "Nunc pater et domine reverende audiatis . . . / . . . quam possit percipi ratione."

Specularium

This treatise immediately follows Arnald's *De secretis naturae,* but that is the only indication that it may be by him; it is apparently anonymous.

Vienna 4751, 15th century, fols. 262r-274r: "Incipit liber specularii. Cum in secretariis philosophie natura concluditur sub figura . . . / . . . omnem rem subtilem vincens et penetrans omnem solidum. Laudetur deus et sanctus Bartholomeus, Amen." At fol. 262v the title is explained, "Cuius libri titulus est Specularius precipue nuncupavi a superioribus speculis."

Testamentum

(see also *Novum Testamentum*)

Vatic. Barb. 273, fols. 244r-245v, lists three forms: *Testamentum* with the incipit, "Ego Arnaldus de Villanova incipio istum librum . . ."; *Vetus Testamentum* with no incipit given; *Testamentum novum,* opening, "Nobilissimo et excellentissimo. . . ." Of these the first is the *Novum Testamentum* of HL No. 63, but it was printed in Manget, I, 704, as *Testamentum.*

BN 7149, 15th century, fol. 11r: "Testamentum summi philosophi Arnauldi de Villanova doctoris egregii. Lapis philosophorum de terra scaturiens . . ." is only nine lines long.

BU 138(104), 1477 A.D., fols. 146v-150r (and not to 157v, as stated in the catalogue, since there is an explicit at fol. 150r, followed by addenda omitted from the *Rosarius* at fols. 109r-123v, while fols. 154v-157v are left blank): "Testamentum Arnaldi de Villanova a libro Hugueti in gallico 1438 in novembri 23 die."

BU 270(457), X, 2, fol. 157r, "Testamentum Arnaldi a libro Hugueti in Gallico, 1455."

BU 270(457), II, 3, fol. 1r-: "Arnaldi de Villanova liber de investigatione lapidis. Dividitur autem . . . / . . . Explicit testamentum magistri Arnaldi de Villanova in Montemartino 1502."

Florence Riccard. N.III.xi and S.II.ii (Lami, p. 46).

Wolfenbüttel 3076, 14th or 15th century, fol. 45r-v: "Hic incipit liber novi testamenti Arnoldi de villa nova. Incipit liber novi Testamenti et dividitur in tres partes principales. . . ." But this MS ends, ". . . Et tunc est lapis bene rectificatus. Et finitur pars prima." This is the text printed by Manget, I, 704-707.

Cassel Chem. Quarto 73, Testamentum mag. Arnoldi de Villanova. Rovigo 402, 15th century, fols. 1-4: "Quia volo breviter . . ."

Verba commentatoria

S. Marco VI, 214 (Nani 55; Valentinelli, XVI, 3), 1472 A.D., fols. 60v-91r: "Incipiunt verba commentatoria primi libri Arnaldi de Villanova et Pericli (Paridi?) ac Phebi phylosophorum quibus dictis ipse Arnaldus collegit librum suum. Cum consonantia plurimorum phylosophorum de naturali philosophia tractantium. . . ." In the table of contents at the beginning of the MS the title is given as, "Commentum Raynaldi de Villanova super rosarium suum."

With this may be compared DWS No. 243: CU Corpus Christi 99, 15th century, pp. 164-183, "Incipiunt verba commentaria primi libri Arnaldi de Villanova ac Phebi a paridis philosophorum . . . / . . . quod et tradidi vobis in nomine domini, Amen."

Visio mystica

BU 138(104), 1477 A.D., fols. 207r-208v: "Flos florum Arnaldi de Villanova. Vidi senem unum clarificatum surgentem et in manu. . . ." This wording of the incipit is also found in HL No. 61 and Vatic. Barb. 273, fol. 243v.

BN 11202, 15th century, fols. 150-153v: "Vidi senem nimia claritate fulgentem in manu sua librum 7 signaculis sigillatum tenentem . . . / . . . sua fortuna facit omnia et est finis libri, etc. Explicit opus magistri Iohannis de Vasconia."

Vatic. 5846, 1496 A.D., fols. 3r-4r: "In nomine sancte trinitatis incipit libellus qui flos florum sive rosarius dicitur. Vidi senem nimia claritate fulgentem . . . / . . . qui dicitur rosarius." In the table of contents of the MS it is ascribed to Arnald: "Rosarius Arnaldi de Villanova brevissimus."

For another variation in the wording of the incipit, "Vidi senem in una claritate fulgentem surgentemque . . ." see DWS No. 227, where one MS ascribes the work to Arnald and another to "Iohannem Bastonem sepultum in Antuarpia." "In una" may be a misreading of "nimia."

APPENDIX 5

MANUSCRIPTS OF THE ROSARIUS WHICH OPENS DESIDERABILE DESIDERIUM . . .

Of the MSS listed in DWS No. 231 I have used rotographs of CU Trinity 1122, fols. 81r-94r, the only complete MS of the fourteenth century, but obviously not an original, and of John Rylands, Manchester, 65, 15th century, fols. 55r-73r, a neatly written copy. In the Trinity College MS the treatise is anonymous, except that another and later hand has written in the upper margin of fol. 81r the following ascription to Arnald of Villanova: "Rosarius M. Arnaldi de villa nova quem misit regi Roberto primogenito regis hierosolymi et Sicilie duci calabrie. Et non est Rosarius ille de quo scribit magnus Bernardus et reprehendit Arnaldum in epistola quam misit M. Thome de Bononia." The word which I have rendered as *Thome* is abbreviated and indistinct and was left blank by James in quoting the passage in his catalogue of the Trinity College manuscripts. But it seems fairly clear that the allusion is to the reply by the alchemist, Bernard of Treves, to Thomas of Bologna, in which Bernard criticizes Arnald's *Rosarius*. Since Bernard wrote about 1385, this allusion to him is probably considerably later, and it may be doubted if its author was qualified to state whether the *Desiderabile desiderium* was by Arnald. In granting, however, that Bernard's allusion to Arnald's *Rosarius* does not apply to the *Desiderabile desiderium,* he gives us grounds for believing that the latter work is not Arnald's.

In the Rylands MS the titulus, "Incipit liber qui Rosarius intitulatur super secretis astrologie inferioris," is followed by the words, "Iohannis tyri anglici," which, however, are so written as not to seem an integral part of it. Similarly from the colophon at its close, "Explicit liber qui Rosarius intitulatur super secretis astrologie inferioris. Amen. Et est liber Iohannis tyri anglici," we might infer that John Tyrus Anglicus was owner of the book rather than its author. At the close of the work in BN 7168, fol. 20v, however, is written, "Explicit Rosarius Magistri Iohannis Dastri alias sciri anglici." Here Anglicus evidently applies to the author. Whether *stiri* is to be read rather than the infinitive *sciri* and whether it is a corruption for *Tyri* or vice versa I do not know.

The Cambridge and John Rylands manuscripts differ considerably from each other and also from the text as printed in Zetzner, *Theatrum chemicum,* III (1659), 663-697. The Rylands MS embodies a good many lines of leonine verse, which are not found in Zetzner or the Trinity MS, although the latter has occasional insertions of this sort in a much later handwriting (hardly earlier than the sixteenth century) on small slips which are pasted in between the pages. But they do not correspond to the verses of the Rylands MS. The printed text is more like the older Trinity MS than it is like the Rylands, which omits several passages, some of considerable length, which occur in both the other versions. Otherwise, however, the readings in the two manuscripts vary less from each other than they do from the printed text. Of this last "Toletanus philosophus maximus" is given as author.

The *Desiderabile desiderium* is ascribed expressly to master John Dastin of England in an alchemical collection made at Vienne in Dauphiné in the years 1476 and 1477, and now preserved in the library of the university of Bologna: BU 138(104), fols. 25v-40v, "Liber qui Rosarium appellatur magistri Iohannis Dastini Anglici." This manuscript also comprises various alchemical treatises under the name of Arnald of Villanova including the *Rosarius* with the incipit, "Iste namque liber vocatur Rosarius . . ." in 31 chapters, which it states was copied at Lyons in 1376.

Another MS of which I have made considerable use is BN 7168, early 15th century, paper, neatly written, fols. 1r-20v: "Desiderabile desiderium inapresiabile (*sic*) pretium . . . quam quidem summam vocamus Rosarium eo quod ex philosophorum libris tamquam rosas a spinis evulsimus (this passage is found also in the Cambridge and John Rylands MSS) . . . / . . . documentum thesaurus incomparabilis et (?)

preciossimus. Deo gratias, Amen. Explicit Rosarius magistri Iohannis Dastri alias sciri Anglici." For Vienna 5230 see p. 55, note 9.

MSS which I have not examined are:

Cambrai 920(819), 15th century, paper, fols. 199-(223v): "Rosarius Desiderabile desiderium . . . / . . . Explicit Rosarius super lapide philosophico, a magistro Johanne Dastini, anglico, compositus, Deo gracias, et secundum aliquos vocatur Rosarius abreviatus magistri Arnaldi de Villanova, et secundum aliquos fuit compositus per eum, quod quidem vulgariter dicatur."

BU 270(457), XIX, 5: "Liber qui Rosarius appellatur magistri Iohannis Dastini Angli. Desiderabile desiderium . . . / . . . incomparabiliter preciosissimus. Die xvi Augusti 1476 in civitate Vienne." XXX, 3, 24 Ian. 1502, "Rosarius Angliae Io. Dastini Angli."

BU 271(458), 3, 16th century.

Geneva 82(151), 16th century, fols. 105r-129r.

Florence Riccard. 925, 16th century, fols. 146r-170v.

APPENDIX 6

MANUSCRIPTS OF PERSCRUTATOR, DE IMPRESSIONIBUS AERIS

G. Hellmann, *Die Wettervorhersage im ausgehenden Mittelalter,* 1917, pp. 181-182, lists four MSS: at Cambridge, CUL 1693 (see vol. III, p. 312 of the catalogue), 14th century, double columns, fols. 13r-24v; at Erfurt, Amplon. F. 395, about 1373 A.D., fols. 98-104; at Munich, CLM 11067, fols. 73r-81v; and at Berlin, Berol. Fol. 192, fols. 121r-127r. The last seems the same as I have noted under the shelf mark, Berlin 963, 15th century, fol. 121 *et seq.;* but Hellmann's reference does not seem to include Berlin 964, 15th century, fol. 140, "frater qui se ipsum dicit perscrutatorem in tractatu suo de ymbribus temperie ponit multas regulas particulares de ymbribus," and, fol. 141, "de puteis ponit perscrutator regulas sequentes de stellis nebulosis et tenebrosis." These indications point to portions of our treatise, whereas Berlin 963 appears to include it entire, since the catalogue quotes from it the very opening and closing passages. The Cambridge MS, now numbered Ii.1.1., I have examined through a rotograph.

I have examined the work further in two other manuscripts which are not mentioned by Hellmann. In CLM 275, 1469-1475 A.D., fols. 144r-154v, of which I have used a rotograph, our treatise follows an "Astrologia Albumazar" and precedes excerpts from the *Vigintiloquium*

de concordia theologie et astronomie of cardinal Pierre d'Ailly. It opens without title or rubric, "Dixit perscrutator anno christi 1325 in civitate Eborum Anglie anno regis eswardi (*sic*) filii regis Edwardi S. (perhaps for *salutem* or *scilicet* or a corruption of the number of the year of Edward II's reign). Scribo vobis qui vultis de mutabilibus elementorum que ab astris contingunt omni tempore seculi huius. . . ." This is in essential agreement with the incipits of other manuscripts of the treatise except that they make Perscrutator write of the marvels (*De mirabilibus elementorum*) rather than the alterations of the elements (*De mutabilibus elementorum*). In the other manuscript of our treatise, which I examined at Paris, Perscrutator is not mentioned, and the work is described, only I think in the catalogue, as *De elementis*: BN 13014, a large MS in double columns clearly written but considerably abbreviated, fols. 9r-14r, col. 1. At fol. 1r in a later hand is written: "In iudicia astrologiae per Salim (?) Commentarius manuscriptus nusquam impressus An. 1337." Our treatise is preceded at fols. 1v-8r by a calendar made at Milan for the years 1311-1386: "Istud kalendarium factum est Mediolani ad meridiem cuius longitudo est 31 graduum latitudo 45 per quod si primo velis scire locum solis. . . ." Our treatise opens: "In anno christi 1335 in civitate eborum anglie anno regis Edwardi filii Edwardi regis 19 scribo vobis qui vultis de mirabilibus elementorum videre que ab astris contingunt omni tempore seculi huius. . . ." It looks as if 1325 had originally been written and a tail added afterwards to the 2. At any rate the year of the reign, which in the Cambridge manuscript noted by Hellmann is given as 18 rather than 19, makes it clear that the date should be 1325.

APPENDIX 7

PERSCRUTATOR ON TIDES: LATIN TEXT

CUL Ii. 1. 1, fols. 23v, col. 2-24r, col. 2; CLM 275, fols. 153r-154r.[1]
Septima conclusio de motu occeani (Et sunt tales regule)

In climate septimo mare fluit et refluit ab oriente in occidens in parte orientis fluit et contrarie refluit et in parte occidentis *mare* (ab oriente in oriens) fluit et refluit (contrarie) ita quod in eodem tem-

[1] Words that are italicized occur only in the Cambridge manuscript; those which are in parentheses, only in the Munich manuscript. In the main I have followed the older Cambridge manuscript and have not troubled to note the minor variations in spelling and word order or the obviously incorrect readings of the less satisfactory Munich text which has been useful chiefly to confirm doubtful readings in the other codex.

pore est mare fluens *et* (vel) refluens in oriente et occidente. *Est* (dico) autem oriens ubi (est) initium climatis, occidens autem *est ubi terminatur* (ubi determinatur). Est enim ut prius patet habitatio hominum quarta pars terre et eius figura est similis medietati circuli. *Quum* (cum) *autem* (itaque) mare sit humidum eius motus neccesario ad lunam pertinebit. Sed cum luna propter eius lationem diversimode ad locum maris situatur necessario secundum appropinquationem eius erit contrarium huic quod fit secundum remotionem. Clima *autem* (itaque) septimus cum sit propter habitationem ut prius patet siccus, mare illud circumfluit per latera cooperiens partem reliquam totam congelatam (153v) in borea. Prius autem dixi quoniam lune potestas in climate septimo completur. *igitur* (dico ergo) ex hoc quoniam super litora occeani que infra terminos septimi climatis continentur necessario dominatur luna secundum excessum potentie sue, reliquis autem partibus (suis) occeani non sic. Cum igitur partes maris sunt grosse terrestres necessario luna in fortitudine sua eas flectendo atque girando subtiliare videtur. Hoc *igitur* (autem) erit *dum* (cum) est in oriente vel in occidente tunc enim solum loca laterum (?) supereminet ubi vis potestatis eius *exercetur* (excrescere). Cum vero est luna in partibus aliis secundum distantiam ab *illis* (istis) locis contrarium fiet in mari et ad *partes suas* (suos) canales terminos influit. Quando igitur appropinquat luna orienti climatis *septimi* (aut)[2] tunc exeunt litora maris ab oriente versus occidens et ab occidente versus oriens secundum fortitudinem potestatis lune quia virtus lune in una parte loci propter materie continuam dispositionem velociter immo in uno momento ad omnes loci partes reliquas *superfluit* (interfluit) et tanto fortius quanto relique maris partes inobedientes terreque partes circumstant contrarie sicut videtur in solis lumine per obiectum spissum in (24r, col. 1) obliquum reflexo. Igitur patet quare similiter in eodem tempore mare occeanum in oriente et occidente in ripis fortiter girat ut exeat. Similiter cum tendit luna in occidens tunc similiter fit sicut cum est in oriente quia cum aquas excitet et non possunt exire secundum cursum lune sicut in oriente quia ut predictum est reliquum mare contrariatur, *reflectitur* (reflecti) opus lune et actione reflexa conturbatur mare occeanum *vero* (ubi) tantum terre supereminet quod satis dinoscitur ut reflexio *propria* (proposita) non repudietur. Quod autem aque dulces girationem (lune) non sequuntur causa est quia rigide non sunt sicut *amare* (mare). Quo-

[2] The copyist of the Munich MS has apparently mistaken the old form of 7 for an a and so turned the abbreviation for *septimi* into that for *aut*.

niam quidem stellarum vires ex luminum irradiatione funduntur necesse est *quod* secundum luminis variationem etiam virtutum esse alterationem *secundum igitur* (Ergo secundum) quod lumine luna crescit atque decrescit secundum hoc potestas eius erit super mare. Sed cum luna soli appropriatur eius nature plus assimilata propter radiorum participationem, plures in visceribus occeani vapores poterit agitare et per consequens mare fortiter girabitur quod si sic est tunc planum (est), quoniam convenit ratio sensui et sensus rationi in hoc verbo quod due erunt crescentie in fluctibus maris et *illud est* (istud erit) fortissimum opus quod in coniunctione solis cum luna fieri solet, deinde hoc quod in oppositione fit luna hac causa vacua sed lumine plena atque media distantia ledones erunt id est flumina debilia quoniam tunc utriusque cause *existit* (extat) minoratio atque debilitas. A coniunctione igitur ad mediam distantiam oppositionis decrescit fluctuatio et tunc crescit versus oppositionem atque tunc iterum decrescit ad medium versus solem et tunc iterum augetur usquequo coniunctio fiat. Flumina autem *magna* (maxima) malvia, minora vero ledones (154r) nuncupantur. Habes ergo horas fluminum occeani. Sed hoc non oportet preterire quod in fluminibus que in mare currunt secundum distantiam (ab occeano) tardatur (propter) tempus apparitionis redundationis aque secundum reflexionem fluminis in tantum quod in 30 miliaribus hoc quod in occeano fit luna existente in linea meridionali in flumine apparet cum fuerit luna inter meridiem et occidens plus *habens* (habet) de occidente. Ex *preconcessis* (premissis) iam videbitur causa voraginum que sunt in occeano una in oriente et alia in occidente in cuius rationis investigatione multi oberraverunt. Liquet ex predictis occeani tantum partes que latera superfluunt climatis *septimi* (aut) dominio lune obedire reliquum (autem) mare rigidum stare (24r, col. 2) rebelle. quod si sic (est), tunc palam quoniam rigidi huius fundamenta aque levioris canales erunt impetu fortissimo illam deferente. erigitur enim occeanum in altum multum ut mons; fundamenta autem eius profundissima semper a ripa se *profundant* (profundans) quapropter *refluxus* (reflexus) erit fundamenta petens veloci cursu et quanto motu levius tanto ictus subtilior atque penetrabilior. *Illud* (Cuius) exemplum est in ictu tonitrui quoniam levis aer corpora *findit* (scindit) durissima ut ferrum ligna et lapides aer dico fractus in nube. Ecce rationis paradigma proposui, in hac dicti dubia quoque resolve.

APPENDIX 8
MANUSCRIPTS OF ICOCEDRON

The "Icocedron philosophie" which Mrs. Waley Singer (vol. II, p. 449, No. 650) catalogues as anonymous is likewise Walter of Odington's work—apparently with some additions and omissions—as a comparison of her description with the text of CU Trinity 1122 makes evident, and a survey of rotographs of the MSS concerned confirms. Thus the incipit of her first section corresponds roughly to the opening words of sentences at fols. 177v, bottom, and 178r, top, in CU Trinity 1122. Part of the explicit of this first section and of the titulus and incipit of the second occur in CU Trinity 1122 in the middle of fol. 178v, where a chapter "De preparatione" begins. The fact that this chapter is numbered three in the text of CU Trinity 1122 indicates that there has been some confusion in the marginal numberings 3 and 4 on fol. 178r. I do not find the explicit of this second section, ". . . ut monstratur in precedenti figura furnelli," in CU Trinity 1122, but this is explainable by the fact that that MS does not contain the figures which occur in BM Addit. 15549, fols. 4-22v, but only a diagram and table. The incipit of Mrs. Waley Singer's third section is that of the twelfth chapter on the preparation of human blood in Walter of Odington's treatise (CU Trinity 1122, fol. 181r). The explicit of this section agrees with that of Walter's fifteenth chapter, and the incipit of the fourth section with that of Walter's sixteenth chapter (CU Trinity 1122, fol. 182r). This fourth section ends, as Walter's nineteenth chapter does, in the middle of fol. 183r of the Cambridge manuscript. The opening of the fifth and last section in the Additional manuscript does not, however, agree with that of the twentieth chapter in Walter's treatise in the Cambridge manuscript, nor do I see it earlier therein. I infer that it does not belong with the *Icocedron* since it opens, "Now that we have described the natures of the metals, let us see the natures of the masteries" by which they can be converted into one another, whereas these processes of transmutation are just what the *Icocedron* has been describing for the past dozen chapters. This fifth section therefore appears to belong with some other treatise. Indeed, in BM Addit. 15549 the text of the nineteenth chapter breaks off at the bottom of a page (fol. 20 or 21 verso) with the words, "Et taliter (*sic*) . . ." in the midst of the last sentence, "Et tam in spiritibus quam in corporibus multiplicabitur tinctura quasi (ad) infinitum." It therefore appears that a leaf or so is missing which would have concluded

the Ycocedron, and that "Descripsimus iam de naturis . . ." at the top of fol. 21 or 22 recto belongs to some other work.

APPENDIX 9

ICOCEDRON, CHAPTER 16: LATIN TEXT

From BM Addit. 15549, fols 18v-20v.

Elementis separatis et ad suas simplicitates redactis quantum possibile fuerit sic est procedendum ad mixtionem. Videtur quod ex igne et aqua surgat medium et ex aere et terra. Sed non est ita quia qualitates secundarie non sunt in gradu primariarum.

De equatione elementorum. Unde in equatione elementorum duplex est via. Una est ut conserves qualitates primas et reducas secundas ad eundem gradum in quo prime. Ut ignis qui est siccus in fine tercii reducas ipsum ad finem quarti. Alia est via magis apparens tamen eadem est ut conserves primas et destruas omnino secundas ut destruere siccum in igne ita quod tantum remaneat calidum. Unde cum gradus habet 60 minuta, 4 gradus habent 240 minuta.

De igne. Dico ergo sic. Ignis est calidus in quarto gradu et siccus in fine tercii; minuta caliditatis sunt 240 et minuta siccitatis sunt 180, unde deficiunt 60 minuta de siccitate in quarto gradu que restauremus de sicco in quarto. Et illud est terra, scilicet sicca in quarto gradu et (fol. 19r) frigida in medio tercii. Modo 60 minuta deficiunt mihi. Tollamus igitur 60 minuta de terra et illa 60 sunt sicca in quarto gradu et frigida in medio tercii, quia quelibet pars gradus est in eodem gradu. Cape ergo 30 minuta de igne et misce simul vide quid provenit, quia 30 minuta se habent ad secundum gradum sicut 60 ad quartum. Igitur temperant duos gradus frigiditatis. Adde iterum 15 minuta de igne et tunc medietas tercii gradus temperabitur. Istud adde ad ignem et habebis siccum in quarto gradu sicut calidum in quarto.

De terra. Nunc ad terram accedo. Terra est frigida in medio tercii gradus et sicca in quarto. Aqua est frigida in quarto gradu et humida in tercio. Minuta frigiditatis terre sunt 150 et minuta siccitatis sunt 240. Sic deficiunt in frigiditate 90 minuta. Misce ergo 90 minuta terre cum 90 minutis aque et habebis aquam frigidam in quarto gradu et siccam in primo. Aufer istam siccitatem. Pone scilicet 30 minuta de aqua, et tunc nec est siccum nec humidum nec calidum sed (fol. 19v) frigidum in quarto gradu, quia 30 minuta de

quarto ponunt primum gradum in temperamento. Misce illud equatum cum terra et habes terram frigidam et siccam in quarto gradu.

De aqua. Equa nunc aquam sic. Deficiunt de humido in quarto gradu 60 minuta. Accipe 60 minuta de aere et 30 et 15 de aqua ut dixi de igne et adde illud equatum ad aquam non equatam et habebis aquam frigidam et humidam in quarto gradu.

De aere. Ad equandum aerem. Accipe 90 minuta de igne non equato et 90 minuta de aere et 30 minuta de igne et habebis propositum.

Nunc ad aliam viam ut conserves qualitates primas et destrues secundas sic procede. Ad 60 minuta de terra pone 30 et 15 de igne, tunc suum calidum nichil est, suum frigidum nichil est, suum humidum nichil est, sed remanet suum siccum in quarto gradu. Sic de igne. Accipe 60 minuta de igne et 60 de aere, misceantur, calidum in quarto gradu reducit calidum in medio tercii gradus ad suum quartum gradum sed humidum in quarto gradu ad siccum in tercio facit ipsum esse humidum in primo gradu. Corrige ipsum per terram siccam tantum scilicet appone 15 minuta de terra (fol. 20r) sicca et destruet illud humidum. Quia sicut medium pondus in secundo gradu ignis reducit ipsum ad temperamentum, sic quarta pars medii reducit primum et sic de aliis contrariis, et sic habes calidum tantum. Accipe 60 minuta de aere et 60 de aqua et appone 15 minuta de igne tantum calido et habebis humidum tantum. Et accipe 60 minuta de aqua et 60 de terra et appone 15 de aqua et habebis frigidum tantum.

Hiis bene impressis in mente habes proportionem miscendorum sed relinquitur unum scilicet ut scias convertere quodlibet in quodlibet. Verbi gratia ignem in aquam. Sint elementa ad simplicitates possibiles redacta ut premissum est. Appone igitur ignem in quarto gradu ad aquam in quarto gradu et erit temperatum. Quicquid igitur sibi apponitur erit eiusdem complexionis ut si aqua apponatur ad hoc temperatum totum erit aqua. Hec est una causa multiplicationis medicine implicita tamen. Et sic ex equata elementorum mixtione surget una quinta essentia que erit incorruptibilis cum non sit inter ea actio nec erit passio (fol. 20v) et ita perseverans quod est unum intentum principale.

APPENDIX 10

MANUSCRIPTS OF DE ESSENTIIS ESSENTIARUM

The first four MSS listed have been consulted.

S. Marco fondo antico 323 (Valentinelli, XVI, 5), 15th century, fols. 1r-4or: "Incipit liber de essentiis essentiarum beati Thome de Aquino

magnifico principi ac illustrissimo domino suo R. primogenito regis (et) Sicilie dei gratia duci Calabrie ac in regno Silicie vicario generali frater Thomas de ordine predicatorum eius capellanus. . . ." The incipit of the dedication is, "Cum prima causa et summa ex altitudine . . .", and that of the text, "Quoniam divina potentia est infinita. . . ." At fol. 35r the ninth tractate ends: ". . . licet esse accidentium non fit nisi esse substantia de esse ergo et essentia dictum est." Then we read: "Incipit liber de esse et essentia intentionali. Ex nono ac (or, Ex novem autem) superioribus tractatibus de esse et essentia reali quid secundum potentiam ingenioli mei pertractatur. Nunc vero de esse et essentia intentionali seu loycali est aliquid pertractandum et primo in generali." This supplementary treatise in two tractates ends at 40r, ". . . nisi domino dirigente quem benedicam in secula seculorum, Amen." *Ibid.*, fols. 130r-131v, "Materia lapidis est aqua grossa habens multum . . ." which is the incipit of the first chapter of the sixth tractate of the *De essentiis:* see Zetzner, V (1660), 806-814.

FL Ashburnham 1451 (1374), 15th century, fols. 1-20r, ending with the eighth tractate, ". . . propter quod non est necessarium de eis hic tractare. Omnipotenti deo laus honor decus et gloria per infinita secula seculorum, Amen."

Vatic. Palat. 1329, 15th century, fols. 144r-154v: "Tractatus fratris . . . (here follow a series of abbreviations and single letters) ad illustrem Robertum primogenitum regis Sicilie et inclitum ducem." After the dedication with its usual incipit, this MS jumps at once to the sixth tractate on minerals and metals, with the incipit, "Nunc de corporibus inferioribus est tractandum . . ." and with an ending in part like that given by DWS No. 184, but then going on further, so that it may be well to quote it at some length: ". . . et multa mirabilia nature vidi sensualiter quod vix aliis possunt contingere nisi domino dirigente. (fol. 154v) In philosophicis experientia vincit rationem quia ratio vel doctrina de hiis a sapientissimis non est tradita quia hec vulgo philosophantium noluerunt publicare abscondentes et negantes ipsos ab hiis per enigmata et parabolas ac multas alienationes. Unde Avicenna ad Assen philosophum dicit, Experimentum discerni sensus rerum seu formam specificam rerum. Practica fratris . . . (then the same series of abbreviations and letters as at the beginning) ad regem Sicilie anno domini M CCCC XXX." The last date is presumably that of copying the manuscript.

BN 12969, 1501 A.D., fols. 1r-27r: "Incipit summa de essentiis essen-

tiarum a beato Thoma de Aquino compilata. Magnifico principi ac illustrissimo domino suo Roberto primogenito regis Iherusalem et Cicilie dei gratia duci Calabrie ac in regione Lonaris (?) generali frater Thomas de ordine predicatorum eius capellanus eiusque factura reverentiam cum humilis devotionis obsequio . . . / . . . Ego enim per sensibilia cognovi plura (?) et non in hoc libello posui quo sic fit quod asseverem me probasse et multa mirabilia nature sensualiter vidi ad que nullo modo aut vix possunt alii pervenire. Deo gratias. Explicit liber de essentiis essentiarum a beato Thoma de Aquino editus et a Leone 1501 13a die augusti scriptus."

Bordeaux 131, 14th century, fols. 135v-136: Thomas Aquinas, Tractatus de mixtione elementorum, opening, "Solet esse dubium apud multos quomodo elementa . . ." and closing, ". . . virtus eorum. Explicit," is perhaps an extract.

See DWS No. 184 for a number of MSS in British libraries, and Duhem II (1909), 304, for some account of BN 1715, fols. 159r-194r.

The following MSS, of which I have made some examination, appear to contain the fourth, fifth, and sixth tractates.

Wolfenbüttel 3586, 15th century, paper, fols. 1-10r.

Naples V.H.134, 15th-16th century, fols. 15r-21r.

APPENDIX II

SOME CONTINENTAL MANUSCRIPTS OF THE COMMENTARY OF ORTOLANUS ON THE EMERALD TABLET OF HERMES

I have used rotographs of the first two MSS and have personally examined the first and third.

