A HISTORY OF MAGIC AND EXPERIMENTAL SCIENCE

VOLUMES V AND VI
THE SIXTEENTH CENTURY

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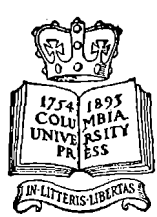
VOLUME V



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PREFACE

As I finish the proofs of these volumes, my thoughts revert to many happy, peaceful hours spent in European libraries which are now for the most part closed or accessible to few scholars. The footnotes and index of manuscripts will reveal my indebtedness to them more eloquently than mere words of thanks here could do. As before, various libraries on this side of the Atlantic have made loans of rare books or answered inquiries. In New York City, aside from the various collections at Columbia, I have especially profitted by use of the library of the New York Academy of Medicine. The reference librarians of Columbia University have been very helpful and generous of their time in aiding me in verifying references, in so far as that could be done in this country. I have benefitted by the counsel and correction of Professor Dino Bigongiari who read the entire work in galley proof, of Dr. Dana B. Durand who looked over a number of chapters, and of Dr. Edward Rosen who read those on Copernicus and Post-Copernican Astronomy. Of my students, Kenneth Setton and George E. Polhemus, Jr., have very kindly gone over the whole text in page proof, while Marshall Clagett and Francis S. Benjamin, Jr., have assisted—like two young Laocoons—in the last agony of proofs and index.

A minor item of some interest comes to hand too late for inclusion in the text. The roasting of a fat goose stuffed with chopped cat and the like, set forth in the *Spiegel* of Fries (see below, V, 432) as a prescription for rheumatism, is anteceded by three centuries by a like recipe in a thirteenth-century manuscript (Bruges 471, fol. 52v), where however it is recommended for quartan fever.

It would seem that the work of Stoeffler on the astrolabe, mentioned below, V, 348, note 66, produced by Jacob Köbel at Oppenheim in 1512 or 1513 and 1524, was the one revamped by Jacob Koebel in 1535, as noted below, V, 330, note 92.

In speaking of Francesco Barozzi I neglected to include mention of the article by Boncompagni, "Intorno alla vita ed ai lavori di Francesco Barozzi," *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche,* XVII (1884), 795-847,[1] which reproduces the "Sentenza degl' Inquisitori di Venezia contro Francesco Barozzi," from a Barberini manuscript.

Finally a general conclusion may be stated which perhaps has not been brought out with sufficient distinctness in the text. Not only was the scientific still tinged with the magical in the sixteenth century, but opposition to what would today be regarded as superstition then often proceeded from the same motives as did hostility to the reign of natural law and of scientific method. For example, while sporadic instances of foreseeing the future might be credulously accepted, any art of divination with fixed rules and claims to universal validity was rejected as leaving no place for divine providence, demon interference, or human caprice. It was the fixed laws as much as, or more than, the divination to which objection was made.

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[1] Another article in the same volume on Bartolomeo da Parma notes that in 1564 Camillo Sacchetti sent from Milan to the emperor Maximilian II a manuscript copy of the geomancy of that thirteenth-century author and in 1571 an astrological work of Alkindi: *ibid.*, pp. 22, 36-37.

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ABBREVIATIONS

Art ancien	L'Art Ancien S.A., Dealers in Rare Books, Manuscripts etc., Zurich.
BB	Boncompagni's *Bullettino di bibliografia e di storia delle scienze matematiche e fisiche*, Rome, 1868-1887, Vols. I-XX.
BL	Bodleian Library, Oxford.
BM	British Museum, London.
BMsl	British Museum, Sloane Manuscripts.
BN	Bibliothèque Nationale, Paris.
BNna	Bibliothèque Nationale, nouvelles acquisitions manuscrits.
Brunet	J. C. Brunet, *Manuel du libraire et de l'amateur de livres*, 1860-1880, 8 vols.
BU	Bologna, University library.
Bulaeus	see Du Boulay.
Bullarium romanum	*Bullarum diplomatum et privilegiorum sanctorum romanorum pontificum Taurinensis editio*, 1857-1872, 24 vols. and Appendix.
c	century.
c.	circa.
Carafa	Josephus Garafa (or, Giuseppe Caraffa), *De gymnasio Romano et de eius professoribus*, Romae, 1751-1752, 2 vols.
Chevalier	Ulysse Chevalier, *Répertoire des sources historiques du moyen âge, Bio-Bibliographie*, Paris, 1905-1907, 2 vols.
CGM	Codex graecus Monacensis, Bayerische Staats-Bibliothek, München.
CLM	Codex latinus Monacensis, Bayerische Staats-Bibliothek.
Col	Columbia University Library, New York.
ColR	Rotograph, Columbia University Library.
comm.	Commentary on, Commentarius, commentator.
Copinger	W. A. Copinger, *Supplement to Hain's Repertorium bibliographicum*, London, 1895-1902, 2 vols. in 3.
CR	*Corpus reformatorum*, ed. K. G. Bretschneider und H. E. Bindsell, 98 vols. to 1935.

CU	Cambridge University.
Dallari, *Rotuli*	Umberto Dallari, *I rotuli dei lettori legisti e artisti dello studio bolognese dal 1384 al 1799,* Bologna, 1888-1924, 4 vols.
De balneis (1553)	*De balneis omnia quae extant apud Graecos Latinos et Arabes,* Venice, 1553.
Dedic	Dedication, Dedicated to, etc.
DES (1917)	David Eugene Smith, "Medicine and Mathematics in the Sixteenth Century," *Annals of Medical History,* 1917, pp. 125-40.
DNB	*Dictionary of National Biography,* London, 1885-1901, 63 vols.
Doppelmayr (1730)	Johann Gabriel Doppelmayr, *Historische Nachricht von den Nürnbergischen Mathematicis und Künstlern,* Nürnberg, 1730.
Du Boulay	C. E. du Boulay, *Historia universitatis Parisiensis,* Paris, 1665-1673, 6 vols.
Duhem I (1906), Duhem II (1909)	Pierre Duhem, *Etudes sur Léonard de Vinci: ceux qu'il a lus et ceux qui l'ont lu,* Paris, 1906, 1909.
Duhem III (1913)	Pierre Duhem, *Etudes sur Léonard de Vinci: les précurseurs parisiens de Galilée,* Paris, 1913.
Duhem I (1913), Duhem II (1914), Duhem III (1915), Duhem IV (1916), Duhem V (1917)	Pierre Duhem, *Le système du monde,* 5 vols., Paris, 1913-1917.
DWS	Dorothea Waley Singer, *Catalogue of Latin and Vernacular Manuscripts in Great Britain and Ireland dating from before the sixteenth century,* Brussels, 1928-1931, 3 vols.
ed.	edited by, edition, printed.
Ep.	Epistola.
et seq.	et sequuntur.
Eubel	C. Eubel, *Hierarchia catholica medii aevi,* Münster, 1898-1910, 3 vols.
f. or fol.	folio, leaf
Ferguson	John Ferguson, *Bibliotheca Chemica: a catalogue of rare alchemical, chemical and pharmaceutical books, manuscripts and tracts . . . in the collection of J. Young,* Glasgow, 1906.
FL	Florence, Laurentian Library (R. Biblioteca Medicea Laurenziana).

FN	Florence, Biblioteca Nazionale.
FR	Florence, Riccardian Library.
fr.	français or French.
Gaurico (1552)	Lucas Gauricus, *Tractatus astrologicus in quo agitur de praeteritis multorum hominum accidentibus per proprias eorum genituras . . .*, Venetiis, 1552.
Gesner (1545)	Conrad Gesner, *Bibliotheca universalis*, Tiguri, 1545.
Grabmann II (1936)	Martin Grabmann, *Mittelalterliches Geistesleben: Abhandlungen zur Geschichte der Scholastik und Mystik, Band II*, Munich, 1936.
Graesse	Jean George Théodore Graesse, *Trésor de libres rares et precieux, ou, Nouveau dictionnaire bibliographique*, Dresden, 1859-1869, 7 vols.
GW	*Gesamtkatalog der Wiegendrucke*, Leipzig, 1925- . 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*, Stuttgart, 1826-1838, 4 vols.
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 (1914)	G. Hellmann, *Beiträge zur Geschichte der Meteorologie*, Berlin, 1914.
Hellmann (1917)	G. Hellmann, "Die Wettervorhersage im ausgehenden Mittelalter," *Beiträge z. Gesch. d. Meteorologie*, II, 169-229, Berlin, 1917.
Hellmann (1924)	G. Hellmann, "Versuch einer Geschichte der Wettervorhersage im XVI Jahrhundert," 54 pp. *Abhandlungen d. preussischen Akademie d. Wissenschaften*, Jahrgang 1924, Physikalisch-Mathematische Klasse, Berlin, 1924.
HL	*Histoire littéraire de la France*, Paris, 1733- . In process.
Hoefer	J. C. F. Hoefer, *Nouvelle biographie générale depuis les temps reculés jusqu'à nos jours*, 1853-1870, 46 vols.
Houzeau et Lancaster	J. C. Houzeau et A. Lancaster, *Bibliographie générale de l'astronomie*, Bruxelles, 1882-1889, 2 parts in 3 vols.

Jobst (1556)	Wolfgang Jobst (Guolph. Justus), *Chronologia sive temporum supputatio omnium illustrium medicorum tam veterum quam recentiorum,* Francoph. ad Viadrum, 1556, 8vo.
Jöcher	Ch. G. Jöcher, *Allgemeines Gelehrten Lexicon,* Leipzig, 1750-1751, 4 vols.
Klebs (1938)	Arnold C. Klebs, *Incunabula scientifica et medica.* Short Title List. Bruges, 1938. Reprinted from *Osiris,* Vol. IV.
Kobolt	Anton Maria Kobolt, *Baierisches Gelehrten-Lexicon,* Landshut, 1795.
Libri	Guil. Libri, *Histoire des sciences mathématiques en Italie depuis la Renaissance jusqu'à la fin du XVIII^e^ siècle,* 1838-1841, 4 vols.
Manget	J. J. Manget, *Bibliotheca chemica curiosa,* Geneva, 1702, 2 vols.
Mazzuchelli	Gianmaria Mazzuchelli, *Scrittori d'Italia,* Brescia, 1753-1763.
Michaud	M. M. Michaud, *Biographie universelle ancienne et moderne,* Deuxième édition, 45 vols.
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.
n.	note or footnote.
n.d.	no date given.
Panzer	G. Wolfgang Panzer, *Annales typographici ab artis inventae origine ad annum MDXXXVI,* Nürnberg, 1793-1803, 11 vols.
Pellechet	M. Pellechet, *Catalogue général des incunables des bibliothèques publiques de France,* Paris, 1897-1909, 3 vols.
Pèrcopo	Erasmo Pèrcopo, "Luca Gaurico, ultimo degli astrologi: notizie biografiche e bibliografiche," *Società Reale di Napoli, Atti della Reale Accademia di archeologia, lettere e belle arti,* XVII (1893-1896), ii, 3-102.
Proctor	Robert Proctor, *An index to the early printed books in the British Museum,* London, 1898-1903.
pr	printed or printer.
Reichling	Dietericus Reichling, *Appendices ad Hainii-Copingeri Repertorium bibliographicum,* Monachii et monasterii Guestphalorum, 1905-1914, 8 vols.

Renaudet (1916)	A. Renaudet, *Préréforme et humanisme à Paris pendant les premières guerres d'Italie (1494-1517)*, 1916.
Reusch (1886)	Franz Heinrich Reusch, *Indices librorum prohibitorum des sechzehnten Jahrhunderts*, Tübingen, 1886.
Richter	J. P. Richter, *The Literary Works of Leonardo da Vinci*, 1883, 2 vols.
Sbaralea	*Supplementum et castigatio ad Scriptores trium ordinum S. Francisci a Waddingo aliisque descriptos*, original edition, Rome, 1806, 2 vols.; revised edition, 1908, 1921.
Schreiber	W. L. Schreiber, *Die Kräuterbücher des XV und XVI Jahrhunderts*, München, 1924.
Sitzb.	Sitzungsberichte.
Sudhoff (1894)	Karl Sudhoff, *Versuch einer Kritik der Echtheit der Paracelsischen Schriften*, Berlin, 1894.
Sudhoff (1902)	Karl Sudhoff, *Iatromathematiker vornehmlich im 15. und 16. Jahrhundert*, Breslau, 1902.
T I, II, III, IV	Lynn Thorndike, *A History of Magic and Experimental Science*, New York, 1923 and 1934, 4 vols.
T (1929)	Lynn Thorndike, *Science and Thought in the Fifteenth Century*, New York, 1929.
T (1937)	Lynn Thorndike and Pearl Kibre, *A Catalogue of Incipits of Medieval Scientific Writings in Latin*, 1937.
Thuanus	Augustus Thuanus (Jacques Auguste de Thou), *Historiarum sui temporis ab anno domini 1543 usque ad annum 1607 libri cxxxviii*, Francofurti, 1625-1628, 4 vols. in 2. The notices of learned men in the years of their deaths were printed separately by Teissier, *Les eloges des hommes savants tirez de l'histoire de M. de Thou avec des additions* etc., Leida, 1715.
Tiraboschi	Girolamo Tiraboschi, *Storia della letteratura italiana*, usually cited from the edition of Milan, 1822-1826.
Tiraqueau	Andrea Tiraquellus, *Commentarii de nobilitate et iure primigenitorum*, usually cited from the edition of Venice, 1574.
Tomasini	Jac. Phil. Tomasini, *Illustrium virorum elogia iconibus exornata*, usually cited from the edition of Padua, 1630.
Toppi	Nicolò Toppi, *Biblioteca Napoletana et apparato agli huomini illustri in lettere di Napoli e del Regno, delle famiglie, terre, città e religioni che sono nello stesso regno*, Napoli, 1678.

tr	translated, translation, translator
Trithemius	*Liber de scriptoribus ecclesiasticis,* Basel, 1494.
VA	Bibliotheca Apostolica Vaticana.
VI	Vienna, National-Bibliothek.
Will	Georg Andreas Will, *Nürnbergisches Gelehrten-Lexicon,* 1755-1758, 4 vols.
ZB	*Zentralblatt für Bibliothekswesen.*
Zedler	J. Zedler, *Grosses Vollständiges Universal Lexicon aller Wissenschaften und Künste,* Halle and Leipzig, 1732-1750, 64 vols.
Zetzner	Lazarus Zetzner, *Theatrum chemicum,* Strasburg, 1659-1661, 6 vols., is the edition usually cited.
Zinner (1925)	Ernst Zinner, *Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes,* Munich, 1925.
Zinner (1934)	Ernst Zinner, *Die fränkische Sternkunde im 11. bis 16. Jahrhundert,* Bamberg, 1934.
Zinner (1936)	Ernst Zinner, "Johannes Müller von Königsberg (Regiomontanus)," *Philobiblon, eine Zeitschrift für Bücherfreunde,* IX (1936), 89-97.
Zinner (1938)	Ernst Zinner, *Leben und Wirken des Iohannes Müller von Königsberg genannt Regiomontanus,* Munich, 1938.

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THE SIXTEENTH CENTURY

Mon principal soin a été d'ôter aux sciences abstraites leur obscurité, de les rendre intelligibles aux personnes qui ne s'y sont pas appliquées et de devoiler ces mystéres ténébreux, à l'abri desquels on a vu si souvent les arts les plus trompeurs et les plus vains séduire les esprits foibles et crédules.

LEGENDRE, *Traité de l'Opinion, 1733*

CHAPTER I

INTELLECTUAL CONDITIONS AND CHARACTERISTICS OF THE SIXTEENTH CENTURY

Among natural prodigies the first and rarest
is that I was born in this age.

—CARDAN

Several forces worked together to give the thought and writing, the science and learning of the sixteenth century a distinctive character. One was the classical reaction which now reachd its height. The stylistic aversion of Italian and other humanists to "barbarous" medieval Latin was now carried over from the fields of poetry, eloquence and pure literature into those of law and medicine, of natural history and anatomy. New translations from the Greek of ancient works of mathematics, natural philosophy, and medicine were called for and executed in place of those made during the twelfth and thirteenth centuries. A smaller number of such works was translated for the first time. There was increased worship of Aristotle and Hippocrates, Galen and Dioscorides, at the expense of their Arabic and medieval commentators, continuers and expanders. It was felt for a time, at least in some quarters, that a mere recovery of the correct original Greek texts, shorn of all glosses and commentaries, would solve every scientific problem. All that one needed to do was to go back to Ptolemy, back to Archimedes, back to Theophrastus, and everything would be all right. It must be added, however, that often the interest of the translator or editor or student was primarily in the classics and only secondarily in science. This is illustrated by studies of birds and plants limited to those found in classical authors and more concerned with their classical names and present equivalents than with their habits or structure.

With this concentration upon classical authors went a growing distaste for the ideas and institutions of the intervening period, a turning away from the subtleties and intricacies and abstractions of scholastic disputations, a disinclination to wade through the mass of commentaries, especially since these were apt to be works of a refined learning designed for advanced and specialized rather than elementary and general students. Hence, while classical authors were cited at every opportunity in order to display the humanistic erudition of the modern writer, a conspiracy of silence seems in have prevailed on the part of many as to their medieval predecessors. Such silence too often veiled almost complete ignorance as to the thought and literature of this more immediate past.

Yet much of all this was a somewhat superficial phenomenon and not so extensive as it appeared on the surface. The scholastic method was kept up at numerous universities. Medieval Latin and Arabic authors continued to pour from the printing press. It is also true that many an important and once well-known work like that of Campanus of Novara on the theory of the planets was never printed. But there was still a good deal of reading of manuscripts as well as of printed books. Hardly a single work of alchemy had been printed before the sixteenth century. Furthermore, considerable covert use seems to have been made of medieval treatises in manuscript by writers of the sixteenth century who did not acknowledge the source of their information or ideas. Sometimes they went beyond such furtive exploitation and boldly published an entire treatise by a medieval author as their own, as in the case of Pompilius Azalus of Piacenza, whose *Liber de omnibus rebus naturalibus,* printed at Venice in 1544, is really a work of the early fifteenth century by Giovanni da Fontana.[1] Or we find Taisnier plagiarizing the thirteenth century work of Petrus Peregrinus on the magnet.

Whether the classical reaction was a symptom, cause or mere accompaniment of the scientific inferiority of the fifteenth to

[1] Lynn Thorndike, *A History of Magic and Experimental Science,* Vol. IV, 1934, Chapter XLV, or *Isis,* XV (1931), 31-46.

the fourteenth century, at least the latter was a fact and perhaps partly accounts for the growing neglect of the previous period. In the later fifteenth century a Nicholas of Cusa, a Regiomontanus, a Leonicenus stood out as if of heroic stature. Such individuals were taken by the following generations not as a thinning out of the previous crop of scientists but as the first to revive and resuscitate scientific thought after a torpor or decline of centuries. Pico della Mirandola's leanings were towards magic and the cabala rather than mathematics and natural philosophy, and his attack on astrology was in a sense an attack on science, or at least more in the nature of a religious retreat than of a scientific advance.

By the time of the sixteenth century the invention of printing had resulted in the appearance in print of a certain amount of popularization, of journalistic writing, and of works in the vernacular.