BN 11201, 15th century, fols. 84r-98r: titulus, "Incipit liber Ortolani philosophi super textum Hermetis proponit primo primam partem lapidis. In hac prima parte istius libri tractans primo in ea quid sit spiritus quinte essentie et in quo elementorum habitat"; incipit, "Dixit philosophus accipe lapidem benedictum qui non est lapis . . ."; fol. 86r, "Secunda pars principalis istius prime partis de operatione elixiris ad vitam hominis tuendam que dicitur aqua vite"; fol. 88v, "Finit huius libri prima pars, Incipit secunda textus Hermetis patris alkymistarum de operatione magni lapidis" (in the margin, "Tabula smaragdi"); fol. 89r, "Expositio textus predicti ab Ortolano, Prohemium. Ego dictus Ortolanus ab ortis Martinus nuncu-

patus pelle (fol. 89v) Iacobina involutus novissimus indignus vocari philosophi discipulus . . ."; fol. 96r, "Et hec sufficiunt in lapide philosophico componendo. Sit nomen domini nostri Ihesu Christi benedictum per omnia secula seculorum, Amen."; fol. 96v, "Sequitur rubrica de putrefactione rerum quod ipsa est mater omnium rerum et est 4 c. allegorie Alphidii"; fol. 98r, ". . . putrefactio ergo est omnium rerum mater. Explicit tractatus magistri Martini Ortolani philosophi egregii Iacobite."

Copenhagen Gl.kgl.S.237, 15th century, fols. 18v-21r: "Ortulanus super expositionem Thelesini Hermetis. Ego dictus Ortulanus Martinus nuncupatus Iacobina pelle involutus novissimus ymmo indignus vix philosophorum mereor vocari discipulus . . . / . . . et hec sufficiunt in lapide philosophico componendo." Then follows in the margin, "Explicit expositio super Thelesino Hermetis." This text is roughly equivalent to fols. 89r-96r of BN 11201.

Naples VIII.D.20, membrane, written at Rome in 1524 A.D. (see fol. 84r), fols. 109r-118v: "In dei nomine incipit liber Ortolani philosophi super textum Hermetis et proponit primo primam partem lapidis in hac prima parte istius libri benedicti narrans in ipsa quid sit spiritus quinte essentie et in quo elementorum habitat. Dixit philosophus. Accipe lapidem benedictum qui non est lapis"; fol. 110v, "Secunda pars principalis istius prime partis de operatione elixiris ad vitam hominis tuendam quod dicitur aqua vite"; fol. 112r, "Finit prima pars huius libri. Incipit secunda pars textus Hermetis patris archimistarum de operatione magni lapidis"; fol. 112v, "Expositio textus predicti ab Ortholano. Ego Ortholanus ab ortis maritimis nuncupatus pelle Iacobina involutus novissimus indignus vocari discipulus philosophi . . . / . . . Explicit liber Ortolani philosophy quantum ad theoricam sed practica hic defficit."

Florence, Riccard. 1165, fols. 47-51. This MS was out on loan when I tried to see it in the summer of 1931, so that I have to follow the description of Carbonelli (1925), p. 50, note 1: "Super Hermetis epistolam Hortulani: inc. Illi qui scit facere lapidem philosophorum etc. Super Hermetis textum Expositio Hortulani inc. Dicit philosophus, accipe lapidem etc. Questo è ripetuto colla dicitura: Hortulanus dictus ab horto marino. . . ." This appears to be the same MS as Riccard. L.III.xxxiv (Lami, p. 238, where it is described somewhat differently).

Ruska, *Tabula smaragdina,* 1926, p. 193, citing H. Kopp, *Beiträge zur Geschichte der Chemie,* 1875, II, 381, represents as the oldest manu-

script of the commentary of Ortolanus on the Emerald Table one of the 14th century on parchment at the Bibliotheca Vadiana, St. Gall.

The following MSS I cite from catalogues:

Cambrai 920(819), 15th century, paper, fols. 21-28: "Dicit philosophus: Accipe lapidem benedictum . . . / . . . Explicit expositio textus Hermetis ab Ortholano super compositione lapidis philosophici."

BU 138, 15th century, fols. 158r-162v: "Incipit liber Ortulani philosophi super textum Hermetis. Dixit philosophus . . . / . . . in lapidis philosophici compositione."

BU 169, 15th century, No. 5: "Incipit liber Ortholani philosophi de lapidis philosophici compositione. Inter philosophos . . . / . . . benedictum in eternum."

BU 270(457), 15-16th century, vol. XXVIII, 4: Liber Hortulani philosophi super textum Hermetis. "Dixit philosophus . . . / . . . lapidis phisici (*sic*) compositione." *Ibid.*, X, 2, fols. 77v-99r: Incipit liber Ortulani super textus (*sic*) Hermetis. "Dum (*sic*) philosophus . . . / . . . magni lapidis compositione."

Rimini 77(D.IV.19), 15th century, fol. 53: Incipit Ortolanus dictus ab orto marino philosophus.

CLM 26059, 1507-1508 A.D., fol. 165 *et seq.*

In the alchemical bibliography of Vatic. Barb. 273 are the following items: fol. 287r, Hortulani liber. "Dixit philosophus, Accipe ergo lapidem benedictum qui non est lapis nec de natura lapidis. . . ." Adverte quod quidam ascribunt libellum hunc Raymundo Lulli et titulus est Potestas divitiarum; fol. 288r, Hortulanus dictus ab horto marino, "Dicit philosophus accipe lapidem . . ."; fol. 288v, Hortulanus tertia pars de compositione lapidis, "Scias igitur quod quamvis lapis noster. . . ."

APPENDIX 12

HEADINGS OF THE WORK, WHICH OPENS, STUDIO NAMQUE FLORENTI . . .

(MS BN 7149)

fol.

32r Incipit liber de magni lapidis compositione in operatione
Studio namque florenti philosophico quandam philosophie partem secretam videlicet scientiam . . .

32v Explicit prologus seu prohemium primi libri.
Incipit glossatio super eodem prologo

35v Et post sequitur textus. Que sit materia principalis qua generantur metalla in mineris. Rubrica. Primum capitulum huius libri.

36r Quod principia huius famose scientie similia sunt principiis nature in generatione metallorum. Rubrica

36v Finit et explicit prima pars huius libri

Incipit secunda in qua ostenditur quod due sunt partes magni lapidis videlicet opus elixiris. Rubrica

37r Quod duplex est elixir ad album scilicet et ad rubeum. Rubrica

37v De compositione et admixtione specierum que operatio vocatur opus veris. Rubrica

Quod lapis est mineralis et quare dicitur vegetabilis et animalis

38r Qualiter purgatur lapis in distillando a suo fleumate superfluo et quomodo debet recipi et custodiri aqua sulfuris nostri cum suo spiritu quinte essentie. Et quod hec aqua dicitur mercurius noster et quod spiritus lapidis non est aliquod elementum sed habitat in igne

Qualiter ignis continuatur et fortificatur et quomodo aqua nostra percipiatur. Rubrica

Quod aqua ista dicitur mercurius noster et quod spiritus lapidis non est aliquod elementum sed habitat in igne

38v Qualiter componitur terra lapidis alba cum aliis predictis tribus elementis. Rubrica

Et quod hec compositio sive matrimonium est vera et est perfecta compositio. Rubrica

39v Explicit secunda pars libri

Incipit tertia pars que est de secunda parte elixiris et dicitur elixir ad rubeum. Rubrica

Quibus modis et regiminibus fit elixir ad rubeum prius calcinatur corpus rubeum. Rubrica

40v Qualiter perficitur verum elixir et verum matrimonium inter utrumque corpus et spiritum. Rubrica

41r Rationes quare coniunctio istarum duarum aquarum est necessaria in hac arte. Rubrica

42r Explicit primus liber

Incipit liber secundus in quo primo queritur quid sit elixir et unde dicitur, quid alkimia, et quid lapis

Qualiter differunt inter se elixir alkimia lapis et medicina. Rubrica

42v Divisio lapidis operationis et hoc eius opus est facere descendere de celo in terram. Rubrica

Qualiter fit dispositio denigrandi quod est primum opus denigrandi. Octava operatio

43r Quomodo et qualiter hic lapis vel terra per se solvatur in aquam rubeam spissam. Rubrica

43v Qualiter terra soluta postea per se debeat congellari et regimen ipsius perfici. Rubrica

De modo et forma vasis

44r Hic exponuntur quedam methaforica philosophorum de hoc lapide. Rubrica (Here the first part of the second book ends and the second part begins)

Qualiter fit dispositio albedinis et incipit lapidis multiplicatio. Rubrica

44v Qualiter operatio quorundam philosophorum videtur contraria operationi predicte. Rubrica

45v Quod qui dat tincturam dat pondus et de compositione quorundam methaphisicorum. Rubrica

46r Finit huius libri secunda pars

Incipit tertia pars de dispositione cinerandi que dicitur fermentum solis. Rubrica

46v Qualiter ad dispositionem predictam generatur lapis vel fermentum solis. Rubrica

Finit tertia pars huius libri.

Qualiter fit et omnino perficitur dispositio ad rubificandum lapidem benedictum. Rubrica

47r Que sunt illa que confirmant opus et que sunt que illud destruunt. Rubrica

47v Qualiter debet esse bonum elixir sive sit album sive sit rubeum. Rubrica

Quod duo sunt ad interiora operis et unus destructor

Que sunt collateralia in abbreviatione operis lapidis benedicti. Rubrica

48r De modo faciendi proiectionem tam ex lapide rubeo quam albo. Rubrica

48v (The fifth part of the second book begins)

50r Quod omne de quocunque fit lapis mercurius nomine nominatur. Rubrica

50v Finit liber secundus.

Incipit liber tertius. Pars eius prima hec est quod spiritus quinte essentie qui in omnibus lapidibus dicitur lapis et non lapis nec

habet naturam lapidis et ita est in animalibus et vegetabilibus sicut in mineralibus

52v De natura et virtute istius aque vite. Rubrica

53r Ac de virtute modice terre lapidis que fermentum lapidis nominatur. Rubrica

Finit huius tertii libri prima pars

Incipit secunda pars in qua continetur secunda operatio lapidis huius

Qualiter media pars aque rubificatur. Rubrica

53v Qualiter fit opus ad album per hanc terram et aliam partem aque non tincte. Rubrica

54r Nunc autem de rubeo vegetabili lapide. Rubrica

55r (Second part of the third book ends and the third part begins) Qualiter fit opus rubeum de aqua rubea et dicitur opus tertium huius lapidis

56v De proiectione istius lapidis et quomodo fieri debet. Rubrica

57r (Fourth part of third book begins) Qualiter debeat fieri elixir vel aqua vite ad vitam hominis conservandam

57v (Fifth part of third book) Qualiter ex mercurio vegetabili generatur lapis animalis. Rubrica

58v (Sixth part of third book: separation of the four elements from any vegetable or animal)

59r Qualiter elementa preparata ad lapidem album vel elixir coniungi debeant. Rubrica

59v Quod secundum verba philosophi dicta in universali sive in speciali potest fieri lapis aque ardentis vel vite. Rubrica

61r (Seventh part of third book) Quod coniunctam vel divisam in tribus modis habuit Hermes scientiam in operatione solis

61v De materia quorundam philosophorum et quo tempore fuit primo compositus liber iste. Rubrica

62r De erroribus quorundam qui fuerunt tempore nostro et de nostris (?) vel indagatione huius scientie

63v . . . qui in perpetuum vivit et regnat etc. Explicit deo gratias.[1]

[1] In addition to the MSS listed at pp. 182-3, notes 24-25, may be mentioned BU 168 (180), 15th century, fols. 147r-171r, Liber qui pars textus alkimie nuncupatur; Turin 1105 (H-II-9), 16th century, Textus alchimiae de magni lapidis compositione et operatione.

APPENDIX 13

TITULUS AND INCIPIT OF JOHN DOMBELAY'S PRACTICA OF ORTOLANUS

Zetzner, IV, 912-932. "Hic incipit practica vera alkimica per magistrum Ortholanum Parisiis probata et experta sub anno domini millesimo trecentesimo et quinquagesimo octavo quam practicam Ioannes Dumbeler de Anglia excepit et compilavit de libris praefati magistri in quantum compendiosius potuit et brevius ex mandato illustrissimi et serenissimi principis patris philosophorum domini ac domini comitis de Falckenstain divina providentia sanctae Treverensis archiepiscopi anno domini 1386." After this titulus the text proper opens, "Quatuor sunt species quae ad opus elixirii pertinent. . . ."

DWS No. 169: BM Sloane 3457, 15th century, fols. 17v-46. "Incipit practica vera alkymica per magistrum Ortholanum Parisius probata et experta sub anno domini M°CCCC°(*sic*)LVIII quam Practicam Iohannes Dombelay de Anglia excepit et compilavit de libris prefati magistri et quantum compendiosius potuit et brevius ex mandato illustrissimi et excellentissimi principis patrum philosophorum domini ac domini Cononis de Falkensteyn divina providentia sancte Treverensis archiepiscopi. Anno domini M°CCC°LXXXVI. Quatuor sunt species que ad opus elixerii pertinent . . . / . . . rex aureo dyademate coronatus omnia ad sui naturam convertens in verum solificium."

Vatic. Barb. 273, fol. 210v: "Practica seu Alchimia seu operatio lapidis mineralis benedicti tam in via particulari quam universali secundum magistrum Ortulanum excepta et compilata per dominum Ioannem Dumbaley de Anglia ex mandato illustrissimi principis et archiepiscopi sancte Treverensis anno 1386. Capitulum primum, Quatuor sunt species. . . ."

Cassel Landesbibl. Chem. Quarto 10 (1): "Practica vera alchemica per magistrum Ortulanum Parisius probata et experta sub A.D. 1358," appears to be simply Dombelay's version.

CLM 25104, fols. 1r-10v: "Summa compilationis Io. Dumbaloy super textum alchimie practice."

APPENDIX 14

ANDALÒ DI NEGRO, LIBER IUDICIORUM INFIRMITATUM: HEADINGS

Based chiefly on MS Vatic. 4082, fols. 196r-209r.

Rubric: "Incipit liber iudiciorum infirmitatum et dividitur in duas partes quarum prima de iudiciis infirmitatum, secunda de electionibus in

faciendis minutionibus sanguinis et medicinis seu farmaciis exibendis et faciendis unctionibus."

Incipit of the preface: "Magnifico et egregio viro domino Johanni de laxa militi regio. . . ."

Incipit of the text in Vatic. 4085: "Qualitates morborum et accidentia infirmitatum nosse cupientibus. . . ."

Incipit of the text in Vatic. 4082: "Primo et ante omnia quere et considera gradum ascendentem. . . ."

Contents of Bk. I

1. de eis que sunt consideranda
2. de cognitione significationis questionis
3. de coniunctionibus corporalibus et aspectualibus planetarum
4. de questione recta et obliqua
5. si infirmitas est animalis vel spiritualis aut corporalis vel si ipse tres partes omnes simul patiuntur vel due eorum vel una tantum, nam pars animalis tunc patitur cum intellectus et memoria variatur et leditur et per consequens voluntas. Pars spiritualis tunc patitur amittitur visus vel auditus vel alius sensus; pars autem corporalis tunc patitur cum cor(pus?) affligitur in toto vel in parte.
6. Capitulum a quo humore procedat ipsa infirmitas et a quo membro
7. si infirmitas est per totum corpus vel per aliquam partem eius
8. si infirmitas est in augmentato statu vel decremento et utrum recidiuari (?) debet
9. crises infirmitatis et tempus eiusdem
10. si infirmitas erit longa vel brevis
11. si infirmitas est curabilis vivente homine
12. si infirmus morietur vel evadet de ipsa infirmitate et de terminis mortis vel salutis
13. si finis patientis erit bona vel mala
14. si infirmus erit perversus vel patiens (passiens) in tollerando infirmitatem
15. si medicus est infirmo utilis bonus et legalis vel non
16. si medicine sunt utiles infirmo vel non.

Explicit of Bk. I: ". . . secundum quod superius dixi de infortuna que infortunavit fortunam."

Rubric: "Explicit prima pars. Incipit secunda de electionibus."

Contents of Bk. II

Prima pars huius opusculi scilicet de iudiciis infirmitatum est adiutorio Christi Iehsu completa. De secunda scilicet de electionibus per sua

capitula breviter tractare curabo. Et primo quedam puncta generalia secundum triplicem modum minutionis sanguinis

2. de flebotomia in generali
3. de diversitate flebotomie secundum humoris proprietates et secundum etates
4. de flebothomia in diversis membris patientibus
5. de flebotomia in egritudinibus sensuum
6. de incisione cum ferro
7. de cauterio
8. de electione incipiendi curam alicuius infirmitatis
9. de electione pro clistere ponendo
10. de electione pro sanandis oculis
11. in electione pro medicina laxativa sumenda
12. de electione pro medicina restitutiva sumenda
13. de vomitu et gargarismo et proponendo medicinam per nares
14. de electione pro uncturis
15. de electione pro intrando balneum

Explicit: ". . . Venus et Luna sunt mediocres. Saturnus est malus. Mercurius secundum quod invenitur."

Rubric: "Explicit liber de iudiciis infirmitatum secundum Andalonem de nigro de Ianua."

APPENDIX 15

CANONS TO THE ALMANACH OF PROFATIUS JUDAEUS

To distinguish between astronomical tables and canons on or accompanying the tables is no easy task or between an almanach and canons on the same. This may be illustrated by the case of Profatius Judaeus, where the confusion is increased by the fact that there are two versions of the text of the *Almanach,* and a *Prohemium* as well as *Canons* accompanying it. These *Canons* are commonly ascribed to Profatius. Indeed, in some manuscripts they are prefaced to the *Almanach:* see BL Digby 114, 13th-14th century, fols. 37-49, Almanach Profatii Iudaei praemissis canonibus, Incipiunt Canones, "Quando vis scire locum trium superiorum. . . ." Why Steinschneider (1876), failed to note this item and instead listed under "Codices incerti" of the *Almanach* of Profatius, fols. 17-37 of the same manuscript, I do not know, since at fol. 17 occurs "Tractatus Profatii Iudei de utraque

eclipsi lune scilicet et solis, de modo operandi et proiiciendi utramque eclipsim," with the different incipit, "Ut autem annos Arabum per hanc sequentem tabulam invenias," followed by various tables and canons for Toledo, London, and Oxford. See Macray's 1883 catalogue of the Digby MSS, which, however, was not available at the time Steinschneider wrote.

The incipit, "Quando vis scire locum trium superiorum . . ." also occurs in a manuscript at Florence, Ashburnham 132 (206-138), 15th-16th century, fols. 86-87, Incipiunt Canones magistri Prefatii (*sic*) Iudei in suum Almanac perpetuum. The work closes, ". . . totam durationem eclipsis cum auxilio Dei. Expliciunt canones etc. Amen," but as it covers only two leaves, can hardly be more than a portion of the *Canons* and *Almanach*. Neither this nor the next manuscript to be noted are listed in Steinschneider's article.

Moreover, we find another incipit given for the *Canons* of Profatius: "Quia omnes homines naturaliter scire desiderant et maxime res occultas." See FL S. Crucis, Plut. XVIII sinist., cod. 1, published in 1908 by J. Boffito and Melzi d'Eril; Digby 149, pro maxima parte saec. XIII, fols. 172v-175v, Canones Profatii Iudaei pro tabulis suis super tabulis Toletanis fundatis ex exordium ab anno 1300 sumentibus; Oxford, University College 41, 14th century, fols. 47-52; Vienna 2492, 15th century, Profatius Iudeus, Tabule motus planetarum 1300-1418; and at Venice, S. Marco XI, 102 (Valentinelli), 14th century, fols. 6-9. But this is what Steinschneider gives as the opening words of the paraphrastic text of the prohemium, and which Duhem, III (1915), 309, translated: "Tous les hommes, dit Jacob au début de ce prologue, désirent naturellement de savoir, et surtout de connaître ce qui est très élevé et très caché . . ." citing BN 7372, by mistake for BN 7272, fols. 68r-69r. It will be clearer, however, to quote the Latin of BN 7272, fol. 68r, col. 1, directly, since it is both fuller and more precise than Duhem's free translation or paraphrase. First comes the rubric or titulus: "Proemium canonum Almanach profacii Iudei de monte pesulano de equationibus planetarum." The text of the proemium then opens: "Quia secundum philosophum in principio metaphisice omnes homines natura scire desiderant et maxime res occultas supremas et altas. . . ."

On the other hand, in BN 7408A, fol. 2r, col. 1, which Duhem did not use but which represents what Steinschneider styled the old or literal version, the prologue to the *Almanach* begins, "Quamquam multi

homines volunt astrologie scientiam et eam breve desiderant, tamen pauci sunt qui in ea studeant et acquirant, quod potest contingere propter duo. Primum quidem est difficultas eius et subtilitas quia multis ex hominibus qui habent intellectum bene dispositum est difficile bene ymaginari figuras que protenduntur in plano et multo magis est eis difficile figuras corporum horum pyramidales et spericales. . . ." In sense this and what follows agree with Duhem's succeeding translation of portions of the prologue, although his wording is more fulsome. "Quamquam multi homines . . ." is also the incipit of the "Prohemium in almanach Profatii Iudei" in a manuscript of the early fourteenth century at Erfurt, Amplon.Q.379, fols. 100-101v, where, however, the prohemium follows the *Almanach* instead of preceding it (*ibid.*, fols. 63-99v, Almanach Profatii perpetuum super revolutionibus planetarum), and, perhaps on this account, is also referred to at the close as, "Explicit Canon supra Al. pl. perpetuum." This manuscript was not listed by Steinschneider, nor was Amplon.Q.370, fols. 8-60v, for a description of which see Schum's *Verzeichnis,* which of course had not been published at the time of Steinschneider's article. In this last mentioned manuscript the opening words of the "Canon supra Alm. Iudei et primo de Saturno," which occur at fol. 59, and run, "Quando vis scire in quo signo est Saturnus . . ." are analogous to the "Quando vis scire locum trium superiorum . . ." already quoted, and probably indicate that only a portion of these Canons are being given.

It would seem then, that the Prohemium sometimes is regarded as an introduction to the *Canons* and sometimes as an introduction to the *Almanach* itself, and that not improbably both the paraphrastic version of the prohemium and the *Canons* are by a later editor than the literal version of the Prohemium and the original Latin translation of the *Almanach.*

We have seen that Andalò composed Canons on the Almanach of Profatius.[1] Their opening words[2] are not those commonly given for the *Canons* on the *Almanach* when these are ascribed to Profatius himself. Moreover, in the old catalogue of the royal library at Paris Andalò's work is described as an exposition or commentary upon the *Canons* of Profatius[3] rather than canons by Andalò on the *Almanach*

[1] BN 7272, fol. 60v, col. 1: rubric, "Incipiunt canones super almanach dicti prefatii (*sic*) in quanto tempore planete currunt zodiacum compositi a domino Andalo de Nigro de Ianua."

[2] *Idem,* "Quia in arte astronomica modus equandi planetas per tabulas arabicas vel latinas nimis erat difficilis. . . ."

[3] "Andaloni de Nigro expositio in supradictos canones," the preceding work

itself.[4] Moreover, following the old or literal version of the almanach of Profatius in the Paris manuscript already mentioned are *Canons* on the almanach which appear to differ both from those by Profatius and the commentary of Andalò. They seem to be written in a hand of the first half of the fourteenth century. They state that the almanach of Profatius was made for the latitude and longitude of Montpellier and according to "the truth of the Tables of Toledo." These *Canons* themselves are brief, covering four leaves.[5]

Below are reproduced the headings or rubrics in the text of Andalò's *Canons* on Profatius as contained in BN 7272. Andalò describes all of Profatius's tables one after the other and adds the corrections which are necessary to bring them up to date. He makes such explanations as why the extra day of February in leap years is not noted by Profatius in the tables for Saturn, Jupiter, Mars, and Venus but only in the tables for the sun. Also that Profatius reckoned the solar year as 365 days and six hours, from which it actually falls short by four minutes and 48 seconds. Consequently for each revolution one should add "no degrees, no minutes, 47 seconds, 31 thirds, and 36 fourths, concerning which Profatius cared to make no mention."

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having been listed as "Profacius Judaeus canones de equationibus planetarum."

[4] In BN 7272 the Canons of Andalò are immediately preceded by the Proemium, at fols. 68r, col. 1-69r, col. 2, to the Canons of Profatius, but neither the Almanach nor the Canons of Profatius appear in the manuscript, giving us yet another illustration of the various combinations in which they may be found in the manuscripts.

[5] BN 7408A, small two-columned page with red and blue initials, fols. 74r-77v. "Incipiunt canones super tabulas almanach Profatii Iudei. Istud almanach Profatii Iudei ordinatum est sive factum super villam Montis Pessulani ad meridiem diei illius qui secunda feria nominatur. Est autem longitudo ab oriente 148 graduum vel ab hary (i.e. Arin, the hypothetical city on the equator at the center of the world) 78 ab occidente vero 52 gradus. Latitudo autem eius est 43 gradus. Sequitur autem istud almanach modum illius quod fecit Ptholomeus ad Cleopatram filiam suam sed in luna diversificatur. In isto autem incipiunt omnes revolutiones planetarum ab anno Domini nostri Ihesu Christi 1300 et prima die martii. Sunt autem omnes planete in prima sui revolutione equate secundum veritatem tabularum toletanarum in quibus non oportet aliquod minui sive addi. In sequentibus vero revolutionibus opportebit addi vel minui secundum quod docebitur infra in canonibus planetarum. . . ." The Canons close, ". . . Si autem non diceret nisi primam revolutionem que est 98 mensium, adde cuilibet diei 10 gradus et 2 minuta et habebis sequentem revolutionem ad alios 98 menses; quod quidem faciendum est in qualibet revolutione donec compleverint 30 revolutiones que faciunt 298 annos lunares, et tunc redibunt ad locum primum nullo addito vel diminuto et quod oportet addere unum solum gradum per alios 294 annos, et sic per consimiliter procedet argumentum. Expliciunt canones Profatii."

Headings of Andalò's *Canons* on Profatius in BN 7272 (the numbers at the left indicate the folios and columns)

70v, 1, Additiones et diminutiones faciende in revolutionibus planetarum
72r, 2, De tabulis 5 planetarum
73r, 2, De tabulis argumenti (augmenti?) lune
75r Tabula ad sciendum qua feria intret quilibet mensis annorum christi
76r, 1, De tabulis equationis argumenti lune
77r, 1, De tabulis capitis draconis lune
78r, 2, De tabula buth
78v, 1, Tabula divisionis longitudinis buth
78v, 2, De tabula latitudinis lune
79r, 2, De tabula eclipsis lune
83r, 1, De eclipsi solis quomodo et qualiter fit
Quid sit coniunctio
83r, 2, Quid sit aspectus.

APPENDIX 16

NICCOLÒ DI PAGANICA, COMPENDIUM MEDICINALIS ASTROLOGIAE: CONTENTS

From MS S. Marco, Venice, fondo antico 538 (Valentinelli, XIV, 23), 14th century, fols. 12r-15r; BL Canon. Misc. 46, 15th century, fols. 51r-60v.

1. de forma et[1] dispositione totius orbis et de figura machine mundialis[2]

2. de proprietatibus et complexionibus naturalibus signorum et planetarum

3. de potestate seu dominio planetarum in signis

4. de influentia universali celestium corporum in inferiora

5. de particulari influentia celi in corpus humanum

6. de influentia planetarum in corpus humanum et de infirmitatibus

7. de duodecim domorum divisionum significatione et de ipsarum dominio supra corpus

8. de coniunctionibus et aspectibus planetarum adinvicem (or, *in signis*)

9. de planetarum et[3] domorum fortitudine cognoscenda et de significatore quidem almutez

10. de formatione domorum et planetarum locis et de instrumentis huic sciencie necessariis[4]

11. de modo formandi questionem et de forma et[5] regula iudicandi

[1] *Seu* in Canon. Misc. 46.
[2] *Mundi* in Canon. Misc. 46.
[3] *Atque* in Canon. Misc. 46.
[4] "De formatione domorum et planetarum locis habendis," in Canon. Misc. 46.
[5] Canon. Misc. 46 omits the words, "de forma et."

12. de causis crisium et terminis creticorum dierum ac pronosticationibus eorundem
13. de electionibus horarum laudabilium in universali
14. de electionibus horarum in particulari
15. de hora electionis ad flebotomiam et farmatiam

APPENDIX 17

EXTRACTS FROM AUGUSTINE OF TRENT ON THE YEAR 1340: LATIN TEXT*

Below I reproduce the Latin text from the two Munich manuscripts of the opening passage of Augustine's treatise and its second, third, and fourth parts, which are those of most medical interest. The first and fifth parts are primarily astrological, as are the text and diagrams which follow the fifth part in CLM 647 but are not contained in CLM 276.

Augustine of Trent on the Year 1340: opening passage CLM 276, fol. 87r, col. 1; CLM 647, fol. 1r.

Reverendo in Christo patri ac domino suo domino Nicolao Episcopo Tridentino frater Augustinus de Tridento lector perusii vester Capellanus et filius in Christo Ordinis fratrum heremitarum sancti Augustini se ipsum cum humili recommendatione et orationem perpetuam in domino. Nam secundum sententiam principis perypateticorum Aristotelis in methaphysica sua. Celum et natura dependent a primo principio. Ex quo verbo elicitur statim quod omnia dependent a deo non tantum in genere cause similis sed efficientis et creantis ut theologi et fideles astruunt. Phtolomeus vero et astrologi dicunt omnia transmutabilia dependere a circulo zodiaco, a coniunctionibus et ab aspectibus planetarum, principaliter tamen a deo. Secundum istum circulum zodiaci formabant et formant continue astrologi figuras revolutionum annorum mundi, figuras nativitatum, et figuras electionum, mediatiantibus quibus figuris et aspectibus planetarum iudicabant et iudicant super accidentia mundi, super accidentia nativitatum, et super accidentia (CLM 647, fol. 1v) particularia personarum. Discutere omnia talia per ordinem esset nimis prolixum. Ad presens autem in genere intendo aliqua discutere circa et sextam domum figure istius anni que domus sexta dicitur infirmitatum secundum astrologos.

Iuxta hoc valde breviter in generali 6 declarabo per ordinem et erunt utilia (*ultima* in CLM 276) in isto anno et in aliis annis concurrenti-

* Revised from *Sudhoffs Archiv*, XXIII (1930), 348-356.

bus similibus constellationibus. Etiam utile erit hoc opusculum quia regule perpetue quamplures ibi continentur utiles medicis et universis personis. Determinavi infrascripta in universitate studii Perusii propter ignorantiam infirmitatis. Nam in ista pestilentia infirmitatum medici Florentie Perusii Rome atque in ceteris regionibus Ytalie tribuebant unam medicinam omnibus humoribus, ut scriptum fuit mihi, ignorantes radices infirmitatum. Et accidit error iste pestiferus multis medicis propter ignorantiam astronomie.

Ad evidentiam autem dicendorum. In primo principali ostendam 9 conclusiones et plura correlaria. Nam primo ostendam quod egritudines istius anni fuerunt et erunt ratione male constellationis scilicet ratione martis et sexte domus (CLM 647, fol. 2r). 2° ostendam in speciali cuius nature fuerunt et erunt egritudines istius anni in generali. 3° assignabo unde proveniant egritudines particulares et permixte et simplices. 4° declarabo qualiter providendum sit egritudinibus simplicibus et permixtis. 5° declarabo quibus personis accidunt egritudines istius anni in generali ratione planetarum. 6° declarabo quibus membris accident egritudines specialiter et radices ex quibus procedunt. 7° declaro terminos infirmitatum utrum sint terminales in bonum (*totum* in the MSS) vel in malum (CLM 276, fol. 87r, col. 2) et qualiter pronosticatio fit. 8° declarabo regiones quibus contingunt infirmitates secundum principia astrologorum. 9° declarabo aliqualiter ascendens civitatis vestre Tridentine unde vestri medici poterunt elicere varia accidentia in isto anno et aliis secundum coniunctionem et oppositionem planetarum. . . .

Augustine of Trent on the Year 1340: secundum principale, etc. CLM 276, fol. 88v, col. 2; CLM 647, fol. 8v.

Sequitur secundum principale ubi declaratur qualiter persone sane se habeant custodire in isto anno et in aliis annis quando similis constellatio regnaret. Regule istius secundi (CLM 276, fol. 89r, col. 1) principalis (CLM 647, fol. 9r) sunt utiles omni tempore et sunt perpetue. Continet inquit istud principale 12 conclusiones principales.

Caveant sibi primo a fructibus quia (*et* in CLM 647) frequenter ipsis comestis et inordinate varios luctus dabunt unde Avicenna 3a fen primi canonis capitulo de regimine eius quod comeditur dicit: 'Oportet ut sanitatis conservator studeat ne cibi ipsius substantia sit aliquod nutrimentum medicinalium sicut olera et fructus.' Ex quo trahitur quod omnes fructus in genere sunt mali. Et subdit Avicenna fructus tamen nutrienti magis similes sunt ficus et uve valde mature et

dactili in regionibus et civitatibus in quibus esse consueverunt. Et in quarto, fen prima, capitulo de cura febrium putridarum in generali dicit quod omnes fructus nocent febricanti cum ebulitione sua et corruptione sua in stomaco.

Caveant sibi 2° a rebus crudis ut a cepis scalonibus lactucis etc. et precipue saturnini. Consulo tamen hiis qui comedunt lactucas, vel portulacas vel similes herbas crudas in aceto ratione caloris accidentalis quod prius eas (CLM 647, fol. 9v) aliquantulum faciant bulire (*pulire* in CLM 276) in aqua simplici et deinde extrahantur et comedantur cum aceto loco salliceti.[1] Nam per talem bulitionem humor terrestris inde tollitur et per consequens magis digestioni conformabunt. Sumantur duo vel tres boli quando oportunum fuerit. Ista videtur esse intentio cuiusdam in libello de regimine sanitatis dicentis, 'Lactuca frigida est et humida in primo gradu.' Et subdit infra ad propositum, 'Cocta magis valet quam cruda et modo nascens quam diu nata.' Et Serapio[n] in libro de simplicibus capitulo 233 dicit de se ipso, 'Et ego quidem comedebam lactucas quando eram iuvenis etc.' Et subdit inmediate ad propositum, 'Et nunc etiam comedo postquam senui eas elixas etc.' Cuius ratio potest esse quia elixe facilioris transitus sunt propter ablationem materie terrestris etc. Similiter dic de aliis herbis.

Caveant sibi tercio a variis motibus frequentatis nimis et specialiter ab hiis qui abiciunt a substantia et evacuant etc. quia tales motus frequenter inducunt febres et passiones varias non tantum in parte extrinseca sed intrinseca scilicet in medullis, ut tradunt auctores medicine. (CLM 647, fol. 10r.) Hic fuit obiectum a quibusdam medicis ad pauca (CLM 276, fol. 89r, col. 2) respicientes de facili enuntiantes et dicentes quod hec regula contradicit multiplicationi speciei humane. Ulterius non potest servari in omnibus quia expedit in aliquibus quod sollicitentur frequenter in istis motibus, aliter possunt perire. Mirabile est de hominibus quod non distinguunt propositiones indefinitas ut docet Aristotiles in loyca sua. Dixi de motibus non regulatis quod ab illis se custodirent, conformans me in parte dicto illius magni astrologi et medici Michaelis Scoti. Unde inquit Michael Scotus in editionibus suis ad Fridericum[2] imperatorem dicit, 'O imperator, si vivere vis sanus, sit tibi semel in die semel in septimana semel in mense et semel in anno,' et ex hoc non tollitur multiplicatio speciei humane, ymo peramplius species multiplicatur, individua perfectius conservantur, et per

[1] For salicetum? *Salletici* in CLM 647; [2] *Federicum* in CLM 276. *salliaci* or *sallicici* in CLM 276.

consequens monstrua non tot generantur vel generabuntur. Nam per unum actum dispositum acquiritur individuum denumeratum (?) quia secundum phylosophum in quinto physicorum, 'Generatio fit in instanti.' Regula inquid[3] simpliciter (CLM 647, fol. 10v) non potest servari in omnibus et precipue in martialibus et in quibus virtus planete Veneris predominatur. Nam Michael Scotus magnus medicus et astrologus forte et sine forte locutus fuit secundum complexionem Friderici imperatoris et non secundum complexionem[4] aliorum. Et per hoc patet ad primum. Ad secundum dicendum quod instantia impedit se ipsam, quia dicit quod expedit, expediens convertitur cum necessario ut alibi declaratur, et necessitas non habet legem. Fiat ergo secundum expedientiam et necessitatem eius, tamen de consilio peritorum medicorum.

Quarto caveant sibi ne fenestras de nocte nec de die dimittant apertas, et quando dormiunt in cameris suis, quia frequenter venti et venticuli flant, nunc ab oriente, nunc ab occidente, nunc a septentrione, nunc ab aquilione etc. Isti venti elevant vapores sepe a locis corruptis et impellunt ad loca habitabilia ubi animalia habitant, que quidem animalia attrahunt vapores corruptos et sic attrahendo animalia et homines inficiuntur quia varie infirmitates inde generantur ex vaporibus corruptis. Ulterius (CLM 276, fol. 89v, col. 1; CLM 647, fol. 11r) isti[5] venti et venticuli inveniunt personas discoopertas propter calorem unde exalatio fit, venti subintrant per poros exalatos, et faciliter persone inde alterantur. De istis talibus vaporibus loquitur Averrois commentator et doctor noster frater Egidius super 2° de anima allegantes dicta Avicenne de prelio Troianorum et de cadaveribus etc.

Quinto caveant sibi a locis corruptis et fetidis propter malum aerem. Habeant cameras suas colerici in estate et in autumpno precipue in locis frigidis et humidis. Aspergant parietes et locum camere aceto vel aliis fumigationibus bonis ut docet Avicenna in rectificando aerem. Non teneant comestibilia nec talia unde aer posset infici quia aer continue attrahitur ab homine etc.

Sexto caveant sibi a stupis et a balneis specialiter colerici et martiales. Et si opportunum esset eis intrare balneum, non intrent nisi digestione facta nec multum morentur. Non intendant capitibus discoopertis, nec statim bibant post balneum, quia frequenter expertum est quod febres vel frenesis tales invasit etc. (CLM 647, fol. 11v.)

Septimo caveant sibi universi a repletionibus et a diversis cibis et

[3] *Inquam* in CLM 647.
[4] *Complexiones* in CLM 276.
[5] *Hi* in CLM 647.

precipue non usitatis, quia diversitas cibariorum arguit diversitatem operationum secundum naturales. Nam secundum Aristotelem et Averroem commentatorem eius in de celo et mundo, Substantia virtus et operatio se consecuntur etc.

Octavo caveant sibi a potatione serotina et diurna, quia serotina impedit digestionem et varias passiones inducit in capite, diurna vero usitata illicite inducit tremulationem membrorum et debilitatem nervorum. Permittitur tamen quod in locis corruptis et ubi aer non est bonus quod persone bibant in mane unum ciphum vini et comedant aliquid cum vino, et intelligitur de personis que use sunt bibere vinum, et excluduntur pueri et mulieres et precipue que apte sunt ad prolem. Tales enim mulieres multum deberent cavere sibi a vino puro et a potatione inordinata etc. Nam vinum sumptum ut prelibatum est reprimit (CLM 276, fol. 89v, col. 2) coleram, prohibet malos vapores, roborat vires, et letificat animum, ut scribitur in quodam libello de regimine sanitatis.

Nono caveant sibi a sompno meridiano (CLM 647, fol. 12r) et specialiter colerici. Vadant ante aliquantulum tempestivius dormitum in sero vel dormiant in mane aliquantulum plus. Et si expediret dormitio eis propter aliquod accidens etc., non dormiant calciative; vapores pedum inde ascenduntur ad caput.

Decimo caveant sibi ne in mane nimis tarde comedant et in sero nimis tempestive, et specialiter in estate et in autumpno. Sit ergo ordo iste comedendo. In mane comedant hora tertia quia ab hora tertie gradu (?) colera accenditur, humidum radicale consumitur, et calor naturalis debilitatur, et appetitus deinde efficitur inordinatus in motibus suis etc. In cenis vero comedant cum sol vadit ad occasum. Comedant in mane melius quam in sero. Non comedant in sero brodilia[6] et specialiter fleuma quia talia brodilia generant varias eruptiones. Sed comedant carnes assatas vel coctas in brodio cum agresto Martialis et Saturninus. Cum vero surgunt de mensa lavent sibi manus cum aqua simplici et deinde lavent sibi os de vino et postea bibant secundum exigentiam suarum (CLM 647, fol. 12v) naturarum et temperate. Vadat postea spatium per rivos aquarum et per viridaria. Addantur cantinelle vel verba leta et sollatii, quia talia letificant animum et per consequens conservant sanitatem, ut scribit quidam libellus de regimine sanitatis. Addit Aristotiles in libro de secretis secretorum ad Alexandrum magnum. Cum homo surgit a dormitione pectinet sibi caput et specialiter cum pectine de ebore. Pectinatio exalat vapores de

[6] *Prodilia* in CLM 276.

capite. Deinde lavet sibi manus et faciem propter oculos etc. Addunt autem ulterius quidam dicentes quod non est bonum dormire in herbis ad coopertum celi propter epar et splenem. Etiam summe cavendum est ne homo dormiat sub umbra arboris nucis quia umbra illa frigida est et (CLM 276, fol. 90r, col. 1) pestifera ut tradunt naturales. Cum vadunt visitando infirmos portant aliqua odorifera in manibus et specialiter rutam cum salvia et feniculo. Ulterius lavent sibi frequenter pedes cum aqua calida saltem semel in septimana etc.

Undecimo caveant sibi a leguminibus et specialiter a fabis quia secundum Serapionem (CLM 647, fol. 13r) in libro de simplicibus capitulo xx faba est cibus inflativus magis quam aliquis alius cibus et tardioris digestionis. Et secundum Diascoridem fabe generant ventositates et inflationes et sunt tarde digestionis et generantur ex eis humores mali. Caveant sibi ulterius ab esu caulium quia caules secundum Serapionem in libro preallegato capitulo 32 dicit. Et caules quidem desiccant sicut lentes et per hoc inducunt tenebrositatem visus. Et in quodam libro de proprietatibus rerum scribitur dicens, Quia caules sunt frigidi et sicci in 2° gradu generant inquam turbidum sanguinem et melancolicum. Permittitur tamen brodium caulium stipticis et hoc pingue[7] quia laxativum et medicinale dicitur.

Duodecimo caveant sibi omnes in omnibus regionibus qui habuerunt martem in suis nativitatibus in sexta domo quia tales fere quassabuntur variis infirmitatibus. Caveant sibi ulterius illi qui habuerunt dictum martem in sexta domo suarum nativitatum quia illis accidet mors secundum astrologos, et diversificaretur mors in hominibus ratione martis (CLM 647, fol. 13v) ex aspectu bonorum et malorum planetarum. Perlegantur super hoc libri iudiciorum et nativitatum, et specialiter liber magnus ipsius Haly et liber aomar et Abohali. Et in illis libris dantur cause quare unus suspenditur et alius decapitatur, quare unus submergitur et alius moritur in lecto etc. Remove hic, bone christiane, intellectum tuum a libris iudiciorum ipsorum philosophorum et astrologorum, quia talis diversitas mortis magis provenit forte propter peccata hominum vel propter relucentiam iustitie divine, ut videtur innuere beatus Augustinus. Noli ergo credere tales effectus procedere ex constellatione quia talia possunt (*possint* in CLM 276) impediri ex parte materie. Et licet hoc sit difficile (CLM 276, fol. 90r, col. 2) non tamen est impossibile quia sapiens dominatur (*dominabitur* in CLM 647)

[7] In place of the four words here following *caulium* CLM 276 has *pingue stipticis*.

astris secundum Ptolomeum. Attendant hic medici dicta circa istud capitulum quid dicant Haly commentator et almansor in suis libris. Nam Haly in libro magnorum iudiciorum parte 5i (*sic*) capitulo 12 dicit, Quicumque habuerit in eius nativitate martem et venerem in sexta domo erit phisicus sapiens intelligens. Et Almansor magnus medicus et astrologus in libro (CLM 647, fol. 14r) nativitatum capitulo 23 dicit, Perfectus medicus erit cui mars et venus fuerunt in sexta domo. Sed planum est per tabulas alfonsistarum patet quod mars fuit in sexta domo in revolutione anni et venus in quinta gradu (*sic*). Ulterius sub marte secundum astrologos continentur milites duces medici etc. Provideant ergo sibi et aliis.

Hic fuit data una glosa per quendam peritum medicum et astrologum dictis Haly et Almansoris atque dictis meis quod dicta debent intelligi de medicis famosis. Mihi vero videtur quod tantum debet intelligi conclusio de illis qui habuerunt martem in sexta domo quantum ad infirmitates vel in sexta domo quantum ad mortem. Et ista videtur intentio omnium astrologorum, et hoc de secundo principali.

Sequitur tertium principale ubi declaratur quibus rebus sit utendum et quibus non in comestibilibus. Et continet conclusiones seu capitula, ut melius dicam, sex. Nam in primo capitulo declaratur quibus carnibus gradientium sit utendum et quibus non. In secundo capitulo declaratur quibus interioribus (CLM 647, fol. 14v) extremitatibus et partibus animalium sit utendum. In tertio capitulo declaratur quibus volatilibus et quibus extremitatibus volatilium sit utendum. In quarto capitulo declaratur quibus piscibus sit utendum et quibus temporibus. In quinto capitulo declaratur qualiter ovis sit utendum et quibus ovis. In sexto capitulo declaratur qualiter sumendus erat caseus. Composui supradicta sex capitula ex libris et ex radicibus Ypocratis, Galieni, Avicenne, Serapionis, et ex dictis quorundam antiquorum et modernorum assignando proprietates in gradibus dictarum rerum comestibilium. Ad presens relinquo vobis intimarum (?) ista capitula cum ratione prolixitatis verborum tum etiam ratione et reverentie medicorum et precipue (CLM 276, fol. 90v, col. 1) magistrorum Odorici Iordani nam libri eorum sufficienter tradunt talia. Et tantum de tertio principali.

Sequitur quartum principale ubi declaratur qualiter medicus habeat providere in variis accidentibus concurrentibus sano et egro. Et continet quatuor capitula. In primo capitulo declaratur (CLM 647, fol. 15r) qualiter medicus debeat providere in minutione sanguinis per fle-

botomiam et per ventosas. In 2° declaratur in quibus temporibus seu constellationibus debeat medicus dare potiones et purgationes etc. In 3° capitulo declaratur qualiter se debeat habere in medicaminibus constipatus. In quarto capitulo declaratur qualiter se debeat habere in sternutationibus gargarismis et vomitibus[8] propter potionem vel per quodcumque aliud.

Quantum ad primum dic(endum) secundum Haly electionum horarum in minutione sanguinis etc. Oportet in hoc quod luna sit in defectu sui luminis et sit in signo masculino.[9] Sit etiam iuncta marti. Nec est timendus mars nisi sit ascendens in latitudine et in circulo sue augis, sitque domus lune aspiciens illum aspectu laudabili. Et dixit quidam quod cavendum est in hoc a Tauro et a leone. Et dixit ulterius quod si modicum necesse fuerit minui de sanguine luna sit in libra vel in scorpione. Et cavendum est ne luna sit in coniunctione mercurii vel saturni etc. Pre omnibus cavendum est (CLM 647, fol. 15v) ne luna sit in signo geminorum quia secundum Ptolomeum aut minutio geminaretur aut membrum inficeretur et interdum homo moritur: experientiam vidi oculis meis. Etiam cavendum est ne ascendens sit signum geminorum. Apta ergo martem et lunam in talibus quia secundum Albumasar Mars est infortunatus in omni opere nisi in hiis que pertinent ad sanguinem et ad apertionem venarum etc. Alkindus dicit in minutione sanguinis etc. necesse est ut sit luna et ascendens in signis aereis et igneis et domini eorum. Nec tangendum aliquod membrum dum fuerit luna dominus domus ascendentis in signo quod habeat illud membrum. (CLM 276, fol. 90v, col. 2.) Laudamus quoque ut sit dominus medii celi fortuna aspiciens lunam vel domum ascendentis et luna non sit in decima domo. Aerea signa meliora sunt post preventionem. Minutio quoque et in initio mensis laudatur. Cavendum est tamen a coniunctione domini octave cum luna etc. Perlegantur libri Haly de electionibus horarum super hoc.

(CLM 647, fol. 16r) Quantum ad secundum, scilicet in purgationibus dandis dic secundum Haly libro preallegato quod oportet cum hoc fecerimus ut luna sit in ultima medietate libre vel in prima facie scorpionis sitque dominus eius fortunatus et fortis, et similiter dominus ascendentis. Bonum est etiam ut sit ascendens aliquod de illis signis vel aliud quodlibet ex signis inferioribus. Bonum est ut sit luna in hiis. In signo autem significante id membrum sit fortuna fortis. Et si volueri-

[8] *Virtutibus* in CLM 647, which also omits the *per* before *quodcumque*.

[9] *Figura masculina* in CLM 647.

mus cum illo medicamine calefacere vel infrigidare, desiccare vel humidare, sit luna et ascendens in signo significante illud.[10] Et caveas ne sit aliquis ex significantibus nec ascendens in signis ruminantibus quia talia signa significant vomitum. Et dixit quidam quod ex omnibus iii[11] signis ruminantibus solus capricornus est odiosus. Cave et precave tibi, bone medice, a saturno et a marte in dandis potionibus quia saturnus constringit medicinam, Mars vero ducit usque ad emissionem sanguinis etc. Perlegatur liber Haly etc.

(CLM 647, fol. 16v) Quantum ad 3m dic quod in medicinis constipativis summe cavendum est a marte. Perlege super isto capitulo librum Haly commentatoris. Cavendum est etiam a signis ruminantibus etc.

Quantum ad 4m dic secundum Haly in libro ut supra, Oportet illum qui voluerit uti aliquod ex istis ponat ascendens et lunam et locum significatoris ex signis ruminantibus. Dicit Accabarus quod luna sit minuta lumine et cursu ascendens in circulo augis. Dicit Achait quod luna sit et ascendens in cancro vel leone vel virgine etc. Hic fuit facta obiectio per medicum quomodo posset medicus talia observare. Re- (CLM 276, fol. 91r, col. 1) spondeo quod cautus et peritus medicus potest in maiori parte servare et specialiter in sanis, etiam in infirmis, hoc supposito quod cognoscat principium egritudinis infirmi et sciat cursum planetarum ut tenetur scire medicus, ut probatum est in quarta conclusione primi principalis secundum intentionem Ypocratis et Galieni. Ulterius fuit obiectum quod expedit aliquando quod fiat evacuatio statim etc. Mirabile est si expedit et se dimisit veni- (CLM 647, fol. 17r) re ad ultimam necessitatem propter ignorantiam vel imperitiam. Fiat quia necessitas non habet legem ut frequenter est allegatum. Et hoc de quarto principali.

APPENDIX 18

DE PRESAGIIS TEMPESTATUM: LATIN TEXT

The following text is based upon these two manuscripts:

BL Laud Misc. 594, 14th-15th century, membrane, double columns, Gothic hand, fols. 115r, col. 2-116r, col. 2, where it is preceded by the *Flores* of Albumasar and followed at fol. 116v, col. 2, by an *Epistle* of the astrologer Messahala.

Vatic. Ottobon. 1870, late 15th century, in a round and less abbrevi-

[10] *Etc.* in CLM 647.

[11] The character in the MSS looks more like ii, n, or 11, but probably the ram, bull, and goat are the "ruminating signs."

ated humanistic hand, fols. 107r-109r (old numbering 106r-108r), where it is preceded by a medical treatise and followed by Alkindi, *Liber de quinque essentiis.*

The text of both manuscripts is frequently corrupt but fortunately is usually not so simultaneously. They seem to have been copied from different originals and to belong to different families of manuscripts. The variant readings given in the notes are of interest chiefly as illustrating the absurdities that a heedless copyist might commit in transcribing a manuscript which he could not read very well, although they also illustrate the common medieval tendency to suit oneself as to order and choice of words in reproducing a text, the transcriber being content if he retained its sense.

Another manuscript which I have seen but not used for the following text is Bruges 523, 13th-14th century, fols. 64-65: "Incipit tractatus de presagiis tempestatum. De tempestatum presagiis tractaturi a sole sumamus exordium. Purus oriens atque non fervens . . . / . . . duras tempestates prenuntiant. Explicit."

According to Léopold Delisle, "Notice sur des manuscrits du fonds Libri conservés à la Laurentienne," *Notices et extraits des manuscrits de la bibliothèque nationale et autres bibliothèques,* XXXII (1886), 81, there is a "Liber de presagiis tempestatum" in FL Ashburnham 1727.

Incipit Liber de Presagiis Tempestatum foeliciter[1]

DE TEMPESTATUM PRESAGIIS TRACTATUri a sole sumamus exordium.[2]

Presagium de sole[3]

Purus oriens atque non fervens serenum diem[4] nuntiat ad hibernum, pallidus grandinem. Si occidit pridie serenus et oritur, tanto certior fides serenitatis.[5] Concavus oriens pluvias predicit,[6] idem ventos. Cum

[1] This heading is found only in Ottob. 1870. In the Laud MS the title, De presagiis tempestatum, is inserted from the bottom margin where it is written in a later hand than the text.

[2] This introductory sentence is from Ottob. 1870, where the first line is written in Roman capitals and a space left blank for an illuminated initial D. In the Laud MS the text opens differently, as if something had gone before, "Predictis difficultatibus transire convenit ad reliqua tempestatum presagia primumque a sole capiemus exordia." Both MSS then continue, "Purus oriens atque non fervens . . ." which therefore seems to be the incipit of the text proper.

[3] This heading is from the margin of Ottob. 1870.

[4] Not in the Laud MS.

[5] Serenitas (Laud MS).

[6] Predicat (Ottob. 1870).

autem ex oriente[7] nubes rubescunt quod si nigre rubentibus intervenerint, et pluvias. Cum orientis aut occidentis radii videntur coire, pluvias.[8] Si circa occidentem[9] rubescunt nubes, serenitatem futuri diei spondent. Si in ortu sparguntur partim[1] ad austrum partim ad aquilonem, pura circa eum serenitas licet sit, tum pluviam cum vento significabunt.[2] Si in ortu aut in[3] occasu contracti cernantur[4] radii, imbrem.[5] Si in occasu eius pluat[6] aut radii[7] in se nubem trahant,[8] asperam[9] in proximum diem tempestatem significabunt.[1] Cum in oriente radii illustres eminebunt[2] quamvis circundati nube non sint,[3] pluviam portendunt.[4] Si ante ortum nubes glomerantur,[5] hyemem asperam denuntiabunt. Si ab ortu repellantur et ad occasum, adhibent[6] serenitatem. Si nubes solem circumdant, quanto minus luminis relinquunt[7] tanto turbidior erit tempestas.[8] Si vero etiam duplex orbis fuerit eo atrocior quod in exortu atque occasu fiet[9] ita ut rubescant nubes, maxima ostenditur[1] tempestas. Si non ambiunt sed incumbant, a quocumque vento fuerint, eum portendunt.[2] Si autem[3] a meridie, ymbrem. Si oriens cingetur[4] orbe, ex qua parte is[5] eruperit[6] expectetur ventus. Si totus effluxerit equaliter,[7] serenitatem dabit. Si in ortu longe radios per nubes porrexerit[8] et medius erit inanis,[9] pluviam significabit.[1] Si ante ortum[2] radiis se ostendit,[3] aquam et ventum. Si circa occidentem candidus circulus erit, noctis levem tempestatem significat.[4] Si nebula, vehementiorem. Si ca-

[7] Ponentem eum (Ottob. 1870).
[8] In the Laud MS this sentence reads: "Occidentis et orientis videtur coire radii pluvias significat."
[9] Omitted in Ottob. 1870.
[1] Partim spargentur (Laud MS).
[2] Sit sed licet pluviam ventosam tum significat (Laud MS).
[3] Omitted in Ottob. 1870.
[4] Serventur (Laud MS).
[5] Ymbrem (Laud MS); henceforth such minor differences in spelling will not be noted.
[6] Pluet (Laud MS).
[7] Radium (Laud MS).
[8] Trahunt (Laud MS).
[9] Omitted in Laud MS.
[1] Significat (Laud MS).
[2] The Laud MS omits all these words before quamvis.
[3] Circumdate sint (Laud MS).
[4] Portentant (Laud MS).
[5] Si autem ex ortu nubes globentur (Ottob. 1870). At this point the heading, De nubibus, occurs in the side margin of Ottob. 1870, but no new paragraph begins in either MS.
[6] Adhibunt (Ottob. 1870).
[7] Qui nihilominus luminis relinquat (Ottob. 1870).
[8] Tempestas erit (Ottob. 1870).
[9] Quod si mox ortu vel occasu fiat (Ottob. 1870).
[1] Ostendetur (Ottob. 1870).
[2] In the Laud MS this sentence reads: Si non ambibunt, a quocumque modo vento fuerunt, eum portendent.
[3] Omitted in the Laud MS.
[4] Tangitur (Ottob. 1870).
[5] Se (Laud MS).
[6] Erumpit (Laud MS).
[7] Defluxerit equalem (Ottob. 1870).
[8] Porriget (Laud MS).
[9] In annis (Laud MS).
[1] Significat (Ottob. 1870).
[2] Exortum (Laud MS).
[3] Radii se extendant (Ottob. 1870).
[4] Omitted in Ottob. 1870. Henceforth I

dente sole, ventum. Si autem circulus fuerit, ex qua regione is[5] raperit se ventum magnum.[6]

Prodigia Lune[7]

Proxima sint vie[8] lune presagia. Quartam eam maxime observat egyptus.[9] Si pendens ex ortu puro[1] nitore fulsit, significat serenitatem. Si rubicunda, ventos. Si nigra, pluvias portendere creditur.[2] In xv[a] cornua eius obtusa pluviam, erecta[3] ventos semper significant. Quarta[4] tamen maxime cornu eius septentrionale acuta mixtum[5] atque rigidum illum presagit ventum; inferius, austrum; utraque recta, noctem[6] ventosam. Si quartam orbis rutilus cingebat,[7] et ventos et imbres premonebit.[8] Apud Varonem[9] ita est: Si quarto die luna erit arrecta,[1] magnam tempestatem in mari presagiet.[2] Ubi coronam circa se habebit et eam serenam[3] quoniam illo modo non[4] ante plenam lunam hyematur[5] ostendit. Si plenilunio per dimidium pura erit, dies serenos significabit. Si rutila, ventos; nigrescens, imbres; si aliquo orbe nubes inclusit, ventos quoniam se ruperit.[6] Si gemini orbes[7] cinxerint, maiorem tempestatem et maiorem ventum, si tres aut nigri interrupti aut distincti.[8] Nascens luna si cornu superiore abstracto[9] surget, pluvias[1] decrescens dabit; si inferiore,[2] ante plenilunium. Si in media illa nigra fuerit, ymbrem in plenilunio significat.[3] Si plena circa[4] se habebit orbem, ex qua parte is[5] maxime splendebit, ex ea ventum ostendet. Si in ortu cornua grossa[6] fuerint, horridam tempestatem significat. Si ante quartam non appa-

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shall usually not note such unimportant omissions of a word.

[5] Hiis (Laud MS).

[6] Ruperit si ruperit se signat ventum magnum (Ottob. 1870).

[7] Heading from the margin of Ottob. 1870, while the Laud MS begins a new paragraph.

[8] Sunt vices. (Laud MS).

[9] Servat egyptius (Ottob. 1870).

[1] Si exsplendens exorta pura (Ottob. 1870).

[2] Conceditur (Ottob. 1870).

[3] Erecta et infesta (Ottob. 1870).

[4] Quartam (Laud MS).

[5] Septentrionale aut minuatam (Laud MS).

[6] Utraque notione (Laud MS).

[7] Tingebat (Ottob. 1870).

[8] Premovebat (Laud MS).

[9] Apud narrationem (Laud MS).

[1] Directa (Laud MS).

[2] Presaget (Laud MS).

[3] Habeat et illam si causam (Laud MS).

[4] Si (Laud MS).

[5] Hyemem amaram (Laud MS).

[6] In place of this sentence the Laud MS has only, "Si rutilia ventos quos erumperit."

[7] Orbes hos (Laud MS).

[8] Distracti (Laud MS).

[9] Superiori ab attracto (Ottob. 1870).

[1] The Laud MS inserts "significat si" between *pluvias* and *decrescens*.

[2] Inferiorem (Ottob. 1870).

[3] The Ottobonian MS omits this sentence.

[4] Si circa plenam (Laud MS).

[5] Omitted in the Laud MS.