The tendency to reduce knowledge to compendiums and epitomes has hitherto been remarked by historians chiefly as a symptom of the decline of ancient civilization and oncoming of early medieval culture or barbarism. It also marked the so-called Renaissance or revival of learning and the development of national literatures in the modern languages. It seems to have received a special impetus from the invention of printing, as books began to be written more for a market, and as printers and publishers became aware of the existence of readers who could not or who would not read anything very deep or very long. Humanism, with its emphasis on style rather than science, and show rather than substance, had partially prepared the way. But classical humanism was still rather specialized and recondite, and made a pretense at least of erudition. It is true that medieval astronomy and anatomy had had their Sacrobosco and Mundinus, that medieval philosophy and medicine had had their *Philosophia pauperum* and *Thesaurus pauperum*. But such books were either admirable elementary manuals to introduce the student to the subject, which continued in use into early modern times, or were professedly composed for the benefit of those who were

too poor in pocket to purchase larger volumes. Only after the invention of printing, when such larger volumes became much cheaper, and the aforesaid reason therefore lost much of its force, do we seem to encounter an increasingly widespread sympathy for the poor in brains which has gone on spreading and increasing with modern universal and compulsory education. I do not wish to press this contention too far. No doubt all periods have had compendiums, handy manuals and popularizations of knowledge. But as Bessarion, Peurbach and Regiomontanus were the first of whom we know to epitomize the *Almagest,* and as the attempt to compile easy introductions and *Ephemerides* for those unable to use the *Alfonsine Tables* grew in the sixteenth century, so the dangerous business of spreading a little learning thin over a greater surface of the population seems to have been stimulated by the invention of printing.

All this tended to obscure more truly learned and scientific works. Printers were unwilling to risk the publication, or authors were unable to foot the bill for printing long and expensive works in Latin which would have a small sale. Leonhard Fuchs printed in 1542 a botanical work with five hundred plates, but the enlarged version which he had prepared before his death and which covered fifteen hundred plants remained in manuscript. Conrad Gesner published several huge tomes, including his *Universal Library* and *History of Animals*. But his most important scientific book, that on plants, remained unprinted until the eighteenth century.

Indeed, despite the invention of printing, books often circulated or remained stagnant in manuscript form for some years, and posthumous publications were common, indicating that the transition from manuscript to printed book was partial, gradual and prolonged over a considerable period. A few examples of such posthumous publication may be given. The encyclopedic *De expetendis et fugiendis rebus* of George Valla was first printed in 1501, two years after his death. The work on weather prediction by John of Glogau and Cracow was issued in 1514, seven years after his death. *The Prince* of Machiavelli

was completed in 1513 but was not printed until 1532, five years after his death in 1527. In 1532, too, appeared the first editions of his *Discorsi* and *History of Florence.* Johann Stoeffler lived to be nearly an octogenarian (1452-1531) and published many *Ephemerides* during his lifetime. But his *Cosmographicae aliquot descriptiones* first issued from the press in 1537 at Marburg. Most of Agostino Nifo's writings were published during his life, but his work on weather signs, although composed by 1526, was not printed until 1540, two years after his death. The book of Vanoccio Biringucci (1480-1539) on pyrotechnics appeared only in 1540. The first edition of the *Canones de mutatione aeris* of Johann Werner (1468-1528) was in 1546. In 1538 Leland began his tour of six years duration, collecting materials for *The History and Antiquities of This Nation,* an invaluable survey of English learning and libraries before the dissolution of the monasteries. The work was not printed until 1710-1712. Jean Fernel's *Universa medicina* had been published posthumously in 1567 by Plancy. Forty years later and thirty-nine years after Plancy's death, his *Vie de Fernel* came out. The works of the naturalist Aldrovandi continued to appear in posthumous volumes of 1606, 1613, 1640, 1642 and 1648. The *Theater of Insects,* begun in the middle of the sixteenth century by Wotton, Gesner and Pennius, and finally completed in 1590 by Thomas Moffett (1553-1604), was printed only in 1634. In the same year the *Dream* of Kepler was published by his son, four years after his father's death. Michele Mercati died in 1593: his *Metallotheca* was not printed until 1717. Such posthumous publication, sometimes long delayed, is a fairly sure sign that ideas were not changing much or science progressing. Otherwise the works would have become too antiquated to publish and find readers.

Like the princes and nobles of the fourteenth and fifteenth centuries, their fellows in the sixteenth and also the town magistrates and municipal councils of that century, unless restrained and guided by a resident university and medical faculty or college, showed themselves singularly gullible with regard to wandering astrologers, transient alchemists, unlicensed medi-

cal practitioners, printers of pirated editions, and other similar quacks, charlatans and intellectual vagabonds. Some such pretentious fakir, rather than a sound and deserving scholar or the holder of an M.D. degree from a reputable university, was all too liable to be made court historian, local schoolmaster, or municipal physician. Some members of this questionable class, like Henry Cornelius Agrippa and Theophrastus Paracelsus von Hohenheim, even made eventually a deep impression upon the thought and learning of the time.

Partly perhaps because of the emphasis upon eloquence, humanism and the classics, the sixteenth century in general was not an age of scientific specialization but marked by a somewhat amateurish literary interest. Gesner would hardly have accepted our suggested interpretation but, although himself a polyhistor at the age of twenty-eight, recognized the fact and bemoaned the lack of specialization. Everyone, he remarked, transgressed the bounds of his profession. Schoolmasters philosophized, men of letters tried to practice medicine, physicians professed astrology and astrologers medicine. There was scarcely one who stuck to his chosen field so that he even tolerably mastered it. Many who had never left the city or region where they were born, or who had certainly not done so with any thought of botanizing, nevertheless dared to publish supposedly authoritative works on herbs.[2] Paul Cortesius, on the other hand, who tried to give theology a literary polish, illustrates our suggested interpretation. In the preface of his commentary on the *Sentences* of Peter Lombard he told pope Julius II, "When I saw philosophy rejected like a faded, colorless painting and the humanities scorned as mere sounding words, I thought it would be a great service if I could somehow supply what each lacked."[3] Towards the close of the century Giovanni Paolo Gallucci, in the preface to Sixtus V of his *Theater of the World*,[4] indicated more scientific specialization. Not all philosophers, he said, excel in all subjects

[2] Gesner, *Bibliotheca universalis*, 1545, fol. 439r.

[3] Edition of Basel, 1513: quoted by Gesner (1545), fol. 537r.

[4] Giov. Paolo Gallucci, *Theatrum mundi et temporis*, 1588.

pertaining to philosophy, but some in some things and others in others. Many have won immortal glory in contemplating and describing certain small particles of the world. But he regarded cosmography and astronomy as the most dignified sciences.

Controversy marked the learning of the sixteenth as of no previous century, although the fifteenth had already set a bad example in the literary warfare between Lorenzo Valla and those whose Latin style he had criticized in his *Elegantiae,* in the mud-slinging of rival Italian humanists at Paris, and in the exchange of treatises between Leonicenus and Collenucius as to the errors or merits of Pliny. In the early sixteenth century the Reuchlin affair and the utterances of Luther spread further the contagion of heated discussion, and it began to invade what one might have thought were the driest and least emotional of subjects. Few went to the extreme of the unutterably coarse billingsgate and bluster of Paracelsus, but what should have been scientific investigation and writing had to suffer too often from the unscientific spirit of controversy. The poise of the medieval schoolmen, who carefully stated the arguments on both sides and dispassionately rebutted those that seemed to militate against their own conclusions without indulgence in personalities or arguments *ad hominem,* gave way to one-sided advocacy of a certain theory or point-of-view with no attempt to do justice to other ways of thinking but rather a straining of every nerve to discredit them and their holders. This might even take the form of personal insults and detraction.

The voyages of trade and discovery into the southern and western hemispheres nearly quadrupled the known surface of the globe. The finding of land in various parts of both these new hemispheres made untenable the old theory of a sphere of water surrounding and enclosing most of the globe of earth. This led to questioning of the Aristotelian physics, of the whole doctrine of four elements and their concentric spheres, and to reconsideration of the respective positions of the celestial and planetary spheres by Copernicus and Tycho Brahe. New flora and fauna, gems and minerals, foods and drugs, from New World or Far

East broke down the limitation of natural history and medicine to the study of classical authors, and stimulated botany and zoology, pharmacy and therapeutic, to fresh endeavor.

These new data were, however, made available only rather tardily and sporadically. They were not absorbed systematically, since existing science was at a somewhat low ebb, and since adequate agencies, machinery and methodology were lacking. New facts were appended to outworn systems, with the result for a time of more confusion than enlightment. Large sections of the world of natural science, of mathematics, and of medicine were still uncharted seas, where, to the minds of those who sailed them, almost any adventure might befall or almost any enchanted island might rise to view. Even in the seventeenth century, for example, we are told that Gabriel Fonseca, physician to Innocent X, in March, 1637, cured a noble nun of the family of de Franchi, aged twenty-seven, who daily voided two hundred pounds of urine, although abhorring drink of any kind. Attendant physicians were Benedictus Averchinus, Johannes Jacobus Baldinus, and Paulus Zachias. The case was recorded by Petrus Servius in his volume on *Miracles of Nature and Art,* and by Digby, Strauss and Deusing in their works on the sympathetic powder. The explanation given was that air taken in through the pores was turned into water in the urinal channels.[5]

To many the fantastic world of demons and witches was more real and actual than the pretensions of physical or chemical experimentation. Others would not be surprised at any freak of nature, startling phenomenon of the sky, or apparent miracle, but would confidently account for it by the influence of the stars or by the occult virtue in inferior objects. Others were ever on the search for "secrets" of nature rather than for laws of nature.

What we have next to note may seem inconsistent with the tendencies just stated, nevertheless was a marked feature of the thought of the time from Ramus to Descartes. The need of sys-

[5] Sachs von Lewenheimb, *Oceanus macro-microcosmicus seu dissertatio de analogu (sic) motu aquarum ex et ad Oceanum, sanguinis ex et ad cor,* Vratislav, 1664, p. 112.

tem and method, referred to above, was strongly felt, if only dimly apprehended and thought out, by such men. Ramus, for example, was of the opinion that all that science needed was a better definition of its terms and aims and premises, a better dialectic, a new arrangement and method. He apparently had no conception that more facts were wanted, together with the elimination of a number of hoary "facts" and beliefs which were really errors. He had no idea that new facts were possible, or that many accepted beliefs were erroneous. He simply advocated a better handling of existing materials. The prominence of charts, graphs and outlines in works of the century is a sign that many others felt likewise. Even Copernicus largely reinterpreted previously observed phenomena rather than introduced new facts. Anatomists had claimed new discoveries before Vesalius, but in the astronomy of the century Tycho Brahe was the first greatly to enlarge the observed phenomena.

Two further features of the sixteenth century are deserving of mention: religious cleavage and nationalist separatism. The church was now rent asunder by the Protestant revolt, while vernacular languages in the rising national states of western Europe first began seriously to threaten the dominant monopoly of Latin as the universal language of learning and culture. Censorship of the press was established both by state and church, and we enter an era of political and religious fugitives on the one hand and of intellectual boot-leggers and idea-runners on the other, of persecution and intolerance, but also of escape therefrom and increasing free thinking and difference of opinion.

These developments did not exert so much influence in the sphere of scientific thought and activity as might be supposed at first glance. Scientific controversy seldom followed religious lines. Luther's right-hand man, Melanchthon, was an admirer of the astrological works of an Italian Roman Catholic bishop, Luca Gaurico. Natural and occult science, medicine and mathematics, were like the classics in offering a neutral territory and in affording a common meeting ground where religious and political differences could be ignored and temporarily forgotten. A

dative was a dative, and Scipio Africanus the conqueror of Hannibal, Saturn was a cold planet, and scammony moved bile, alike for Catholic and Lutheran, Calvinist and Libertin, Frenchman and German. Late in the century, it is true, because of action of the Roman church against astrology and divination, Protestants seem more favorable to the occult arts than Catholics, and conversely were perhaps more active against witches. But it is seldom that we can draw such a distinction.

As for nationalist separatism, the sixteenth century had still gone only a little way from medieval Latin unity to the ideatight compartments of modern national languages, where linguistic barriers are even more formidable than tariff walls. Few works in Latin were printed in England but many were read there. William, landgrave of Hesse, noted for his astronomical observations, wrote to Caspar Peucer concerning the new star of 1572 in German. But Tycho Brahe translated it into Latin for inclusion in his work. As a rule, works of importance for science and medicine were composed in Latin or, if first printed in a vernacular, were soon reissued in Latin translation.

In our discussion of the authors and ideas of this period we shall try to avoid duplication of what has already been brought out by the investigations of others, particularly Pierre Duhem. This may seem to leave some gaps in the completeness of our presentation, but I believe that sufficient ground has been covered to indicate amply the relations between the magical and the scientific interests and methods in the sixteenth century. At this point it may be well to recapitulate some of the distinguishing characteristics of these two ways of looking at and interpreting the world.

Science is systematized and ordered knowledge, a consistent body of truth, attained through sense perception, introspection, and reflection, aided by mechanical and mathematical instruments, independently of faith, emotion, prejudice, appetite, pleasure, and the like. Mind and senses must be free from phantasy and unwarranted association of ideas. Errors of senses and mind must be corrected by repeated experience and measurement, by

an equal consideration of all possibly pertinent factors and logical exclusion of all extraneous matter. Hypotheses, like dogmas, should be viewed with great suspicion and disproved rather than proved, since even those which contain a large amount of truth, like the Ptolemaic or atomic, will eventually be shown to involve also too great a proportion of error. Regularities, such as the sun's daily rising, are important for science to observe and discover. But irregularities such as its rising at different times in different latitudes or in the same latitude on different days are equally noteworthy.

Magic was a systematized and ordered marvel-believing and marvel-working, a consistent body of error, attained through sense perception, introspection, reflection, and dreaming, influenced by faith, emotion, appetite, and pleasure, marked by unwarranted associations of ideas, without adequate means of correcting error and without proper standards of measurement. The last deficiency was due to the fact that mechanical invention had not yet proceeded far enough. Imagination, irresponsible conjecture and loose logic therefore filled the gap of mystery. Before such inventions sculpture and painting were more exact and interesting pursuits than physics and chemistry. In magic the desire to attain ends and satisfy human cravings not primarily intellectual was dominant; in science the urge is to measure and know.

It is a surprising and paradoxical fact that, although in the sixteenth century the persecution of witches reached greater proportions than before, and the literature against witchcraft became much more vehement and voluminous, there was less objection to the word magic and more approving use of it than in the preceding centuries. Wier could complain that, while witches were ruthlessly punished, magicians were allowed to go scot free. It is true that a line between natural and diabolical magic had been drawn all along, but it was now more generally recognized, and the name magic was more often applied to the natural variety—with perhaps also the cabala and other occultism—while the diabolical stigma was largely transferred to witch-

craft. In the thirteenth century Roger Bacon had felt it still necessary to distinguish mathematics from divination and to differentiate two varieties of mathesis. In the sixteenth century the word, mathematics, no longer had such a double meaning[6] although it still included astronomy and astrology, so that a royal *mathematicus* might include the drawing up of horoscopes and annual predictions among his functions. In the case of the word magic, there seems to have been a similar shifting, partly perhaps because in Protestant countries the old unfavorable definitions of magic in the canon law and scholastic theology went by the board, partly because of an increasing tendency towards occultism in the later fifteenth and the sixteenth centuries. As the later century wore on, the turning away from Aristotle's natural philosophy and the rise of Paracelsanism encouraged the development of occult philosophy and a favoring attitude toward natural magic.

This tendency continued briskly into the seventeenth century until by its excesses it exhausted and killed itself, and was replaced by the sceptical rationalism and enlightenment of the eighteenth century. But while minds like those of Galileo, Descartes and Newton introduced clarity and precision in the domain of mathematics, physics and astronomy, in the biological, chemical and medical fields a good deal of the old feeling for occult nature persisted even in the Age of Reason and eighteenth century.

The original intention was to limit this volume to the sixteenth century, but it has proved less easy to terminate it at the year 1600 or thereabouts than it was to limit the third and fourth volumes respectively to the fourteenth and fifteenth centuries. Various men and topics have run over into the early seventeenth century, as they did past 1300 in our second volume, and it appears that as the Thirty Years War and Treaty of Westphalia make a convenient terminal point for the first political period in

[6] Nor, it should be said, is there any suggestion of such a double meaning in the scholastic Utrums as to mathematics which Grabmann II (1936), 231-32, has quoted from a master Sebastian of Aragon at the end of the thirteenth or beginning of the fourteenth century.

modern history since the close of the middle ages and beginning of the Reformation, so we may carry on our account to the verge of the days of Galileo and Kepler and Descartes, to the writings of Vanini and Campanella. Then investigations based upon telescope and microscope ushered in a new age of science, at whose portal the present volumes stop. Like Moses we have brought the reader through the wilderness to within sight of the promised land of modern science. It remains to be seen whether we shall enter in or whether we shall content ourselves with viewing the prospect o'er from the other—magical—side of Jordan.

CHAPTER II

LEONARDO DA VINCI: "THE MAGICIAN OF THE RENAISSANCE"

Non essere bugiardo del preterito

Leonardo da Vinci did not write in Latin. He never published or even finished a book or literary composition. Of the collection of 120 notebooks which he bequeathed to Francesco de Melzi hardly a quarter are extant. These manuscripts, written in Italian with his left hand from right to left, are difficult to decipher and have come down in a mutilated, dismembered, scattered, chaotic and perhaps corrupt condition. They contain a sporadic record of readings, observations and reflections, with sketches in the master's hand. They reveal the interest in nature as well as art of an ingenious and acute, if untrained and self-made, intellect. They consider a large and varied assortment of scientific problems. Partly for these reasons, they have been much admired and studied. Since, as Pierre Duhem has indicated,[1] they are based in large part upon the scientific writings of the preceding medieval centuries, and at the same time were apparently utilized by subsequent writers on science, they constitute a good transition and introduction to the thought of the sixteenth century. Although more years of the life of the great painter belong to the fifteenth century, his extant notebooks and literary remains seem to have been penned largely in the sixteenth[2] and probably exerted little influence upon others until after his death.

[1] *Études sur Léonard de Vinci,* 3 vols., Paris, 1906, 1909, 1913.

[2] The MS known as F at the Institut de France was begun on September 12, 1508; that called A at some subsequent date; while MS E refers back to a trip from Milan to Rome on September 24, 1513. Duhem I (1906), 19-20, 173, 193. Other writings were begun on April 23, 1490, Aug. 1, 1497, July 12, 1505, March 22, 1508, while part of the Codice Atlantico was finished on July 7, 1514. Edward MacCurdy, *The Notebooks of Leonardo da Vinci,* 2 vols., 1938, II, 559-64.

It is far from clear to the modern reader just what Leonardo was driving at in his many notebooks. It may even be doubted whether he himself had reached a unified plan, or maintained a definite and fixed aim. His notion as to the final purpose which these occasional brief jottings were to serve may have fluctuated and varied from time to time and have never been fully formulated. Whether he had in mind a magnum opus primarily for thorough training of the artist,[3] in which detailed observation of nature would play a prominent part, or whether he envisioned a more general survey of man and the world, will probably never be known. He may have planned several works. Such statements as those found in his rough drafts for a prooemium that he proposed a work in forty books or that, since the best subjects have already been covered, he will have to content himself with those which are left over,[4] are not to be accepted too hastily as the last word of his considered purpose. Nor may complete confidence be placed in occasional cross references, such as the statement, "as we shall show in the fourth book," or "this is proved by the ninth (chapter?) on local movement."[5] More weight, in view of the considerable repetition found even in a partial selection from his notebooks such as that made by Richter, is to be laid upon his excuse for repeating himself, that he cannot remember what he has written before without reading it over again, the more so since a long time often elapses between two entries.[6] This confession suggests the lack of system and connection in his notes. They are more like the leaves of the sibyl than the leaves of a book. Even on a single page may be found great variety and disarray, such as drafts of four different prefaces intermingled with four anatomical paragraphs.[7] It is hopeless to try to piece

[3] The work of his contemporary, Pomponio Gaurico of Naples, on sculpture treated of such subjects as physiognomy, perspective and chemistry, as well as symmetry, lineaments, plastic, proplastic, ectyposis, caelatura, colaptic, etc. I have consulted an edition of 1603—BM c. 79.a.2—with a preface by Iac. Curio Hofemianus, dated at Mainz in April, 1542. The *editio princeps* seems to have appeared at Florence in 1504.