[6] Crassiora (Laud MS).

ruerit[7] vento favonio[8] flante, hyemalis[9] toto mense erit. Si xvi vehementius flamme apparuerint,[1] asperas tempestates presagiet. Si ipsius lune[2] articuli quotiens in angulos solis incidat plurimisque inter eos tantum[3] observationibus et presagiis eius, hoc est in tertia vii xviiii xxiii viiii et interlunum xiiii.[4]

Presagia stellarum

Tertio loco stellarum observationem esse oportet. Discurrere hee videntur interdum ventique protinus sequuntur in quorum parte ita presagite.[5a] Celum cum equaliter totum erit splendidum articuli temporum[5] quos proposuimus autumpnum serenum ac densum nimisque[6] ventosum facient. Auptumni serenitas ventosam hyemem facit cum repente stellarum fulgor[7] obscuratur ut id neque nubilo neque caligine accidat graves denuntiantur[8] tempestates. Si volitare plures stelle videbuntur quo ferantur absentes,[9] ventos ex hiis partibus nuntiabunt. Aut sicuti stabunt certum si id in pluribus partibus fiet, inconstantes ventos indici.[1] Si stellam aliquam orbis incluserit, ymbres. Sunt in signo cancri due stelle parve asselli[2] appellate exiguum inter illas spatium obtinentes[3] nubeculam quam presagia appellant. Hec cum in celo sereno[4] apparere desierit, atrox hyems sequitur. Si in alteram illorum aquiloniam caligo abstulerit, auster sevit; si austrinam, aquilo.

De arcubus[5]

Arcus cum sint duplices, pluvias nuntiant;[6] amplius, serenitatem, non tamen[7] certam. Circulus nubis[8] circa sidera,[9] aliquam pluviam. Cum estate[1] vehementius tonuit quam fulsit, solitos[2] ventos ex ea parte denuntiat. Econtra,[3] si minus tonuit, imbrem. Cum sereno celo fulgura

[7] Habuerit (Ottob. 1870), with the *non* omitted.
[8] The Laud MS omits "vento favonio."
[9] Hyemali (Laud MS).
[1] Flamma apparuerit (Laud MS).
[2] Sunt et ipsius linee viii (Ottob. 1870).
[3] Intra tantum (Ottob. 1870).
[4] Hoc est 3 de xl xv xviiii xiii vii v et interlunium (Ottob. 1870).
[5] Articulari tempore (Laud MS).
[5a] Presagiere (Laud MS).
[6] Autumpnum cadens vero serenum minusque (Laud MS).
[7] Fulgur (Laud MS).
[8] Dinumerantur (Ottob. 1870).
[9] Videntur quo feruntur abscenter albescentes (Laud MS).
[1] In place of this sentence Ottob. 1870 has only, "aut cursitabunt certos."
[2] Acelli (Laud MS).
[3] Obtinentem (Laud MS).
[4] Hoc cum sereno celo (Laud MS).
[5] Marginal heading in Ottob. 1870, while the Laud MS begins a new paragraph.
[6] Ostendunt (Laud MS).
[7] Proiende (Ottob. 1870).
[8] Nubem (Ottob. 1870).
[9] Fidem (Ottob. 1870).
[1] Estatem (Laud MS).
[2] Omitted in Ottob. 1870.
[3] Omitted in Laud MS.

erunt et tonitura, adhyemabit in hyeme atrocissime aut cum ex omnibus quatuor partibus celi fulguraverit.[4] Cum ab aquilone, tantum in posterum diem aquam portendit;[5] cum a septentrione, ventum eurum;[6] cum ab austro vel choro vel favonio nocte serena fulguraverit,[7] ventum et imbrem eisdem regionibus demonstravit. Tonitrua matutina ventum significant; ymbrem meridiana. Cum nubes[8] celo sereno fuerunt,[9] ex quacumque parte id sit[1] venti expectantur.[2] Si in eodem loco glomerabuntur propinquitatique sole discutiuntur et hoc ab aquilone fiet, ventos.[3] Si ab austro, ymbres portendentur.[4] Sole in occidente si ex utraque parte eius celum patet,[5] tempestatem significabunt vehementius. Arce ab oriente in nocte aquam[6] minantur,[7] ab occidente in posterum diem. Si nubes ut[8] vellera lane spargentur[9] multe ab oriente, aquam in triduum presagient.[1] Cum in cacuminibus montium nubes concident,[2] yemabit. Si hec cacumina[3] pura fient disserenabit[4] nube grandula cadente quod vocant tempestatem albam minebit celo quamvis sereno nubia quamvis flatum procellosum dabit. Nebule montibus discedentes an celo cadentes vel in vallibus scindentes serenitatem promittent.[5]

Ab hiis terrenis ignes[6] proxime signant, pallidi nam murmurantesque tempestatum[7] nuntii. Sequuntur pluvie iam lucernis fungi si fluctuose flamma ventum et lumina cum ex sese flammas elidunt aut vix accenduntur.[8] Item cum in haeno pendente scientille inacervantur vel tol-

[4] Because of misspellings and omissions this sentence is largely unintelligible in the Laud MS.
[5] Ponendum (Ottob. 1870).
[6] *Inventum* instead of *ventum eurum* in Ottob. 1870.
[7] Laud MS omits the rest of this sentence.
[8] Ymbres (Ottob. 1870).
[9] Sereno in celum fertur (Laud MS).
[1] Fiet (Laud MS).
[2] Expectentur (Laud MS).
[3] Globabuntur appropinquantesque celo decutiantur et non ab aquilone, fiet ventus (Ottob. 1870).
[4] Protendunt (Ottob. 1870).
[5] Petant (Ottob. 1870).
[6] In noctem aliquam (Laud MS).
[7] Minatur (Ottob. 1870).
[8] Vel (Ottob. 1870).
[9] Sparguntur (Ottob. 1870).
[1] Presagiunt (Ottob. 1870).
[2] Conscinderint (Ottob. 1870).
[3] Caumata (Laud MS).
[4] Fiant asseverabit (Ottob. 1870). After this word I follow Ottob. 1870 rather than the Laud MS which continues, "gravida causa dicante quam vocant tempestatem alba ingratitudo minnebit celo quamvis astrenabicula quamvis parva statum procellosum dabit."
[5] In place of this sentence Ottob. 1870 reads more briefly: "Nebule autem montibus descendentes serenitatem promittunt."
[6] The Laud MS reads, "terreni ignes;" Ottob. 1870, "terrenis igne."
[7] Namque murmurantes tempestate (Ottob. 1870).
[8] In the Laud MS this sentences reads: "Sequuntur pluvie namque si lucernes fungi si flexo se volutet flamma ventum et lumina cum ex semine flammas elidunt aut vix accenduntur."

lentibus ollas carbo adheret aut contextus ignis est,[9] favillam discutit, scintillam non emittit,[1] vel cum cinis in foco crescit[2] et carbo vehementer perlucet. Est et aquarum significatio.[3] Mare[4] si tranquillum[5] in portu gurgitabit[6] murmurabitve intra[7] se, ventum predicit.[8] Si id hyemem et ymbrem[9] littora rippeque resonabunt tranquillo, asperam hyemem.[1] Item maris ipsius tranquillitas[2] spumeve disperse aut aque bullientes[3] pulmonesque marini[4] in pelago[5] plurimorum[6] dierum hyemem portendunt.[7] Sepe et silentio intumescit[8] inflatumque[9] altius[1] solito iam intra[2] se esse ventos fatetur.[3] Aliquid etiam montium sonitus nemorumque[4] mugitus predicunt et sive aura[5] que sentiatur[6] folia ludentia lanugo[7] populi aut spina volitans[8] aquisque plume ut natantes[9] aut etiam in campanis venturam hyemem[1] precedens. Simul[2] fragor celique murmur[3] non[4] dubiam significationem habet. Presagiuntque[5] alia delphini tranquillo mari lascivientes flatum ex qua veniunt[6] parte. Item spargentes aquam idem turbatio.[7] Solligo volitans conche adolescentes echini affingentes sese aut harenam subintrantes tempestatem signabunt[8] rane[9] quoque ultra solitum[1] vocales et fulices[2] matutino clangore. Item conchi anates quoque penitus rostro purgantes, ventum.[3] Cetere-

[9] In the Laud MS the sentences reads: "Item cameno pendentem scintille coacervantur vel contollentibus carbo adheserit aut cum ventus ignis est."
[1] Excitat, scintilla non emicet (Ottob. 1870).
[2] Distis in loco concrescit (Ottob. 1870).
[3] Ventorum et aquarum significatio (Ottob. 1870) and marginal heading, Prodigia ventorum.
[4] Ille (Ottob. 1870).
[5] Transquillum (Laud MS).
[6] Cursitabit (Ottob. 1870).
[7] *Neuter* instead of *ve intra* (Ottob. 1870).
[8] Predicat (Ottob. 1870).
[9] Hyeme et ymbreia (Ottob. 1870).
[1] Tempestatem (Ottob. 1870) and marginal heading, De Mare.
[2] Tranquillus sonitus (Ottob. 1870).
[3] Bullantes (Laud MS).
[4] Pulmonesve mari (Ottob. 1870).
[5] Pela (Ottob. 1870).
[6] Plurimum (Laud MS).
[7] Protendunt (Laud MS).
[8] Ut tumescunt (Ottob. 1870).
[9] Inflammatumque (Ottob. 1870).
[1] Alicuius (Laud MS).
[2] Niteat (Ottob. 1870).
[3] Fatentur (Ottob. 1870).
[4] Est et quidem sonus montium ventorumque (Ottob. 1870).
[5] Omitted in Ottob. 1870.
[6] Sentiantur (Ottob. 1870).
[7] Tamio (Ottob. 1870).
[8] Aves pine volitas (Laud MS) or, primo volitans.
[9] In nantes (Laud MS).
[1] Tempestatem (Ottob. 1870).
[2] Suus (Laud MS).
[3] Celi quid murmur (Laud MS).
[4] Nam (Ottob. 1870).
[5] Presagiunt et (Laud MS).
[6] Veniat (Laud MS).
[7] Item exspargentes aquam idem perturbato tranquillitatem (Laud MS).
[8] In the Laud MS this sentence runs: "Luligo volitas conche adherescentes hescini affringentes esse aut harena subburrantes tempestatis signa sunt."
[9] Bene (Ottob. 1870).
[1] *Sonitum* in both MSS.
[2] Fulice (Laud MS).
[3] Item iurgia nautesque primas rostro purgantes, ventum (Laud MS).

que[4] aquatice aves concursantes graves[5] in mediterraneo mergite ve maria[6] aut stagna fugientes grues per silentia sublime volantes,[7] serenitatem sicut noctua in ymbre garrula aut sereno,[8] tempestatem. Stricta[9] singultu quodam latrantes sese concutientes[1] si continuabunt si nec carpint vocem resorbescunt,[2] ventosum[3] ymbrem. Garruli[4] (graculi?) vero[5] a pabulo recedentes, hyemem et albe aves congratulabantur.[6] Et cum terrestres volucres circa[7] aquam clangores dabunt profundentes[8] sese sed maxime cornix, hirundo tamen[9] iuxta aquam volitans ut pennas[1] sepe percutiat queque[2] in arboribus habitantes fugiant[3] in nidis suis et anseres continuo clangore intempestive[4] (?) ardea in mediis harenis tristis.[5] Nec mirum aquaticas[6] aut in totum[7] volucres presagia aeris sentire; pecora exultantia et indecora lascivia ludentia[8] easdem significationes habent. Et boves celum olfactantes[9] seseque lambentes[1] contra[2] pilum in urbesque[3] (*sic*) porci alienos manipulos feni lacerantes segniter ve contra[4] industriam suam vel abscondite, vel formice concursantes[5] aut ova progerentes.[6] Item vermes terreni erumpentes trifoliumque[7] inhorrescere et folia contra[8] tempestatem subrigere[9] certum[1] est. Necnon et in cibis mensisque nostris vasa quibus esculentium[2] additur sudorem repositoriis[3] relinquentia diras[4] tempestates prenuntiant.[5] Explicit.[6]

[4] Ceteraque (Laud MS).
[5] Omitted in Ottob. 1870.
[6] In mediterranea mergita vie marine (Laud MS); in mediterraneo mergi eam ve maria (Ottob. 1870).
[7] Silentio per sublime voluntates (Laud MS).
[8] Vel serena (Ottob. 1870).
[9] Cornuque (Laud MS).
[1] Seque concurrentes (Laud MS).
[2] Si vero carptum (carptim?) voce resorbebunt (Laud MS).
[3] Vetitum (Ottob. 1870).
[4] Gracilis (Laud MS).
[5] Sero (Ottob. 1870).
[6] Et aves congregabuntur (Laud MS).
[7] Contra (Laud MS).
[8] Profundentesque (Laud MS).
[9] Hirunde tam (Laud MS).
[1] Penna (Ottob. 1870).
[2] Qui (Ottob. 1870).
[3] Habitant fugitantes (Ottob. 1870).
[4] Idem pe . . . (Ottob. 1870).
[5] Omitted in Ottob. 1870.
[6] Aquatica (Ottob. 1870).
[7] Ottob. 1870 omits "in totum."
[8] Lucentia (Ottob. 1870).
[9] Olferantes (Ottob. 1870).
[1] Se oblabantes (Laud MS).
[2] Circa (Ottob. 1870).
[3] Turpesque porci sibi (Laud MS).
[4] Segnifere et circa (Ottob. 1870).
[5] Ottob. 1870 omits.
[6] Aut obviam progredientes (Ottob. 1870).
[7] Trifolium quoque (Laud MS).
[8] Folium circa (Ottob. 1870).
[9] Submergere (Ottob. 1870).
[1] Rectum (Laud MS).
[2] Extulentium (Laud MS).
[3] Suppositoriis (Ottob. 1870).
[4] Duras (Ottob. 1870).
[5] Signant (Laud MS).
[6] This word occurs only in Ottob. 1870. In Laud Misc. 594 we have merely the close of a paragraph and only after nearly a column and a half more of text do we read, "Explicit de pronosti-

APPENDIX 19

MANUSCRIPTS OF THE ASTROLOGICAL WRITINGS OF GEOFFREY OF MEAUX

A. THE TREATISE ON THE COMET OF 1315

BL Digby 228, fol. 14r-v, "De stellis comatis," opening, "Omnibus in stellarum scientia studentibus Galfredus de Meldis presentem cedulam corrigendam. . . ." BM Sloane 1680, fols. 45v-46v, where the tract opens without title, "Omnibus in stellarum forma studentibus. Gamfredus de Meldis presentem cedulam corrigendam. . . ."

Wiesbaden 63, 15th century, fols. 123r-125v: listed by Gottfried Zedler, "Die Handschriften der Nassauischen Landesbibliothek zu Wiesbaden," *Zentralblatt für Bibliothekswesen,* Beiheft 63, 1931, p. 75, as Godefridus de Meldis, Notae astronomicae, but opening, "Omnibus in stellarum scientiam (*sic*) studentibus Gaufridus de Meldis presentem cedulam corrigendam . . ." and at fol. 123r referring to "illa stella comata qui apparuit anno domini 1315^{mo}. . . ."

B. THE TREATISE ON THE COMET OF 1337

Erfurt Amplon. F. 386, 14th century, double columns, fol. 59r-v, opening, "Ad honorem illius sanctissimi astronomi qui solus numerat multitudinem stellarum propriis nominibus vocans eas . . ."; closing, ". . . poterit huiusmodi virtus. Et in hoc terminatur epistola magistri Gaufredi de prognosticatione comete," although in Schum's *Verzeichnis* it is listed as "Pronosticacio Gaufredi super magna coniunctione Saturni et Iovis (et Martis a.1345 facta)." What Duhem IV (1916), 69, note 1, has quoted from BN 15118, fol. 75, as a note of the copyist terminating Geoffrey's Calendar for 1320 is really the opening sentence or paragraph of this treatise on the comet of 1337, although Duhem gives the date as 1334. Whether the remainder of the work on the comet is wanting in this MS I have not ascertained. In this opening paragraph the words ". . . cunctis catholicis in eis studentibus Gaufridus presentem cedulam . . .", which occur somewhat later, resemble those which form the very opening of the treatise on the comet of 1315.

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cationibus futurorum." This additional matter consists of weather predictions according as the day of Christ's birth falls on each day of the week. Since this far-fetched and superstitious method does not harmonize well with the purely meteorological character of the preceding sections, and since we find such weather predictions from Christmas day separately in the MSS (see *History of Magic and Experimental Science,* I, 678, for a number of such), we may regard this section as not properly a part of the preceding text.

C. THE TREATISE ON THE CONJUNCTION OF 1325

BL Digby 176, fols. 25r-26r, opening, "Cunctis quorum interest astronomie scire nova Galfridus de Meldis hoc quod in presenti cedula continetur. . . ." A single line is left blank between it and the ensuing review of the causes of the great pestilence.

D. THE TREATISE ON THE CAUSES OF THE BLACK DEATH

BL Digby 176, fols. 26r-29r, opening, "Rogatus a quibusdam amicis meis ut de causa huius generalis pestilentie aliquid scriberem. . . ." BL Ashmole 192, I, 3, fols. 1-10, is a late transcript by George Wharton from Digby 176, and, where it varies from its original, in all probability has no independent value. Ashmole 1471, late 14th century, fols. 102r-104v, describes the treatise as, "Iudicium magne coniunctionis Saturni et Iovis, anno 1345," and it is attributed, at least in Black's catalogue of the Ashmolean MSS, to John of Ashenden, but the incipit is as above.

E. THE COMPENDIUM OF ALL JUDICIAL ASTROLOGY

BM Sloane 1680, fols. 42r, col. 2-45v, col. 1, where it follows the *Directorium astrologie phisicate* or *Amicus medicorum* of Jean Ganivet, composed in 1431, and is in the same hand as this fifteenth century work; and Avignon 1022, 15th century, fols. 203v, col. 1-206r, col. 2, which is in somewhat poorer handwriting and gives a briefer text than Sloane 1680 but otherwise sometimes seems to offer the more reliable readings. The text opens: "Totius astronomie iudicialis compendium ex omnibus libris actorum collectum melius quod (*quam* in Avignon 1022) potui compilare per quod appetitus noster erit dei gratia plenarie satiatus. . . ." In Avignon 1022 the work ends, ". . . a medio celi ad angulum terre. Et sit deus benedictus. Explicit brevis liber editus a magistro gaufrido de meldis, deo gratias." In Sloane 1680 it closes somewhat differently: ". . . a medio celi ad angulum terre. Deo gratias. Explicit tractatus brevis et utilis de esse infirmorum et infirmitatum ex libris astronomie extractus quantum spectat ad artem medicine editus a magistro gamfredo de meldis."

Wiesbaden 63, 15th century, fols. 118r-123r: Godefridus de Meldis, Astronomiae iudicialis compendium, "Pocius (*sic*) astronomie iudicialis compendium ex omnibus libris . . . / . . . a medio celi ad angulum terre. Explicit tractatus bonus et utilis de ente Primorum et Primitatum ex libris astronomie extractus quatenus spectat ad artem medicine editus a magistro Gaufredo de Meldis."

F. THE CALENDAR OF 1320

Duhem, *Système du monde,* IV, 69-70, has already briefly treated of this work from two manuscripts of the Bibliothèque Nationale, Paris, BN 7281, fols. 160v-162r, and BN 15118, fols. 74-75. I have re-examined both manuscripts. As Duhem notes, they give only a part of the work. The incipit, "Cunctis solis et lune scire desiderantibus vera loca . . ." somewhat confusingly resembles that of Geoffrey's prediction from the conjunction of 1325. For other MSS, Zinner 7265-7266.

APPENDIX 20

MANUSCRIPTS OF THE ASTROLOGICAL WRITINGS OF JOHN OF ESCHENDEN

A. THE PREDICTION OF 1345

BL Digby 176, membr., 14th century, fols. 9r-16r, rubric, "Incipiunt pronosticationes de eclipsi universali lune et de coniunctione trium planetarum superiorum que apparaverunt anno domini 1345° in martio. Et complete fuerunt iste pronosticationes 20° die predicti mensis martii anni christi supradicti." The rubric is obscured by a red line drawn through its letters. A later hand has added: "Per Jo. Eschenden ut apparet postea ad hoc signum marginale." The text opens: "Significatio eclipsis lune universalis iuxta sententiam pthol. et haly 2° quadripartiti secundum quod misceantur significationes aliarum coniunctionum trium superiorum planetarum. . . ." At fol. 1v of this Digby 176 is written, "Liber M. Wilhelmi Reed episcopi." That is to say, this manuscript belonged to William Reed, Rede or Reade, bishop of Chichester, who died in 1385, leaving this particular manuscript for the use of the scholars of Merton and Exeter colleges. The note at fol. 1v goes on to say that Rede was given part of the manuscript by Nicholas of Sandwich, purchased part of it from the executors of Thomas Bradwardine after the death of that mathematician and archbishop of Canterbury in 1349, bought another section of it from the executors of Richard Camsale, and wrote part of it himself or caused it to be written. See Macray's catalogue of the Digby MSS for the Latin of this note, which is an interesting testimony as to the way in which medieval learned manuscripts were aggregated and brought together or torn apart.

At fol. 1v is further a table of contents which Macray dated of the fourteenth century. If it is by Reed, he speaks of himself in the third

person. Concerning the prediction of 1345 it says: "Pronosticationes cuiusdam eclipsis universalis et coniunctionum trium superiorum anno christi 1345 contingentium et primam pestilentiam precedentium quas M. W. Reed calculavit et M. Io. Eschenden pronosticavit." Nothing, however, seems to be said of William Reed when we come to the text of the prediction itself, so that he was probably responsible only for the astronomical calculations utilized in it. The situation is the same for the prognostication on the conjunction of 1365. In the table of contents we read, "Pronosticatio coniunctionis magne saturni et iovis anno christi 1365 quam M. W. Reed calculavit et I. Asshenden pronosticavit," while in the text the treatise is ascribed simply to John of Eschenden.

B. SUMMA IUDICIALIS DE ACCIDENTIBUS MUNDI

I have chiefly used two manuscripts of this work: at Munich, CLM 221, a large quarto in double columns, written in a fine hand, where the treatise covers 222 fols.; and at Oxford, Oriel College 23, 14th century, but later than 1360 (see fol. 155v), a work of 224 leaves, or 226 according to the present numbering. CLM 221 is a copy of the work made in 1488, witness the colophon: "Explicit summa iudicialis optima de accidentibus mundi secundum magistrum Iohannem de Eschenden professorem sacre theologie quondam socium aule de mertone in oxonia. Scripta autem est et finita anno domini 1488 die vero 9 mensis Augusti."

The work was printed at Venice, 1489 (Hain *6685): "Summae astrologiae iudicialis de accidentibus mundi quae Anglicana vulgo nuncupatur Iohannis Eschuid viri Anglici eiusdem scientiae astrologiae peritissimi finis hic imponitur faustus, opere quoque et cura diligenti qua fieri potuit Iohannis Lucilii Sanctiter (Santritter) Helbronnensis Germani, impensis quoque non minimis generosi viri, Francisci Bolani, eloquentissimi olim viri Candiani Patritii Veneti, anno salutis 1489, nonis Iulii impressione completum est Venetiis," 221 fols.:—from Bandini's description of FL Plut. 29, cod. 17. The wording varies a little in the British Museum catalogue and in Pellechet 4626.

This printed edition is very faulty, as is shown by marginal corrections of it in BL Ashmole 576 from a Merton MS no longer identifiable.

The incipit of Eschenden's prologue is, "Intentio mea in hoc libro est compilare sententias. . . ." The text proper opens: "Dicit Iulius Firmicus libro 3° in principio et Hermes Trismegistus libro 2° ca° 1° . . ." The colophon, differing slightly in Oriel 23 from that of the

Munich MS, runs, fol. 226r, "Explicit summa iudicialis de accidentibus mundi secundum magistrum Iohannem de Eschendon quondam socium aule de mertone in Oxonia cuius anime propitietur deus amen."

Manuscripts of the *Summa* seem to be numerous: a few other examples are. At Oxford, Digby 225, 14th century, 243 double-columned leaves; Bodleian (Bernard) 2621, now Bodley 714; Bodleian (Bernard) 6751, now Savile 25. In London, BM Harleian 5082, 15th century, imperfect. At Cambridge, CUL, Ii, I, 27, Iudiciae Eschendenses, completed about 1348, at fols. 61-140. At Erfurt, Amplon. F. 379, 14th century, fols. 99-159; Amplon. F. 207A; and probably the anonymous *Summa* in Amplon. Q. 383. At Vienna, Latin MS 5387, anno 1366, 256 fols. At Rome, Vatic. Palat. 1443. At Cracow, university library 565 (DD.III.17), paper, 14th century, 282 pp.; anonymous but the incipit serves to identify it, "Intentio mea in hoc libro est compilare. . . ." At Naples, Oratoriana XV, xi (Mandarini, chart. 49), first half 15th century, fols. 1-141. See also Zinner, 852-860.

C. ABBREVIATION OF THE SUMMA BY JOHN DE PONTE

BN 7335, fols. 1r, col. 1-100v, col. 2: Incipit opusculum abbreviatum a quodam libro vocato summa iudicialis de accidentibus mundi extractum quam composuit Iohannes Essenden anglicus prout in suo circulo repperitur scriptum. Causa enim que me movit ad istam abbreviationem ordinandum fuit quia in summa predicta erant tot allegationes et tot dupplicationes cum aliquibus aliis superfluis sic quod animum studentis perturbabant. Et si aliquis hoc habet pro malo vel non bene facto, rogo quod michi parcat et ipse recurrat ad originale si voluerit . . . / . . . Explicit istud opus quod fuit defloratum sive abbreviatum de quodam volumine vocata summa iudicialis astronomie de accidentibus mundi compillata per magistrum Iohannem Essenden Anglicum de Oxonia anno supradicto que abbreviatio fuit expleta die mercurii 23° die februarii anno domini 1379 per me Iohannem de Ponte in civitate Lugduni et sit deus laudatus et benedictus." Following the introductory passage the text proper opens, "Convenerunt astrologi quod initium orbis fuit ante diem Iovis qui fuit ante initium annorum diluvii per 279 annos.

Another MS is found in John de Ponte's native city where it was made in 1488 by Stephanus de Rupe. Lyons 329 (262), fols. 80-167, "Liber Iohannis Ascenden anglici de ymbribus et pluviis cum aliis iudiciis generalibus." But the colophon shows it to be the abbreviation:

"Explicit istud opus quod fuit defloratum abbreviatum vel extractum de quodam volumine vocato Summa iudicialis astronomie de accidentibus mundi, compilatum per magistrum Iohannem Essendem anglicum de Oxonia anno predicto (i.e. 1348), et fuit scriptum et completum die mercurii 20 augusti anno 1488 per me Stephanum de Rupe, alias Villefranche, in civitate Lugdunensi, et deus sit laudatus et benedictus, Amen." Fols. 165-166 are blank, and the beginning of the work as given in BN 7335 seems lacking, this Lyons MS opening, "De nativitatibus prophetarum a coniunctione Saturni et Iovis . . .", a theme considered on the second page, fol. 1v, col. 1, of the other manuscript.

D. ON THE CONJUNCTION OF 1349

BL Digby 176, fols. 30r-33r: "Pronosticatio coniunctionis saturni et martis 4 gradu arietis 23a die martii eclipsis lune universalis 17 gradu capricorni primo die Iulii coniunctionis Iovis et martis 11 gradu cancri 7 die augusti anno Christi 1349. Sicut dicit haly 2° quadripartiti tholomei ca° 6° cum fuerit eclipsis vel coniunctio . . . / . . . cum marte in qualitatibus suis non impediet totaliter effectum suum. Expliciunt iste pronosticationes 6to die mensis Februarii anno christi millesimo CCCmo xl nono."

E. ON THE CONJUNCTIONS OF 1357 AND 1365

There are three MSS at the Bodleian. First may be mentioned Digby 176, 14th century, fols. 42r-49v, 34r-40r: "Incipit tractatus Iohannis de Eschyndene de significatione coniunctionis saturni et martis in cancro que erit illo anno christi 1357° in 8° die Iunii et de significatione coniunctionis magne Saturni et Iovis que erit anno christi 1365 in 30° die Octobris. Sicut dicit philosophus (more correctly *Ptholomeus* in the two Ashmole MSS) in centilegio propositione 50a, Non obliviscaris . . ." fol. 49v, ". . . que erit isto anno. De magna coniunctione Saturni et Iovis de qua erat mentio in principio istius tractatus vide in proximo quaterno precedenti qui hic deberet situari." fol. 34r, "Significatio coniunctionis magne Saturni et Iovis que erit anno christi 1365 in mense octobris completis de eodem mense 29 diebus 14 horis et 22 minutis. Pro significatione istius coniunctionis magne. . . ." fol. 40r, "Ista scripsi de significationbus predictarum coniunctionum magnarum ad communem utilitatem (?) studentium in astronomia et precipue ad exercitium et solacium sociorum meorum aule de Mertone in Oxonia quos et domum nostram predictam conservet dominus dominus altissimus per infinita

secula amen. Completus est iste tractatus 10 die mensis martii anno christi 1357° per magistrum Iohannem Eschinden."

Ashmole 393, 15th century, fols. 81v-86, "Significatio coniunctionis Saturni et Martis in cancro que erit anno Christi 1357 mense Iunii completis de eodem mense 7 diebus 22 horis et 38 minutis": fols. 86-89, "Significatio coniunctionis magne Saturni et Iovis que erit anno Christi 1365 et mense Octobri completis de eodem mense 29 diebus 14 horis et 22 minutis."

Ashmole 192, I, 1, pp. 1-106, is a copy of Ashmole 393 aforesaid.

I have chiefly depended on the Digby MS for the text and only cursorily examined the later Ashmole manuscripts. I have just glanced at a fourth manuscript, BM Royal 12, F, XVII, fols. 172r-180r. Yet another manuscript of it at the British Museum is Sloane 1713, 15th-17th century, fols. 1-14.

In the following MS the prognostication from the conjunction of 1365 appears alone as a distinct treatise. This version is shorter than that in Digby 176, and opens and closes differently, but has essentially the same text so far as it extends.

BN 7443, fols. 221r-227v: "Incipit tractatus Iohannis Veschinden condam socii aule de mertoñ in Oxonia de significatione coniunctionis magne saturni et iovis que erit anno christi 1365 completis de mense octobris 29 diebus 14 horis et 29 (*sic*) minutis in signo scorpionis et in nova triplicitate que significabit valde magnas mutationes in mundo et accidentia grandia et tristibilia secundum omnes astronomos loquentes de hac materia. Secundum omnes astronomos predicta coniunctio saturni et iovis deberet esse magne significationis . . . / . . . Illa erit secta martis et scorpionis secta scilicet totius crudelitatis et nequitie, totius falsitatis et fallacie. Et hec de significatione istius coniunctionis magne ad presens dicta sufficiant." A figure occupies most of fol. 221v.