[4] J. P. Richter, *The Literary Works of Leonardo da Vinci*, 2 vols., 1883, I, 12-13.

[5] Richter II, 149.

[6] Richter I, 14.

[7] Codice Atlantico, fol. 119v: in Vol. I of the printed edition.

them together, for their author never did so himself. Even what were published as distinct treatises, like the *Trattato della pittura* and *Trattato del moto e misura dell'acque,* were perhaps considerably edited. Taken as a whole, or rather as a series of particular, often brilliant observations, sketches and inferences which were never welded together, Leonardo's manuscripts are too disorderly and wanting in method to qualify as classified knowledge or science. Looked at from this standpoint, they are mere empirical collections and random reflections, whatever scientific attainments they may possess in detail. Leonardo made many a brilliant spurt and burst of speed in both science and applied science. But he never finished the course.

Richter, who was the first to decipher and edit on an extensive scale extracts from Leonardo's notebooks, in various introductory remarks uttered vague and sonorous generalizations and assumptions which the subsequent texts seldom bear out. Probably this was especially due to his ignorance of the scientific interests and attainments of the closing medieval centuries, although in part to a desire, conscious or otherwise, to magnify the significance of his own publication. Thus he says that Leonardo's "views of nature and its laws are no doubt very unlike those of his contemporaries and have a much closer affinity to those which find general acceptance at the present day."[8] On the contrary, we shall presently see that Leonardo was interested in and puzzled by the stock questions and problems of centuries past, rather than fertile in formulating new lines of investigation. As Duhem has said, "Even his most novel and audacious intuitions had been suggested and guided by medieval science."[9] He might attack these problems with fresh observations of his senses and intellect, but the problems themselves were seldom of his devising, and his suggested solutions were by no means always correct or happy.

Again Richter writes: "Leonardo's researches as to the structure of earth and sea were made at a time when the extended voyages of the Spaniards and Portuguese had also excited a

[8] Richter II, 282.

[9] Duhem I (1906), 123.

special interest in geographical questions in Italy and particularly in Tuscany."[10] Elsewhere Richter admits that Leonardo "never once alludes to the discovery of America,"[11] so that it is difficult to see why he here connects Leonardo's "researches" with the interest those voyages excited, since they seem to have aroused none in him. Richter proceeds in the aforesaid passage, "Still, it need scarcely surprise us to find that in deeper questions as to the structure of the globe, the primitive state of the earth's surface and the like, he was far in advance of his time."[12]

This representation of da Vinci as far in advance of his time and in touch with modern science reminds one of the similar picture drawn of Roger Bacon by his earlier modern admirers. To complete the resemblance, we have Leonardo suspected of magic by his ignorant contemporaries, whereas according to Richter he "declared that in all his scientific research his own experience should be the foundation of his statements."[13] As if magicians did not similarly declare that their statements are based on experience! As if our four previous volumes have not demonstrated the close connection between magic and experimental science!

So impressed was Richter by one or two assertions in Leonardo's notes that he followed experience—an ideal which may be found duplicated in many previous writers and which was much easier to profess than to fulfill—that he jumped to the conclusion that Leonardo must have personally visited the Straits of Gibraltar, the Nile, Taurus mountains and Tigris-Euphrates, because he cited no authorities for his allusions to them.[14] Similarly Leonardo cites no authority for the entry in his notebooks that when Fortune comes, one should seize her in front with a sure hand, because behind she is bald.[15] Yet we may rest assured that this old classical proverb did not originate with him. No more did his repetitions of the old tales that the hunted beaver castrates itself; that the hoopoe nurses its aged parent-birds, feeding them, pulling out their old feathers, and restoring their

[10] Richter II, 173.
[11] *Ibid.*, 225.
[12] *Ibid.*, 173.
[13] *Ibid.*, 223.
[14] *Idem.*
[15] *Ibid.*, 294.

sight with a certain herb; that the pelican feeds its young with its own blood; that the female viper, after conceiving through the mouth, bites off the male's head, and that the young vipers avenge their sire by gnawing their way out of their mother's vitals.[16] For these and a dozen more concerning the ant, siren, basilisk, peacock, dolphin, chameleon and other old favorites Leonardo cites neither Physiologus nor other authority. Yet he surely did not mean to assert that he had proved them all by his own experience. He was, however, apparently unaware that many of them had already been called into question and rejected by serious naturalists. Richter classified such statements by Leonardo as "Humorous Writings," while the supposed actions or properties of animals were given by da Vinci as illustrations of virtues and vices, such as peace, gratitude, flattery and vainglory. But they had been so given by numerous previous writers. We may not take them seriously and disparage medieval science in the one case and refuse to do the same for Leonardo and glorify him as in advance of his time. De Toni has very properly included them and even the fables in his book on plants and animals in Leonardo da Vinci.[17] At least they, like other more scientific views which Duhem showed were derived from earlier authors, demonstrate the absurdity of attempting to apply literally or universally his statement that he follows experience. It occurs in the draft of a preface in which he says that he may not be a literary man but follows experience and is a practical inventor. He surely did not mean this to apply to his notes on reading in the works of others.

As a matter of fact, or rather of intelligent reading, it should have been quite plain to Richter from the tone of Leonardo's references to the Nile, Taurus and Tigris-Euphrates that he had no first-hand knowledge of them, although he was fairly well informed concerning them. As for the Straits of Gibraltar, he repeatedly supposes that the Mediterranean Sea, fed by three hundred rivers, pours through the straits into the Atlantic,

[16] *Ibid.*, 316-34.

[17] G. B. de Toni, *Le piante e gli animali in Leonardo da Vinci*, 1923.

whereas the actual current is, as even Richter stated, always in the opposite direction.[18] Finally, a cynic might suggest that, after a writer has boasted that he will follow experience and not authorities, it is to be expected that he will suppress rather than cite the latter. Leonardo, however, was just jotting down rough notes, the result alike of his personal observation, experience, reading and reflection. He had a right to take and to express these as he pleased. He never published anything and probably would have greatly altered his text before doing so. We therefore should not suspect him of plagiarism or attempting to mislead. Sometimes, as Duhem has noted, he indicates the name of the author from whom he is taking notes.

We may, however, illustrate a little further the question how far Leonardo restricts himself to his own experience. When he gives the interesting information that the shepherds in Romagna at the foot of the Apennines make conical holes in the rocks and blow a horn through these, thus producing a very loud noise, it is evident that he is not stating either his own experiment or invention, and that whatever credit attaches to this precursor of the megaphone or loud-speaker must go to the shepherds. On the other hand, it might be better if he would give some authority for such a vague assertion as this: "A spring (what spring?) in Sicily (just where in Sicily?) at certain times of year (at precisely what times of year?) discharges a great quantity of chestnut leaves which must come undersea from Italy, since chestnuts do not grow in Sicily."[19] This very unscientifically worded assertion is further vitiated by the fact that chestnut trees are very common in Sicily. Recognizing this fact, Richter suggested that Leonardo perhaps meant Cilicia rather than Sicilia. But that would be a long, long way for leaves to come underground from Italy, and in either case it would seem evident that Leonardo's note cannot have been based upon his own experience.

Especially objectionable is this type of assertion by Richter. "Ever since the publication by Venturi in 1797 and Libri in 1840 of some few passages of Leonardo's astronomical notes,

[18] Richter II, 259-61.

[19] *Ibid.*, 248.

scientific astronomers have frequently expressed the opinion that they must have been based on very important discoveries."[20] Apart from the fact that Richter's subsequent extracts from the notebooks do not measure up to this advance notice, he fails to state who the "scientific astronomers" were and what the "very important discoveries" were. Also, if the astronomers were truly scientific, why they ventured such an opinion on the basis of a few passages, when they presumably knew nothing of the astronomical knowledge of the centuries immediately preceding Leonardo. Apparently they resembled those scientists who more recently allowed themselves to be beguiled into affirming that Roger Bacon must have used the microscope and been possessed of unusual medical knowledge, on the basis of an obscure illustration or two in a manuscript in cypher of uncertain date, authorship and provenance. No one, it sometimes seems, is more gullible and uncritical historically, or more ready to give vocal expression thereto, than a natural or mathematical scientist. Not that I am gullible enough to believe Richter that scientific astronomers had frequently expressed such an opinion.

Before we take leave of Richter, the reader should further be warned that not only his introductory remarks but also his translation of Leonardo's text is sometimes at fault.[21]

[20] *Ibid.*, 135.

[21] At I,11, and II,274 Richter misinterprets Leonardo's assertion that he can stay under water "so long as I can go without food," to read, "or how long I can stay without eating."

At II,211, where Leonardo speaks of those who say that shellfish were born far from the sea "per la natura del sito et de'cieli che dispone e influisce tal loco a simile creatione d'animali," Richter translates, apparently misreading cieli as cicli, "from the nature of the place and the cycles which can influence a place to produce such creatures," instead of, "by the nature of the place and of the heavens which dispose and influence such a place to similar creation of animals."

At II,238, where Leonardo speaks of "il pescie temolo il qual vive d'argiento del quale se ne trova assai per la sua rene," Richter translates, "the fish temolo which live on silver of which much is to be found in its (i.e. the river's) sands," instead of, "in its (i.e. the fish's) guts."

At II,264, Leonardo's "Moltissime volte il Nilo e gli altri fiumi di gran magnitudine anno versato tutto l'elemento dell'acqua e renduto al mare," is rendered by Richter, "Very many times the Nile and other very large rivers have poured out their whole element of water and restored it to the sea," instead of, "have poured out the entire element of water." Leonardo's meaning is not that the rivers have merely completely emptied themselves but that all the water in the world has repeatedly passed through them.

Duhem has shown that the extant notebooks of Leonardo consist quite as much of notes taken from the works of medieval schoolmen like Albertus Magnus, Albert of Saxony, Jean Buridan, Themo Judeus, Blasius of Parma and Nicholas of Cusa as they do of his own observations of nature, experiences and reflections. In his rough notes, however, he might take down any argument or opinion that happened to appeal to him, whether favored or confuted by the author whom he was reading. Or he might shift his position as he found in time an explanation which satisfied him better. Thus in one place he explained the rise of water through subterranean channels to burst forth as springs high up on mountain sides by the supposition that the Sea of Azov and the Caspian Sea were higher than any mountains, so that the water in the aforesaid springs was not rising above its own level.[22] But perhaps because he came to recognize either that under these circumstances those seas would eventually be emptied, or that they were fed by rivers which flowed down from land and mountains yet higher, and that the origin of the water in these rivers also must be explained, he turned to the theory that the heat of the sun drew moisture up through the earth as well as through the air above sea level, a theory which he derived from Albertus Magnus and Themo.[23]

A few illustrations may be given of the fact that Leonardo was to a large extent interested in the same topics and problems as his predecessors and contemporaries, just as was Descartes or, for that matter, every so-called innovator and mind far in advance of his age. "Every continuous quantity," says Leonardo laconically in one passage, "is intellectually divisible ad infinitum."[24] Here in a short sentence he records baldly a conception which had occupied generations of previous schoolmen and borne a rich crop of disputations and commentaries. Many persons could have rattled off a dozen or more distinguished names upon this point. Leonardo probably could not have mentioned that many. It was enough for him to lay hold of the main idea, and perhaps he was well advised to let it go at that.

[22] Duhem I (1906), 182-83.
[23] *Ibid.*, 188-91.
[24] Richter II, 308.

In Leonardo's discussion of perspective the same conception of pyramids of rays is prominent[25] which had appeared far back in Alkindi and Roger Bacon and often in the interim.

The problem of the relative amounts of earth and water occupied Leonardo as it had previous writers. Like others, especially Albert of Saxony,[26] he held that the centers of gravity and magnitude of the earth were different, and that earth and water constituted a single sphere.[27] But, like Aristotle and others since, he was convinced that the quantity of water exceeded that of earth, and that therefore there must be a great deal of water in caverns inside the earth.[28]

The *reductio ad absurdum* of this resort to caverns of water within the earth was seen in a publication by Antonius Berga, who as late as 1580 endeavored to maintain against Alessandro Piccolomini that there was more water than earth.[29] Being practically forced to concede that there was more land surface (although this was not actually true), and that the sea was for the most part quite shallow, he made much of subterranean waters and held that the opinion, promulgated by Aristotle and held by Pliny, Strabo, Ptolemy and many others through the centuries, should be maintained as true, even if water did not cover the face of the earth or have so great an altitude as the land. He did not seem to realize that by thus locating most of the water inside and below the earth, he was completely ruining the fundamental Aristotelian conception of earth as heavier than water and having its natural place nearer the center. Moreover, if water ascended through subterranean channels to moun-

[25] Richter I, 30 *et seq.*

[26] Duhem I (1906), 11-14.

[27] Richter II, 182.

[28] *Ibid.*, 183-84.

[29] Ant. Berga, *Disputatio de magnitudine terrae et aquae (contra A. Piccolomineum conscripta)*, 1580. Copy used: BM 536.c.27. The *Trattato della grandezza dell'acque e della terra* of Piccolomini was printed at Venice in 1557 or 1558. Benedetti answered Berga: *Consideratio Io. Bapt. Benedicti sereniss. ducis Sab. philosophi Disputationis magnitudinis terrae et aquae ab Antonio Berga conscriptae*, Taurini, 1580. Nonius Marcellus Saya, a native of Apulia who became mathematician or astrologer to Catherine de'Medici, published a *Tractatus in quo adversus antiquorum et praecipue Peripateticorum opinionem terram esse aqua maiorem . . . demonstratur*, Paris, Th. Perier, 1585.

tain tops, why did not the heavier earth also descend through such channels from the mountain tops? Water wears away even stone and also deposits lime. Such argumentative possibilities of the problem do not seem to have been fully taken advantage of by those who discussed it.

Returning to Leonardo, we may note that the old question why the sea was salt attracted his attention. He found it hard to answer, the more since he held that the water of the sea continually circulated through subterranean channels and fresh water surface rivers.[30] He still accepted the element and sphere of fire, and spoke of the eagle as soaring in the highest and rarest air close to the element of fire.[31]

Leonardo occasionally displayed a rather odd tendency to waste his strength, to say nothing of the time of possible future readers, in overthrowing men of straw or opinions which were no longer generally held. An instance is his persistent refutation of the contention of Epicurus that the sun was only as large as it looked,[32] a notion which no medieval astronomer would have thought of maintaining. Or he opposes what he is pleased to call the general opinion that the surface of the sea is higher than the loftiest mountains.[33] Averroes had so held, but it was hardly the general opinion even before the discovery of America. It was already rejected in the thirteenth and fourteenth centuries by Campanus of Novara, Albert of Saxony and Themo.[34]

Leonardo made frequent and very effective use of, and developed farther the conception of geological change which was already present in germ in the works of Aristotle, where it is stated that what was once the bottom of the sea is now dry land and vice versa. This thought had already been elaborated by the later medieval commentators upon Aristotle. It fitted in exceptionally well with Leonardo's keen interest as an artist in life in movement: how animals swim, the flight of birds, men laughing, weeping, fighting and toiling. So the idea of geological change

[30] Richter II, 189, 196, 198.
[31] *Ibid.*, 279.
[32] *Ibid.*, 150.
[33] *Ibid.*, 186.
[34] Duhem I (1906), 178.

had an especial appeal for him, and his experience as a builder, engineer and observer of nature provided him with supporting data. He was fascinated by the thought that every portion of the earth's surface was once at the center, or that every drop of water had repeatedly coursed through the Nile.[35] He attributed a great deal to the action of rivers. By piling up silt at their mouths they kept raising one side of the earth, while the other sank closer to the center and the water ran off towards it.[36] The Mediterranean and similar seas would in time fill up and become the basins of the largest entering river, with the others as its tributaries.[37] The shores of the sea keep moving towards its center and displace it from its original position.[38]

On the other hand, rivers have cut and divided such mountains as the Alps, as can be seen by the correspondence of the strata on either side of the stream.[39] In this observation of the strata in the soil Leonardo perhaps made his chief contribution to geology. He held that the earth was arranged in layers with the heaviest at the bottom, and that these had been formed from the sediment laid down by rivers.

The problem of the formation of mountains had already exercised other minds, and Leonardo was here rather less happy than in his suggestions concerning the action of rivers. He said that rivers formed mountains by piling up silt at their mouths[40] as well as by cutting through highlands as in the formation of the Alps. He further suggested that the great height of mountain peaks above sea level might have been caused by the caving in of parts of the earth which were filled with water.[41] One would think that this would be more apt to raise the level of the sea than of the land. Leonardo does not seem to think of volcanic

[35] Richter II, 96, 187, 264.

[36] *Ibid.*, 182.

[37] *Ibid.*, 192.

[38] *Ibid.*, 247. See T IV, 230 for the expression of similar ideas in the previous century by John de Fundis, a writer not noted by Duhem.

[39] Richter II, 95-96, 139, 205.

[40] Duhem II (1909), 307-8, has pointed out that the idea that mountains are engendered by the action of water is already found in Avicenna: or whoever composed the addition to the fourth book of Aristotle's *Meteorology*.

[41] Richter II, 183.

action in connection with the formation of mountains. He did not share the error of those early modern writers who greatly overestimated the height of the peak of Teneriffe, since he affirmed that the highlands of central Europe and of Africa must exceed any maritime peak in height.[42] But he grossly underestimated the height of inland peaks like the Alps, when he asserted that none in Europe was as much as a mile high.[43]

Much, indeed, of Leonardo's geological speculation and assertion is erroneous, as was to be expected from its being rather reckless at times and based both on incorrect general assumptions as to nature and misapprehension or ignorance concerning particular phenomena. Thus, in seeming contradiction to what he has said elsewhere about rivers piling up silt and making mountains at their mouths, he affirms that the Gulf of Persia was formerly a vast lake of the Tigris, whereas the lower valley of the present Tigris-Euphrates was once covered by the Gulf of Persia. Or he asserts that the sinking of the Black Sea laid bare the valley of the Danube, the plains of the Don, and the whole of Asia Minor, whose mountainous character he would scarcely seem to realize. He says that the Caspian Sea always flows through subterranean passages into the Black Sea, whereas the level of the Caspian is lower than that of the Black Sea, and he himself asserts that the Sea of Azov is situated at a higher altitude than any mountains of western Europe.[44]

Leonardo, however, appears to excellent advantage when he has closely observed the natural phenomena himself, as in his demonstration that shells found far inland and on mountain sides were neither deposited there by the deluge nor were the result of imperfect spontaneous generation by the influence of the stars. It was this remarkable description of the petrification of fossils of shellfish which led Duhem to exclaim: "In writing this fragment Leonardo created Palaeontology."[45] Such fossils had been noted and discussed at least since the time of Albertus Magnus, but Leonardo's treatment seems superior to any pre-

[42] *Ibid.*, 185.
[43] *Ibid.*, 268.
[44] *Ibid.*, 262, 257, 268.
[45] Duhem I (1906), 39.

vious and to most subsequent discussions in early modern times. Leonardo's treatment was based upon a wider range of observation and marked by sharper insight and realism in argument than others. The rains of the deluge, he said, should have washed objects down into the sea rather than carried them up into the land. Shellfish could not have themselves traveled from the Adriatic to Montferrat in forty days, and the sea could not have carried them, for they would have sunk in it. Or, supposing that it did convey them, since the flood is said to have covered the highest mountains, they should be found on the summits, not a thousand feet up a mountain side, nor all at one level, since the turbid deluge would have confused them, nor in regular layers. Leonardo's explanation is that from time to time the bottom of the sea was raised and its level lowered, depositing these shells in strata, as may be seen in the cutting at Colle Gonzoli laid open by the river Arno, where such layers of shells are plainly visible in a bluish clay. Against the incomplete spontaneous generation explanation he notes that some shells are large, some small; some have marks of their years of growth on them; some are filled with sea sand or fragments of other shells or bear traces of other animals which moved about on them like worms in wood.[46]

This does not mean that Leonardo rejected the entire notion of spontaneous generation by the influence of the stars. Rather he took it seriously enough to demonstrate that the evidence was against it in this particular case. In general he was not unfavorable to the astrological hypothesis. He affirmed that necessity is the mistress and nurse, the bridle and eternal rule of nature, and that our bodies are under the control of the sky.[47] He accepted the common belief that the eighth month's child dies.[48] He utilized the conception of man as a microcosm.