F. WEATHER PREDICTION FOR 1368-1374

BL Ashmole 192.I.4, fols. 12r-16v; Ashmole 393, 15th century, fols. 79-80: opening, 'Carissime (or, Karissime) et Reverendissime, quoniam fide cuiusdam communis utriusque et vobis et mihi valde dilecti amici crebra relatione didici. . . ."[1]

[1] The British Museum catalogue of the Arundel MSS (1834), p. 23, assigns a treatise on conjunctions in eleven chapters in Arundel 88, c. 1484 A.D., fols. 1r-15r, to "Johannis Archenden sive Estwode, ut videtur." But examination shows that the work was composed between 1435 and 1444.

APPENDIX 21

THE THIRTY INTELLIGENCES OF JOHN OF RUPESCISSA: LATIN TEXT

From BN 3598, fols. 1r-44r.

1r Reverendissime in christo pater et domine domine Guillerme sacrosancte romane ecclesie cardinalis titulo quatuor coronatorum. . . .

Modus revelandi fuit iste. Cum anno domini millesimo tricentesimo quadragesimo quinto multis diebus flerem. . . .

1v Intellectus in revelatione patrum et generis antichristi et nominis eius et persone et loci

Primo intellexi quod de semine frederici imperatoris. . . .

3r Intellectus secundus in adventu multorum antichristorum

Secundo intellexi multos debere fieri antichristos. . . .

3v Intellectus tertius in extremis ytallorum et gallicorum et in tribulatione eorum

Tertio intellexi in eodem carcere clare et vidi neapolim. . . .

4r Intellectus quartus in multitudine notabilium cladium preeuntium tempus proximi antichristi quarum quedam sunt facte quedam adhuc facture

Quarto intellexi multas clades futuras erunt in Ianuis. . . .

4v Intellectus sextus in revelatione secretorum Danielis super apertione temporis antichristi et quando consurget ad seculum acquirendum[1]

Sexto intellexi esse futurum ut circa annum domini M.ccc. lxvi. . . .

5v–6r Intellectus septimus in revelatione adventus unius falsi pappe et casus malorum ecclesiaticorum a fide et ab hobediencia veri pappe et de generatione meretrici apocalipsis capitulo xvii° descripte

Septimo intellexi sed magis explicite tholoze in carcere. . . .

8r Intellectus octavus in revelatione temporis in quo eligetur ad imperium antichristus et quando incipiet affligere ecclesiam non ut antichristus set ut tirannus

Octavo intellexi quod circa tempus introductionis predicte scismatis. . . .

[1] There is no fifth *Intellectus*, probably because there were five subordinate points under the fourth *Intellectus*, leading the writer inadvertently to number his next topic six.

8r-v Intellectus nonus in revelatione qualiter ordo fratrum minorum in tres partes dividentur quarum due efficientur heretice et pars tertia adherens catholico pontifici orthodoxe fidei remanebit

Nono intellexi ordinem fratrum minorum in tempore illo. . . .

10v Intellectus decimus in revelatione casus ordinum mendicorum in heresi et adnichilationis eorum excepta mendica portione fratrum minorum et qualiter meretrix occidetur

Decimo intellexi futuro existere ut ordo heremitarum. . . .

11v–12r Intellectus undecimus in revelatione transmutationis monarche in antichristum et qualiter eius lex per hereticos conficientur et sub ea reprobi unientur

Undecimo intellexi quod percussa meretrice prescripta. . . .

12v Intellectus duodecimus in revelatione conflictus ultime ecclesie cum proximo antichristo et qualiter rebellabunt ellecti

Duodecimo intellexi conflictum sacrosancte romane ecclesie . . .

13r Intellectus xiii^{us} in revelatione bellorum principum fidelium contra reprobatorum antichristum

Tertiodecimo intellexi quod ipse generalis reproborum. . . .

13v Intellectus xiiii^{us} in revelatione qualiter proximus antichristus et per quem modum et ordinem subiciet seculum universum

Quartodecimo intellexi modum et processum per quem. . . .

15r Intellectus xv^{us} in revelatione misterii bellorum regum francie et anglicorum et cuiusdam concordie principum contra ecclesiam nimis laboriosis que fiet ante tempora antichristi maligni

Quintodecimo intellexi falsam esse opinionem multorum. . . .

16r Intellectus xvi^{tus} in revelatione eventuum accidentium sub domino pappa clemente sexto

Sextodecimo intellexi eodem anno M°ccc°xlv. . . .

Intellectus xvii^{us} in revelatione eventum futurorum sub quatuor summorum pontificum qui ordinate succedent

Septimodecimo[2] intellexi sub summo pontifice immediate. . . .

18r Intellectus xviii^{us} in revelatione duorum passagiorum ante tempora antichristi quorum ultimum pariter fiet per reges francie et anglicorum postque eligetur ad imperium antichristus

Decimo octavo intellexi esse futura duo passagia. . . .

[2] *Secimoseptimo* in the MS.

20r Intellectus decimusnonus in revelatione occisionis antichristi et victorie ecclesie sacrosancte romane et expositionis quorundam ministrorum occultorum scripture
Decimonono intellexi sanctam ecclesiam tam fortiter. . . .

21v–22r Intellectus xx^us in revelatione misterii mille annorum solarium quibus durabit mundus post antichristum proximum et qualiter hoc ex scriptura probatur
Vicessimo intellexi mille annis solaribus debere durare. . . .

23r Intellectus xxi^us in revelatione trium personalium adventuum verbi et trium notabilium resurrexionem (*sic*) sanctorum
Vicesimoprimo intellexi tres adventus corporales. . . .

26r Intellectus xxii^us in revelatione excecacionis reproborum et quod impii non poterunt capere futurorum misteria sed blafemabunt hunc librum
Vicesimosecundo intellexi totam multitudinem carnalium. . . .

27r Intellectus xxiii^us in revelatione hereticorum futurorum infra spatium mille annorum solarium qui fluent post antichristum et quod hoc ex scriptura probatur
Vicesimotertio[3] intellexi ex fluxis horum mille annorum. . . .

28r-v Intellectus xxiiii^us in revelatione utilitatum missionis proximi antichristi
Vicesimoquarto intellexi quod pro maxima et imprehensibili . . .

29v Intellectus xxv^us in revelatione archanorum Danielis prophete super successione xlv annorum laboriosorum post antichristum futurorum
Vicesimoquinto intellexi futuros esse post mortem antichristi. . . .

31r Intellectus xxvi^us in revelatione unius generalis catholice monarchie post antichristum proximum affuture cum destructo romano imperio totum seculum subicietur Iudeis tunc conversis ad christum
Vicesimosexto intellexi post mortem antichristi. . . .

33r Intellectus xxvii^us in revelatione translationis sedis ecclesie generalis romane in civitatem Iherusalem appertio scripturarum super renovationem illius civitatis et super gloria et magnitudine eius
Vicesimoseptimo intellexi futurum esse ut civitas. . . .

35r Intellectus xxviii^us in revelatione intentionis prophetarum su-

[3] *Dicesimotertio* in the MS.

per pace M annis durature aut quasi post proximum antichristum ecclesie potestatem

Vicesimooctavo intellexi pacem istam futuram ecclesie. . . .

35v Intellectus xxix^{us} in revelatione eventuum futurorum in successione mille annorum et dispositione orbis usque ad finem mondi

Vicessimonono intellexi tantam plenitudinem spiritus sancti . . .

37r Intellectus xxx^{us} et ultimus huiusmodi libri in revelatione generationis gog et adventus ac destructionis eius et apertionis secretorum ezechielis prophete super conversione totius orbis et in fine seculorum

Tricesimo et ultimo intellexi in fine predictorum mille. . . .

40v . . . qui cum eodem patre et spiritu sancto vivit et regnat deus per infinita secula seculorum, Amen.

Hec ergo, reverendissime pater et domine, sunt per me de futuris eventibus in carce- (fol. 41r) ribus intellecta. . . .

44r Scripta sunt hec per me fratrem Iohannem de Rupecissa ordinis fratrum minorum provincie Acquitanie custodie Ruthenensis conventus Aurelhiaci in Romana curia in Avinione in carcere domini pappe Clementis VI pontifficatus sui anno octavo. Qui carcer vocatur carcer Soldani. Anno ab Incarnatione domini nostri Ihesu christi M°CCC°xlix° in mense novembris in die sancti Martini ad gloriam dei, Amen.

APPENDIX 22

MANUSCRIPTS OF JOHN OF RUPESCISSA, DE CONSIDERATIONE QUINTAE ESSENTIAE

BN 7151, membrane, 14th rather than 15th century as stated in the old manuscript catalogue of the Bibliothèque du Roi, fols. 1r-32v, in four quires of eight leaves each. This is a fine MS with an illuminated initial and other colored initials and blue and red paragraph signs and headings alternating. About 11 x 8 inches with a written page about 8 x 5 inches; 36 lines to the page. "Incipit primus liber de consideratione quinte essentie omnium rerum tradendus pauperibus et evangelicis viris servis yesu christi a magistro Iohanne de Rupescissa sacre theologie professore compositus. Dixit Salomon Sapientie capitulo septimo deus dedit michi horum scientiam veram que sunt. . . ." This is the oldest and finest manuscript I have used, but I am not sure that it can be relied on for the original text, since it contains

patent inaccuracies, such as *Second Corinthians* for the *Second Epistle to Timothy.*

BL Digby 43, late 14th century, fols. 101r-120v, Liber de famulatu philosophie ewangelio domini nostri Ihesu Christi et pauperibus ewangelicis viris primus liber de consideratione quinte essentie omnium rerum transmutabilium. Dixit Salomon sapientie capitulo vii° deus dedit. . . ."

BL Canon. Misc. 37, 15th century, quarto minori, 57 fols. Neatly and legibly written in an Italian humanist hand, but the order appears to have been purposely jumbled as a bit of mystification.

Oxford, All Souls College 81, 15th-16th century, fols. 100r-133v, "Incipit liber de quinta essentia editus a fratre Iohanne de Rupecissa de ordine fratrum minorum. Canon primus de investigatione quinte essentie et causa investigationis. Secretum primum est quod per virtutem quam contulit deus nature ministerio humano potest homo incommoda senectutis curare. . . ."

Wolfenbüttel 2841 (83.7.Aug.fol.), 15th century, paper, fols. 342r, col. 1-371v, col. 2: rubric, "Incipit liber quinte essentie magnifici magistri Iohannis de Rubicissa monachy secundum artificium medicine ac alchimie. Et primus liber est de consideratione quinte essentie." Incipit, "Dixit Salomon rex sapientie capitulo septimo. . . ." At fol. 361v, col. 1, begins the second book divided into the usual twenty remedies. Then, "Explicit summum magisterium quinte essentie magistri Iohannis de Rubicissa monachi etc."

FL Ashburnham 191(123), membrane and paper, 31 lines to a page, neatly written in 1471 A.D. by Cornelius Boscarinus of Germany, as a note of March 22 at fol. 34v shows: fols. 1r-32v. Liber de consideratione quinte essentie omnium rerum transmutabilium. No author is indicated. The initial rubric reads: "Primus liber de consideratione quinte essentie omnium rerum transmutabilium in nomine domini nostri Ihesu Christi. Incipit liber de famulatu philosophie Evangelio domini nostri Ihesu Christi et pauperibus evangelicis viris." The text opens, "Dixit Salomon sapientie capitulo 7° . . ." and ends, ". . . vel in eius absentia aqua ardens. Deo omnipotenti patri et filio et spiritu sancto sit laus per infinita secula. Amen. Explicit liber de consideratione quinte essentie omnium rerum transmutabilium pauperibus et evangelicis viris erogatus. Deo gratias."

FL Ashburnham 1448 (1371), paper, quarto, 15th century, fols. 1r-39r, anonymous. "In nomine domini nostri Yhesu Christi Incipit liber primus de consideratione quinte essentie omnium rerum trans-

mutabilium pauperibus et evangelicis viris editus. Dixit Salamon sapientie capitulo VII . . . / . . . vel in eius absentia aqua ardens. Et sic est finis secundi libri de consideratione quinte essentie de quo laudetur deus in secula. Deo gratias amen. Explicit liber de quinta essentia."

FL Ashburnham 1451, fols. 2r-8v, is a fragment of the first book and seems further to be misarranged.

Naples, Bibl. Naz. VIII.D.20, a little MS on membrane, containing various alchemical treatises. At fol. 84r the date of copying another treatise, written in the same hand as ours, is given as 1524 at Rome by Celestine Brocchard. Fols. 1r-60v, "Incipit liber de consideratione quinte essentie omnium rerum pauperibus evangelicis viris erogatus editus a magistro Ioanne de Rupecisa ordinis fratrum minorum. Dicit Salomon sapientie in capitulo VII. . . ." This MS has numbered chapters in addition to the canons and in some other respects provides a sort of transition to the subsequent printed editions.

S. Marco fondo antico 323, fols. 124r-130r, is a portion of the first book, including the extraction of the fifth essence from antimony and the fire of the adept. It opens: "Incipit liber de consideratione quinte essentie auri et aliquibus annexis ad quam multi vocati pauci vero electi qui scient extrahere meritum ad eternam gloriam pro futuris. Indagatio celestis nostri seu quinte essentie. Oportet rem querere que se sic habet respectu quatuor elementorum. . . ."

Vienna 5485, 15th century, quarto. This MS first contains, at fols. 1v-28r, a considerably altered version of Rupescissa's work combined with Raymond Lull's *Tertia distinctio* or *De secretis nature* to make a work on the fifth essence ascribed to Lull which fills fols. 1r-61v, with Lullian tables continuing to fol. 70r. But later at fols. 128r-157r under Rupescissa's name is the usual text of the *De consideratione quinte essentie* with its quaint rubrics and *Indagationes*.

In some MSS the work is attributed to Raymond Lull, as in the following which I have examined personally.

FL Ashburnham 190(122), 15th century, paper, quarto, 34 lines to a page, legible, fols. 11r-42r (or, 12r-43r). "Incipit quinta essentia. Dixit Salamon sapientie capitulo . . . / . . . Explicit liber aureus Raymondi ordinis sancti Francisci." Also on fol. 1v or the fly-leaf of the MS is written, "Liber aureus de quinta essentia Raymondi ordinis Sancti Francisci." In this MS the first book is divided only into canons without chapters, although there are various other rubrics which might be numbered and converted into chapter headings.

Vatic. 5847, 1500 A.D., the second of two large volumes which once

formed a single MS consisting almost entirely of alchemical treatises ascribed to Raymond, fols. 1-29v or 201-229v: "Explicit liber secundus de quinta essentia compositus atque editus per magistrum Raymundum Lulium civem civitatis Maioricarum et fratrem observantie beati Francisci maximum et philosophum et sacre theologie magistrum ad laudem honorem et gloriam Salvatoris et domini nostri Iesu Christi ac semper virginis Marie eius matris et domine nostre, quorum nomina benedicantur in secula et ultra, Amen. Scriptus per me Petrum Boccatum utriusque iuris doctorem poetam et astronomum de Tybure quem cum prole pia benedicat Virgo Maria. Amen." In this MS the two books of Rupescissa are regarded not as a distinct treatise but as the first of four books on the fifth essence.

In Wolfenbüttel 3284, 15th century, fols. 34r-129r, opening, "Deus dedit michi horum que sunt scientiam veram . . ." we have an anonymous combination of the two books on the fifth essence with the *Tertia distinctio* commonly ascribed to Raymond Lull and which begins at fol. 86r. The first book on the fifth essence divides into thirteen canons; the second is the usual twenty remedies.

The combination of Rupescissa's work with Lull's *De secretis nature* or *Tertia distinctio* was printed in 1518 in part as *Sacri doctoris Raymundi Lulii de secretis nature de quinta essentia libellus,* with the longer sub-title (on page a ii) "De secretis nature libellus. Incipit liber prime distinctionis secretorum nature seu quinte essentie sacri doctoris magistri Raymundi Lulii de insula Maioricarum qui doctrinam eius extractionis et applicationis ad corpora humana ad opera terribilia totius artis medicine procuranda et etiam metallorum transmutationem referat qui est imago omnium librorum super his tractantium." The volume begins with the prologue of the *De secretis nature,* "Contristatus erat Raymundus et non modica desolatione repletus. . . ." After explaining more clearly than the MSS of this version which I have seen that this book divides into four parts and three distinctions or books, the first part of the first book is largely devoted to further preliminaries in Lullian vein. With the second part Rupescissan canons begin: "Non reputes nos mendacium dixisse. . . ." But the number of canons is raised by sub-division to forty-five or forty-six, although much of Rupescissa's text is omitted, and the last two or three canons are in dialogue form and of Lullian or pseudo-Lullian content. Rupescissa's second book of remedies is also expressed in dialogue form and seventeen canons. And therewith the edition abruptly ends without the third book which would have been the *De secretis nature* proper or the

Disputation between Raymond and the monk which commonly follows it: "Excusum Augustę Vindelicorum anno Sal. MDXVIII. die vero prima Iulii." This edition is bound up with Vienna 11342.

The foregoing manuscripts have been consulted and compared with the printed text. More than thirty other manuscripts in the British Isles are listed in DWS, I (1928), No. 292. The following are a few more in libraries on the continent. For others see Sbaralea (1921), p. 129.

Berlin 966, 1467 A.D., fols. 106-166.

Vienna 5307, 15th century, fols. 165r-187r, has the usual incipit, but in Vienna 5491, 15th century, quarto, fols. 37v-49v, the text opens, "Laboraverunt philosophi rem invenire . . ." and ends, ". . . et omni die suffragetur domus." I have not seen these two MSS.

Venice, S. Marco XIV, 24 (Valentinelli), 15th century, fols. 70-116, de philosophie famulatu ac de consideratione quinte essentie; a copy made in 1466 A.D. by Ianellus de Martinengo.

Venice, S. Marco, XIV, 39 (Valentinelli), 16th century, fols. 1-41. Divinum opus doctissimi Iohannis de Rupecissa de philosophie famulatu ac de consideratione quinte essentie libri duo. "Dixit Salomon. . . ."

FN Palat. 695, 15th century, 42 fols. De consideratione quinte essentie omnium rerum transmutabilium et de famulatu philosophie libri duo. "Dixit salomon sapientie 7mo: Deus dedit horum scientiam veram. . . ."

Klagenfurt, Bischöfliche Bibliothek, XXX.d.1, 1419 A.D., paper, fols. 62r-94r: "Dixit Salomon sapientie capitulo septimo: Deus dedit . . . / . . . Explicit liber quinte essentie."

CLM 25115, 16th century, fol. 25 *et seq.*

Bordeaux 531, 15th century, fols. 2-48, Liber de famulatu philosophie. "Dicit Salomon Sapientie. . . ." The catalogue mentions a liber tertius, which would seem some additional matter, possibly the *Liber lucis,* which, as DWS I, 277 notes, is sometimes added as a third book to the two books on the fifth essence, but more likely is the *Tertia distinctio* ascribed to Raymond Lull.

Copenhagen Gl.kgl.S. 1712, quarto, 15th century, fols. 5-38v, Tractatus quinte essentie, "In nomine Domini nostri Ihesu Christi eiusque gloriose matris virginis Marie. Primus liber est de consideratione quinte essentie. . . ."

Turin D-IV-31 (Pasini, lat. 399), 15th century, Liber de consideratione quinte essentie.

Wolfenbüttel 479, 15th century, fols. 227-241, Liber quinte essentie editus per Iohannem de Rupecissa, fratrem ordinis minorum Hyspanum, de famulatu philosophie evangelico domini nostri Ihesu Christi et pauperibus et evangelicis viris.

Wolfenbüttel 3107, 15th century, fols. 1r-24r: "Incipit liber quinte essentie. Dixit Salomon Sapientie capitulo septimo Deus dedit mihi. . . ." Without name of author.

BU 20, 15th century, mutilated.

The following MSS open immediately with the first canon:

Cassel Chem. Folio 10, 15th century, fols. 2r-25v: "Hoc est in quo laborant omnes . . . / . . . habens contrarietatem nec causam corruptionis. Et sic est finis. Explicit tractatus mirabilis de quinta essentia Iohannis de Cappacissa" (*sic*).

Cassel Chem. Octavo 20, 15th-16th century, fol. 62 *et seq.*, "Incipit breve opusculum magistri Ioh. de Rupescissa quod intitulatur pauper evangelium. Secretum primum est quod per virtutem quam. . . ."

Klagenfurt, Bischöfliche Bibliothek XXIX.d.24, 1421-1423 A.D., paper, fols. 292r-324: "Primus canon. Hoc est in quo laboraverunt omnes antiqui . . . / . . . sedat quam nobilissima quinta essentia vel eius absentia aqua ardens."

Berne 480, 15th century, membrane, 42 fols. "Incipit primus liber de consideratione quinte essentie omnium rerum transmutabilium in nomine domini nostri Iesu Christi incipit liber de famulatu philosophie datus ab angelis domini nostri Iesu Christi pauperibus et euvangelicis viris. Dixit Salomon sapientie. . . ."

The following work on the fifth essence would seem not to be that of Rupescissa:

Prag 267 (I F 35), 1431 A.D., fols. 93-136r, "Incipit prohemium sive prologus in divinam artem scilicet essentiam quintam ex diversis philosophis collectam . . . / . . . Et sic est finis nostri duplicis tractatus de divina sapientia quinte essentie."

APPENDIX 23

EXTRACTS FROM DE CONSIDERATIONE QUINTAE ESSENTIAE: LATIN TEXT

The first of these extracts, A. B, and C, are from the shorter manuscript text in Oxford, All Souls College 81, fols. 114v-116r, 118r, 119v-120r, with some indication of variant readings in other MSS.

A. SCIENTIA AD EXTRAHENDUM QUINTAM ESSENTIAM DE ANTIMONIO ET MARCHASITA PLUMBEA

Et nota quod antimonium vocatur quidam lapis qui si bene tritus igneatur in patella super ignem rubescet et est mira res.[1]

Deus est testis quod nunc tibi tantum secretum revelabo quod paucis aut nullis adhuc fuit revelatum, et hoc est archanum omnium philosophorum. Pulveriza ergo mineram (materiam?) antimonii donec sit sine tactu et pone in aceto optimo distillato donec acetum colo- (fol. 115r) retur rubeum. Quo facto remove acetum coloratum in alio vase et superpone aliud acetum donec super modicum ignem etiam coloretur, quo facto auferatur. Et sic fac donec acetum non amplius coloretur, deinde omnia aceta sic colorata simul pone in distillatorio et ascendet primo acetum. Deinde videbis miraculum stupendum quia per rostrum alembici videbis quasi mille venidas (*venulas* in S. Marco fondo antico 323, fol. 127v, and Ashburnham 1448, fol. 21v) benedicte minere descendere per guttas rubeas sicut est sanguis. Quem benedictum liquorem serva per se in ampulla vitrea forti bene obturata, quia est thesaurus cui totus orbis non valet adequari. Vide miraculum viz. tantam dulcedinem antimonii ut dulcedinem mellis excedat. Et dico per dei caritatem quod humanus intellectus vix posset credere virtutem et valorem huius aque sive quinte essentie antimonii. Et dicit Aristoteles quod illud est plumbum suum in libro de secretis (fol. 115v) secretorum. Crede mihi quod numquam in natura fuit maius secretum. Omnes enim homines laboraverunt ut spiritus minerarum sublimarent et numquam habuerunt quintam essentiam antimonii supradicti. Et breviter numquam possem exprimere medietatem huius archani. Aufert enim dolorem vulnerum et mirabiliter sanat. Virtus eius est incorruptibilis miraculose et utilis supra modum. Quadraginta diebus indiget putrefieri in fimo in ampulla sigillata et tunc operatur archana. Non enim hoc quod dixi credas impossible. Nam si in aceto distillato ponatur cerusa et bulliatur per duas horas in eo vel plus donec acetum evaporet et remaneat ad spissitudinem olei, illud vocatur oleum saturni et habet dulcedinem mellis. Sed illa dulcedo fatua est, sed dulcedo quinte essentie antimonii est sicut dulcedo mellis et zucari. Crede mihi, revolve libros philosophorum (fol. 116r) omnium et quere plumbum ipsorum et numquam invenies quod est illud nec artem veram invenies

[1] This first sentence is not found in FL Ashburnham 1448, fol. 21r-v; S. Marco fondo antico 323, fol. 127v; or in BN 7151, fol. 20r-v. On the other hand, these MSS are considerably wordier in their version of the next paragraph.

ut quid preter argentum vivum possit mirabiliter in colore rubeo solificare. Lauda ergo deum.

B. IGNIS ADEPTI[2]

Excellentia ignis adepti secreti est tanta ut eius virtus explicari non possit, et sic fit. Recipe mercurium sublimatum cum vitriolo et sale communi, sed melior est eius quinta essentia. Recipe salem armoniacum novies aut decies sublimatum. Ana misce et tere diligenter et expande super lapidem marmoreum et pone de nocte ad aerem quietum et serenum vel in celario frigido, et ibi convertetur in aquam que est tante virtutis ut si una modica gutta ter (*tibi* in BN 7151) cadat super manum tuam statim perforabit eam, et similiter si cadat super laminam cupri vel ferri. . . .

C. EXCUSATIO QUOD ARCHANA PHILOSOPHIE ULTERIUS NON REVELANTUR ET MERITO CELENTUR PROPTER INDIGNOS

Quoniam secundum sacram theologiam melior est obedientia quam victima, propter reverentiam statutorum ordinis nostri medicinas supramirabiles que non solum miraculose corpora nostra sanarent ab omni malo morbo sed ipsa etiam metalla imperfecta in aurum et argentum in ictu oculi transmutarent, quarum magisterii (fol. 120r) veritas est mihi in carceribus deo volente reserata, minime revelabo. In hoc ergo finem capiat primus liber ad honorem omnipotentis dei et sue matris gloriose.

Explicit primus liber Iohannis de Rupecissa de extractione et conservatione quinte essentie.

D. FULLER MANUSCRIPT VERSION OF THE *Excusatio* FROM BN 7151, FOLS. 22V-23R (WITH OCCASIONAL VARIANT READINGS FROM OTHER MSS)

Excusatio mirabilis[3] quia arcana philosophie sublimia ulterius non revelat.

Quia secundum philosophiam Catolicam vollo[4] dicere secundum scripturam sacram melior est hobedientia[5] quam victima propter reverentiam statutorum ordinis nostri et hobedientiam prelatorum eccle-

[2] This word undergoes various vicissitudes in the MSS. In S. Marco fondo antico 323, fol. 129r, it becomes *ad aptatum:* in Vienna 5485, fol. 146r, *ad actum.* The following text is very similar in FL Ashburnham 1448 and BN 7151, fol. 21v, but a bit more diffuse.

[3] *Pauperis* in FL Ashburnham 190, fol. 32r.

[4] *Catholicam volo.*

[5] *Obedientia.*

sie sancte dei medicinas valde mirabiles[6] ac summe desideratas a mundo que non solum quasi miraculose corpora nostra sanarent ab omnibus malis morbis sed etiam ipsa metalla imperfecta in aurum et argentum in ictu oculi transmutarent quarum magisterii veritas est mihi in tribulationibus carcerum volente deo intellectualiter reserata minime revelabo quia de alchimiaticis[7] operationibus religioni nostre pertractare non licet. Ideo tibi in consideratione[8] quinte essentie finem constituo ubi operationes vel considerationes alchimie possent vel deberent misceri. Contestor autem omnibus evangelicis viris deo invocato in testem quod si diabolo instigante in operationes achimiacas[9] prolabantur in reprobum sensum dabuntur et cito, quia via est perditionis et mali pro eo quia nullus philosophorum scripsit veritatem in libris[10] nisi ficte et sub parabolis que non valent comprehendi ingenio humano, et nullus valet ad sublimia huius artis pervenire nisi fuerit per altissimam contemplationem et sanctissimam vitam deificata mens eius ita ut non solum noverit omnia interiora nature sed etiam transmutabilem transmutare naturam, et hoc paucissimis est concessum, et communiter fictionum et sophisticationum sectatores sunt, efficiuntur falsificatores monete[11] et sigillorum prelatorum et principum vagabundi deceptores et sine religione et dampnabilis vite de quibus verificatur ad litteram proverbium Pauli IIa ad Corinthios[12] capitulo tertio dicentis, Semper discentes (fol. 23r) et numquam ad scientiam veritatis pervenientes quia quando non possunt ad scientiam perfectam pervenire ad sophisticationes inutiles se committunt[13] et communiter malo fine clauduntur. Reliqua autem opera philosophie sume stupenda que hic subicio[14] coniectus contra deum et iustitiam sicut deus in die iudicii ostendet[15] ab emulis in vinculis integris iam septem annis inter compedes et catenas per sublimes theoricas et illuminationes celestes didisci[16] inferius per libros singulos si deus voluerit vobis viris evangelicis quibus scribo plenissime revelabo ut potero.[17] In hoc ergo finem accipiat primus liber de consideratione quinte essentie ap-

[6] *Supramirabiles* in Ashburnham 190; *supra modum mirabiles,* in Ashburnham 191, fol. 22r.
[7] *Alchemicis.*
[8] *In caritate de consideratione,* in Ashburnham 190.
[9] *Alchimicas.*
[10] *Libris suis,* in Ashburnham 190 and 191.
[11] *Falsificationes monetarum,* in Ashburnham 190.
[12] *Timotheum*—which is correct—in Ashburnham 190 and 191.
[13] *Convertunt.*
[14] *Summe stupenda quecumque hiis que hic subicio,* in BL Canon. Misc. 37, fol. 40r.
[15] *Sicut dies iudicii ostendet.*
[16] *Didici.*
[17] Canon. Misc. 37 has merely, *vobis evangelicis viris revelabo ut potero.*

pelatus et ad gloriam omnipotentis dei et domini nostri yhesu christi et gloriose virginis Marie et omnium sanctorum ad consolationem bonorum virorum[18] et honorem ecclesie Dei, Amen. Explicit primus liber.

APPENDIX 24

DIFFERENT VERSIONS OF THE LIBER LUCIS OF JOHN OF RUPESCISSA

For the text of the *Liber lucis* I have used rotographs of the first five manuscripts listed, and have personally examined others except the last two.

For twelve MSS in English libraries see DWS No. 293. BL Ashmole 1423-V is not there listed as being later than 1500.