Uzielli called attention to some notable botanical observations by Leonardo: the way that leaves are arranged on branches, the

[46] Richter II, 208-17. From the Leicester MS (now in the Pierpont Morgan Library) edited by Gerolamo Calvi, Milan, 1909.

[47] *Ibid.*, 285-86.

[48] *Ibid.*, 114.

nourishment provided plants by dew, the structure and concentric strata of stems and trunks, the fact that the south side towards the sun grows more vigorously and has the pith nearer it, the importance of the movement of the sap.[49] These points may have been noted by others before Leonardo, but I failed to find them in the *De vegetabilibus et plantis* of Albertus Magnus, who has been called the greatest botanist between Theophrastus and Cesalpino.

Leonardo made some excellent studies of animal life as well as of human anatomy,[50] such as his observation of the eyelids of birds.[51] On the other hand, he tells of fish in the Valtelline and Adda who live on silver,[52] or of the goldfinch which, when carried into the sickroom, turns away its head, if the patient is going to die, but keeps looking at him, if he is destined to recover.[53] The goldfinch will also, according to Leonardo, "carry spurge [a poisonous herb] to its little ones imprisoned in a cage—death rather than loss of liberty."[54]

Leonardo harbored many incorrect notions as to nature which must be placed in the balance against his instances of sharp insight or of argument well sustained upon a strictly natural basis. He maintained that the light of the sun illuminated all the heavenly bodies, and that the fixed stars had no light of their own but received it from the sun.[55] On a single page he makes the following statements, all wrong or involving error. Man is composed of the four elements—earth, air, fire and water. The tides of the ocean are like the breathing of the lungs. The veins ramifying from "the lake of blood" all over the body resemble the subterranean channels filled with infinite veins of water from the ocean. The earth lacks nerves or sinews because they are made

[49] Gustavo Uzielli, "Sopra alcune osservazioni botaniche di Leonardo da Vinci," *Nuovo Giornale Botanico Italiano*, I (1869), 1-13: quoted by De Toni, *Le piante e gli animali in Leonardo da Vinci*, Bologna, 1922, pp. 4-8. The remainder of De Toni's volume, however, is mainly occupied by artistic sketches and animal fables.

[50] See J. Playfair McMurrich, *Leonardo da Vinci the Anatomist*, 1930, 265 pages.

[51] Richter II, 123.

[52] *Ibid.*, 238.

[53] *Ibid.*, 315.

[54] MacCurdy II, 490; from MS H 63 [15] v.

[55] Richter II, 149-50.

for movement, while the earth remains perpetually stable and unmoved.[56] Leonardo thought that waters in the north were lower than their level at the equator because they were colder and converted into ice, thus showing that he was unaware that water expands when it freezes.[57] In another passage he connects the tides both with the influence of the moon and with the drawing off of water from the ocean by subterranean channels.[58]

Two favorite notions of Leonardo, but neither of them original with him, have been interpreted to indicate that he understood the circulation of the blood. One was that the earth is like a great animal; the other, that subterranean channels of water ascend from the ocean to the mountain tops, "not observing the nature of heavy objects," or the tendency of water to seek its own level, but then flow down from the mountains in rivers to sea level. Because Leonardo compared the ascent of water underground to the mountain tops to the rising of the blood from the heart to the head, and the bursting forth of a spring on the mountain side to nosebleed, Richter declared that "from this passage it is quite plain that Leonardo had not merely a general suspicion of the circulation of the blood but a very clear conception of it."[59] Aside from the fact that Duhem has argued that Leonardo derived this idea from Themo,[60] Richter's conclusion of course does not follow at all. Every student of medicine since Galen and Aristotle had known that the blood flows from the heart to the head, but they thought that it ebbed back by the same path. Neither they nor Leonardo said that the blood circulated. It is true that Leonardo, like many others, thought that water circulated from the sea underground up the mountains and then down in surface rivers to the sea. He put this forcibly when he declared that all the sea and rivers had passed through the mouths of the Nile or Tigris-Euphrates "an infinite number of times."[61] Thus a wrong hypothesis of circulation preceded and possibly paved the way for a correct one. But its holders did not

[56] *Ibid.*, 179.
[57] *Ibid.*, 181.
[58] *Ibid.*, 193.
[59] *Ibid.*, 132.
[60] Duhem I (1906), 191-93.
[61] Richter II, 187.

state this of the blood or distinguish clearly the functions of the veins and the arteries. Nor did Leonardo, although a closer approach to it and more suggestive passage than that noted by Richter might be quoted.[62]

Leonardo was aware that water is raised in the air in evaporation by the heat of the sun and falls in rain,[63] but he did not use rainfall to explain springs high up on mountains. Aristotle in the *Meteorology,* misled perhaps by the scanty precipitation in the Mediterranean basin, held that rainfall was insufficient to supply the springs and rivers. Leonardo apparently thought that there was not much precipitation high up on mountains. He took a glacier as evidence of the fall of hail, not of snow.[64] He held that the same heat which raised water in air by evaporation drew it from the sea up inside mountains whence it gushed forth in springs.[65] He refused to attribute great rivers like the Nile to winter rains or to the melting of snow in summer, asserting that in torrid equatorial Africa it never rains, much less snows.[66] In this case he would better have maintained his ideal of adhering to his own experience.

Leonardo rejected the explanation of certain mathematicians that the sun looked larger when setting because it was then seen through a denser atmosphere, and preferred the explanation that "every luminous body appears larger in proportion as it is more remote," the setting sun being further distant than at noonday by the radius of the earth or 3,500 miles.[67] That he should have thought that this difference in distance would be of much account, seems to indicate that he underestimated the sun's distance from us. Despite his interest in anatomy and in animals, he affirmed that tears come from the heart and not from the brain and that man has weaker sight than any other animal.[68]

Vision by extramission was denied by Leonardo,[69] and he

[62] For example, the following passage: "Come il sangue che torna indirieto quando il core si riapre non è quel che riserra le porte del core."
[63] Richter II, 180.
[64] *Ibid.,* 246.
[65] *Ibid.,* 185.
[66] *Ibid.,* 200.
[67] *Ibid.,* 143-44.
[68] *Ibid.,* 117, 121-22.
[69] *Ibid.,* 124.

understood the *camera obscura*.[70] He asserted that the twinkling of the stars was really in the eye of the observer.[71] He declared that every object appeared larger to the human eye at midnight than at midday, and larger in the morning than at noon, because the pupil of the eye was much smaller at noon than at any other time.[72] But he did not apply this line of reasoning to the apparent size of the setting sun. Because a gilt ball reflects light only at one point, he inferred that there must be water on the surface of the moon in order to illuminate it all by reflection of the sun's rays in the waves and drops of water.[73] His comparing the earth to a star was not an adumbration of the Copernican theory, but a corollary of this same idea: namely, that to an observer on the moon or a star our earth would reflect the sun's rays from its waters just as the moon does.[74]

A sane tenet upon Leonardo's part was that the sun itself is hot and not merely the virtual cause of heat in other things.[75] He also may be credited with some originality for his speculation whether the moon was not situated in the center of elements of its own.[76]

Leonardo has been called the magician of the renaissance, and Argüello had recently written a book in Spanish on "The Magic of Leonardo da Vinci."[77] Some of the externals of his manuscripts savored of the methods of magic rather than of science. "Voglio far miraculi" had been the motto, watchword and battlecry of magic for many years. One cannot escape its implications merely by disowning necromancy and incantations. Leonardo recognized that the would-be worker of marvels was likely to share the fate of long poverty with alchemists, seekers after perpetual motion, and the nigromancer and enchanter.[78] The guise of secrecy which da Vinci threw over his notes by writing them backward with his left hand, and his claim to possess

[70] Richter I, 44.
[71] Richter II, 140.
[72] *Ibid.*, 122.
[73] *Ibid.*, 144, 156, 162. "Having proved that the part of the moon that shines consists of water."
[74] *Ibid.*, 139, 144, 156.
[75] *Ibid.*, 151.
[76] *Ibid.*, 155.
[77] S. Argüello, *La magia de Leonardo da Vinci*, 1935, 8vo. There are few or no references to Leonardo's writings.
[78] Richter II, 107.

wonderful secrets were other signs pointing in the direction of magic. His manuscripts in many respects continued the tradition of those medieval books of experiments and secrets of which I have treated in my second volume. They often resemble the *Secrets* attributed to Albertus Magnus or the "experimental science" of Roger Bacon. In other words, it was natural magic which Leonardo would work. He had no faith in necromancy by the aid of spirits, which he characterized as the stupidest of all human obsessions. He held that spirits can neither assume bodies, combine with air, nor move the air to produce sound and voices. He pointed out that an incorporeal spirit, if it occupied any space, would be equivalent to a vacuum, which cannot exist in nature according to the ancient Aristotelian doctrine which Leonardo ordinarily accepted. In describing, however, the sight which he had witnessesed of a tower at Milan being struck by lightning, he tells how the lightning ran down the side of the tower part way and then left it, tearing away part of the thick wall of the tower with it, because of the vacuum caused by the action of the lightning.[79]

Leonardo was much less favorable towards alchemy than were Albertus Magnus and Roger Bacon. He not merely denied the possibility of making gold but uttered the far more sweeping statement that the alchemists had never "either by chance or deliberate experiment succeeded in creating the smallest thing which can be created by nature."[80] He denied that quicksilver was the common seed of all metals[81] and pointed out that neither quicksilver nor sulphur was found in gold mines. On the other hand, he held that gold "is begotten of the sun," and that in the ground veins of it expand slowly "transmuting into gold whatever they come in contact with."[82] In another passage he called necromancy the sister of alchemy. But then he recognized that it was worse than alchemy, since it was entirely lies, while alchemy worked at nature with actual instruments.[83] Sometimes

[79] MacCurdy I, 408-9.

[80] *Ibid.*, 150-51: Royal Library, Windsor, *Dell' Anatomia Fogli B* 28v., edited by Piumati and Sabachnikoff, Turin, 1901.

[81] Codice Atlantico, fol. 76v, a.

[82] MacCurdy I, 151.

[83] Richter II, 303-8.

Leonardo himself seems guilty of magic logic and association, as when he explains that men born in hot countries are black because they love the refreshing nights and hate the light, while Nordics in cold countries are blonde for the opposite reason.[84]

The manuscripts of Leonardo also continue the technological tradition of the preceding centuries. His pages on the artist's materials resemble the medieval books of colors. His ideas as to measuring the speed of a ship and other practical devices remind one of Nicholas of Cusa and Giovanni da Fontana in the previous century. The latter had anteceded Leonardo in employing a secret method of writing to conceal the military engines which he devised.[85] The city of Milan had had a military engineer three centuries before Leonardo.[86] No thorough-going analysis, comparison and evaluation of the medieval technological literature has yet been attempted. It is hard to tell whether a rude sketch and brief description represents a practical device, either in the medieval writers or in Leonardo's notebooks. But the invention of the revolver has been attributed to the *Bellifortis* of Konrad Kyeser, written between 1393 and 1405. A *Feuerwerksbuch* of about 1422, found in many manuscripts and printed at Augsburg in 1529, is said to contain a nitro-explosive, a kind of shrapnel and the manufacture of sulphuric acid. The *De re militari* of Valturius, printed at Verona in 1472, includes revolving gun turrets and platforms and something resembling a "tank," as well as the more commonplace paddle wheels and inflated diver's suit.[87] The devices suggested in the da Vinci manuscripts must be estimated in the light of this very considerable previous literature, such as the ten books on machines composed in 1449 by Mariano di Giacomo Taccola. Also other men were still working at such inventions. The German assistant who did not work for Leonardo enough to suit him but spent his time in his room de-

[84] *Ibid.*, 270. Codice Atlantico, fol. 393v, a.

[85] CLM 242 (cod. icon.), Bellicorum instrumentorum liber cum figuris et fictivys literis conscriptus.

[86] F. M. Feldhaus, *Ruhmesblätter der Technik*, 2nd ed., II, 17. Feldhaus's *Leonardo der Techniker und Erfinder*, Jena, 1913 and 1922, is popular.

[87] I have examined the work in a manuscript of 1463 A.D., anteceding the printed editions: BN 7236.

vising mills for twisting silk, which he concealed when anyone else entered,[88] was perhaps already constructing the spinning-jenny which we see portrayed in 1607 in Zonca's work on new machines[89] long before that of Hargreaves in 1764. It is to be noted that Leonardo gave as his reason for not revealing his method of staying under water, lest men use it to sink ships with all on board.[90]

Despite the many dissections which Leonardo had performed and his extensive knowledge of anatomy, his attitude towards medicine was that of the outsider or man in the street. In one passage he promises to teach the conservation of health, "in which you will succeed the more, the more you eschew physicians, becauses their compounds are of the same stripe as alchemy." Yet he records with care "a remedy for scratches taught me by the herald of the king of France."[91]

Leonardo drew up a good indictment against the tendency towards compendiums and the desire to save time in education which become so manifest in the sixteenth century. The abbreviators of works, he said, did injury to knowledge and to love of knowledge. They professed to give an idea of a whole field, yet failed to cover most of its parts. It was impatience, mother of stupidity, that praised brevity and produced such works as Justin's Epitome of Trogus Pompeius. Finally, Leonardo alluded sarcastically to those impatient minds who regard as wasted whatever time they spend profitably in the study of nature or of history.[92]

The smug assurance of Richter that it is "scarcely necessary to observe that there is absolutely nothing" in da Vinci's writings "to lead to the inference that he was an atheist," is perhaps literally true.[93] In general Leonardo avoids the domains of religion and theology. He says that he lets inspired writings stand because they are the supreme truth.[94] Or, like previous lay astro-

[88] Richter II, 408.
[89] Vittorio Zonca, *Novo teatro di machine*, Padua, 1607, p. 74.
[90] Richter II, 274.
[91] *Ibid.*, 133.
[92] *Ibid.*, 302.
[93] *Ibid.*, 282.
[94] *Ibid.*, 127: "Lascio star le lettere incoronate perchè sono somma verità." Quaderni IV, fol. 10r.

logical and technological writers, he indulges in a sarcasm at the expense of the friars, stating that he leaves the rest of the definition of the soul to these "fathers of the people who know all secrets by inspiration."[95] There also runs through his notes on nature an Aristotelian-like faith in the great antiquity and unceasing recurrence of its processes, and a determination to face all natural questions on a purely physical, not to say materialistic, basis. This was to his credit, although not peculiar to him. When he hints that the biblical universal deluge can not be explained from natural causes,[96] he is perhaps like other writers who claimed thereby the theological credit of demonstrating it a divine miracle. But when he affirms that all souls descend from the sun, because the heat in living animals comes from the soul, and there is no other heat or light in the universe than that of the sun,[97] he seems to approach close to materialism.

[95] *Idem.*
[96] *Ibid.*, 208 *et seq.*
[97] *Ibid.*, 149.

CHAPTER III

ACHILLINI: ARISTOTELIAN AND ANATOMIST

Erat venustus altae staturae sed bene proportionatus laetus iucundus ridens affabilis

—LUCA GAURICO

Our survey of magic and experimental science in the sixteenth and early seventeenth century may well direct its attention to the Peripatetics or Aristotelians, as they regarded themselves, although others have called them Averroists, of the great university centers of Bologna and Padua. Before Luther, Zwingli and Calvin had definitely opened their struggle for what they deemed spiritual liberty and ecclesiastical reform, and while Erasmus was still meditating a Christian renaissance by ridicule of abuses and a campaign of gradual education and enlightenment, a Nifo and a Pomponazzi called into question more basic supports of religion itself: the belief in miracles, in demons, in the existence of another and super world, and in the immortality of the soul. They thus laid the foundations for the growing scepticism, free-thinking, deism and atheism of succeeding centuries. It would be difficult to say whether their teaching and writing would have had more immediate and potent influence, or a longer delayed and diminished effect, had it not been for the outbreak of the Protestant revolt and the subsequent Catholic reaction. At least it was more purely rational than the teaching either of Erasmus or of the Protestant reformers. It also lacked the sensuousness of the contemporary revival of pagan art and the selfishness which recommended Machiavellianism to the rising tide of secular politics. Yet it too had its Achilles' heel. As we shall see, its denial of demons and miracles was supported by an appeal to the astrological influence of the stars, to occult forces in nature, and to magical powers in man. If the superna-

tural was rejected, the preternatural was retained. This weakness, however, accorded well with the spirit of the sixteenth century and with the views of most men of science and of most intellectuals of that period. It was not until the days of Bayle and Voltaire that anyone, however enlightened or sceptical, was capable of disbelieving in both Christianity and astrology simultaneously.

In casting the net of our investigation into the intellectual current of the Peripateticism of Bologna and Padua, we shall take the fish as we find them. If our catch, in addition to such celebrated names as those of Achillini, Nifo and Pomponazzi, includes such small fry as Cocles the chiromancer, we shall not throw back the latter as undersized. They will never grow any bigger historically than they were in the estimation of the sixteenth century, and they are as truly representative of its intellectual life as are their larger fellows. Had it not been for an observant astrologer like Luca Gaurico, we might not even know what some of the big fish looked like.

Gaurico tells us that Alexander Achillini of Bologna, born on October 29, 1463, was tall, well proportioned, good looking, smiling and affable, that he studied philosophy for three years at Paris and became an eminent dialectician, philosopher and subtle disputant, but as a lecturer was obscure and confused. He published many books, of which Gaurico singles out for especial mention and praise only his *De orbibus,* saying nothing of his work in anatomy. He died of an acute fever in his forty-ninth or climacteric year on August 2, 1512.[1] No doubt Gaurico's own predilection for astrology and astronomy had something to do with his singling out the *De orbibus,* but his complete failure to mention anatomical writing or activity by Achillini has its significance.

At Bologna Achillini taught logic from 1484 to 1488, was extraordinary professor of philosophy until 1490, ordinary until 1495, when he became ordinary professor of medicine and gave

[1] *Lucae Gaurici. . . . Tractatus astrologicus,* Venice, 1552, fol. 58v. Whether Achillini studied at Paris has been doubted.

the morning lecture. In the academic year 1497-1498 he reverted to philosophy, giving the afternoon lecture, while after 1500 he lectured twice daily, in the morning on medicine and in the afternoon on philosophy.[2] His name appears without interruption on the faculty lists until his death in 1512, but actually he was at Padua teaching philosophy from 1505 or 1506 to 1508, when he returned to Bologna.[3] He is said to have been driven from Bologna in 1506 in connection with the fall of the Bentivogli family, to have succeeded Antonio Fracanzano in the chair of philosophy at Padua, but to have incurred the hostility of his colleague Pomponazzi, and in consequence to have returned to Bologna in September, 1508.[4] The very fulsome obituary of Achillini in the *Liber segretorum artistarum ac medicorum* of Bologna says nothing of his anatomical knowledge.[5]

Some of Achillini's writings were published in the fifteenth century, as *De intelligentiis*[6] and *De distributionibus ac de proportione motuum*[7] in 1494, and *De orbibus* in 1498.[8] An edition of his *Opera* in 1508 reprinted the treatises on the intelligences and the orbs, with another on the principles of chiromancy and physiognomy which had appeared separately in 1503, and four more on universals, the elements, the power of the syllogism, and the subject of medicine.[9]

The thought and writing of Achillini to a large extent still flowed in the accustomed channels of late medieval scholasticism.

[2] Dallari, *I rotuli;* consult the Index.

[3] L. Münster, "Alessandro Achillini . . . ," *Rivista di storia delle scienze,* XXIV (1933), 14-20. Michele Medici, *Compendio storico della scuola anatomica di Bologna,* Bologna, 1857, pp. 48-49.

P. Capparoni, *Profili bio-bibliografici di medici e naturalisti celebri italiani dal secolo XV° al secolo XVIII,* I (1925), 11, states that owing to political tumults in Bologna and its siege by the Spaniards Achillini had to suspend his lectures in 1511 for lack of scholars.

[4] Wickersheimer (1936), 18-19. According to Capparoni the government of Bologna ordered him to return or have his property confiscated.

[5] The obituary is reproduced by Medici, *op. cit.,* pp. 56-57.

[6] GW 192; Klebs (1938), 6.1

[7] Duhem I (1906), 227-28.

[8] GW 191; Klebs (1938), 7.1.

[9] Alexander Achillinus Bononiensis, *Opera,* Venice, 1508, Octavianus Scotus et Bonetus de Locatellis. I have used a fuller edition of his works of Venice, 1545, apud Hieronymum Scotum, which adds *De proportione motuum, De physico auditu,* and *De distinctionibus.* It is full of misprints. Copies used: BN R.245 and R.1316.

The chapter heads of his *De distinctionibus* ran thus: "de entis significationibus," "de uno," "de vero," "de bono," "de quo" "de re," "de eodem subiecto," "de eodem secundum formam," "de eodem secundum materiam," "de eodem secundum modum," "de eodem secundum esse," and so on. He composed treatises on the intelligences, the orbs, and the elements. In the last named he discussed such questions as whether matter exists, whether a dead man is still a man, whether first matter has any substantial form of its own, whether matter can exist without form, whether matter is intelligible *per se,* whether privation is the beginning of transmutation, whether several substantial forms are found in a compound. He contended that the elements remain in the compound neither actually nor potentially but in a halfway state between potentiality and actuality. Against Aquinas, Scotus, Aegidius, Plusquam Commentator, and many other authorities, he held that the elements combining in a compound are not wholly corrupted. They suffer violence, however, in mixing together. Such was his approach to the conception of chemical change. He believed that the generation of one thing was the corruption of another, and that in simple generation there was resolution even into first matter in the case of substantial, but not of accidental, forms. This led him on to a discussion of transubstantiation in the sacrament. In the last of his three books on the elements he went into such problems as whether there is a minimum in natural things, whether anything moves itself, whether there are only four elements, whether the first qualities are the substantial forms of the elements, whether an element has a definite shape or distinguishing form, whether one element may be the natural place of another, whether one element may be immediately transmuted into another, whether earth is colder than water.

Elsewhere I have summarized Achillini's discussion of the question how much of the earth's surface or climate is habitable.[10] He also noted that mathematicians had reckoned the earth's diameter as 6,500 miles, that of the sphere of water as 208,000 miles, the diameter of the sphere of air as 6,656,000 miles, and that of

[10] **T** (1929), 208-9.

fire which reaches to the sphere of the moon as 212,992,000 miles. But he added that natural experience cast some doubt upon the accuracy of these figures.

In his treatise on the proportion of motions Achillini raised the question whether more recent mathematicians had detected Aristotle in error on that subject. He further asked whether the proportion of velocities in motions was equal to the proportion of proportions moving to their resistances. He cited Euclid, Averroes, and that stalwart medieval trio, Jordanus, Campanus, and Calculator, more than once. He thought that moderns such as Paul of Venice, Albertutius (i.e. Albert of Saxony), and Thomas Bradwardine erred from the ancient mathematicians because they were unwilling to insert between two extremes like eight and one any mean which was not smaller than the greater number and greater than the lesser number. Jordanus, on the contrary, did not care whether the mean was greater or less than the extreme. Again Achillini complained that the common gloss on the fourth book of Aristotle's *Physics*, comment 71, which moderns followed and which Thomas Bradwardine had inserted there, twisted the true text into a false opinion and was not consonant with the mind of Aristotle.

In treating *De physico auditu* itself, Achillini kept taking issue with Albertus Magnus. For example, Albertus held that "nature does not aim at a designated individual: we hold the opposite." Or Albertus held that "nature does aim at the species: I hold the opposite." Achillini also took it ill that Peter of Abano, who said he had seen a pygmy, denied that pygmies were human beings, whereas Aristotle had so classified them. Achillini suggested that Peter had imitated an erroneous passage in Albertus Magnus's twenty-first book on animals.

It may be doubted if Achillini was always correct in his interpretation of Aristotle. He accepted as genuine the chapters on minerals, which were rather by Avicenna, and printed them as Aristotle's in 1501. But there would seem to be little doubt of his intention to make Aristotle his main reliance and to disregard many of the suggestions made by recent Christian Latin commentators. In this respect he tended to break with the medieval

centuries and to go along with the classical revival and rehabilitation of ancient authors. Another indication of a Peripatetic or Averroistic leaning on his part is a tendency to note the differences between the views of theologians and philosophers. He does this throughout *De distinctionibus* and at its close points out the divergence between Aristotle, Averroes and the theologians as to the eternity of matter and unity of the intellect. Again in *De orbibus* he compares their differing views as to demons. At least once he waxes quite sarcastic concerning the past attempt to reconcile Aristotle with Christianity. Noting that Albertus Magnus, Scotus, Thomas and Aegidius represent Aristotle as admitting creation, he remarks that they wished to baptize Aristotle, not noticing that he was dead.[11] This attitude we shall follow farther and illustrate in more detail in the chapters on Nifo and Pomponazzi.

A brief discussion of the subject of medicine by Achillini is based mainly upon Galen but also cites such medieval writers as Taddeo Alderotti, Hugh of Siena, and James of Forlì—with all three of whom he disagrees— Peter of Abano, Plusquam Commentator (i.e. Pietro da Torrigiano), and Christopher de Honestis.

The favoring attitude of Achillini to astrology, or at least to the influence of the stars, is shown at the beginning of his second book on the elements by his attributing to Aristotle the view that this inferior world is continuous with the sky, so that all its virtue is governed thence.

The work of Cocles on chiromancy of which our next chapter treats was composed or published with the approbation of Achillini.[12] There is furthermore prefixed to it a short question by Achillini as to the principles or subject of physiognomy and chiromancy.[13] Noting that some astronomers falsely assume that the

[11] *Opera* (1545), fol. 82r.

[12] *Bartholomei Coclitis Chyromantie ac physionomie Anastasis cum approbatione magistri Alexandri de Achillinis,* Bologna, 1504.

[13] *Ibid.,* fol. 1r, "Alexander Achillinus Bononiensis de Chyromantiae principiis et physionomiae"; fol. 2r, "Alexandri Achillini Bononiensis questio de subiecto physionomiae et chyromantiae."

sky rules human actions necessarily and inevitably, Achillini asserts that physiognomy and chiromancy do not compel human free will but act by natural causes which may be impeded, though actually they rarely are. He holds that physiognomy and chiromancy are speculative sciences and not (merely) practical. Incidentally he suggests that Scotus from want of books may not have seen Aristotle's first book on the generation of animals, when he held, contrary to it, that animals generated from putrefaction were of the same sort as those generated by propagation. After this example of smug Peripateticism Achillini presently concludes that physiognomy and chiromancy are subalternated to natural philosophy and encourages Cocles to elaborate them more particularly. Lest their truth pass into desuetude, Achillini has fulfilled his promise to Cocles of "joining the universal elements of things with particular subjects" in this preliminary treatise. At its close the *Questio* is dated 1503, and its author is described as "the son of Claudius Achillini teaching publicly as ordinary professor both philosophy and the theory of medicine." This discussion of physiognomy and chiromancy by Achillini is also found in an Escorial manuscript immediately followed by Pomponazzi *On Incantations*.[14]

Achillini has received credit in modern times for anatomical discoveries, although his contemporaries, as we have seen, appear to have maintained silence on this point. Alidosi, writing in the first part of the seventeenth century, states that Achillini was among the first discoverers of certain little bones in the ear called the hammer and anvil, as is attested by Eustachio Rudio and by Giulio Casserio of Piacenza in his book on the organ of hearing.[15] This does not attribute the discovery of these bones to Achillini solely, while the authors cited by Alidosi were of

[14] Escorial f.III.2, 16th century, fols. 1 and 9.

[15] Giov. Nicolò Pasquale Alidosi, *I dottori bolognesi di teologia, filosofia, medicina, e d'arti liberali dall'anno 1000 per tutto marzo del 1623*, Bologna, 1623, 4to, p. 8: "Fu de i primi inventori di certi ossiculi posti nell'orrecchia chiamati da gli Anotomici maleolo et inchude et stassa come attesta Eustachio Rudio e Giulio Casserio Piacentino nel suo libro de organo auditus."

the late sixteenth and early seventeenth century.[16] In the eighteenth century Tiraboschi affirmed that the work on anatomy ascribed to Achillini contained new discoveries concerning the ear (particularly two little bones in it), brain and intestines. Tiraboschi, however, was in some doubt whether the work was really by Achillini. In the nineteenth century Haeser, after stating in one passage that Achillini followed Mundinus completely,[17] in another attributed to him the discovery of bones in the ear in 1480[18]—when he would have been but seventeen—and in a later edition added that he observed the ductus choledochus opening into the duodenum and also the ileocaecal valves.[19] This assertion was repeated by Puschmann.[20] But, between the editions of Haeser, Medici had stated that Carpi alluded more clearly and fully than Achillini to the hammer and anvil bones in the ear, but that they were well known already and the discovery neither of Berengario da Carpi nor of Achillini.[21] However, the anatomist Falloppia, writing in 1561, definitely credits the discovery of them to Carpi, and states that a third bone in the ear was first noticed by Joannes Philippus ab Ingrassia, a

[16] Eustachius Rudius was a physician of Udine or Belluno whose work on the heart was printed at Venice in 1587, *De humani corporis affectibus dignoscendis curandis praeservandis libri III* at Venice in 1595, *De anima* at Padua by Petrus Bertellus in 1611, and treatise on the pulse at Frankfurt in 1642 if not before.

Casserius had been a domestic in Aquapendente's house before he matriculated at Padua in the arts course. He is said by Italo Simon, "Una dedica autografa di Giulio Casseri," in *Rivista di storia delle scienze mediche e naturali,* XIII (1931), 22-25, to have substituted for Aquapendente when the latter was sick in 1595 and in 1604, but not to have been made public professor or lecturer in surgery until 1609 because of Aquapendente's jealousy, which put a stop to his private teaching and dissecting as against the statutes. According to Papadopoli, *Historia gymnasii Patavini,* Venetiis, 1726, I, 346, Casserius cured cases of which others including Aquapendente had despaired, and died before Aquapendente in 1616, not in 1625, as stated by Freher. The work referred to by Alidosi is his *De vocis auditusque organis historia anatomica,* Ferrara, Vittorio Baldino, 1600. Other anatomical works by him are in print. See further G. Sterzi, "Giulio Casseri, anatomico e chirurgo, ricerche storiche," in *Nuovo Archivio Veneto,* XVIII, ii, 12.

[17] *Lehrbuch d. Gesch. d. Medicin,* I (1853), 391: "der sich noch ganz an Mondini hält."

[18] *Ibid.,* p. 407.

[19] *Lehrbuch* II (1881), 24-25.

[20] *History of Medical Education,* London, 1891, p. 295.

[21] Michele Medici, *Compendio storico della scuola anatomica di Bologna,* Bologna, 1857, p. 51.

very learned philosopher and physician of Sicily, while he taught anatomy publicly in the university of Naples. When Falloppia began to teach at Pisa and mentioned this third bone, which neither Vesalius nor Colombo had noted, one of his students informed him that Ingrassia had already called attention to it and named it the stirrup. Falloppia generously admits and records Ingrassia's priority in the discovery.[22]

Some author, whose name now escapes me but whom I believe I quote with substantial accuracy, has written that Achillini "observed the course of the cerebral cavities into the inferior cornua; knew of the ileocaecal valve and other facts unknown before; described the malleus and incus, two tympanal bones; showed the tarsus to consist of seven bones; rediscovered the fornix, a triangular brain lamina, and the infundibulum or brain tunnel." Recently Capparoni has attributed to Achillini an even longer list of anatomical discoveries but without citing definite passages from his writings in support thereof. Indeed, when he asserts that Achillini left three anatomical writings, he appears to have regarded what are simply different editions of one and the same brief treatise as three different works.[23] With reference to such assertions two qualifications may be hazarded. First, that were the medieval literature of anatomy thoroughly examined, many of these so-called discoveries would be found to have been already known. Second, that one will experience difficulty in finding any of them set forth in the work on anatomy printed under the name of Achillini.

No treatise on anatomy by Achillini appears to have been printed during his lifetime, but eight years after his death his brother, Philotheus, published in 1520 at Bologna his *Anatomical Annotations*.[24] There were other editions of it at Venice in

[22] Fallopius, *Observationes anatomicae,* 1561, fols. 25r-26r. Also in the 1725 edition of the works of Vesalius, II, 698.

[23] P. Capparoni, *Profili bio-bibliografici* etc., I (1925), 12-13.

[24] "Expliciunt Anotomicae (*sic*) annotationes Magni Alexandri Achillini Bonon. Editae per eius fratrem Philotheum. Et impressae Bonon. per Hieronymum de Benedictis Anno M.D.XX. Die XXIII Septemb." This edition which I have seen at the Academy of Medicine, New York, has a picture of "Magnus Alexander Achillinus" on its first page, below which

1521 and 1522, but the treatise was not included in the collected editions of Achillini's works issued at Venice in 1545, 1551, and 1568, just as it had not been found in the *Opera* published during his lifetime at Venice in 1508. It covers only sixteen or eighteen small leaves and seems to be a brief outline of the subject based upon the standard medieval manual of Mundinus but with some additions. Achillini commonly enumerates the parts of the body as briefly and rapidly as possible. He has, for example, only three lines on the ear and says nothing of any newly discovered bones there. Besides Mundinus various medieval authors are cited, either earlier like Haly, Rasis, Avicenna, Averroes and Albertus Magnus, or coming between the time of Mundinus and Achillini's own day like Pietro Torrigiano, Hugh of Siena, and James of Forlì whom we have already heard Achillini cite elsewhere, or Francis of Piedmont and Giovanni Arcolani of Verona. A *Liber de anatomia vivorum* is also cited more than once. Ancients like Aristotle, Galen and Dioscorides are not forgotten. Such disagreements between authorities are noted as that between Aristotle and Galen as to where the sperm is generated, that between Avicenna and James of Forlì as to where the nerves originate in the brain, that between Galen and "the moderns" as to the cause of apoplexy, or the disagreement of Mundinus with Avicenna, Averroes and Albertus as to the number of orifices possessed by the monoculus. Achillini agrees with Aristotle that the heart has three ventricles rather than with Galen that there are only two. He occasionally criticizes a past writer or

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are verses of "Hannibal Camillus Corrigiensis artium et medicinae discipulus."

In the Venice, 1521 edition, of which the Academy of Medicine also has a copy, the picture and verses occupy separate pages after other preliminary matter and a table of contents. The background of the picture also is altered. The title page reads: "Alexander Achillinus de humani corporis Anatomia." On its verso we read, "Nicolaus Lectori felicitatem." The edition of 1522 is with the *Fasciculus medicinae* of Johann von Ketham.

Capparoni mentions a Venice, 1516, edition in folio, "De humani corporis anatomia"; and another Bologna edition by Hier. de Benedictis in 1524, "In Mundini anatomiam adnotationes"; but I have not found these. See also Ladislao Münster, "Alessandro Achillini anatomico e filosofo, professore dello Studio di Bologna," in *Rivista di storia delle scienze*, XXIV (1933), 7-22, 54-77, at p. 72.

belief. For example, he declares it untrue that the vasa circumvoluta are parts of the testicles, as some had held in an effort to reconcile Aristotle and Galen as to the place where the sperm is generated. Sometimes Achillini refers to his own observations or experience. In 1502 he saw five bones of the foot; in 1503, seven. The same year he saw a monstrous birth with two pores for urine on the left side and only one on the right. Twice in 1502 he verified the statement of Avicenna that two veins issue from the left emulgent vein. Later is cited another personal observation of 1503 and his experience in dissecting another monstrous body in 1506. The *Anatomical Observations,* which sound like brief lecture notes, therefore seem to have been finished or left unfinished at some time between 1506 and his death in 1512.

The treatise is not wholly free from matter which approaches superstition. It is stated that sperm for a female child comes from the left testicle because the left vessel branches from the emulgent vein full of watery blood before it is purified by the kidneys, while the right vessel rises from the chilic vein full of pure blood after the kidneys have dispelled the wateriness. Also a branch of an artery is joined with the right vessel which therefore contains more spirit. Hence elevation of the left testicle after intercourse is a sign that the child will be a girl, while rising of the right testicle indicates the birth of a male.[25]

While it is doubtful if Achillini made any great original contributions to anatomical knowledge, he at least was interested in the subject. The circumstance shows us that experimental anatomical inquiry might be combined with a somewhat hidebound Aristotelianism in the same individual, and that these were not diametrically opposed interests necessarily represented by different and opposing persons. Certainly the two interests coexisted amicably not only in the person of Achillini but in the universities of Bologna and Padua in the first part of the sixteenth century.

We have yet to note a *Septisegmentatum opus* edited by Achil-

[25] *Anatomicae annotationes,* edition of 1520, fols. Vv-VIr.

lini which appears to have been first printed at Bologna on October 26, 1501,[26] and then was published posthumously at Paris in 1520, "in order that it might no longer lie hid in darkness."[27] Of the seven segments thus published four were works of the pseudo-Aristotle which had been perfectly well known since the thirteenth century or earlier and not hid in shadows at all: namely, the *Secret of Secrets* in the translation of Philip of Tripoli, the *Letter to Alexander* concerning the marvels of India, the work on weather signs translated in the thirteenth century by Bartholomew of Messina, and the alchemical addendum to the *Meteorology* known as *De congelatione*. The three remaining items were Alexander of Aphrodisias on the intellect, Averroes on the beatitude of the soul, and Achillini himself on universals. The pseudo-Aristotelian portion may be taken as a further indication of Achillini's favorable attitude towards occult science.