Copenhagen GL.kgl.S.236, F., 15th century, double columns, fols. 52r-54v (old numbering, in the upper margin, 54r-56v), "Iohannis de Rupescissa monachi, liber lucis magisterii magni." The text proper opens: "Consideravi tribulationes electorum . . . / . . . Explicit liber lucis magisterii magni editus a fratre Iohanne de Ruppescissa Anno domini millesimo trecentesimo quinquagesimo quarto decima quarta die Septembris compilatus per me Walterum Vallreuere anno domini M°CCCC°XXVIII° pro tunc Parisius studentem in artibus."

Copenhagen GL.kgl.S.1712, 4to, 15th century, fols. 111-118v, Liber Lucis Magni Magisterii, with same incipit. "Explicit liber lucis magni magisterii fratris Iohannis de Rupescissa cordigeri. deo gratias, etc."

Klagenfurt, Bischöfl. Bibl. XXIX, d, 24, 1421 and 1423 A.D., paper, fols. 202v-214r. After a titulus, reproduced below, which this MS has in common with that of St. Mark's, Venice, the text opens: "Consideramus consideramus tribulationes electorum. . . ." "Explicit liber lucis magisterii magni editus ab egregio philosopho divinitus illustrato fratre Io. de Rupescissa ordinis minorum. Anno domini M°CCC°lxxx et die xiiii mensis octobris, qui latuit multis annis qui utinam lateat in perpetuum malos homines avaros et tyrannos

[18] Ashburnham 190 reads, "et gloriose virginis semper eius matris et sanctorum apostolorum Petri et Pauli et beatissimi patris nostri Francisci ad considerationem evangelicorum virorum . . ."; Ashburnham 191 has merely, "ac patris nostri Francisci ad consolationem evangelicorum virorum"; Canon. Misc. 37 closes, "et virginis gloriose ac beato patris nostri Francisci et ecclesie dei honorem pro evangelicis viris."

precipue sed sub custodia crucifixi servetur viris ewangelicis in tempore necessitatis."

Venice, S. Marco fondo antico, cod. lat. 323 (Valentinelli, XVI, 5), fols. 114v-119r. After the titulus, reproduced below, comes a briefer Prohemium than in the other MSS and with a different incipit, "Volo revelare lapidem . . . / . . . Explicit liber lucis magisterii . . . editus ab egregio philosopho divinitus illustrato Iohanne de Ruppascissa ordinis minorum anno domini M°CCC°lxx° et die xvii mensis octobris." This manuscript is a short version of the *Liber lucis* as printed in Zetzner, III (1613), 179-188; III (1659), 189-197 and 284-291, but there is a still more abbreviated version at fols. 185v-186v of the same manuscript. At fols. 185v-186v occurs an abbreviated form of the seven operations of the *Liber lucis:* "Incipit liber magisterii perfectionis veri lapidis philosophorum. In nomine domini Amen. Recipe sal petrum et vitrioli . . . / . . . elixir rubeum vel album suppositum. Explicit tractatulus magistri Iohannis de Rubecisse faciens rosas albas et rubeas extractus breviter ex libris philosophorum. Et vocatur liber rosarius philosophorum."

BL Ashmole 1423-V, pp. 68-77. This is a late copy of the closing sixteenth century but presents some interesting variations. "Johannes de Rupiscissa practica quarta die mensis octobris anno domini 1350. Ad sublimandum maximam inopiam et paupertatem sancti et electi dei . . . / . . . cui sit honor et fortitudo et gloria et imperium in secula seculorum amen amen amen. Explicit Veritas huius artis per Iohannem de Rupiscissa anno domini 1350 mensis octobris quarto die." In this MS there are only six *Operationes,* the fourth and fifth being included in very condensed form under the *Tertia operatio* and the *Quarta operatio* being that usually numbered six. The catalogue of Ashmolean MSS does not identify this *Practica* with the *Liber lucis.*

Vatican Palat. 1330, mostly about 1463 A.D., paper, fols. 111v-117r (119v-125r), "Hic incipit prologus libri Iohannis de Rupecissa in arte alchemica et in philosophia naturali magister maximus. Consideravi tribulationes electorum . . . / . . . sic partes in partes mutantur usque in infinitum. Explicit liber lucis magisterii magni editus ab egregio philosopho divinitus illustrato fratre Iohanne de Rupecessa qui sub custodia crucifixi servetur."

BN nouv. acq. français 4141, 15th century, fols. 29r-38v. "Incipit liber fratris Iohannis de Rupecisa qui dicitur liber lucis et tribulationis. Consideravimus magnas tribulationes . . . / . . . Cui est

honor et gloria et imperium per omnia secula seculorum, Amen. Explicit liber lucis et tribulationis editus per fratrem Iohannem de Rupecisa. Deo gratias." This MS seems a very careless copy—*Ianuis* for *annis, fructibus* for *fluctibus,* etc.—from an original of considerable independent value.

Cassel Chem. Fol. 10, 15th century, fols. 26r-29v: "Incipit alius tractatus Iohannis de Cappacissa. Consideravi tribulationes electorum . . . / . . . et corrupta facere materiam puram. Explicit tractatus Iohannis de Cappacissa de lapide philosophorum."

Florence Riccard. 925 (L.III.xxviii; Lami, p. 248), De lapide philosophorum seu liber lucis. Commentarium super librum eiusdem de quinta essentia.

Titulus from BN nouv. acq. français 4141, fol. 29r.

Incipit liber fratris Iohannis de Rupecisa qui dicitur liber lucis et tribulationis.

Titulus from the Venice and Klagenfurt MSS.

Incipit liber magisterii confectionis veri lapidis philosophorum clare et absque quacumque palliatione editus per fratrem Iohannem de Ruppascissa[1] ordinis minorum virum utique a deo illustratum quem libellum composuit ad sublevendas[2] inopias pape et cleri tempore future tribulationis ecclesie eram[3] (?) divina premonitus revelatione.

Brief opening, found only in the Venice MS.

Prohemium. Volo revelare lapidem maximum philosophorum ad lunam et ad solem ad album et ad rubeum ad aurum et argentum clarissime contra modum philosophorum qui ante me fuerunt qui tanta invidia percussi leguntur ut propriis filiis celarent. Et quia non est intentionis mee probative ad recitationem verborum vel impugnative procedere sed tantum simplici recitatione verborum sacrosanctam generalem ecclesiam doctrina et experimento fideliter informare obmissis contentionibus ad propositum summatim et in brevitate accedo.

Sequitur de prima operatione ad sublimationem.

[1] *Magistrum Iohannem de Rupescissa* in Klagenfurt MS.
[2] *Sublimandas* in Klagenfurt MS.
[3] *Etiam ad hoc* in Klagenfurt MS.

Prima operatio. Natura seu materia lapidis est res vilis pretii ubique reperibilis quia est aqua viscosa . . . etc. as in the other MSS.

Another brief opening from Ashmole 1423-V.

Ad sublimandum maximam inopiam et paupertatem sancti et electi dei quibus datum est misterium noscere veritatis sine parabolis lapidem philosophorum maximum ad lunam et ad solem ad album et ad rubeum volo dicere et ad argentum et aurum clarissime revelabo contra morem philosophorum qui ante fuerint qui tanta invidia fuerint repleta (*sic*) ut propriis filiis veritatem celarent.

Opening passage from the other manuscripts.

Consideravi tribulationes[4] electorum in (sacro) sancto ewangelio[5] prophetatas a christo maxime tribulationes temporum antichristi instare in annis[6] quibus est sacrosancta ecclesia universalis romana hoc dubium[7] plurimum affligenda et ad montes fuganda et certe per tyrannos omnibus divitiis temporalibus spolianda in successu temporis.[8] Sed licet iactetur[9] in validis fluctibus Petri navicula est tamen liberanda in fine dierum domina generalis. Quapropter ad sublevandam gravem inopiam et paupertatem futuram populi sancti et electi dei quibus datum est noscere misterium veritatis sine parabolis lapidem maximum philosophorum ad lunam et ad solem, ad album et ad rubeum volo dicere ad argentum et ad aurum clarissime revelabo contra morem philosophorum qui ante me fuerunt qui tanta invidia percussi leguntur ut propriis filiis celaverunt veritatem. Et quia non est intentionis mee probatione aut recitatione aut impugnatione probare sed tantum sub simplici narratione verborum sacrosanctam romanam ecclesiam de veritate exprimendo et fideliter probando informare omissis contentionibus ad praxim summatim et breviter accedo.[10]

Materia lapidis est res una vilis pretii ubique reperibilis quia est aqua viscosa scilicet argentum vivum commune sicut extrahitur a terra . . . etc.

[4] *Consideravimus magnas tribulationes,* BN nouv. acq. français 4141.

[5] *Sacrosancta ecclesia* in the Klagenfurt MS.

[6] *Ianuis,* BN nouv. acq. français 4141.

[7] *Hoc dubium,* omitted in BN nouv. acq. français 4141.

[8] *Spolianda in brevi,* in BN nouv. acq. français 4141.

[9] *Iacture mihi,* in BN nouv. acq. français 4141.

[10] An abbreviated version of this paragraph, beginning "Primo consideravi futura tempora . . ." opens the version of the *Liber lucis* printed in Zetzner, *Theatrum chemicum,* III (1659), 284. It is omitted in the other version printed *ibid.,* p. 189.

In Vatican Palat. 1330, fols. 111v-112r (119v-120r), this opening passage is somewhat fuller:

Consideravi tribulationes electorum in sacrosancta ecclesia a Christo prophetatas maxime antichristi tempore tam mistici quam realis et vere satis cito iustitie videtur et quasi in ianuis nisi deus pro consolatione bonorum et correctione malorum velit tempus cum possit misericorditer prorogare. In quibus est sacrosancta universalis ecclesia Romana nulli dubium plurimum aff(l)igendo et certe per tyrannos omnibus divitiis temporalibus in brevi spolianda. Sed licet iactura in validis fluctibus Petri navicula tamen liberanda est in fine tribulationis dierum differentia (?) generali. Quapropter ad sublevandam inopiam et paupertatem populi sancti et electorum dei quibus datum est noscere misterium veritatis sine palliatione lapidis maxime philosophorum ad solem et (fol. 112r) ad lunam clarissime revelabo contra morem philosophorum qui ante me fuerunt qui tanta invidia percussi leguntur ut propriis filiis celaverunt. Et quia non est intentionis mee ut recitem aut impugnative procedam sed tantum simpliciter verbis planis sacrosanctam ecclesiam generalem doctrina et experimento informare obmissis contentionibus ad oppositum summatim in brevitate accedo.

Modo incipit liber magisterii confectionis veri lapidis philosophorum clare et absque quacumque palleatione editus per prefatum fratrem Johannem de Rupecissa qui fuit ordinis minorum virum utique a deo illustratum etiam divinitus premonitum revelatione qui est via veritas et vita Ihesus Christus deus et homo cui laus sit per eterna secula amen.

Nota quod natura seu materia lapis est res vilis pretii ubique reperibilis que est aqua viscosa scilicet argentum vivum. . . .

Solutio lapidis in aquam per se et in lac virginis.[11]

Quarta operatio est ut post digestionem predictam completam in stufa[12] sicca ponas spiritum in urinali (S. Marco, fondo antico 323, fol. 116v) clauso[13] in balneo infra ollam aqua plenam donec totus spiritus dissolvatur in aqua qua dissolutione completa [14] pone desuper alembi-

[11] This heading is found only in Copenhagen S. 1712. The two printed versions of this passage in Zetzner, III (1659), 102-103, and 287-288, correspond roughly to the MSS but differ considerably in their wording. In the second version in S. Marco fondo antico 323, fol. 186r, there are only nineteen lines of text under this heading.

[12] *Stupa* in Copenhagen S. 236. The Klagenfurt MS omits several words here.

[13] *Ampulla clausa* in S. Marco, fondo antico 323, fol. 186, which then continues: "in balneo ut totus spiritus dissolvatur in aqua tunc suppone alembic et receptaculum."

[14] *Facta et completa* in Copenhagen S. 236.

cum vel in principio quando urinale[15] ponis in balneo potes desuper alembicum aptare. Deinde[16] da ignem et ascendet stilla roris madii[17] et aqua vite lucida lacrima oculi lac virginis purissima materia lapidis ultima preparatione perfecta, gustu amara, acetosa,[18] volatilis, non fixa, incorruptibilis fere, per digestionem in pulverem reducibilis,[19] a Geber[20] numquam cognita, ab Avicenna ignorata. hanc Hermes palpavit Alphidius aptavit Rosarius intellexit Magister Arnaldus dictavit. [Nam de hac quarta operatione que dicitur expressio lactis virginis (Copenhagen S. 1712, fol. 114r) dixit M. Arnoldus quod oportet (Copenhagen S. 236, fol. 53r) a terra exaltari filium (hominis) in aerem in cruce quia intelligit[21] ad litteram de materia in 3a operatione digesta que terra ponitur ad dissolvendum in fundo urinalis. Ascendit quod ibi purum[22] est et spirituale et in aerem fumosum convertitur et exaltatur in cruce capitis alembici quasi christus (Klagenfurt MS, fol. 207r) ihesus ut Arnoldus dicit elevatus in cruce.][23] Et ista dissolutione completa habes tuam materiam ultimam preparationem preparatam et perfectam.[24]

Si unam guttam ex hoc lacte virginis super laminam ignitam proieceris dealbabit ipsam intus et extra. Et ita vidisti quod materia lapidis est res una non omnino simplex sed composita ex spiritu mercurii et ex spiritu vitrioli romani qui dicitur sulfur invisibile non vulgi sed philosophorum qui est tinctura intrinseca rubedinis [licet et mercurius in se habeat tincturam ad rubeum intrinsecus absconsam sed propter purgationes quia nimis est terrea diminuta. Et ob hoc indiget sulfure purissimo vitrioli epotari ad plenum.][25] Hac igitur[26] dissolutione completa invenies in fundo urinalis elementa aeris et ignis cum terra[27] simul mixta quia remanet materia grossa combustibilis et extraxisti

[15] *Materiam* in both Copenhagen MSS.

[16] This word is found in the Klagenfurt and Venice MSS. In place of it Copenhagen S. 1712 has *et* and Copenhagen S. 236 has no equivalent. The second text in S. Marco 323 continues to omit many words and phrases.

[17] *Madidi* in Copenhagen S. 1712.

[18] *Ad litteram acetosa* in Copenhagen S. 236 and the Klagenfurt MS.

[19] This word is omitted in the Klagenfurt and Venice MSS.

[20] Spelled differently in each MS; Gebare, Gebre, Gebro, Geber.

[21] Omitted in both Copenhagen MSS.

[22] *Purissimum* in the Klagenfurt manuscript.

[23] The passage in brackets is omitted from the Venetian MS. The Klagenfurt MS omits one or two words.

[24] This sentence is omitted from Copenhagen S. 1712.

[25] The passage in brackets is omitted in the Venetian MS. BN nouv. acq. français 4141 has *per purgationem* in place of *propter purgationes, ex* instead of *ob,* and *sibi* instead of *epotari,* while the Klagenfurt MS has *terreus dimittit* in place of *terrea diminuta* and instead of *epotari* has *inbibi.*

[26] *Autem* in Copenhagen S. 236.

[27] In place of this and the five preceding words Copenhagen S. 236 has *elementa tria.*

ab ea elementum aque animatum anima spirituali vitrioli romani et est per se sine aliis tribus sufficiens materia lapidis maxime ad album et ad rubeum consequenter. Et si vis separare alia tria elementa ab invicem operabis in hunc modum. Recipe alias[28] feces et pone ad digerendum in stupha sicca ut prius. Post pone in balneo ad dissolvendum et distillandum ut prius cum fortissimo igne et quod ascendit per ignem balnei est elementum aeris de colore olei. Recipe ipsum et serva. Et cum nichil amplius poterit ascendere transfer vas de balneo ad ignem (Copenhagen S. 1712, fol. 114v) sublimationis in cinere et da ignem bonum et ascendet per alembicum ignis rubicundus in liquore olei et rubei. Recipe ipsum et serva ad partem et ita habes a mercurio sublimato quatuor elementa ab invicem separata primum elementum aque scilicet lac (S. Marco 323, fol. 117r) virginis 2m elementum aeris scilicet oleum resplendens in balneo distillatum, 3m elementum ignis rubeum scilicet oleum resplendens distillatum ad ignem. 4° habes in fundo urinalis elementum terre nigerrimum ut carbo quod nichil[29] valet ultra nisi ut[30] mittatur foras et conculcetur ab hominibus. [Intellexistis hec omnia nescio quid clarius potest dici.][31]

APPENDIX 25

MANUSCRIPTS OF THE PLANETARIUM OF JOHN DE DONDIS

S. Marco VIII. 17 (Valentinelli, XI, 85), membrane, folio, double columned, 14th century, fols. 1r-43v, col. 2: "Planetarium Iohannis de Dondri (?) dum Padue viveret. Tres sunt partes . . . / . . . usque ad quinque huiusmodi emendationes sexta vero penitus obmissa. Et hic sit finis cum illius laude qui entium finis est." With many large figures and diagrams. Pars II begins at fol. 39v, col. 2; Pars tertia at fol. 41v, col. 1.

Eton College 172. Bl.a.i (Bo.3.20), 15th century, 2 vols. in one, copied from an Italian MS of 1397 A.D. The first part of 58 fols. contains careful drawings of various parts of planetary clocks. The second part of 87 fols. contains the text, "Opus planetarii Ioanis de

[28] *Illas* in BN nouv. acq. français 4141, which thereafter has a fuller text. After *feces* Copenhagen S. 236 adds *terre* and before *dirigendum* inserts *ignem*.

[29] *Ad nichil* in Copenhagen S. 236.

[30] *Quod* in Copenhagen S. 236.

[31] The passage in brackets is omitted in the Venetian MS, which adds a paragraph explaining the "Balneum marie" which is not found at this point in the other MSS or the two printed versions of Zetzner.

Dondis fisici Paduani civis," with further drawings, some of which are unfinished. This description is based on M. R. James' catalogue of the MSS at Eton.

BL Laud. Misc. 620, 16th century, 102 fols., double columns: "Opus planetarii Iohannis de Dondis fisici Paduani civis," opening "Astronomorum priscorum eximii qui prestantibus ad modum ingeniis ea que in sublimi mundi regione. . . ." These words would seem the incipit of an introduction not found in the earlier 14th century MS. The figures are said to be "Iacobi Politi Cartolari anno 1461."

Cracow, university library 577 (DD.III.28), 16th century paper, Iohannes de Dondis, Fabrica horarii magistralis, is probably the Planetarium.

APPENDIX 26

EXTRACTS FROM ORESME'S QUOTLIBETA: LATIN TEXT

A. OPENING PARAGRAPHS

Incipiunt quotlibeta annexa questioni premisse
(MS FL Ashburnham 210, fol. 21r, col. 2).

Ut autem aliqualiter pacificentur animi hominum, quamvis sit extra propositum, aliquorum que mirabilia videntur causas proposui hic declarare, et quod naturaliter fiant sicud ceteri effectus de quibus communiter non miramur, nec propter hoc oportet ad celum tamquam ad ultimum et miserorum refugium currere nec ad demones nec ad deum gloriosum, quod scilicet illos effectus faciat immediate plusquam alios quorum causas credimus nobis satis notas.

Unum autem hic noto quod effectuum singularium oportet etiam causas singulariter assignare quod est difficillimum nisi homo videat illos effectus singulariter et eorum circumstantias singulariter. Et ideo quod predicta fiant naturaliter ut iam dixi et quod nullum inconveniens inplicatur, sufficiet mihi declarare quare autem sor est pauper et plato dives aut quare alias tali hora perdidit et quare piper in pauca quantitate provocat cetessum et in magna urinam et scamonea econtra ut dicit Aristoteles in prima parte probleumatum. Et quare bladum defecit in isto campo et quare sor audivit talem vocem aut vidit tale mirabile quomodo istorum redderentur cause particulariter et immediate et circumstantie singulariter cognoscuntur. ideo ut dixi quod talia naturaliter fiant in generali solum declarabo quemadmodum fecerunt valentes (fol. 21v) medici in medicina scribentes regulas generales et

documenta singularia medicis particulariter operantibus relinquentes, nullus enim medicus scivet (sciret?) dicere sor si sit infirmus qualis est infirmitas et quomodo causabitur nisi videat ipsum et consideret consideranda singularia. Similiter valentes mortales ut Aristoteles et ceteri solum generalia scripserunt nec est aliqua lex ut ipse dicit in politicis quin quandoque sit mutanda.

B. ORESME ON SPECIES

(FL Ashburnham 210, fol. 42r, col. 2).

Utrum sine speciebus reservatis in anima ut communiter ponitur possent salvari operationes anime, scilicet, cogitare, scire, memorari, etc. Quod non, quia aliter frustra ponerentur. 2° quia omnes actores eas ponunt. 3° quia ut superius fuit dictum nichil potest aliquid de novo quando aliquid aliud recipiat de novo vel quando aliquid aliud recipiat aliquid in se etc. Modo nunc anima aliquid scit quod prius non scivit et etiam recolit etc., igitur etc.

In oppositum quia manus multa potest diversa opera nec propter hoc quod in se habeat tot virtutes distinctas etc. 2° quia anima, ut ponit Avicenna 6° naturalium particula prima, multa nec propter hoc in ea ponere tot qualitates vel dispositiones distinctas quot etc., igitur cum anima sive sui mutatione multa possit et noviter agat sive patitur pari ratione et anima. 3° quia mirabile videtur quod in anima seu in organo reservarentur tales species ita diu. Et quomodo essent, cum continue humores et spiritus novi generentur et fluant antiqui etc. 4° quia non manent sic in speculo nec in medio igitur nec in anima. 5° quia difficilius est eas ponere et modum dare quod etc.

Utrum in anima sint species sonorum et etiam obiectorum aliorum 5 sensuum sicud et colorum. Quod sic, quia non videtur maior ratio de uno quam de alio. 2° quia ita memoror me audivisse Sortem sicud vidisse et ipsum tetigisse sive tactu sensuisse sicud etc.

In oppositum, quia vide qualis confusio esset ibi. 2° quia species soni non multiplicetur sine motu. 3° quia queritur si cum figura et situ distincte sint ibi in anima etc. Si sic, tunc multa ymo quasi infinita sunt simul. Si non, est contra omnes.

Omitting a Quodlibet on another subject, we continue:

Utrum in anima sunt tot species distincte quot res distincte cognoscit tam totales quam partiales, tam de toto quam de parte et parte partis etc. Et videtur dicere quod sic et sustinere (fol. 42v, col. 1) videtur difficile sic quod in parva anima aut instrumento aut organo parvo

sint etc. Et etiam videtur quod omnis albedinis sit una species et omnis magnitudinis etc., et tunc anima componit et dividit in uno vel ab uno etc. Est enim in anima eadem species representativa Sortis et Platonis etc., sed illa que representat Sortem est cum tali figura et tali etc., et alia cum alia sicut videmus quod ex 20 litteris fiunt omnes dictiones mundi, et sic diceretur de speciebus etc. 2° positis in anima speciebus aliquorum anima libere per se componit et dividit eas et concludit unam rem esse eandem vel diversam ab alia, igitur non oportet tot ponere quot sunt res etc. Et illa ratio non solum hoc concludit sed cum hoc quod in anima non sunt alique species ponende ut videtur unde inde quod essent res in anima Sortis scientis 3 vel 4 ydeomata et multos psalmos et multos libros.

APPENDIX 27

MANUSCRIPTS OF TREATISES BY HENRY OF HESSE

The first three MSS listed are those which I have chiefly used, examining them first at their respective libraries and later studying them through rotographs.

Vienna 4217 (Theol. Lat. MS. N. 608), 14th century, double columns; on the whole presenting the best text of the three. Fols. 1r-9v, col. 1, *De habitudine causarum* etc., opening, "(Q)uia libenter scire vellem modum naturalis administrationis et regiminis naturaliter agentium mundi inferioris . . .;" and closing, ". . . de se videtur propositum patere. Explicit tractatus de habitudine causarum et influxu nature communis respectu inferiorum quem edidit Magister henricus de hassia subtilis speculator." Fols. 29r-38r, *De reductione effectuum* etc., opening, "Propter admirari inceperunt antiqui homines phĩlosophari . . .;" and closing, ". . . nichil exceptis istis scilicet deo et sanctis angelis invenitur fortius malis spiritibus. Explicit tractatus quidam de reductione effectuum specialium in virtutes communes. Incipiunt capitula et materie capitulorum." A table of contents follows in the second column which is reproduced in Appendix 29. The incipit, "Propter admirari inceperunt . . ." came from the first book of Aristotle's *Meteorology* and had already been employed in the 1348 pest tract of the masters of Paris. See Sudhoff in *Archiv*, V, 83, quoting Würzburg M.p.Ms.f.6, fol. 61r, "Quia testante Aristotele primo Metheoricae Ex admirari inceperunt homines primitus phylosophari. . . ." Fols. 38v-45r, col. 1, "Questio de Cometa magistri henrici de hassia,"

opening, "Anno domini M^mo^ CCC^mo^ lx octavo a vigilia palmarum usque ad tres septimas visus fuit cometes . . ."; and closing, ". . . grosse et superficialiter absque pertinacia taliter sint dicta. Explicit tractatus disputativus cum astrologo super iudiciis apparationum cometarum et est totum unica questio."

FL Ashburnham 210 (142), 1401 A.D. and thereabouts, double columns, neatly written but sometimes faulty as to the text. This MS is of interest for its combination of works by Oresme and Henry of Hesse. I will therefore list briefly its other contents in addition to the treatises by Henry.[1] Fols. 3r-21r, Oresme's work of 1370 against astrology. Fols. 21r-70v, Oresme's Quotlibeta. Fols. 71r-84v, col. 1, "Incipit tractatus Magistri heinrici de hassia per eundem parisius contra eos qui ex coniunctionibus planetarum quas magnas vocant magnos effectus predicere conati sunt vulgares decipiendo compilatus." The text opens, "Odit observantes vanitates supervacue ideo sic viguit universitas parisiensis semper in iudicio et veritate. . . ." It closes, ". . . habundant herbe que tandem putrefacte exalant in aera." A table of contents follows and then, "Explicit tractatus contra coniunctionistas de eventibus futurorum editus a Magistro henrico de hassia." Fols. 84v, col. 2-89r, col. 1, "Tractatus magistri Nicolay oresme Argutivus principum qui vanis artibus ut per astrologiam et huiusmodi nituntur occulta perquirere et investigare futura . . . / . . . Explicit tractatus quem edidit vir profunde speculationis magister Nycolaus oreym normannus contra astrologos iudici (*sic*) qui se prophetas volunt appellari." Fols. 89r, col. 2-101r, col. 1, "Incipit tractatus de reductione effectuum in suas causas communes a reverendo M. heinrico de hassia parisius compilatus." The text opens, "Propter admirari inceperunt antiquitus homines philosophari . . ."; and closes, ". . . fortius istis malis spiritibus. Et sic est finis huius operis. Explicit Tractatus de reductione effectuum in suas causas communes." A table of contents follows in col. 2. Fols. 101v-129r, Oresme on the configuration of qualities. At fol. 129v begins a tract on the magnet which on the fly leaf of the MS is ascribed to Henry of Hesse but in reality is the well known work on that theme of Petrus Peregrinus. It is followed at fol. 133r by Oresme's *De monetarum mutatione*, and at fols. 141v-144v,

[1] The MS has been described by L. Delisle in *Notices et extraits des manuscrits*, XXXII (1886), 49-51, in some respects more fully and in others more briefly than here. Delisle was mistaken in placing the beginning of Oresme's treatise at fol. 82v instead of 84v, and, I think, in interpreting the abbreviation in the incipit at fol. 89r as *prophetari* rather than *philosophari*.

by Philo, *De ductibus aquarum pluviarum dans ingenia subtilia.* Fols. 145r-158v, Henry of Hesse, *De habitudine causarum,* with opening words as in the Vienna MS. At the close the date of copying the treatise is given as 1401 A.D.: ". . . qui quidem scriptus per manus Arnoldi Smeds de Wesalia Clivensis Anno domini M.CCCC.primo." At fol. 159r begins Oresme's *De commensurabilitate motuum celestium,* at fol. 172r his *Algorismus proportionum.* The MS concludes with the *Speculum astronomiae* of Albertus Magnus at fols. 178r-183r.

BM Sloane 2156, early 15th century, double columns. Fols. 116v, col. 2-130v, col. 1 (older numbering 122v-136v), "Incipit tractatus magistri henrici de hassia de reductione effectuum particularium in causas universales." The text opens, "Propter admirari inceperunt antiquitus . . ." as usual, and closes, ". . . fortius malignis spiritibus. Et sic est finis istius tractatus. Explicit tytulo ut supra." The work is written in an earlier hand than the two following treatises which were copied in 1428 and 1430 A.D. Fols. 194v, col. 2-209v, col. 1 (old numbering 199v-214v), following the work of Oresme on the configuration of qualities: "Finit de configurationibus reverendi doctoris magistri Nicolai orem. Et tractatus de habitudine causarum et influxu nature communis respectu inferiorum venerabilis doctoris M. hinrici de hassia subtilis speculatoris incipit, 1428°, 16to die novembris." The text opens and closes as usual. Then we read, "Ecce finis delectabilis speculationis tractatuli propter corruptionem exemplaris incorrecte scripti Anni 1428^{1} et mensis decembris die ultima que erat vigilia circumcisionis christi benedicti in eternum, Amen." Fols. 209v, col. 1-224r, col. 1 (no older numbering on these fols.), "Et tractatus venerabilis Nicolai orem Contra coniunctionistas incipit"; but apparently the same hand has added in the margin, "Non ipsius quoniam bis allegatur in processu." The text opens, "Odit observantes vanitates supervacue universitas parysiensis que adeo sic viguit semper in iudicio et veritate. . . ." After the closing words which are identical with those of Vienna 4217 we read, "Tractatus contra coniunctionistas de futurorum eventibus explicit 1430 bonegiis (?) mensis aprilis die vi que fuit crastina post dominicam palmarum."