In a manuscript of the late fifteenth century at Milan are preserved opuscula of Achillini which it is stated were never printed and which were presented to the Ambrosian library in 1673 by Giovanni Battista Capponi, a doctor of medicine of Bologna. After seven tracts on the logic of Aristotle come some remarks on the *Prohemium* of Aristotle and Averroes to the *Physics* and a question as to the subject of philosophy. Besides an exposition of the remarks of Averroes on the *Physics* and a work on intension and remission, the manuscript further contains questions in natural philosophy and discussion whether the bones are nourished by the marrow, whether hyle is generable or corruptible, whether a projectile is moved by the thrower after its separation from him, and whether the elements are first matter. Since the manuscript as a whole has something of the appearance of a

[26] "Impressus Bononiae impensis Benedicti Hectoris." This edition, which I have not seen, is fully noted by E. J. Holmyard and D. C. Mandeville, *Avicennae De congelatione et conglutinatione lapidum*, Paris, 1927, p. 14.

[27] Copy used, BM c.19.a.34. At fol. 114v, "Explicit septisegmentatum opus ab Alexandro Achillino ambas ordinarias et philosophie et medicine theorice publice docente ut non amplius in tenebris latitaret editus (*sic*). Et impressus Parisius Anno domino (*sic*) 1520.)" A table of contents follows at fol. 115r.

scrapbook, and at least one item is a chapter copied from Albertus Magnus, it may be doubted how many of the tracts are by Achillini himself, although they very likely illustrate his interests.[28] According to Alidosi, Achillini left in manuscript a commentary on Averroes, *De substantia orbis,* a treatise *De mixtis* based on the twelfth book of the *Metaphysics,* a correction of the text of Aristotle's *Rhetoric,* and a *De anima* of 114 pages in his own handwriting.[29]

It is remarkable that Gesner, in his *Universal Library* of 1545, should devote several folio pages to the works of Nifo, and a page and a half to Vesalius, but mention only the brief introduction to chiromancy and physiognomy among the works of Achillini and dismiss it as written in a barbarous style. Since, however, of other writers on chiromancy and physiognomy, to be mentioned in our next chapter, Gesner gives more than a page to Cocles, a generous paragraph to Antiochus Tibertus, and again over a page to John ab Indagine, we may perhaps infer that he or his readers had a special interest in these and other forms of occult science.

[28] Milan, Ambros. A.236.Inf. On the flyleaf is written: "Alexandri Achillini opuscula in Aristotelem numquam typis edita que dono dedit Ambrosiane Bibliothece vir doctissimus Jo. Baptista Capponius Bononiensis in Patrio Gymnasio Artis Medice doctor nonis Septembr. Anno 1673 Petro Paulo Bosea Biblioth. Prefecto." On the following flyleaf is a table of contents:

Quaedam Alexandri Achillini opuscula in libros Aristotelis
Praedicabilia Porfirii
Praedicamentorum Aristotelis
Peri Ermenias
Tractatus de Syllogismo tum probabili tum sophistico
Trac. de demonstratione
De consequentiis
Agregator plurium in logica Alexandri Achilini
179r—Nonnulla circa Prohemium Aristotelis et Aver. in libris Phisicorum
Questio de subiecto philosophiae
188r—(Albertus Magnus, cap. 3, I Physicorum)
193r—Nonnulle q. in philosophia naturali
200r—Utrum ossa nutriantur medulla
203r—Utrum hyle sit generabile aut corruptibile
207r—Utrum proiectum moveatur a prohiciente post separationem ab eo
208r—Utrum elementa sint materia prima
214r—Expositio dictorum Averrois in libris Phisicorum
225r—De intensione et remissione

The text ends at fol. 236v. The writing of the closing treatise is very abbreviated, and the other writing is very poor in places.

[29] Alidosi, *I dottori bolognesi,* 1623, p. 8.

CHAPTER IV

COCLES AND CHIROMANCY

Ut audeam dicere me nullo modo in hac arte errare posse
—COCLES

Bartolommeo della Rocca, called Cocles, by recording his favorable horoscope gives us the exact date of his birth, March 19, 1467, at the third hour of the night on the meridian of Bologna. Further biographical information is provided in a letter from Horatius Bichardus of Fano to Alessandro Bentivoglio, dated from Bologna on December 15, 1503, which is prefixed to the *editio princeps* of 1504 of Cocles' work on physiognomy and chiromancy.[1] The letter states that Cocles left his country home (Tuguriolum) and came to Imola, to whose princes he predicted the loss of their dominion. He then went to Faenza, where Hieronymus de Manfredis was cousin of the prince, and foretold an ill fate for Astorgius of Faenza, who died soon after. As for Cocles, he proceeded to Cesena and Pesaro and visited Guido Ubaldi. To Julius Varanus of Camerino he forecast an evil fate for himself and his sons. After other predictions and perils he returned to his native place, wrote the present work and dedicated it to Bentivoglio, to whom Bichardus appeals to protect Cocles from his enemies. He praises him as a physiognomer, chiromancer, geomancer and interpreter of dreams, concerning which last subject he had already decided to publish a work under the name of the brother of Galeazzo Sforza, prince of Pesaro. Cocles himself, in closing his book, tells us that he began it in

[1] Bartholomaeus Cocles, *Chryomantie ac physionomie Anastasis cum approbatione magistri Alexandri de Achillinis*. Bononiae, ex arte Ioannis Antonii de Benedictis, 1504, small folio, 176 leaves.

At the beginning of the *Anastasis* itself we read: "Magistri Batholomei Coclitis Bononensis Medicine Distillatoris Chyrurgici Physionomiste Chyromantici Geomanticique Anastasis ex pluribus et pene infinitis auctoribus feliciter incipit."

the year 1500, while Alexander VI was pope, and finished it under Julius II on June 28, 1504, at the nineteenth hour on the vigil of St. Peter, bearer of the keys. He also refers to a previous work which he had presented to Giovanni Bentivoglio. In it he had predicted the kind of death that various famous men would incur. This treatise seems not to have been printed but to be referred to by Cardan and by Paolo Giovio as including a correct forecast of its author's own fate. He was murdered on September 24, 1504, by order of Ermete, son of Giovanni Bentivoglio, to whom he had predicted death as an exile in battle.[2] Predictions of death would certainly seem to have been his specialty.

Cardan described Cocles as a mendicant barber ignorant of letters who undertook the study of physiognomy and chiromancy with such zeal that he edited a vernacular work in Latin and became the admiration of his age. He was said to have left at his death a list of forty-five men[3] who would die a violent death, of whom all but two had done so by the time that Cardan wrote. Cardan regarded as even more marvelous the report that Cocles had foretold the day and manner of his own death, although he had not foreseen at whose hands it would be.[4] Alidosi, writing in

[2] On the murder of Cocles see the passages quoted from Paolo Giovio and the Cronaca Seccadenari by Giovanni Fantuzzi, *Notizie degli scrittori bolognesi,* Bologna, 1781-1794, III, 180-83. The death of Cocles was also recorded by Cherubino Ghirardacci, *Historia di Bologna:* Muratori, *Scriptores,* XXXIII (1915), 332. He writes, "Bartolomeo detto Cocles che compose un libro di fisonomia astronomo de' primi d'Italia fu occiso alli 24 d'Agosto." See also Erasmo Pèrcopo, *Luca Gàurico, ultimo degli astrologi; notizie biografiche e bibliografiche, Atti della reale accademia di archeologia, lettere e belle arti,* Napoli, XVII (1896), ii, 15.

Fantuzzi names Antonio Capponi as the actual assailant of Cocles. Pèrcopo cites Achillini in the *Viridario* that he was struck down by an unknown hand.

Paolo Giovio states that Gaurico in old age told him that Cocles had warned him against falling into the hands of justice, which fate befell Gaurico in 1506, when Giovanni Bentivoglio arrested and tortured him. Giovio's statement is that Gaurico received "cinque altissime strappate di corda," but Gaurico himself says in his *Tractatus astrologicus,* Venice, 1552, fol. 49v, "quater brachiorum torturas."

[3] Probably this is the work that Cocles says he presented to Giovanni Bentivoglio.

[4] Cardan, *Opera,* 1663, V, 468, in *De exemplis centum geniturarum.* Perhaps by a misprint, the date of Cocles' birth is here given as March 9, 1467, while Cocles himself states it as March 19, 1467.

the following century, states that Cocles, foreseeing it would be his fate to be knocked over the head, wore a metal plate concealed in his hat, but that the assassin, disguised as a vendor of kindling wood, hit Cocles over the head with a bundle of sticks, when the chiromancer opened the door for him to enter the house. Alidosi quotes some verses of Pontano on Cocles which would seem to be prophetical, since Pontano died first. They run

> Cur caput armatum galea? latus ense revinctum est?
> Vim fati radios dixtin' habere tuos?
> Sed video melius fatum est nescire scivisse,
> Quando nihil prodest tela nec arma valent.[5]

In his foreword to the *Anastasis* of Cocles[6] Achillini noted his zeal for science, adding that even those whose morals might have rendered despicable, their love of truth makes more tolerable. Whether this remark had some personal application to Cocles I cannot say.

Achillini went on to mention the diligence of Cocles in recalling to light physiognomy and chiromancy, which with other parts of philosophy had remained for many years past in darkness—the usual vague and unsubstantiated humanistic aspersion on the learning of the preceding period. Cocles also maintained this fiction of a revival of learning by giving his book the title, *Anastasis* or *Awakening*, suggesting a renaissance in the fields of physiognomy and chiromancy, and by emphasizing in his prohemium how he had labored to restore this almost buried science to light. As we shall see, the citations of fifteenth century and earlier medieval authors in the text itself give the lie to this fiction of burial and resurrection. So do the fairly numerous manuscripts and incunabula of treatises on chiromancy, chiefly anonymous. Even in this prohemium Cocles finds it advisable to explain away the fact that much of what he has written is duplicated in earlier works by asserting that he never saw them before, God help him, and that this knowledge came to him not

[5] Alidosi, *I dottori bolognesi*, 1623, pp. 31-33.

[6] Alexander Achillinus Bononiensis de Chyromantiae principiis et physiognomiae, fol. 1 verso, in the edition of Bologna, 1504.

from books but from the stars. This assertion is contradicted by the work's initial rubric which describes the *Anastasis* as drawn from "an almost infinite number of authors."

The *Anastasis* is divided into six parts. The first deals with the general principles of physiognomy. The second covers the human body from top to toe in the form of a dialogue between Cocles and his disciple Augustinus. It is to a large extent based on Aristotle or the work of physiognomy attributed to him. The third part is on the relation of the planets to physiognomy and considers the lines of the forehead, beginning with Saturn. The fourth part turns to chiromancy and again is in the form of a dialogue with the aforesaid Augustinus with much criticism of previous writers on the subject. The fifth part purports to be a treatise on chiromancy by Peter of Abano with some additions by Cocles. Peter of Abano certainly wrote on physiognomy and included a page or so on the hand. Whether he was actually the author of the tract on chiromancy here ascribed to him seems more doubtful.[7] But inasmuch as Peter of Abano lived in the thirteenth century and first years of the fourteenth, the mere ascription of this text to him suggests that there is no justification for humanist aspersion on the medieval period in the fields of physiognomy and chiromancy, that Cocles' revival is of medieval as well as of classical or supposedly classical authors, and that the years of darkness to which Achillini referred must have been the recent years since the invention of printing and spread of humanism, in short, the period formerly known as "the Renaissance." The sixth book of the *Anastasis,* the theoretical side of the subject having now been finished, turns to the practice of the art of chiromancy, to which it devotes over three hundred chapters.[8]

[7] Sante Ferrari notes no such work in his two substantial monographs on Peter of Abano, and I know of no manuscript where the work is attributed to him. The text printed by Cocles as by the Conciliator (i.e. Peter of Abano) opens, "Secantur scientie inter se et res ex quibus sunt . . ." and is in three parts. The first part closes with chapters on the seven planets; the second deals with judgments; the third is on the quantity and quality of the hand, "De quantitate et qualitate manus."

[8] It is entitled, "De chyromantia parva cum capitulis distinctis et recollectis in chyromantia magna."

Although Cocles ranks Peter of Abano as the prince of more recent physiognomists and chiromancers, he shows that he has read in many other medieval and recent authors than the Conciliator. He often cites Michael Scot but also harshly criticizes him as a physiognomist.[9] He uses the fourteenth century commentary of William of Mirica to pope Clement VI on the physiognomy ascribed to Aristotle.[10] He is aware that Michael Savonarola in the fifteenth century had composed a *Mirror of Physiognomy* from Savonarola's own reference to it in the prologue to his work on baths. But Cocles seems not to have had access to the *Mirror,* which remained in manuscript, whereas the treatise on baths had been printed. Cocles refers to its disputations concerning leapyears.[11] He further asserts that another illustrious physician of the middle of the fifteenth century, Antonio Cermisone, wrote upon physiognomy. Zacharias and Hieronimo Manfredi in his *Propter quid* also touched on it. Other medieval authors cited by Cocles are Blasius of Parma,[12] Albertus Magnus,[13] Gilles de Corbeil on urines, Aegidius Romanus on colors in his *De anima,*[14] Constantinus Africanus, Mundinus on anatomy, Morbeth cardinalis (whoever that may mean),[15] and such Arabic writers as Alkindi, Albumasar, Rasis and Avicenna. For geomancy he has used Haly, Gerard of Cremona, Tondinus,[16] Bartholomew of Parma, and others whose names now escape him.

In the field of physiognomy Cocles was especially concerned to refute the opinions of Antiochus Tibertus of Cesena. His extant work, however, is entitled, *Three Books of Chiromancy,* not physiognomy. It was first printed in 1494. In the dedicatory

[9] *Anastasis,* II, 5: "De superciliis male dixit Michael Scotus ideo eius dictum non inseritur quia ignavum physionomum illum fuisse testor."

[10] *Ibid.,* I, 6; VI, 139, "eximius commentator physionomie Aristotelis Gulielmus Nurice" (*sic*). See T III, 527.

[11] *Anastasis,* I, 3: "Savonarola in libro de balneis in disputationibus bissextilibus."

[12] *Anastasis,* II, 8; V, 1, ". . . et Blasius de Parma aliqua problemata super quarto quinto et sexto physicorum deprompserunt."

[13] *Ibid.,* fol. bb.ii.verso, "Albertus Magnus de animalibus"; I, 3, "Albertus in speculo philosophie," by which the *Speculum astronomiae* is probably meant.

[14] *Ibid.,* II, 1.

[15] Possibly William of Moerbeke.

[16] Similarly we shall hear Agrippa cite a geomancer named Tundinus. I have found no such author.

preface Tibertus promised that works on the sister sciences of physiognomy and pyromancy would soon appear,[17] but they seem not to have. Concerning this Antiocho Tiberto further information is supplied by a note in Italian in a historical collection in manuscript at Milan.[18] According to this account a soldier of Cesena took him as a noble youth to France and, seeing that he was much inclined to learning, left him in Paris to pursue his education. After some years he returned to Italy, practiced divination, and wrote a noted work on chiromancy. Later, however, this work is referred to as "three books of physiognomy and chiromancy," thus corroborating Cocles' citation of it. The work itself, however, is primarily concerned with chiromancy. Tiberto gained a multitude of clients and revived, says our account, the magic art which had been buried in oblivion since the days of Peter of Abano—another fictitious renaissance. Tiberto predicted truly to Guido da Bagni, also called Guerra, that a friend of his would die, and to Pandolfo Malatesta, despot of Rimini, that he would be driven out and end his days in exile and poverty. But Tiberto did not foresee his own death which happened as follows. He was imprisoned by Pandolfo and had a love affair with the daughter of the warden of the castle. They eloped together but were retaken and beheaded.

In matters of chiromancy Cocles repeatedly cites Andreas Corvus, a physician of Mirandola, whom he also makes the object of frequent objurgations, calling him "black crow" or "blackest crow" by an obvious pun on his name.[19] In the prologue to

[17] Gesner (1545), fol. 49v.

[18] Milan, Ambros. G.289.inf., fols. 38v-39r (1496-1497, according to the older numbering observed by the table of contents at the beginning of the volume).

[19] *Anastasis*, VI, 54, "Dicit Corvus"; VI, 62, "ut dicit niger Corvus"; VI, 63, in more complimentary tone, "ut dicunt recentiores precipue Corvus non valde niger in hoc loco"; but VI, 142, "Dixit nigerrimus corvus," and "O caput vacuum, vade et disce que nescis, postea scribe. Summa deberes affici verecundia scribendo fabulas"; VI, 145, "Dixit ille corvus et aliqui moderni"; VI, 152, "Dixit nigerrimus corvus," etc. etc.

For the work of Corvus see Hain 5776 (n.d.) and GW VII, 185, which dates this edition "Nach den Druckmarken . . . 16 Jh." and gives "Venice, Niccolo e Domenico fratelli dal Jesu," as the printers and place of publication. It was also printed at Venice, 1513, and subsequently. It was dedi-

his sixth book he upbraids Corvus as a thief who has used other writers without naming his authorities—something which Cocles has always been careful to do. He admits, however, that this Andreas Corvus is good enough in the practice of chiromancy by virtue of many years of experience, but in the theory of the art he is worthless. If to some Cocles seems to have borrowed from Corvus, this is not true. Rather has he made independent use of the sources which Corvus fails to acknowledge. Once Cocles confesses that he himself has no experience of a certain point and does not know whence Corvus extracted it. Before beginning to write the *Anastasis* Cocles had read twenty-three volumes on chiromancy and while composing it has read four more but has failed to find the matter in question in any of these twenty-seven volumes and so thinks that perhaps Corvus dreamt it.[20] Cocles also often refers to the book of Corvus as "picta,"[21] perhaps because it was illustrated with figures of hands, as is the case in a number of editions of an anonymous chiromancy printed before 1501.[22] Cocles further cites "Ugo in his Chiromancy" a number of times and refers more vaguely to modern or recent observers and to anonymous authors.

Cocles was very boastful concerning his ability as a chiro-

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cated to Gianfrancesco (III?) Gonzaga, marquis of Mantua, the dedication opening, "Librum de chiromantia, princeps undequaque ornatissime, superioribus annis tuae celsitudini dicatum in publicum edere constitui . . ." The text opens, "Artem chiromanticam ab excellentissima philosophorum schola collectam . . ."

[20] *Anastasis*, VI, 98.

[21] *Ibid.*, VI, 146, "Dixit Corvus in sua picta chyromantia"; VI, 151, "Moderni dicunt et precipue auctor picte chiromantie scilicet corvus noster"; VI, 273. "Dixit fur picte chyromantie."

[22] "Opus pulcherrimum chiromantie cum multis additionibus noviter impressum . . ./. . . Ex divina philosophorum achademia collecta chiromantica scientia naturalis ad laudem Dei finit que Impressa fuit Venetiis per Bernardinum Benalium M.CCCC.XCIX Die XXV Novembris. Laus Deo et virgini sacre": this edition is numbered IA.22410 at the British Museum. IA.22365 is an earlier edition by the same printer, dated "M.CCCC. LXXXXIII de mense Octobri." IA.20530 is also the same work, "Impressum Venetiis per magistrum Erhardum Ratdolt de Augusta." Anent this last mentioned edition the British Museum Catalogue of Fifteenth Century Books remarks: "The diagrams of hands (instrumenta) used in this and the following book"—i.e. an undated edition in Italian numbered IA.20531—"were in the possession of Matheus Cerdonis of Windischgraetz at Padua in 1484 (Hain *4974, IA. 30014)."

mancer. He asserts that his predictions have always come true, "so that I venture to say that I cannot err in this art in any way." Furthermore, he has restored many persons to health by use of physiognomy and geomancy. At first everyone derided him, but now all wish to become physiognomers, especially the uneducated and rude persons such as rustics, lawyers, mechanics, humanists, grammarians and women. Thus Cocles is disrespectful to humanists of the renaissance rather than scornful of schoolmen of the middle ages. In another chapter he claims that Hermes, Aristotle, Albertus, Conciliator, Ptolemy, Helenus the son of Priam, Julian, Ugo and other "were not so great observers of an abundance of individual cases as I am." For this reason he believes that his book is superior to any previous one.[23]

In closing the *Anastasis* Cocles announced his intention of composing and publishing "a beautiful compendium of physiognomy" and a work on the interpretation of dreams.[24] He further thought that it would be easy to compose the most perfect geomancy in existence, since all past writings on that art were mutilated and imperfect. His death in 1504 presumably prevented the completion of these proposed works, unless a geomancy in Italian ascribed to him and printed in 1550 is genuine.[25] Orlandi mentioned the publication at Strasburg in 1533 of a *Physionomiae compendium quantum attinet ad partes inter capitis gullam et collum* by him and of *Poesie volgari* at Venice in 1535.[26] But the former was probably merely one of the numerous abbreviated editions of his *Anastasis,* of which we shall say more later.