Erfurt, Amplon.Q.298, paper, later 14th century, 116 fols. Fols. 68-84v, Tractatus Hassonis nobilis de habitudine causarum et influxu nature communis; fols. 85-97v, Tractatus eiusdem Hassonis de reductione effectuum specialium et mirandorum in virtutes communes bonus et subtilis; fols. 97v-111r, Tractatus eiusdem Hassonis optimus con-

tra coniunctionistas seu ho(r)oscopos: "Sequitur tractatus de novo parisius compositus contra coniunctionistas." The incipit of the text is "Odit observantes vanitates supervacue . . ." as usual and does not read *supervacuas,* as Schum's *Verzeichnis* has it. The work closes, ". . . putrefacte exalant in aera. Explicit Tractatus contra coniunctionistas de eventibus futurorum parisius compositus a magistro Henrico de Hassia." This last treatise is the most poorly written of the three by Henry in this MS, but the writing is none too good in any of them.

BN 16401, paper, end of 14th century, writing difficult to read: among other works by Henry occur at fols. 28-47, "Explicit tractatus contra coniunctionistas de eventibus futurorum editus a venerabili magistro Henrico de Hassia"; fols. 68-91, De habitudine causarum; fols. 92-109, De reductione effectuum; fol. 110 *et seq.,* Questio de cometa. According to Feret, *La faculté de théologie de Paris,* III, 269, this MS also contains a *De sphaera* [at fol. 55] and *Questio utrum corpus durum sit alteri immediate quomodolibet naturaliter approximabile* [fol. 47]. As usual Feret gives no statement of the leaves occupied by these tracts, which I take from the catalogue. It, too, appears to credit them to Henry of Hesse, but they may be, like the *De instantibus, Questiones communis perspectivae,* and *Algorismus proportionum* which Feret also attributes to Henry, really works by other authors which have got mixed in with treatises by Henry. Their titles are the same as those of well-known works of other writers, although it is not inconceivable that Henry might have dealt with the same topics.

Paris, Bibliothèque de l'Arsenal 522, a parchment MS in double columns formerly in the library of the college of Navarre. Since it includes a copy of the *De anima* of Pierre d'Ailly, a work composed by him while a student at Paris in 1372 (see Salembier, *Petrus ab Alliaco,* 1886, pp. xiii, 146), which copy alludes to him as bishop of Puy en Velay, we may date the manuscript as of the same period, namely, 1395 to 1398. Since this MS contains works by Oresme as well as Henry of Hesse, we may briefly indicate their position also. Fols. 1-29, Oresme de configurationibus qualitatum. Fol. 29, the work on latitudes of forms, which opens, "Quia formarum latitudines . . ." and is sometimes ascribed, as it is here, to Oresme, but also to such authors as John de Dondis and Blasius of Parma: see BL Canon. Misc. 177 and 393. Fol. 33, d'Ailly's *De anima.* Fol. 57, Tractatus de reductione effectuum in virtutes communes et ad causas generales, opening

as usual, "Propter admirari inceperunt antiquitus. . . ." A heading has been inserted ascribing the work either to Oresme or Henry: "editus a magistro Ni. Oresme vel de Hassia." Fol. 66, "Questiones communis perspective edite a magistro Henrico de Hacia," opening, "Presens huic operi sit gratia neumatis almi. . . ." The work is also ascribed to Henry at its close: "Expliciunt questiones communis perspective edite a magistro Henrico de Hacia sacre pagine professore. Deo gratias. Finis." Fol. 88, Oresme's De communicatione ydiomatum, incomplete. Fol. 88v, Tractatus de habitudine causarum et influxu nature communis, opening as usual, "Quia scire vellem . . ." but without name of author. Fol. 98bis, Tractatus disputativus cum astrologis super iudiciis aparitionum cometarum, opening as usual, "Anno domini millesimo tre^{mo} LX octavo a vigilia Palmarum . . ." but ascribed, in the catalogue at least, to Oresme. Fol. 106, Henry of Hesse, Dici de omni, opening, "Inquisiturus de Dici de omni. . . ." Fol. 110, Oresme, Algorismus proportionum, according to the catalogue, but the opening words, "Zenonem et Crisippum maiora egisse . . ." are those of his De commensurabilitate. Fol. 122v, a work on proportion opening, "Est autem istarum regularum de algorismo proportionum. . . ." Fol. 126, Oresme, De proportionibus velocitatum in motibus, opening, "Ut circa ardua asperaque fantasmata ex difformibus. . . ." Fol. 169, Oresme, Tractatus de instantibus, opening, "Circa tractatum de instantibus intendo primo. . . ." For further details see the *Catalogue des manuscrits de la Bibliothèque de l'Arsenal.*

Rome, Vatic. 9369, 14th century, 135 fols. This MS once contained *De habitudine causarum* and *De reductione effectuum* but they are now missing, and the codex opens with *De discretione spirituum,* fols. 1r-15r, beginning, "Sicut in philosophia motus et operationes referri consueverunt ad formas . . ." and closing, "Explicit tractatus de discretione spirituum reverend. doctoris ac illustrissimi magistri henrici de hassia." There follow Henry's *Speculum anime* and two questions, "Whether according to natural philosophy there are any separate substances besides the movers of the orbs," and concerning the substance of demons, at fols. 26r and 33v. At least, so the catalogue states, but from examination of the MS I incline to regard fols. 26r-40r as all one treatise. In any case the discussion as to what demons are has begun by fol. 29v, not at fol. 33v. A treatise on the sphere at fol. 41 is then followed at fol. 51 by the work of William, bishop of Paris, on the immortality of the soul.

The remaining MSS contain only one each of the treatises in which

we are interested. I have used a rotograph of the Vatican manuscript.

Erfurt, Amplon.Q.150, fols. 25-46, "De reductione effectuum specialium in effectus vel virtutes communes."

Rome, Vatic. 3088, fols. 14r-26r, col. 1, 14th century, small double columned pages with forty lines to the column. The text opens and closes as usual, then we read: "Explicit tractatus de habitudine causarum et influxu communis nature respectu inferiorum quem edidit Magister henricus de hassia subtilis speculator et speculativus subtiliatorum. laus sit domino deo nostro."

Other Paris MSS of *De habitudine causarum* are BN 2851 and 14887, 15th century, fols. 42v-65.

Feret, *La faculté de théologie de Paris,* III, 268, states that the *Contra coniunctionistas* is contained in BN 14579, 15th century, but I have utilized that MS only for Oresme's work on the configuration of qualities. The catalogue merely states that a treatise by Henry of Hesse opens at fol. 60 but gives no title for it.

De discretione spirituum is found in three MSS at Prag: 71 (I B 15), 14th century, paper, fols. 1r-8v: "Sicut in philosophia motus et operatio . . . / . . . posse retineri. Explicit tractatus nescio cuius." Another hand adds that Henry of Hesse is the author. 102 (I C 11), 15th century, fols. 144r-152v. 2565, 14th century, fols. 130r-145v.

Another MS of *De discretione spirituum* is Kapuzinerkloster in Klagenfurt, Maria Saal 10, 15th century, paper, fols. 227r-239v, with the usual incipit and ending, "Sicut in philosophia motus et operationes referre consueverunt . . . / . . . non nisi solo impossibilitatis freno posse retinere (retineri?)."

There are also MSS at Munich such as CLM 3436, fol. 168, and CLM 4775.

Another MS of the *Questio de cometa* is Monast.B.M.V. ad Scotos Vindob. 290, 15th century, fols. 41v-48r. It has the usual incipit, but the statement that it was composed at the command of the king of France seems dubious since the king is called Philip, who had died many years before the comet of 1368: "Ista questio de cometa determinata est parisius per reverendissimum artium et theologie monarchum magistrum hainricum de hassia ad mandatum christianissimi regis francorum philippi."

Yet another MS of the same work is Cassel MS astron. Fol. 9, 15th century, cols. 1-68: "Ista questio de cometa determinata est Parisius per reverendissimum Henricum de Hassia artium et sacre theo-

logie monarchum magistrum ad mandatum christianissimi regis Francorum Philippi. . . . Anno Domino millesimo trecentesimo sexagesimo octavo a vigilia palmarum usque ad tres septimanas Parisius visus fuit cometes tempore crepusculi vespertini in parte Occidentis occasione ejus quesitum fuit: utrum apparicio comete euentuum aliquorum fit signum prognosticat[iv]um. Et arguit quod non . . . / . . . absque pertinacia taliter sunt dicta. Explicit tractatus disputatus cum astrologo super iudiciis apparitionum cometarum et est totum unica questio."

Of the treatise against the hermit Thelesphorus there is the following MS: Escorial c.IV.20, 15th century, 190 fols., fol. 1, Epistola de falsis prophetis edita per magistrum Hainricum de Hassia ad dominum Gregorium Schench prepositum et archidiaconum ecclesie Saltzburgensis; fol. 86, Liber fratris Theolofori de cognitione presentis scismatis ac status universalis ecclesie usque ad finem mundi." BM Arundel 117, 15th century, fols. 112v-114, has extracts: Quaedam ad improbationem libri eiusdem per Henricum de Hassia. Other manuscripts are listed by L. Pastor, *Geschichte der Päpste,* I (1886), 121, note 2; I, 2 (1891), 129; English translation, I (1891), 152-3. Pastor could not locate an edition of the prophecies of Telesphorus of Venice, 1515, mentioned by Döllinger, "Weissagungsglaube", *Historisches Taschenbuch,* V (1871), 369, and affirms that modern writers know the work only from the MSS. The *Catalogue général des MSS des bibliothèques publiques des départments,* however, in describing MS Lyon 189(116), 15th century, fols. 16v-38, Telesphorus de Cosenza, hermite calabrais, Commentaire sur les prophéties faussement attribuées à Joachim de Fiore, cites an edition of Venice, 1516, apud lazarum de Soardis, with the incipit, different from the MS in question, "Cum tristis et dolens de malis presentis scismatis. . . ." Pastor cites this MS as Lyons 654, but I cannot imagine why, since its number in the *Catalogue général* is 189 and its number in the older catalogue of Delandine, Paris et Lyon, I (1812), 181, is 116. Delandine, by the way, made Telesphorus a hermit of Cusance, a village of Franche-Comté, instead of Cosenza in Calabria. In 1565 was printed at Paris (pour T. Bessault) what purported to be a French translation of Telesphorus, "Livre merveilleux contenant en bref la fleur et substance de plusieurs traittez. . . . Revue et corigé par messieurs de la faculté de théologie de Paris." (BM 8632.aaa.56.)

In addition to his tract on the prophecy of Telesphorus Henry of Hesse discussed in a letter to the bishop of Worms the prophecy of

Hildegard concerning antichrist. I have used rotographs of two MSS preserved at Wolfenbüttel: Wolfenbüttel 270 (cod. 237 Helmst.), c. 1453 A.D., fols. 385r, col. 1-392r, col. 2; "Epistola Hinrici de Hassia ad episcopum wormaciensem de prophetia Hildegardis de antichristo." Wolfenbüttel 402 (cod. 367 Helmst.), 15th century, fols. 31v, col. 1-38r, col. 2; "Epistola magistri hinrici de hassia ad episcopum wormaciensis." Both MSS then continue: "Reverendo in christo principi domino domino episcopo wormaciensi Hinricus de Hassia suorum minimus futurorum consideratione . . . / . . . deinceps in fortissima vi rectitudinis persistent. Amen. Explicit prophetia Hildegardis de adventu et habitudine antichristi collecta in quadam epistola quam reverendus magister Hinricus de Hassia scripsit ad episcopum Wormaciensem pro quo laudetur deus. Amen." The last sentence is found only in the second manuscript, Wolfenbüttel 402 (cod. 367 Helmst.).

Melk 51, 15th century, fols. 210-218, de improbatione epiciclorum et concentricorum, ascribed to Henry of Hesse, is probably his *Contra coniunctionistas* or part of it, since its second chapter opens with mention of epicycles and eccentrics.

CLM 18544b, fols. 30r-42v: "Sicud in philosophia motus et operationes referri . . . / . . . freno posse retineri. Et sic finitur tractatus de discretione spirituum sub annis domini 1409 magistri Hainrici de Hassia."

CLM 7083, 14th-15th century, fols. 96-105: Henricus de Hassia de spiritibus.

A brief discussion of popular superstitions on Christmas day and the feast of the Circumcision is ascribed to Henry of Hesse in Monast. B.M.V. ad Scotos Vindob. 269, 15th century, fol. 158r-v. It may be a fragment from some other work of his, but sometimes the work on superstitions of Nicholas de Gavir is incorrectly attributed to him. What the Munich catalogue gives as Henry of Hesse, De superstitionibus in CLM 12258, anno 1466, fols. 213-266, is really, however, his work on contracts: *ibid.*, fol. 261v, col. 1, "Explicit tractatus de contractibus editu(s) per venerabilem virum magistrum Henricum. It was printed with Gerson's works in the 1480 edition, IV, 185-223.

Bamberg 1776 (Q.VI.58), 15th century, de divinationibus, and Bamberg 1784 (Q.II.9), 1460 A.D., de superstitionibus, are both attributed to Henry of Hesse. Possibly the latter is the De superstitionibus of Nicolaus Gawor, but Franz (1898) in his list of 57 MSS of that work includes no Bamberg MS.

A work or portion of a work on medicinal simples is ascribed to Henry in CLM 3073, 15th century, fols. 247-283, De medicinis simplicibus particula II.

For MS of other works by Henry than those which are germane to our investigation the reader may refer to the works of Roth and Feret, Hartwig and Pastor. For some further astronomical and astrological MSS see Zinner 6323-6333.

APPENDIX 28

HENRY OF HESSE, DE HABITUDINE CAUSARUM: HEADINGS

From MS Vienna 4217, formerly Theol. Lat. N. 608, fols. 1r-9v.

fol. 1r, col. 1 Intelligentie nullam actionem habent in istis inferioribus nisi mediantibus qualitatibus influentialibus orbium et stellarum

Licet intelligentia unita orbi sit in se libera solum tamen naturali modo et de necessitate agit in materiam exteriorem et non libere contingenter

Nullam intelligentiam secundam solo intellectu et imperio voluntatis aliquem effectum producere in mundo inferiori

Eadem stella et pars orbis semper eandem influentialem qualitatem retinet quam modo habet

fol. 1v, col. 1 Ad hoc ut in aliquo passo aliquis effectus fiat vel dispositio preter naturam particularem non oportet aliquam influentialem qualitatem ab aliqua intelligentia stella vel constellatione in ipsa hora ibi specialiter diffundi

col. 2 Ad effectus qui propter vitationem vacui aut aliorum in natura inconvenientium contingunt specificas naturas inferiorum effective causaliter non concurrere

Ab essentiali ordine vel concathenatione superiorum causarum citra primam huiusmodi effectus qui communi nature solet communiter attribui effective causaliter non dependet

fol. 2r, col. 1 Res inferiores respectu dictorum effectuum activam causalitatem sub nulla ratione communi vel generali habere

col. 2 Non est aliqua unius speciei influentialis diffusio omnibus rebus inherens virtute cuius contingant dicte operationes insolite in naturalibus

fol. 4r, col. 1 Ex istis omnibus volo habere aliquas conclusiones quarum prima est

Cause celestes corporee vel incorporee respectu invicem essentialem ordinem et dependentiam in agendo non habent.

Secunda est singulis secundis causis singulos effectus et operationes naturaliter deputari quas solo concursu cause simpliciter prime in materiis inferiorum explere possunt.

Tertia est omnes secundas causas superiores eque et equaliter immediate a causa prima tam in esse quam in agere dependere

col. 2 Causas perfectiores determinare imperfectiores ad effectuum eorum rationes specialissimas potius quam econtra

Causas inferiores nihilominus et in productione naturalium effectuum dispositive quodammodo et determinative concurrere ad rationes specificas eorum et individuales

fol. 4v, col. 2 Solam causam simpliciter primam precipue intellectus et voluntatis imperio extra se contingenter libere causare

fol. 5r, col. 1 Tot essentiales ordines causarum cause simpliciter prime subesse quot sunt intelligentie secunde ac ipsam nullius earum in causando indigere

Quamlibet dictarum essentialium ordinationem causarum adminus tres causas includere

Infima causarum essentialiter subordinatur suum effectum producere sine concausalitate cuiuscunque aliarum repugnantiam contradictionis non includere

fol. 5v, col. 1 Nulli subordinationi causarum[1] causam essentialiter interponi quod ipsis in ea non repositis in suas proprias effectuationes non possent

In essentiali subordinatione ymaginarie[2] circumscripto concursu supreme cause non solum potentialem quamdam et confusam effectus vestigationem relinqui in causa infima secundum eius naturam propriam impossibilem actuari ymmo determinatam et essentialem accidentem sine repugnantia prima causa non prohibente in actum reducibilem

col. 2 Causalem rationem cuiuslibet effectus plenius et naturaliter prius in prima causa essentialis concathenationis respectu istius reperiri et relucere quam infima effectuum[3] proxima

Omnem effectum prius et immediatius adequari alicui rationi

[1] This reading from Sloane 2156, fol. 202v, col. 2, seems preferable to the *causas* of Vienna 4217.

[2] *Imaginative* in Sloane 2156, fol. 203r, col. 2.

[3] Or, *effectum*.

exemplari intellectuali quam cuicumque rationi causali naturali

Si prima causa esset essentialiter non intellectualis (fol. 6r)

fol. 6r, col. 1 nichilominus secundum omnem speciem et ordinem et pulchritudinem singuli effectus fierent sicut[1] modo.

Opus nature communis in istis inferioribus non est opus alicuius intelligentie nec alicuius concathenationis essentialis earum

fol. 6v, col. 2 Omnium effectuum qui de potentia nature ordinata inferius fiunt intelligentias mediantibus suis orbibus causas essentialiter supraordinatas[2] esse

fol. 7r, col. 1 Optimam dispositionem et consonantiam universi natura prefert perfectioni proprie cuiuscumque speciei eius et individui

col. 2 Secundum legem nature magis inconveniens est fieri vacuum quam inter terminos distantes fieri mutationem subitaneam

fol. 7v, col. 1 Lex nature magis vitat subitaneam mutationem inter terminos distantes quam elementi ultra gradum nature particularis rarefactionem et a suo loco naturali remotionem[3]

col. 2 Tabulas immediate se tangentes cum minore difficultate contingit equedistans[4] levari quam per aeris aliquam tenuitatem distantes

fol. 8r, col. 1 Rarefactionem vel condensationem aliquorum corporum natura communis magis vitat quam localem subitaneam mutationem

col. 2 Omnes res elementares respectu activitatis nature communis habent equaliter sine resistentia obedientialem potentiam

Actio tamen nature communis est secundum magis et minus quandoque prout exigit dispositio et receptivitas rerum

Quantumcumque grave superius planum vel concavum in aere uniformi equedistantis non[5] descenderet sine concursu speciali nature communis

fol. 8v, col. 1 Ut grave descendat natura communis non solum ad rarefactionem et condensationem sed quandoque ad remotionem elementi extra suum locum naturalem operatur

Precise secundum exigentiam conatus[6] violentie tractive vel

[1] *Aliquo* in Sloane 2156, fol. 203v, col. 1.
[2] *Subordinatas* in Sloane 2156, fol. 205r, col. 1.
[3] *Removere* in Sloane 2156, fol. 206r, col. 1.
[4] *Equedistantes* in Sloane 2156, fol. 206v, col. 1, seems preferable.
[5] *Nature* in Sloane 2156, fol. 207r, col. 2.
[6] *Tractus* in Sloane 2156, fol. 207v, col. 2.

impetus unum corpus alterum non insequi ex motione communis nature

fol. 9r, col. 1 Communis natura aquam a suo loco naturaliter quandoque potius ascendere facit quam quod eam extra suum locum quiescendo arrestat

col. 2 Aquam per unam partem canalis non elevari ratione maioris ponderositatis aque in parte altera

Habitudo et situatio quatuor elementorum respectu invicem nature eorum particularis transgreditur exigentiam.

APPENDIX 29

HENRY OF HESSE, DE REDUCTIONE EFFECTUUM: HEADINGS

(Vienna 4217, fol. 38r, with variant readings from Amplon.Q. 298, fol. 85r, FL Ashburnham 210, fol. 101r, and from BM Sloane 2156, fols. 116v-130v, which has the headings scattered through the margins opposite the beginning of most of the chapters.)

Incipiunt capitula et materie capitulorum

Primum capitulum de modo inventionis philosophie specialis

2^{m} de limitatione formarum substantialium ad distinctas dispositiones qualitativas

3^{m} de limitatione earum[1] ad dispositionem materie de quarta specie qualitatis

4^{m} movet dubium circa predicta

5^{m} respondent ad motiva post oppositum

6^{m} replicat et respondet

7^{m} ostendit propter quid requiritur[2] dispositio armoniaca materie confirmando precedens[3]

8^{m} descendit ad armoniam et discrasiam[4] microcosmi in generali

9^{m} de comparatione microcosmi ad macrocosmum quantum ad predicta

10^{m} de duplici modo ponendi influentias in superioribus

11^{m} de modo quo incidunt[5] rebus inferioribus

12^{m} de concurrentia[6] et modo impeditionis et promotionis inferiorum virium naturalium activarum a superioribus

13^{m} ostendit quatuor species influentiarum sufficere ad salvandum effectus naturalis cursus

[1] *Formarum substantialium* in Sloane 2156.

[2] *Dicitur* in Amplon.Q. 298.

[3] *Precedentes* in Ashburnham 210.

[4] *Discrasivam* in Ashburnham 210.

[5] *Incidunt in* in Ashburnham 210. *Inciditur* in the table of Amplon.Q. 298, but *incidunt* in its text.

[6] *Concurrentibus* in Ashburnham 210.

14[m] de modo resultationis variarum specierum sensibilium qualitatum ex concursu primarum
15 de modo exitionis[7] vel reductionis talium in actualem operationem
16 de resultatione multiplicium[8] specierum secundarum[9] qualitatum formaliter[10] motivarum
17[m] ostendit quomodo ex predictis salvari possunt effectus et actiones rerum speciales
18[m] de actione reali qualitatum secundarum que sunt colores
19[m] ostendit quod species sensibilium qualitatum ad salvandum effectus predictos sufficiunt
20 movet dubitationem[11] de actione substantie sine coefficientia accidentis[12]
21 ponit aliam[13] considerationem circa virtutes vel qualitates communes[14] ad salvandum effectus speciales
22 probat sensibiles qualitates mediantibus earum speciebus[15] reales actiones facere
23 ponit[16] aliam considerationem ad salvandum effectus speciales ex viribus communibus
24 de[17] modis et speciebus combinationum virium totius nature
25 de[18] effectibus talium combinationum et ultimato posse nature

APPENDIX 30

HENRY OF HESSE, QUESTIO DE COMETA: HEADINGS

From MS Vienna 4217, fols. 38v-44v.

These captions, standing out in larger and bolder writing than the remainder of the text, begin to occur in it only about half way through the treatise at fol. 42r, col. 2, although previously there had been one written in the margin in a different hand at fol. 39v, "de pestilentia post comete apparitionem." The figures to the left in the following list mark the leaf and column where the respective headings occur.

42r, col. 2 Exalatio cometalis ibi ut plurimum medium interstitium penetrat potius ubi ab eo venti reflectuntur
42v, col. 2 Figuram corporis comete ex figura et disrepione (?) porcionis iam inflammate resultari

[7] Omitted with *vel* in Ashburnham 210; *exitaticnis* in Sloane 2156.
[8] *Multiplicantium* in Ashburnham 210.
[9] *Respectu* in Ashburnham 210.
[10] *Localiter* in Sloane 2156.
[11] *Dubitationes* in Ashburnham 210.
[12] *Coefficatia activitatis* in Ashburnham 210.
[13] *Aliquam* in Sloane 2156.
[14] *Omnes* in Sloane 2156.
[15] *Specierum viribus* in Amplon.Q. 298.
[16] *Probat vel ponit* in Ashburnham 210.
[17] *Est de* in Amplon.Q. 298.
[18] *Est de* in Amplon.Q. 298.

Cometam raro vel numquam sub sua propria figura apparere

Cuiuslibet comete dyameter sive latitudo est minor dyametro stelle cui apparet equalis

Si aliquis cometa et luna sub equalibus angulis apparent, tunc dyameter eius esset tanto minor dyametro lune quantum distancia comete ab respectu distancie lune a nobis

43r, col. 1 Latitudo comete apparentis equalis lune esset fere equalis latitudine tercie partis terre

Contingit apparentia quantitatis comete propter radiorum refractionem notabiliter variari

col. 2 Apparentiam caude comete per modum quo virge solares fiunt non irrationaliter forte contingere

Diversitas aspectus comete verisimili maior quam dupla ad diversitatem lune coniecturatur

Si cometa visibiliter iungeretur uni stelle fixe in cenith diversitas aspectus eius esset nota in illa regione

43v, col. 1 Si semidyameter concavi ignis quovis modo fuerit nota, diversitas aspectus comete in omni elongatione a zenith erit nota et econtra

Nota diversitate aspectus comete distantiam eius a centro mundi penes quantitatem semidyametri terre patefacere

col. 2 Diversitatem aspectus comete in regione ubi non transit per cenith impossibile est haberi

Verus locus comete nec in celo nec in zodiaco ubi dicto modo apparet potest haberi primum

44r, col. 1 Materiam cometalem preter motum continentis proprium motum circularem non habere

Motum comete in latitudine propter motum medii continentis super polis zodiaci ex influxu 2^{1} motus celi versus oriens non pervenire

col. 2 Cometam solum versus occidens ad modum diurnum circumferri

Cometam tardius unam revolucionem quam primum mobile complere

Motum declinacionis comete versus aliquem polorum verisimilius propter materie versus illam ipsam consumptionem contingere

Quantitatem veri motus comete in dato tempore impossibile est nobis determinare

44v, col. 1 Idem cometa tardius apparet moveri ex consideratione motus eius respectu stellarum fixarum de vespere quam de mane

Per diurnam lationem comete lineam gyrativam sepius describi ad aliquem polorum appropinquantem

Cometam equedistanter ecliptice moueri potius numquam quam rarissime contingere

APPENDIX 31

HENRY OF HESSE, CONTRA CONIUNCTIONISTAS: HEADINGS

FL Ashburnham 210, fol. 84r, col. 2-84v, col. 1, with variant readings from the preceding text and from BM Sloane 2156, fols. 209v-224r, where the headings are scattered through the text.

Incipiunt capitula prime partis

Capitulum primum de occasione scribendi

2^{m} quod inpugnanda est rationabiliter practica iudiciorum[1]
3^{m} de relatione coniunctionum saturni et Iovis ad triplicitates[2]
4^{m} de comparatione coniunctionis vere et medie in ordine ad triplicitates[3]
5^{m} de comparatione coniunctionum ad se penes maiorem et minorem efficatiam[4]
6^{m} de numeratione[5] coniunctionum a tempore christianorum
7^{m} obicit generaliter contra talem observationem coniunctionum[6]
8^{m} obicit specialius de coniunctione quadam in aquario[7]
9^{m} arguit ad idem de duabus aliis considerationibus[8]
10^{m} obicit generaliter contra modum observationis[9] coniunctionum eclipsium et introituum[10]

[1] Quod rationabiliter est impugnanda practica iudiciorum. In the text of the Ashburnham MS the introductory passage is unnumbered and this chapter is headed, "Capitulum primum in quo tangitur aliquid de fundamentis erroneis."

[2] In the text we read, "Ca^{m} 2^{m} de mutatione coniunctionum magnarum de triplicitate ad triplicitatem."

[3] The text has, "Ca^{m} 3^{m} de differentia mutationis secundum coniunctionem veram et mediam in triplicitatibus.

[4] In the text, "Ca^{m} 4^{m} Quis sit ordo coniunctionum magnarum in efficatia?"

[5] Enumeratione. In the Ashburnham text, "Ca^{m} 5^{m} Calculationes de coniunctionibus magnis preteritis et futuris."

[6] In the text, "Ca^{m} 6^{m} In quo impugnantur recitata fundamenta in capitulis premissis."

[7] In the text, "Ca^{m} 7^{m} Argumenta specialia contra efficatiam coniunctionis saturni et iovis."

[8] In the text, "Alie rationes fortiores in destructionem efficientie coniunctionis saturni et iovis."

[9] Et observantias.

[10] In the text, "Argumenta militantia contra plura principia astrologorum."

11m obicit de coniunctione saturni et martis quadam et eclipsi[11]
12m obicit contra quendam modum divinationis pestilentie a coniunctione saturni et iovis in aquario[12]
13m obicit contra impugnationem coniunctionum et solvit obiectionem[13]
14m obicit[14] contra specialem observationem quatuor aspectuum planetarum[15]
15m obicit in contrarium et solvit.[16]
16m probat adhuc observationem aspectuum ex cursibus[17] acutarum.[18]
17m ostendit probationem illam efficatiam non habere.[19]

Incipiunt capitula secunde partis

Primum de modo subiectionis actuum humanorum superioribus[20]
2m quod diligentiam circa radicem inferiorum[21] astrologi facere non possunt quam deberent[22]
3m ostendit idem ex parte inscrutabilis eis varietatis regionum
4m declarat inobedientiam inferiorum ad superiora in materiali dispositione et particulari actione
5m ostendit quomodo per eam[23] que advertere habent astrologi ex parte superiorum necessario deficiunt et frustra laborant
6m movet quandam questionem curiosam incidentalem et arguit ad partem affirmativam
7m arguit ad oppositum tendens[24] qualiter secundum veram astrologiam[25] astra debent significare
8m arguit contra et solvit quomodo astrologi videntur experientias quasdam habuisse.[26]

Incipiunt capitula tertie partis

Primum quod virtus vegetabilium plus indiget aliis influentia solari vel celesti[27]

[11] In the text, "Argumenta quod non aliter influunt planete coniuncti in uno loco quam in alio."
[12] In the text, "Argumenta quod dominium planete in signo non auget influxum."
[13] In the text, "Solutio quarundam tacitarum obiectionum redarguenti coniunctionistas."
[14] Obicit specialiter.
[15] In the text, "Capitulum seu positio principalis huius tractatus ubi de aspectibus planetarum eorum virtutes vel malitias redarguendo agitur."
[16] No heading in the Ashburnham text.
[17] Crisibus.
[18] In the text, "Solutio obiectionum possibilium fieri de aspectibus per ponentes eos."
[19] In the text, "Solutio statim obiectorum."
[20] In the text, "Quod admissis fundamentalibus principiis ipsorum astrologorum coniunctionistarum adhuc frustra conantur omnes effectus circa nos sine particulari discussione radicum inferiorum ad superiora precise reducere."
[21] Inferiorem.
[22] Henceforth the headings in the Ashburnham text are practically identical with those of the table of contents.
[23] Propter ea.
[24] Et solvit ostendens.
[25] Astronomiam.
[26] Arguit et solvit ostendens quomodo astrologi videntur experientias aliquas habuisse.
[27] Sequitur tertia pars cuius primum capitulum ostendit quod vires vegetabilium plus aliis indigent influentia solari vel celesti.