Of Cocles' attitude towards other occult arts there is considerable evidence in the *Anastasis.* He ranks their practitioners high in the intellectual scale along with philosophers, mathematicians, those who speculate concerning nature or who have long observed things rational.[27] In his Introduction he lists and

[23] *Anastasis,* VI, prologus and caps. 240 and 328.

[24] He had already promised to write such a work at VI, 252.

[25] Cocles, *La geomantia,* 1550: copy used, BM 8631.aaa.36.(2.).

[26] Orlandi, *Notizie degli scrittori bolognesi,* Bologna, 1714, p. 68.

[27] *Anastasis,* VI, 208.

describes a number of other methods of divination than by physiognomy and chiromancy. Indeed, several different modes of procedure are presented under pyromancy, hydromancy and necromancy. Long accounts are given of augury and interpretation of dreams. Spatulomancy is not defined as usual as divination from the shoulder blades of sheep but rather from the bone of a goat recently killed. Other less familiar varieties of divination are litteramancy and nomancy from letters and names respectively, solmancy from the rays of the sun, venamancy and umbilicomancy which are both connected with childbirth and of which Cocles learned the latter from his mother, who was the most skilful of all the midwives of this age. Yet another method of foretelling the future is by plucking chickens.

Astrology continually crops out in the work of Cocles as it did in the earlier works on physiognomy of Michael Savonarola and Peter of Abano. It serves to explain why human mores differ naturally in different regions. The stars can act on the mind indirectly, although not directly.[28] Cocles takes up the great conjunction of 1484 and decries the theological critics of astrology.[29] Or he examines the revolution of his own nativity "in this year, 1504,"[30] without, however, foreseeing his imminent death, although we have heard Cardan state that he predicted it to the very day. But he affirms that many princes who are now prosperous will lose their power, "and this will happen in revolutions of years of the world and in genitures and directions." No one can be a good physiognomist who has not some knowledge of astronomy and medicine, because a great and most important part of that science depends on these.[31] Scholars born under Venus will rarely amount to much intellectually.[32] Such are some examples of Cocles' astrological dicta. One chapter, however, deals with accidents which a chiromancer or astrologer could not have predicted.[33]

Certain allusions by Cocles to alchemy imply that he was less

[28] *Ibid.*, I, 7.
[29] *Ibid.*, II, 27.
[30] *Ibid.*, VI, 138.
[31] *Ibid.*, VI, 282.
[32] *Ibid.*, III, 5.
[33] *Ibid.*, IV, 18.

favorably disposed towards it than towards astrology. He states that those who are ignorant of anatomy, philosophy and medicine stir up water in a lead mortar and are to be connected with sophistical alchemy. "But we," he adds, "have another path for investigating the nature of the planets."[34] Or in speaking of Caesar Borgia, Cocles says that he was sophistic. "For when it came to the supreme test, he vanished like smoke or vapor because he was like the mercury of the alchemists, badly fixed and congealed."[35]

The *Anastasis* abounds in personal experiences and reminiscences and resembles the medical *Consilia* of the closing medieval centuries in its record of particular cases, in which Cocles does not hesitate to give the names of the persons concerned. He explains that he does not wish to brand anyone with infamy but to adduce witnesses to his judgments whose names will carry weight. He describes the *complexio* and physiognomy of Galasius Nigrisolus Carpensis of Mantua, who was himself a famous chiromancer and predicted long imprisonment to Ludovico Sforza.[36] Once Cocles with surgeons visited a man who had great wounds in his head and berated his wife and his mother. Cocles pointed out to the surgeons and physicians present that the patient had a small pointed head and was exceedingly choleric and that his left shoulder was humped, and that therefore his character could not be otherwise. They agreed and confessed to their inadvertence. The patient recovered from his wounds but not from his folly.[37] Indeed, later on Cocles asserts that he has cured many wounded persons.[38] In 1495, when Cocles disputed at Bologna in the presence of many learned students of the arts, he passed judgment on two persons who were then students there but are today fools, Master Antonius of Forlimpopoli and Master Jacobus Romanellus of Verona.[39] That some physiognomies denote "deceivers, thieves and tricksters," Cocles noted especially in an

[34] *Ibid.*, VI, 240.
[35] *Idem.*
[36] *Ibid.*, II, 15. See also Zwinger, *Theatrum humanae vitae*, 1604, p. 1223.
[37] *Anastasis*, II, 3.
[38] *Ibid.*, VI, 265.
[39] *Ibid.*, II, 9.

evil surgeon, "our fellow countryman, Seraphinus de Pisis."[40] Men born under the planet Saturn commonly have cloven heels. When Cocles was in Forlì, he noticed that his companion had cloven heels and straightway withdrew from his society. "In short, I have found such a person to be of extreme malignity."[41]

Especially vindictive are Cocles' estimates of the reformer Savonarola on the one hand and the Borgias on the other. The former is adduced as an example of the principle that eyes placed lengthwise denote a hot, envious and deceptive individual. "And one of these was brother Hieronymus Savonarola, a great deceiver and seducer of the people, defrauder of defrauders, nay fraud itself, who promulgated new laws in the city of Florence. Whose physiognomy was as follows: small pointed head, eyes lengthwise, aquiline nose, thick lips, and the color of the face was livid, ashen, the neck oblique." A sign of the great heat of his *complexio* was that he could not endure wearing underclothes, or anything on his head. His baldness indicated dryness in the anterior part of the head and brain. And he was very hairy all over his body. "Beware therefore of pseudo-prophets thus complexioned."[42]

The fact that Cocles regarded Savonarola as an impostor rather than a reformer does not mean that he looked on Alexander VI with favor. He states that a certain color may better be called diabolical, as will appear in the case of Alexander VI.[43] Or he recalls how the French overran all Italy without a battle "under the Satanic sanctity of Alexander VI."[44] Cocles believed in the fabrication in his day of poisons which would afflict those taking them with incurable sicknesses from which they in time died. He was unable to explain how this was done, however, and gave as common report rather than his own knowledge, that Alexander VI had disposed of many persons in this fashion.[45] He notes that the pope died at the time of a conjunction of the three superior planets in Cancer.[46]

[40] *Ibid.*, II, 20.
[41] *Ibid.*, III, 1.
[42] *Ibid.*, II, 11.
[43] *Ibid.*, VI, 272.
[44] *Ibid.*, VI, 306, "sub sanctitate malefica Alexandri sexti."
[45] *Ibid.*, VI, 283.
[46] *Ibid.*, VI, 240.

Caesar Borgia, the son of pope Alexander, was a homicide, deceiver, breaker of faith, lustful for others' women, the greatest liar. He had radiant eyes, signifying the rule of Mars. He gave over his nights to lust, drunkenness and vigils. He listened to none of his people in his affairs, was given to solitary reflection. At times a prodigal destroyer of human religion, avaricious, timid, bold in words and endowed with great eloquence. He threatened the property of others, and this because of the disposition of Saturn and Mars. He was accursedly tricky in detestable matters which proceed from the same planets, Saturn and Mars.[47]

Occasionally Cocles speaks of someone in complimentary terms, as of "that most excellent doctor of arts and medicine and supreme surgeon, master Laurentius de Gozadinis," who successively taught logic, surgery, and medicine at the university of Bologna from 1473-1474 to 1504-1505, or Ludovicus Vitalis, who was to teach there from the latter year to 1533-54.[48] Cocles characterizes him as indeed lame in body, but in genius and in doctrine so erect that he seems to surpass all sound persons. He excels in mathematics, philosophy, and in especial astrology, wherein his judgments are so true that whatever he says seems to come forth from an oracle. "He has compared astrological calculations with our judgments and has found them so true that there is absolutely no difference between them."[49]

Cocles came to the rescue of the memory of Peter of Abano whom he defended from the popular reputation of being a necromancer.[50] He also noted the passage in the ninth Differentia of the *Conciliator* in which Peter alludes to his having been charged with heresy but acquitted by the pope. From other references in Peter's writings Cocles compiled a list of his works including the translation into Latin of the book of Galen on black cholera and his therapeutic, the addition to Mesue, an *Antidotarium* (presumably his version of Dioscorides), the work on poisons, a *Physiognomy, Astrolabium planum,* "astronomical differences"

[47] *Idem.*

[48] For their dates see U. Dallari, *I rotuli,* I, 93-188, and I, 188-II, 130.

[49] *Anastasis,* VI, prologus.

[50] *Anastasis,* V, i.

(i.e. the *Lucidator*), and the work on the motion of the eighth sphere. Cocles states that Abano both translated and commented upon the *Problems* of Aristotle, but only the commentary appears to be extant. Cocles further informs us that Peter long studied at Paris, took his doctorate there, and then publicly taught philosophy. Cocles is mistaken, however, in affirming that it appears from Peter's work on physiognomy that he flourished in the year 1319 and was on most friendly terms with pope John XXII,[51] since the *Physiognomy* was written in 1295, while we know that Peter was dead by 1318.

Many of his disciples asked Cocles which was the truer, physiognomy or chiromancy. His reply was that both were equally reliable, but that chiromancy had more fixed roots, since the lines of the hand remain the same from birth, while the physiognomy may alter. Many things may be learned from physiognomy which chiromancy does not reveal and vice versa. But chiromancy is a subdivision of physiognomy. Cocles further distinguished between *physionomia methaphorica* and *physionomia confusa*, the latter being that which we know in part and are in part ignorant of and which is worked out gradually in practice with great labor.[52]

There is not a little of the seamy and vicious side of life in the *Anastasis*. Long descriptions are given of a harlot seen in a bathing establishment and of a *cinaedus* sixteen years of age.[53] Cocles has known of women who abused boys and of cases of Lesbianism.[54] He suggests that judges might apply torture more intelligently by examining the palms of the persons in question first.[55] Under the caption, "Of unheard of and malign diseases," Cocles gives a detailed account of the *morbus gallicus* or syphilis which he says appeared in the pontificate of Alexander VI. Cocles prescribes mercury ointment for it. The astrologers, particularly Dominicus Maria of Ferrara, attributed this new disease to the

[51] *Ibid.*, "et apparet etiam in sua physionomia quod floruit anno domini 1319 et fuit amicissimus summi pontificis Jani."

[52] *Anastasis*, VI, 175; III, Prohemium.

[53] *Ibid.*, VI, 74 and 76.

[54] *Ibid.*, IV, 10.

[55] *Ibid.*, VI, 235.

conjunction of 1484. The malice of this meeting of the planets was confirmed by subsequent positions of the stars in 1492 and 1495. Cocles found that the lines of the hands of all those who contracted the dread disease showed certain resemblances.[56]

Hostility to certain professions as well as individuals was manifested by Cocles. Lawyers were sometimes the target of his jibes, as in an allusion to a litigation which lasted for thirty years because of their garrulity and to procurators who stir up discords for gain.[57] Cocles also attacked the regular clergy, declaring that "we have at Bologna certain hypocrites in hoods who are supremely ignorant, whose names I pass over in silence, who under a certain appearance of sanctity are really fathers of deception. They daily deceive our citizens, especially idle women and most of all widows and insane old crones and some little men."[58] Perhaps Cocles, like Guido Bonatti, the thirteenth century astrologer,[59] opposed the friars because they had opposed his art.

The *Anastasis* of Cocles had a considerable vogue. Its three books on chiromancy were printed separately in 1525 with some omissions and explanations by Patricio Tricasso da Cerasari of Mantua, who was probably a different person from Paride Ceresara of Mantua of whom we shall speak in our chapter on the Court of Paul III. Patricio tells us that he was born on September 17, 1491, and his dedication to the marquis of Mantua, Federigo Gonzaga, is dated at Treviso on October 19, 1523.[60] In it he states that he began his revision of the *Anastasis* in 1523 and completed it on October 18 of that year. Tricasso criticized Cocles among other things for too violent invective against his predecessors. The edition of Pavia, 1515[61] seems the same as

[56] Since Cocles' account of the *morbus gallicus* appears to have some independent value, I reproduce the Latin text of it in Appendix 1.

[57] *Anastasis*, III, 4; also VI, 181.

[58] *Ibid.*, VI, 268.

[59] On Bonatti see T II, 830-33.

[60] Giacomo Tricasso of Mantua, who taught metaphysics and philosophy at the university of Naples at this time, was probably Patricio's brother: see Gimma, *Idea della storia dell' Italia letterata*, Naples, 1723, II, 561.

[61] This edition, under the general title, *Infinita nature secreta quibuslibet hominibus contingentia previdenda cavenda ac prosequenda declarant in hoc libro contenta*, includes the Physiognomies of Aristotle and Michael Scot and the *Questio* of Achillini as

that of 1504, but the various later Latin editions of Cocles were for the most part much briefer than the original *Anastasis* and bore the title *Compendium of Physiognomy and Chiromancy*. This is the case with editions of 1533, 1534, 1554 and 1555. But in these abbreviated versions the text of the *Anastasis* is apparently used only for its part on physiognomy and only so far as Chapter 25 on the neck. The chiromantic section is taken from Cocles' hated rival Corvus.[62] Tricasso further published in Italian a treatise on the interpretation of dreams according to the Indians[63] and a translation of the Latin geomancy attributed to Peter of Abano.[64] It will be noticed that these subjects are precisely those of which Cocles had proposed to treat.

Cocles' work was further translated into various modern languages, generally in its abbreviated form with Corvus. An Italian version was printed at Venice in 1525;[65] a German rendition ap-

well as the *Anastasis* of Cocles. First comes the *Physiognomia Aristotelis*, followed at fols. 5r-6r by the letter of Bichardus. For the *Anastasis* a new foliation begins, the text ending at fol. 128r, col. 2, "Et sic adest finis Physionomie Coclitis atque Chyromantie eiusdem Diligenter Papie impresse per magistrum Bernardinum de Garaldis anno domini 1515 die 19 mensis Ianuarii." Then another new foliation begins with the *Questio* of Achillini at fols. 1r-8v, "Impressa Papie per magistrum Bernardinum de Garaldis anno domini 1514 die 5 Decembris," followed at fols. 9r-23v by the *Physionomia* of Michael Scot, "Impressum Papie per magistrum Bernardinum de Garaldis anno domini 1515 die 20 Februarii." Why the contents of the volume, or rather three volumes, should have been so misplaced is hard to understand especially in view of the dates of printing. Copies used: BM 510.k.19.(1.); BN Rés. V.307.

[62] This is the case in *Barptolomaei Coclitis Bononiensis naturalis philosophiae ac medicinae doctoris physiognomiae et chiromantiae compendium*, Argentorati, 1551, which I have examined in BN V.21861.(2), and, according to the catalogue, the same is true of the edition of Argentorati, 1533, BN Rés. V.2242. It is also the case in editions of 1534, 1554 and 1555 seen at the British Museum.

[63] *Expositione degli insonii secondo la interpretatione de Indy . . . date* (sic) *in luce per il Tricasso*, 1546, 8vo, BM c.32.c.8; again in 1551, 8vo, BM 710.c.28.(3.). Perhaps it is a translation of the Latin work of William of Aragon: see Thorndike and Kibre (1937), col. 486.

[64] *Geomantia di Pietro d'Abano, nuovamene (sic) tradotta . . . de Latino in volgare per il Tricasso Mantuano*, 1542, 4to, BM 8631.aa.34; again in 1546, 8vo, BM 8631.aaa.36.(1.).

[65] An Italian translation of Corvus was printed in 1530: *Opera Nova de Maestro Andrea Corvo da Carpi habita a la Mirandola Tratta de la Chiromantia.* Stampata in Marzaria A la libraria dal Iesus Apresso san Zulian Ad instantia de Nicolo Et Domenico Fradeli MDXXX Adi XXIIII Zener. Copy used: BN Rés. p.R.215.

peared at Strasburg in 1530 and again in 1537; a French translation, at Paris, in 1550; an English translation by T. Hyll, at about the same time.[66] The lasting influence of the work is attested by the publication of French versions in the next century: *Enseignements de physionomie et chiromancie* at Paris in 1638, and *La physionomie et la chiromance* at Rouen in 1679 and again in 1698.[67]

Antiochus, Cocles, Corvus, Tricasso and John ab Indagine, of whom we are about to treat, were all included in the list of writers on chiromancy in Agrippa's *De incertitudine et vanitate scientiarum*.[68]

In the remainder of this chapter we shall leave the Peripatetic haunts of Bologna and Padua to pursue the subject of chiromancy and physiognomy farther afield, first noting a work by John ab Indagine which ran through even more editions and had as long a life as that of Cocles, then one or two other authors. An appendix at the close of this volume will give a list of treatises on chiromancy in manuscripts and editions before the sixteenth century, identified by their opening words.

The *Introductiones apotelesmaticae*[69] of John ab Indagine or von Hagen, a priest at Steinheim near Frankfurt,[70] combine astrology with physiognomy and chiromancy in one volume. Perhaps we should regard it as a congeries of tractates rather than a single work, since a new pagination begins for the sections on physiognomy and chiromancy, while the more strictly astrologi-

[66] *A brief . . . epitomye of the whole art of Phisiognomie . . .* by . . . Cocles . . . Englished by T. H. (1550?), 8vo: copy at the British Museum. It was reprinted in 1613.

[67] Barthelemy Cocles, *La Physionomie Naturelle, La Chiromance, ou par les Traites & les Signes du Visage & par les Marques de la main, on peut connoitre les moeurs, les complexions, le natural & l'interieur de toutes Personnes*. With over 160 woodcuts. 12mo. Rouen: chez Jean B. Besongne, 1698.

[68] Cap. 35, *De chiromantia*.

[69] Joannes ab Indagine, *Introductiones apotelesmaticae . . . . in chyromantiam physiognomiam astrologiam naturalem complexiones hominum naturas planetarum. Cum periaxiomatibus de faciebus signorum et canonibus de aegritudinibus*, etc. 2 parts, [Strasburg], 1522, folio: copy used, BM 719.i.1. Other editions or reprints of the same year were: Ursellis, folio, see Graesse, III, 421; Francofurti, duodecimo, BM 8630.aa.23. The title varies somewhat in later editions.