2[m] de coniecturatione status vegetabilium ex duabus radicibus sine recursu[28] ad coniunctiones magnas eclipses et annorum revolutiones

3[m] salvat causam pestilentie ex parte radicum superiorum similiter sine talibus scilicet observatione preteritarum coniunctionum et specialium constellationum et ita de causis varietatis aeris

4[m] recolligit modos aliquos divinationis pestilentie et[29] concursu duarum radicum.

APPENDIX 32

EXPERIMENT OF RAISING A FLAT PLATE FROM THE SURFACE OF WATER: LATIN TEXT

Vienna 4217, fol. 7v, col. 1; Sloane 2156, fol. 206r, col. 1.
From Henry of Hesse, *De habitudine causarum*

Lex nature magis vitat subitaneam mutationem inter terminos distantes quam elementi ultra gradum nature particularis rarefactionem et a suo loco naturali remotionem.

Patet quia experimur in equedistante levatione plane tabule contigue alicui aque secundum superficiem aliquam[1] per modum pyramidis simul cum tabula levari ad notatabilem distantiam et igitur posito quod ista aqua fuisset sub proprio gradu raritatis specifice nature eius debito sequitur ipsam ultra eius gradum rarefieri quod est[2] propositum ymmo si etiam fuisset sub maxima raritate aque possibili de potentia ordinata nature pateretur ulteriorem rarefactionem vel contingeret aliquando tabulam planam equedistanter ab aliquo humido non posse levari quod nusquam contingit etc. Ex quibus patet tabulam planam non recte neque oblique a superficie aque quam immediate tangit posse levari sine aliquarum partium aque rarefactione. . . .

APPENDIX 33

MANUSCRIPTS OF DOMINICUS BANDINUS, FONS MEMORABILIUM UNIVERSI

The following MSS appear to contain the entire work:

Oxford, Balliol College 238, 1448 A.D., folio membrane, in 5 vols. of 135, 242, 174, 257, and 158 leaves respectively. Volume I contains the first part; volume II, the second and third parts; volume III, the first four sections of part four; volume IV, its remaining eight sections; volume V, the fifth and last part.

[28] Concursu.
[29] *Ex* in Sloane 2156 and in the text of Ashburnham 210.
[1] *Aquam* in Sloane 2156, fol. 206r, col. 1.
[2] *Erit* in the Sloane MS.

Vatican 2028-2029, 43 x 29 cm., fols. 502 and 474 respectively. At fol. 2v of 2028 is a letter with the title, "Sermo Laurentii decretorum doctoris ac sacri palatii apostolici causarum auditoris et apostolice sedis capellani unici filii auctoris contra detractores huius libri." I am indebted for information concerning this and the two following entries to the kindness of Monsignore Eugène Tisserant, prefect of the Vatican library.

Vatic. Palat. 922-923.

Vatic. Chigi G.VIII.234-237.

The following MSS contain portions of the work:

Lambeth Palace 35, 1450 A.D., contains the first four parts. Cambridge, Corpus Christi 78 has most of part five.

Venice, S. Marco VII.XLIV (Valentinelli, XIV, 47), paper, 1429 A.D., fols. 2r-92r: "Liber de herbis leguminibus et oleribus et de virtutibus herbarum editus a magistro Dominico magistri Bandini de Aretio." An index covers fols. 3r-7v. At fol. 10r, after a long heading, the text opens, "Rebar post arbores de aratoriis agris dicere. . . ."

Vatic. Urbino 300, 15th century, membrane and paper, double columned folio, fols. i, 303. On the fly leaf, "Sanctus Isidorus Hispalensis De viris claris. Non est Isidorus sed auctor longe recentior Dominicus filius Bandini Aretinus ut habetur p. ss. qui edidit etiam in Dantis poema commentarium ut habetur p. 194 a tergo." Fol. 2r, Proemium opens: "Nature solers indagator phylosophus metaphysice primo. . . ." Fol. 9v, col. 2, text opens: "Abachuc propheta ut scribit Ieronimus. . . ." Desinit littera P voce Pamphilus, verbis, ". . . inde sublatus fuerat in portum."

Vatic. 3121, small quarto, membrane, fols. 1r-53r: "Incipit liber de celo signis et ymaginibus celestibus editus a magistro Dominico de Aretio artium doctore egregio totiusque scientie monarchato. Iuvat me diu versatum in tenebris celum aspicere . . .;" fol. 23r, "Explicit liber de celo signis et ymaginibus celestibus;" fol. 23v, "Incipit liber stellarum erraticarum editus a magistro Dominico de Aretio. Hic docet astrorum leges loca tempora motus. . . ."

FL Gaddi reliq. 126, membrane, small quarto, nitidissimus, 15th century, 24 fols.: fol. 1r, "Incipit prohemium libri de mundo editi a magistro Domenico de Aretio ad nobilem virum decusque militie dominum Rinaldum de Gianfigliatis de Florentia. Horribili (not *Terribili* as given in the catalogue) atque tremendo bello. . . ." The text opens, "Mundi essentiam atque originem proferre. . . ."

FL Ashburnham 1279(1265), 14th century, paper, large folio, double

columns: fol. 1r, col. 1, "Hoc est repertorium memorabilium quarte partis principalis huius libri colupne fontis memorabilium continentis libros 12 et primo librum provinciarum et regionum." This table of contents runs to fol. 11r, col. 1, where we read: "In precedentibus voluminibus expletis libris trium partium principalium operis huius columpne fontis memorabilium universi consequenter in presenti volumine tractatur de quarta parte principali totius eiusdem operis continentis libros 12 et compilati a domino Dominico de Aretio. Et primo incipit liber provinciarum et regionum. Sequitur prohemium. Subtili mente vidi librorumque multitudines cartas volvi et percepi difficultatem interminabilem. . . ." At fol. 50r the book on provinces ends and at fol. 51r that on islands begins. It ends at fol. 75r, col. 1, and the book on cities opens in col. 2. At fol. 117v, col. 1, the book on cities is left unfinished in the letter L, and at fol. 120r, col. 1, the text resumes concerning the sects of philosophers. At fol. 127v, col. 2, we have the ages of the world; at fols. 140r, col. 2-203v, col. 2, "Incipit liber virtutum"; fol. 204r, col. 1, "Sequitur de aliquibus medicine remediis"; fol. 204v, col. 2, the book on heresies; and at fol. 215r, col. 1, the book on famous women begins, breaking off with Circe at fol. 248, where the MS also ends.

APPENDIX 34

AN ANONYMOUS WORK ON METAPHYSICS AND NATURAL PHILOSOPHY: HEADINGS

BN 6752, fol. 22r. Capitula primi libri:

Primum capitulum de subiecto metaphysice.
Secundum capitulum de subiecto philosophie naturalis.
Tercium de qualitate utriusque philosophie.
4^{m} an dicte scientie sint propter quid vel quia.
5^{m} ubi agitur que sunt nota nature.
6^{m} qualiter universalia prius vel posterius cognoscuntur.
7^{m} utrum universalia sint ponenda realia ad extra.
8^{m} de differentia individuali penes quid attendatur.
9^{m} de quibusdam opinionibus circa causam individuationis.
10 qualiter sit respondendum ad motivum platonis.
11 qualiter sit respondendum ad 2^{m} motivum eiusdem.
12 de ulteriore errore platonis et qualiter sit respondendum rationibus Aristotelis et Boetii.
13 de quorundam inepta difficultate circa distinctionem individualem.
14 in quo consistat ratio diffinitiva individuationis.
15 quomodo intelligenda sit diffinitio individui seu supposite.

Fol. 50r. Explicit liber secundus cuius capitula sunt hec:

Primum capitulum de principiis rerum naturalium secundum Empedoclem.
2^{m} ca^{m} de principiis rerum naturalium secundum Platonem.
3^{m} ca. de principiis rerum naturalium secundum Anaxagoram et Anaximandrum.
4^{m} ca. de principiis rerum naturalium secundum Permenidem et Mellissum.
5^{m} ca. de principiis rerum naturalium secundum Aristotelem et philosophicam veritatem.
6^{m} ca. de investigatione diffinitiva materie.
7 ca. de rationibus Aristotelis in ponendo materiam.
8 ca. qualiter ponenda sit materia in celestibus et in istis inferioribus.
9 ca. de proprietatibus materie.
10 ca. de quibusdam dubiis circa predicta.
11 ca. de tercio dubio circa eandem materiam.
12 ca. de inquisitione forme.
13 ca. de proprietatibus forme substantialis.

Fol. 50v.

14^{m} ca. penes quid debeat attendi perfectio formarum.
15 ca. de aliis opinionibus circa eandem difficultatem.
16 ca. an replicatio alicuius gradus essendi augeat perfectionem specificam.
17 ca. qualiter respondendum sit rationi eorum.
18 ca. an independentia dici debeat aliquis gradus perfectionis in latitudini essendi.
19 ca. de quibusdam dubiis circa predicta.
20 ca. an supremus gradus essendi in latitudine creabilium sit producibilis.
21 ca. de quibus[1] motivis et evasionibus opinionis predicte.
22 ca. de varietate latitudinum.
23 ca. quomodo latitudo creabilium est uniformiter difformis.
24 ca. an latitudo creabilium sit continua.
25 ca. an latitudo creabilium est discreta.
26 ca. de genere latitudinis creabilium.
27 ca. de quibusdam dubiis circa predicta.

Fol. 95v. Explicit liber tercius cuius sequuntur capitula:

Primum ca^{m} de inquisitione anime secundum antiquos.
2^{m} c. de impugnatione predictorum opinionum.
3^{m} c. quid sit anima secundam philosophicam veritatem.
4^{m} c. de perpetuitate anime.
5^{m} c. de potentiis anime.
6^{m} c. de sensu visus.
7^{m} c. de speciebus existentibus in medio.

[1] "Quibusdam" in text.

Fol. 96r.

8^{m} c. de quibusdam dubiis circa predicta.
9^{m} c. de quibusdam aliis circa eandem materiam.
10 c. de explanatione predictorum.
11 c. de modo causandi visionem.
12 c. de sensu auditus.
13 c. de tribus sensibus s. gustu odoratu et tactu.
14 c. de distinctione potentiarum nonorganicarum ipsius anime.
15 c. de intellectu agente et possibili.
16 c. de proprietatibus intellectus atque conditionibus.
17 c. de proprietatibus anime in generali.
18 c. an in eodem corpore possint simul esse plures forme substantiales.
19 c. de aliis opinionibus circa eandem materiam.
20 c. de ulteriori declaratione predictorum.
21 c. de quantificatione perfectionis specierum ydealium existentium in anima vel extra animam.
22 c. de 2° dubio circa predicta.
23 c. de perfectione essentiali ydearum seu specierum complexarum.
24 c. de aliquibus dubiis circa pretactam materiam.
25 c. de quidditate seu indivisibilitate ydearum complexarum.
26 c. penes quid attenditur perfectio ydearum complexarum.
27 c. de obiecto intellectus quid sit obiectum intellectus.
28 c. de quibusdam dubiis circa predictam materiam.
29 c. de quorundam modernorum indiggesta subtilitate contra predicta.
30 c. de secunda propositione eiusdem opinionis.
31 c. de tercia propositione eiusdem opinionis.
32 c. quid querunt predicte opiniones cum suis rationibus et distinctionibus.
33 c. de somno et vigilia.
34 c. de memoria et reminiscentia.
35 c. de quibusdam documentis circa memoriam.
36 c. de appetitu et voluntate.
37 c. de quibusdam dubiis et opinionibus circa predicta.
38 c. de complexione anime et cuiuslibet forme substantialis.

Fol. 158r. Explicit quartus liber cuius hec sunt capitula:

Primum capitulum de speciebus transmutationibus (sic) in generali.
2^{m} ca. de quibusdam veritatibus transmutationum in generali.
3^{m} c. de quibusdam aliis veritatibus.
4^{m} c. de quibusdam veritatibus de natura que est principium motus.
5 c. de transmutatione que fit ad substantiam.
6 c. de quibusdam veritatibus Aristotelis de generatione et corruptione.
7 c. qualiter respondendum sit predictis rationibus.
8 c. de quibusdam aliis veritatibus.
9 c. de mensura seu duratione generationis et corruptionis.
10 c. de quibusdam aliis propositionibus in eadem materia.

11 c. de aliis propositionibus in eadem materia (Supplied from text, fol. 108r).
12 c. de limitatione rerum atque transmutationum secundum maximum et minimum.
13 c. de quibusdam propositionibus circa maximum et minimum et primo de rebus homogeneis et etherogeneis.
14 c. de potentia visiva qualiter terminetur respectu distantie atque effectuum seu velocitatis in agendo.[2]
15 is omitted here.
16 c. qualiter potentia passiva terminatur seu in quelibet res (?) secundum durationem.
17 c. de motu seu transmutatione ad qualitatem.
18 c. de contrarietatibus et oppositionibus.
19 c. qualiter contraria possint esse simul in eodem subiecto et utrum qualitates medie constent ex extremis.
20 c. quid sit tenedum circa predictam materiam.
21 c. de quibusdam dubiis circa predicta.

Fol. 158v.

22 c. de quibusdam aliis dubiis circa eandem materiam.
23 c. de quorundam modernorum inepta subtilitate in eadem materia.
24 c. de gradibus intensivis formarum secundum aliquas opiniones.
25 c. de gradibus intensivis formarum secundum veritatem.
26 c. de quibusdam dubiis circa predicta.
27. de motu ad quietem.
28. quid realiter sit quantitas continua.
29. de quadam alia opinione.
30. de partibus ad quantitatem sicut de puncto et consimilibus.
31. de arte et figuris artificialibus.
32. de corpore et suis dimensionibus.
33. de infinito et eius acceptionibus.
34. an infinitum sit producibile.
35. de impugnatione predicte opinionis.
36. qualiter respondendum sit rationibus.
37. de motu secundum locum.
38. de loco diffinitive et quantificatione motus localis.
39. de quibusdam proprietatibus loci ac quibusdam dubiis.
40. de dubiis circa eandem materiam.
41. de vacuo quid sit et utrum possit esse.
42. an in vacuo possit esse motus.
43. de tempore et motu secundum durationem.
44. de quibusdam aliis mensuris s. evo eterno et de instanti.
45. de actione et passione.

[2] This heading for cap. 14 seems to be a fusion of two headings in the text where we read, fol. 112v, "De potentia visiva qualiter terminetur respectu distantie et de potentia activa respectu distantie"; fol. 114r, cap. 15, "de potentia activa respectu distantie atque effectuum seu velocitatis in agendo."

Fol. 212v. Explicit liber sextus (*quintus*) cuius sequitur capitula:

Primum capitulum de figura terre.
2^{m} ca^{m} de motu terre et quibusdam aliis dubiis.
3^{m} ca^{m} de quibusdam aliis dubiis in eadem materia.
4^{m} c. de animalibus et partibus eorundem.
5^{m} c. de quibusdam aliis propositionibus in eadem materia.
6^{m} c. de homine et quibusdam incidentibus atque sibi pertinentibus.
7^{m} c. de phisonomia.
8^{m} c. de quibusdam aliis propositionibus magis in speciali.
9^{m} c. de metallis et de sulphure et argento vivo ex quibus generantur.
10 c. de materia metallorum secundum multiplices opiniones.
11 c. de forma substantiali metallorum et transmutatione secundum philosophos et alchimistas atque de loco generationis eorum.

Fol. 213r.

12 c. de generatione lapidis.
13 c. de quibusdam proprietatibus et passionibus lapidum et operationibus eorundem.
14 c. de imaginibus repertis in lapidibus.
15 c. de suspensionibus et coloribus atque quibusdam incidentibus lapidum.
16 c. de lapidibus in speciali secundum ordinem alphabeti et primo de iis quorum nomina incipiunt per a. b. c.
17 c. de lapidibus quorum nomina incipiunt per d. e. f. g.
18 c. de lapidibus quorum nomina incipiunt per has litteras i. k. l. m. n.
19 c. de lapidibus quorum nomina incipiunt ab his litteris o. p. q. r. s. t. u. z.
20 c. de ventis et causis eorum.
21 c. de exalationibus et vaporibus.
22 c. de quibusdam dubiis circa materiam ventorum et varietate ipsorum.
23 c. de quibusdam opinionibus pretermissis circa motum terre.
24 c. de fontibus et fluminibus.
25 c. de mari et quibusdam incidentibus.
26 c. de salsedine et dulcedine aquarum.
27 c. de stagnis et figura maris.
28 c. de quibusdam aliis dubiis et veritatibus circa naturam aquarum.
29 c. de pluvia et causis eius.
30 c. de signis pluviarum.
31 c. de quibusdam aliis signis pluvie.
32 c. de rore prima et nive atque caligine.
33 c. de grandine.
34 c. de yride.
35 c. de halone et de virgis perpendicularibus atque parelio.
36 c. de cometa.
37 c. de iis que comete signant (or *significant* as in the text).
38 c. de galaxia que alio nomine dicitur via lactea.
39 c. de hiatibus (?) et voraginibus et de tiphone atque etnesia.

40 c. de tonitruo coruscatione fulgure et fulmine.
41 c. de effectibus fulminis et quibusdam aliis impressionibus metheorologicis.

Fol. 235v. (Sixth and last book.)

Primum ca^{m} de speris et planetis in generali.
2^{m} c. de spera et equinoctiali atque zodiaco.
3^{m} c. de coluris meridiano et orizonte aliisque circulis.

Fol. 236r.

4^{m} c. de diversitate plagarum locorum atque climatum.
5^{m} c. de differentia et diversitate locorum.
6^{m} c. de motibus corporum celestium in generali et de mensuris inde acceptis.
7 c. de qualitate signorum aliisque mensuris temporis.
8 c. de eclypsibus et quibusdam circulis planetarum.
9 c. de ortu et occasu signorum et quantitate dierum.
10 c. de intelligentiis.
11 c. de causis et concatenatione ipsarum.
12 c. de prima causa et sui perfectione.

APPENDIX 35

THE ARTICLE OF PARIS CONCERNING THE SOUL OF CHRIST AND THE SOUL OF JUDAS

From BN 6752, fols. 46r-46v.

Our author introduces the matter on fol. 46r by saying, "Nam aliqui crediderunt quod in latitudine creabilium species quelibet haberet certam latitudinem intensivam in qua latitudine omnia individua existentia dicuntur esse eiusdem speciei." The individuals of the species would then differ *specifice* but not *essentialiter*. Our author states that his first book has already made the falsity of this opinion clear. He then proceeds (fol. 46v):

Verum est tamen quod isti suam opinionem muniant articulo parisiensi quo dicitur quod anima Christi in essentialibus perfectior est anima Iude, certum est tamen quod predicte due anime fuerunt eiusdem speciei, si ergo essentialiter se mutuo excedunt, igitur in eadem specie reperitur excessus essentialis.

Et licet articulum Parisiensem investigare sit potius catholicum quam philosophicum, quia tamen articulus favere videtur opinioni predicte que philosophica est investigatione, non tamen veritate, ideo ad articulum parisiensem respondere convenit. Dicendum ergo quod ille articu-

lus condemnatus est non tanquam falsus sed tamquam scandalosus. Nam comparare animam Iude anime Christi hoc est comparare pessimum optimo quod penes Deum facere non congruit.

Vel aliter dicitur quod per essentialia anime Christi non solum intelligitur perfectio naturalis ipsius anime, imo etiam intelliguntur perfectiones et gratie collate anime Christi que ideo dici possunt quodammodo essentiales anime Christi eo quod fuerunt sibi coeve et ab ea numquam separate, imo in tantum sibi radicate quod sibi tanquam connaturales adherebant. In talibus igitur anima Christi excessit animam Iude, et si talia dicantur essentialia large accipiendo, ut predictum est, tunc articulus remanebit verus non obstante falsitate predicte opinionis.

Insuper aliter dici potest quod predicte gratie, licet non essent essentiales anime Christi in quantum erat anima, erant tamen sibi essentiales in quantum erat anima Christi quia impossibile fuit ipsa existente anima Christi non habere multas gratias quas habuit.

Item aliter dici potest quod predictus articulus inconsulte seu minus diggeste fuit damnatus. Hanc tamen responsionem dare non auderem nisi in doctoribus solemnibus etiam parisiensibus simile legissem sicut in Egidio et Henrico de Gandavo. Credo tamen melius esse in predictis responsionibus sistere quia presens responsio presumptione suspecta est.

The article of Paris to which reference is made seems to be the following:

Chartularium Univ. Paris., I (1889), 550.

124. Quod inconveniens est ponere aliquos intellectus nobiliores aliis; quia cum ista diversitas non possit esse a parte corporum, oportet quod sit a parte intelligentiarum; et sic anime nobiles et ignobiles essent necessario diversarum specierum, sicut intelligentie.—Error, quia sic anima Christi non esset nobilior anima Iude.

Such words as 'essential,' 'in essentials,' and 'essentially,' do not appear in this article itself as they did in our author's discussion of it. But there appears to be a relation to the debate between Aquinas and Egidius Romanus whether a quality is more or less perfect in its essence, or whether its intensity is a matter of existence (*esse*), that is, of its more or less complete realization in different individuals.[1] Henry of Ghent, who in his *Quotlibeta* confesses that he was one of those who condemned the 219 opinions in 1277,[2] agreed with Aquinas that forms in their essence possessed a certain latitude.[3] There would therefore

[1] Duhem, III (1913), 318 *et seq.*

[2] *Quodlib.* 2, q. 9; 8, q. 1; cited by Du Plessis d'Argentré, *Collectio judiciorum de novis erroribus*, I (1755), 213.

[3] Duhem, III (1913), 319: "En ce débat, Henri de Gand (1217-1293) se range

seem to be no ground for the notion, although it prevailed already at the beginning of the fourteenth century, that the 124th article of 1277 was one of those censuring Thomist opinions.[4] It is also difficult to understand how our author can represent Henry as disapproving of the condemnation. Egidius and Godofredus de Fontibus, however, are known to have criticized it.[5] At any rate in 1325 the condemnation of 1277 was annulled in so far as it touched or might seem to touch the doctrine of Aquinas, who had been canonized two years before. This might seem to leave the 124th article open to discussion, and, since our author does not feel quite free to do so, might tend to induce us to put his writing before 1325. But other features of the treatise seem to call for a date subsequent to that.

APPENDIX 36

MATTHAEUS DE GUARIMBERTIS, DE RADIIS ET ASPECTIBUS PLANETARUM

Manuscripts

Affò, *Memorie degli scrittori e letterati Parmigiani,* 1789, II, 106, listed BN 7292, Vatic. Urbino 1491, and Barberina 7961. Perhaps the last is the same as that now numbered at the Vatican Barberini 328. Manuscripts which I have used are:

A. Vatic. Barb. 328, 15th century, fols. 143-163, double columns, with tables following at fols. 165r-170v, giving a page for each sign of the zodiac. Titulus and explicit are written in in what seems a later scrawl, while the text is in a neat, fine hand, abbreviated, print-like, and widely spaced.

B. BL Canon. Misc. 179, 15th century, double columns, fols. 11r-31v: written apparently in the same hand as Matthew's treatise on human

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nettement au parti de Saint Thomas d'Aquin: 'L'*intensio* et la *remissio* des formes,' dit-il, 'se doivent produire en leur essence et par leur nature même, car en leur essence même, elles possèdent une certaine latitude (*latitudo*).' "

[4] Iohannes de Neapoli, *Quodlibeta,* II, qu. ult.; cited by *Chartularium Univ. Paris.,* I, 556.

[5] Du Plessis d'Argentré, *op. cit.,* especially p. 214, col. 2, where is given Godfrey's quotation of the 124th article. Godfrey also, like John of Naples, states that these articles were held to reflect upon Aquinas: *ibid.,* 215, "Sunt etiam in detrimentum non modicum doctrinae studentibus perutilis recentissimi et excellentissimi doctoris, scilicet fratris Thomae, quae ex predictis articulis minus iuste aliqualiter diffamatur; quia articuli suprapositi et quamplures alii videntur sumpti esse ex iis quae tantus doctor scripsit in doctrina tam utili et solemni."

felicity which immediately follows at fols. 31v-35r, col. 2, and was copied near Padua in 1445.

C. Wolfenbüttel 2816 (81.26 Aug. fol.), 1461 A.D., paper, double columns, fols. 182, 186r-200r. After fol. 182 five leaves have been cut out, fols. 183-185 are left blank, and part of the work is omitted.

D. Venice, S. Marco VIII, 73 (Valentinelli, XI, 82), paper, 16th century, 46 fols., 22 lines to a page, provenienza Zeno Apostolo 233.

Manuscripts not seen are:

E. Vienna 5498, quarto, 15th century, fols. 1r-30r.

F. Prag 1609, 15th century, paper, fols. 111r-143v, may be a different work. Tractatus de radiorum proiectionibus et directionibus significatorum. "In Christi nomine Amen. Vidimus nonnullos . . . / . . . directio equata. Explicit tractatus" etc. ut supra

G. Amsterdam 1533, 14-15th century, fols. 1-16.

H. Pommersfelden Schlossbibliothek 275, 16th century.

Titulus

In my own title above I have adopted the form given by Affò. There is no agreement among the MSS examined. A gives, "Tractatus de directionibus et de aspectibus et de radiis," but this seems inserted in a later hand. "De directione et proiectione radiorum" is the form suggested in the colophons of B and C, although Heinemann's catalogue incorrectly gives "De dominatione et proiectione radiorum." D agrees with Affò.

Incipit

The proemium opens: "Per aspectus et radios planetarum . . ." in MSS A, B, and D; "Per radios et aspectus planetarum . . ." in C.

The first chapter begins, "Primo videamus (videas) quid (que) sit directio. . . ."

Table of Contents

(The headings are practically identical in all four MSS)

Prohemium de causa et utilitate et intentione operis.

Primum capitulum quid sit directio et quid dirigere et de quibusdam proprietatibus seu condictionibus directionis. Et quid sit aspectus. Et quid sit aspicere. Et quid sit aspectus et radios proicere. Et de causa sufficiente aspectuum.

Secundum capitulum de diversis oppinionibus circa modos dirigendi et proiciendi radios et aspectus.

3m capitulum de quibusdam perambulis satis utilibus ad intelligendum modos dirigendi positos ab auctoribus.

Quartum capitulum de diversis modis dirigendi et proiciendi radios et aspectus positis ab auctoribus secundum diversas eorum opiniones circ(h)a hoc. Et de instrumento dirigendi plano ab aliis invento. Et de instrumento nostro sperico ad idem maioris utilitatis et facilioris operationis.

Quintum capitulum de forma tabularum nostrarum.

Sextum capitulum de modo dirigendi per predictas tabulas.

Septimum capitulum de modo inveniendi et proiciendi seu extendendi radios et aspectus per predictas tabulas.

Octavum capitulum de ampliori utilitate et sufficientia predictarum tabularum ad plura (plurima?) climata.

APPENDIX 37

MANUSCRIPTS OF JOHN BOMBELEN OR BUMBELES, STELLA ALCHIMIAE

Wolfenbüttel, 3282, 1497 A.D., fols. 224v-244r (old numbering 194v-214r): "Flos regis sive stella. Cum omnium philosophorum documenta diligentibus artes liberales sunt delectabilia . . . / . . . concessit michi indigno et peccatori. Explicit stella alchimie quam composuit Iohannes Bombelen(m?) de Anglia baccalaurius in medicinis anno domini MCCC84." At fols. 224v-225r the author says, "Idcirco nominavi istum libellum stellam completionis perfecti magisterii secrete artis alchimie."

BU 303(500), 15th century, fols. 201r-202r: De stella alkymie Iohannis Bombelen anglici, "Deus gloriosus . . . / . . . valeat immutari." This a fragment opening with the incipit of the first chapter.

There seem to be no MSS in England dating before the sixteenth century, the work not being included in DWS. But there are several late MSS of it.

BM Sloane 2234, 17th century, fols. 2r-16r: Johannes Bumbeles de Anglia, Stella alchymiae compositus A.D. 1384, "Cum omnium philosophorum documenta. . . ."

BL Ashmole 1450, IV, late 16th century, fols. 49-71v: "Cum omnium philosophorum documenta . . . / . . . mihi indigno et peccatori. Explicit libellus vocatus stella alkimie compositus a Iohanne Bumbulem(n?) de Anglia anno domini 1384."

BL Ashmole 1407, VIII, pp. 12-17; and 1424, I, fols. 12-14; are English translations of a portion, opening, "Take Mercury sufficiente for thy worke . . ." and closing, ". . . converting it into his nature."

APPENDIX 38

MANUSCRIPTS OF PETRUS DE ZELENCE, DE OCCULTIS NATURAE

Manchester, John Rylands library 65, 15th century, fols. 146r-151v: "Incipit tractatus magistri Petri de Zelence de occultis nature. Attendite doctrine filii eloquia mea . . . / . . . liquefaciendo ac venenum faciendo. Deo gratias. Amen. Explicit opus magistri Petri de Zelence de occultis nature." DWS No. 351 spells the name, "Zeleuce," but a rotograph of the MS which I have used shows it plainly as "Zelence."

Geneva 82 (151), 16th century, fol. 1r *et seq.*, Petrus de Zelento, Methodus philosophiae occultae, opening, "Attendite doctrine filii eloquia mea. . . ."

FN Palat. 885, 16th century, fols. 183r-199v: Petrus de Zelento, Liber de philosophia occulta operis maioris, opening, "Attende, o doctissime fili, ad eloquia mea. . . ."

Cassel Landesbibliothek Chem. Folio 3, fols. 103v-106r: Petrus de Zolento, Tractatus secundum puncta quaedam excerptus, opening, "Attendite filii doctrinae ad eloquia mea. . . ."

Cassel Chem. Octavo 20, fols. 159r-171r: "Incipiunt occulta magistri Petri de Zolento. Attendite doctrine filii eloquia mea. . . ."

Vatic. Barb. 273, fol. 209r, "Petrus de Zeleuco, Epistola de philosophia occulta. Attende, o doctrine fili, ad eloquia mea. . . ."

Rome, Casanatense 1477, 15th century, fols. 121r-133v: Philosophia Petri. "Attendite filii eloquia mea auribus . . . / . . . liquefaciendo ac venenum faciendo. Explicit philosophica Petri."

Vienna 5509, 15th century, fols. 241r-249r: Nicolaus de Walssee (?), alchemical tract opening, "Attendite doctrine filii eloquia mea. . . ."

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