[70] He should be distinguished from two earlier clerics of the same name who lived during the fifteenth century.

cal portion falls into divisions with distinct titles and two prefaces. We shall treat of this astrological section in a later chapter. A dedicatory preface of June 1, 1522, to Albrecht, archbishop of Mainz, contains an attack upon scholastic theology. The chiromantic part of Indagine's work, dated at its close November 1, 1522, "from our church of Steynheim," is related to the planets as well as the lines of the hand. It is preceded by a brief résumé of physiognomy, which John admits is merely a compendium. This is addressed to Theodoricus Zobel, vicar or chaplain and *scolasticus* to the archbishop of Mainz and canon in the metropolitan church. The chiromancy is followed by a tract on determination of the planets of the horoscope and the ascendent sign from the four temperaments: choleric, phlegmatic, melancholy and sanguine. The volume then closes with a pessimistic letter addressed to a fellow priest, Otto Brunfels, author of the well-known herbal, *Vivae icones*. In it Indagine laments that he had not been made dean and that people call him a Lutheran. Amid such disappointments and dangers there is no greater tranquillity anywhere than in letters. Thus John ends with a humanistic commonplace as he had opened with an anti-scholastic banality.

The work of Indagine, though it does not seem of a high order, proved quite popular with the reading public. The three Latin printings of 1522 were followed by one in German the next year, and there were later Latin editions in 1531, 1534, 1541, 1543, 1547, 1556, 1582, 1603, 1622, 1630, 1663, 1664, and 1672. These appeared especially at Strasburg, but also at Paris, Lyons, Ursel and Treves. There were furthermore English and French translations, and these, like the German version, were frequently reprinted. Presumably the combination of astrology, physiognomy and chiromancy with humanistic bias and some approach to Protestant partisanship accounted for its long and widespread currency north of the Alps. With it is sometimes found bound the opuscule on physiognomy of Gratarolo, the physician who for religious reasons fled from Bergamo to Basel, a work first printed in 1554.

Returning to the Italian peninsula, we find in a Riccardian manuscript of the sixteenth century[71] a treatise on physiognomy and chiromancy by a Carmelite of Prato named Giuliano Ristori. We shall treat in another chapter of astrological compositions by him of 1528 and 1537, in one of which he calls himself a professor of theology. He was the teacher of the later astrologer, Giuntini or Iunctinus, who attended his lectures at Pisa in 1548.[72] Our present manuscript on physiognomy and chiromancy is largely occupied by diagrams of hands. The author describes the briefer text as extracted from many books of the ancients and moderns, but as containing nothing which he has not himself found to be true by repeated trial and experiment. Thus we once again find the ideal of experimental method subscribed to and upheld by the exponent of an occult or semi-occult science.

The work of Antonio Piccioli on chiromancy will be discussed in our chapter on the Court of Paul III.

Antonius Molinius or Antoine du Moulin of Mâcon published at Lyons in 1549 a work on physiognomy[73] compiled from the three ancient works on that subject ascribed to Loxus, Aristotle and Polemon.[74] It was printed again at Lyons the next year in French translation[75] and in an Italian translation by Paolo Pinzio with a dedication to Catherine de' Medici, in which the apothegm that the wise man rules the stars was ascribed to Solomon instead of Ptolemy, while physiognomy was mentioned

[71] FR 1221 F, 47 fols.

[72] F. Iunctini, *Commentarium in sphaeram Joannis de Sacro Bosco*, 1577, I, 416.

[73] On the title page the work is called *De diversa hominum natura prout a veteris philosophis ex corporum speciebus est cognoscenda liber*, Lugduni Apud Ioan. Tornaesium, 1549, 107 pages. But at p. 9, preceding the text proper, is the caption, *De physiognomiae ratione libellus ex veterum philosophorum monumentis summo compendio collectus*. Copies used: BM 1141.b.11.(1.); BN Rés. p.R.214.

[74] *Ibid.*, p. 9, opening words: "Ex tribus autoribus quorum libris prae manu habui Loxi medici Aristotelis philosophi Polemonis declamatoris qui de physiognomia scripserunt ea elegi quae ad primam institutionem huius rei pertinent et quae facilius intelleguntur."

[75] Ant. du Moulin, *Physionomie naturelle, extraite de plusieurs Philosophes anciens et mise en françois*, Lyons, J. de Tournes, 1550, 8vo, 151 pages.

along with chiromancy, geomancy and pyromancy as a way to discern the favoring or unfavoring attitude of the stars towards creatures and inferior bodies—in its case through the proportion, disposition and quality of the human body.[76]

Works on chiromancy, physiognomy and metoposcopy which were composed after the middle of the century may be fittingly considered in later chapters, either in connection with other arts of divination or in relation to the bull of Sixtus V against such arts. For the present we may merely list the treatise of Hagecius on metoposcopy in 1560, reprinted in 1584, the work on physiognomy of Porta which first appeared in 1586 and ran through many editions,[77] those of Rizza Casa and Padovanius in 1588 and 1589, that of Johann Rothmann on chiromancy in 1595, those on physiognomy of Gerónimo Cortés in 1601, Jean Taxil in 1614, and Dominicus de Rubeis in 1639, while chiromancy and physiognomy were combined by Jean Belot in 1619 and Maurice Froger in 1622. Thus these subjects continued to be cultivated at least well into the seventeenth century; as the reprintings of Cocles and Indagine to 1698 and 1672 have also demonstrated.

[76] *Fisionomia con grandissima brevità raccolta da i libri di antichi filosofi, Nuovamente fattà volgare per Paolo Pinzio. Et per la diligenza di M. Antonio del Moulin messa in luce.* In Lione per Giovan di Tournes, MDXXXXX. Copy used: BM C.77. a.18.(1.).

[77] *De humana physiognomia,* 1586. Other editions quickly followed in 1588 and 1593. By 1655 there are said to have been twenty-one. See Casey A. Wood, *Johannes Baptista Porta* (1540-1615), reprinted from the *Proceedings* of the Charaka Club, 1935, p. 128. In the following pages Dr. Wood discusses Porta's comparison between certain human physiognomies and the heads of animals.

CHAPTER V

NIFO AND DEMONS

Nihil potest demon super hominem figmentis non credentem.
—SYMPHORIEN CHAMPIER

It may well be questioned how far the numerous—or rather, almost innumerable—discussions during this period of demons, witchcraft, apparitions and specters fall within the scope of our investigation. It might be argued plausibly enough that these subjects were more closely related to the natural philosophy of their time than they are to the science of today. But the literature on witchcraft almost universally took the position that the feats of the witches were not accomplished through knowledge of and control of nature but solely by pacts with and the aid of demons. In so far, therefore, this type of writing would seem—at least in details—of slight concern to us, whereas the attempt of an author like Pomponazzi to give a natural explanation for marvelous apparitions, miraculous cures, and the supposed activities of demons and dead saints closely concerns us. There was, however, the further question to what extent the demons themselves utilized or interfered with the course of nature, and how far the activities of the world of spirits were consonant or in conflict with natural law. This would seem more germane to our purpose. But, as Hansen has shown, by 1500 the orthodox theory on this problem had been reduced to a set formula from which few subsequent writers on the subject deviated. For the rest their treatises consisted chiefly of a mass of idle and—to us today—incredible stories, many of which, moreover, were repeated by author after author. These off-scourings of the criminal courts and torture chamber, of popular gossip and local scandal, are certainly beneath the dignity of our investigation and have been for the most part passed not merely unnoticed but unread.

But when an author, whose other writings properly fall within the scope of a history of magic and experimental science, demeaned himself by descending to this lower level, as we shall see Fontaine did in *Des marques de sorciers,* we must take adequate cognizance of the fact.[1] Moreover, what holds true for such single cases applies to the thought and writing of the age as a whole. These works on witchcraft and spirits are so numerous, they were so widely read, they were so often by authors who were otherwise persons of repute and intellectual standing, that we may not pass them over too cavalierly, even though they form the gloomy background rather than any integral and organic part of our picture, and though they possess few original distinguishing features.

To the year 1540, however, a sufficiently clear and consecutive picture of most of the writers on witchcraft has been already presented in Hansen's *Quellen.*[2] To it the reader may turn for paraphrase of the arguments or extracts from the text of such opponents of the witchcraft delusion as Samuel de Cassinis, the Franciscan of Milan in 1506, and of the civil lawyer, Ponzinibius of Piacenza, about 1520, or of such advocates of the developed theory as to the relations between demons and witches as Martin Plantsch of Tübingen in 1505,[3] Vicenzo Dodo of Pavia in 1506, the inquisitor Bernard of Como writing about 1508 shortly be-

[1] That gifted linguist and adroit diplomat, Aleander, could record in his diary for January 14, 1528, the "most marvelous of all marvels," an instance of the phantasm of a man having intercourse with a woman, though all the doors of her room were locked. Henri Omont, "Journal autobiographique du Cardinal Jerôme Aleander," *Notices et Extraits,* XXXV (1897), 70.

[2] Joseph Hansen, *Quellen und Untersuchungen zur Geschichte des Hexenwahns und der Hexenverfolgung im Mittelalter,* Bonn, 1901, pp. 256-357, deal with the sixteenth century to 1540. See also Nicolaus Paulus, *Hexenwahn und Hexenprozess vornehmlich im 16. Jahrhundert,* Freiburg-im-Breisgau, 1910.

[3] Plantsch makes a surprising statement which Hansen has not noted when he says (*De sagis maleficis,* 1507, c iv verso), "potest enim diabolus formare formas," since it was generally held that the demons could not create or alter substantial forms. But probably he uses the word, *forma,* carelessly here and really means only appearances, since he goes on to say, "sicut potest diversarum formarum corpora quasi subito formare et assumere," and later (c v recto) states, "Omnia enim illa per solum motum localem rerum aut specierum efficere posset."

fore his death, the learned Trithemius in the same year, another inquisitor Jacobus Hochstratus or Jakob von Hochstraten in 1510, the Dominican Joannes Baptista Theatinus about the same time, Martin of Arles, Prierias in 1520, Giovanni Francesco Pico della Mirandola and Bartholomaeus de Spina in 1523, Grillando in 1525 or thereabouts, and Martin de Castañega in 1529. Of works on the subject by Symphorien Champier and Cirvelo, however, it will be advisable to say something in connection with our discussion of other writings by these men in our other chapters. Moreover Hansen's selection is rather limited to works—or to the sort of works—that were printed in the various editions of the *Malleus maleficarum*. Works on demons, and especially works discussing them from the philosophical, Peripatetic, or medical, rather than from the theological, standpoint he may fail to notice. In particular he omits the treatise on demons of Agostino Nifo of Sessa (1473-1546).

Nifo seems to have taught at several universities in the Italian peninsula. According to Facciolati and Tiraboschi,[4] he was extraordinary professor at Padua from 1492 to 1495 when he became ordinary professor, left in 1496, returned in 1498, and left again in 1499, probably returning to his native town of Sessa. Gesner states that his *De sensu agente,* in which he took issue with Jean de Jandun, was composed in 1495.[5] According to Gabriel Naudé, Nifo before 1492 had been a student at Padua under Nicoletus Verniates Theatinus who taught the unity of the intellect after Averroes. But although he had taught this most pertinaciously for thirty years, he was forced in a book published in 1499 on the immortality of the soul to say that it was multiple and divided to correspond with bodies.[6] No such work seems to be extant, and we shall find reason to doubt Naudé's entire account. As for Nifo, in his work *On the Causes of Our Calamities,*

[4] Facciolati, Jacopo, *Fasti gymn. Patav.*, 1757, II, 109, 111; Tiraboschi, VII, i (1784), 380-82. Since there seems to be no good biography or other modern account of Nifo, I go more into detail as to his life and works than might otherwise seem necessary.

[5] Gesner (1545), fol. 108v.

[6] G. Naudé, *De Augustino Nipho philosopho judicium,* 1645, fols. u i verso and u ii recto. Copy used: BM 525.1.18.

completed at Sessa on July 20, 1504, he tells how he was driven from Sessa by the war of 1503 between France and Spain, when the Spanish army occupied the town for 45 days and pestilence followed and few escaped alive. In his retreat he recalled the many volumes which he had so enjoyed writing at Padua: commentaries on Aristotle's *De anima,* on the *Destructio destructionis* of Averroes, *De intellectu, De demonibus, De sensu agente,* and many more. Now, overwhelmed by so many hardships and calamities, he turned to another type of writing.[7] Yet on November 17, 1504, he completed at Sessa and addressed to cardinal Grimani a treatise on the infinity of the First Mover.[8] His commentary on the *Metaphysics* was printed at Venice in 1505,[9] while on May 15, 1506, we find him completing his translation of and commentary upon the *Physics.*[10] From April, 1504, through January, 1505, he had received salary as physician to the Grand Captain, Gonsalvo Hernandez de Cordova.[11] On August 22, 1507, he completed at Sessa commentaries on Averroes, *De substantia orbis,* which he addressed to Robert II Sanseverino, prince of Salerno, and in which he speaks of teaching at Salerno that year.[12] Robert's attempt to revive the university of Salerno was not, however, to be a permanent success. He died in 1508. Meanwhile Nifo had begun his *Metaphysicarum quaes-*

[7] *Euthici Augustini Niphi Philotei Suessani de nostrarum calamitatum causis liber ad Oliverium Carafam Cardinalem maximum,* Completum suesse M.d.iii. Iulii xx die. Venetiis exactum mandato et expensis heredum quondam nobilis viri domini Octaviani Scoti civis Modoetiensis Per Bonetum Locatellum Bergomensem presbyterum 1505 tertio nonas Aprilis: fol. 2r, col. 1. Copy used: BN Rés. R.107. Other copies are BN Rés. R.108 and BN Rés. 646.(1).

[8] Aug. Niphus, *De primi motoris infinitate,* 1504. Copy used: BM 527.m.11.(2.).

[9] Gesner (1545), fol. 107r; BN Rés. R.648.(2).

[10] Gesner (1545), fol. 106r-v, citing the edition of Venice, 1519, but the British Museum has an earlier edition of 1508, BM 520.k.8.(1).

[11] Ercole Cannavale, *Lo studio di Napoli nel rinascimento,* Torino, 1895, p. cclxx, Doc. 2658.

[12] *Eutychi Augustini Niphi philothei Suessani commentationes in Librum de substantia orbis ad illustrem principem Salerni Robertum secundum Sanxeverinum. . .* Completum Suesse M.CCCC.VII Augusti 22. . . Venetiis impressa mandato et expensis heredum Nobilis viri olim Domini Octaviani Scoti civis ac patritii Modoetiensis Per presbyterum Bonetum Locatellum Bergomensem Anno ab incarnatione Domini 1508, Die 29 mensis Decembris. Copy used: BN Rés. R.105.(2).

tionum dilucidarium at Salerno in 1507 and was to finish it at Naples in 1510.[13] In Nifo's two books on the helionoric figures of the stars addressed to the most illustrious Maria Sanseverina, princess of Nola, and printed at Naples only in 1526,[14] he states that the work was begun on August 20, 1510, was completed while hunting in Roman forests with prince Prospero Colonna "in the winter of the present year," and was revised and the last touches given it at Sessa on February 4, 1511.[15]

Nifo is said to have passed from the university of Salerno to that of Naples in 1510,[16] and apparently was still there in 1513, when he printed his commentaries on the astrology of Ptolemy[17] which he states in the preface were written for his medical students. He composed his commentaries on the physiognomy and *Parva naturalia* in 1512[18] and his translation and exposition of

[13] Gesner (1545), fol. 108r, citing the edition of Venice 1521. The British Museum has an earlier edition of Naples, 1511, *Metaphysicarum disputationum dilucidarium:* 714.k.10.

[14] *Libri doi de Augustino Nipho de Medici Suessano dele figure dele stelle helionorice. Alla Illustrissima Maria Sanseverinia Principessa de Nola. Cum gratia et Privilegio.* Napoli, 1526.

After a Proemio of 3 pp. addressed to the princess comes another title page in Latin: "Augustini Niphi Medices Suessani de Figuris Stellarum Helionoricis ad Illustrissimam Mariam Sanseveriniam Nolanorum principem. Libri duo Cum Gratia et Privilegio." Then the same preface is repeated in Latin, which is also the language of the subsequent text.

At fol. xxxix verso occurs the colophon: "Augustini Niphi Medices Phylothei Suessani Philosophi egregii de Figuris Stellarum Helionoricis praeclari libri duo diligenter recogniti per Dominum Matheum Martinellum Gravinensem bonarum Artium professorem faeliciter finiuntur et Neapoli Impressi per honestum virum Ioan. Pasq. &. Dominicum Pasquetum Perthenopeum In aedibus suis prope Templum Angelicae Salutationis Anno a Virgineo partu M.D.XXVI. Quarto Idus Maij."

[15] *Ibid.*, fol. xxxix recto: "Et de Helionoricis figuris hactenus. Caepimus autem Libellum hunc 1510 die 20 Augusti, confecimus autem eum in Venationibus quas hieme anni praesentis egimus cum Iustissimo ac Strenuissimo Principe Prospero Columna apud Romanas sylvas, Revidimus denique eundem Suesse 1511 Februarii die quarto et Ultimam manuum ad honorem Dei Imposuimus. Finis."

[16] Origlia, *Storia dello studio di Napoli,* 1753, II, 21. His name, however, does not appear in the *Rotuli* as published by Cannavale until the year 1531-1532.

[17] *Ad Sylvium Pandonium Boviani episcopum Eutichi Augustini Niphi Philothei Suessani ad Apotelesmata Ptolemaei Eruditiones.* Impressum Neapoli per Petrum Mariam de Richis Papiensem Anno Domini MDXIII Die vero xxiii Aprilis. Copy used: BN Rés. R.112(1).

[18] Gesner (1545), fol. 107r, printed at Venice, 1523: BM 456.c.6.

De coelo et mundo in 1514.[19] Leo X consulted him in a dangerous illness and made him a professor in the university at Rome and count palatine.[20] He taught at Pisa from 1519 to 1521, receiving a salary of 1225 florins,[21] and thence is dated in 1520 his commentary on *De anima*,[22] dedicated to cardinal Giulio de' Medici. In 1525 he refused an offer from Bologna, Ferdinand Sanseverino granted him an annual pension of 200 ducats from the customs duties of Salerno, and in 1528 the city of Naples bestowed its citizenship upon him, while in 1531 he was teaching both medicine and philosophy there.[23] He was a voluminous writer on a multiplicity of subjects and enjoyed a great contemporary reputation. Some of his works we shall have occasion to notice in other chapters. Especially in his younger days and earlier publications he anticipated Paracelsus in the piling up of grandiose or fanciful epithets, such as Eutychus and Philotheus, before or after his name.[24] His books are now so rare that I have gone into some bibliographical detail concerning others[25] than that in which we are now primarily interested, his discussion of demons.

Before turning to it, however, a word may be said concerning Nifo's Aristotelian translations and commentaries. In the translations he tried to steer a middle course between Boethius, who was too literal and obscure, and Argyropulos, who was intent merely on the sense and used his own words rather than those of Aristotle. In his commentaries Nifo took the position that Aris-

[19] *Ibid.*, fol. 106v, where Venice, 1525, is given as the date of printing, but BM 520.h.5 is 1519.

[20] Giuseppe Carafa, *De gymnasio Romano et eius professoribus*, 1751, II, 330.

[21] Angelo Fabroni, *Historia Academiae Pisanae*, I (1791), 316.

[22] Gesner (1545), fol. 107r, ed. Venice, 1523. Cannavale, *op. cit.*, pp. 63, 85, clxxxiii, Doc. 751-55.

[23] N. Cortese, "L'età spagnuola," in *Storia della Università di Napoli*, 1924, pp. 299, 302, 326. Nic. Toppi, *Biblioteca Napoletana*, Napoli, 1678, pp. 4-5.

[24] As preceding footnotes have indicated. Gesner (1545), fol. 105v, says on this point: "Augustinus Niphus Philotheus Suessanus (aliquando etiam Euthyci alias Magni alias philosophi praenomina adiunguntur. Post Niphi cognomen aliquando Medicen alias Philotheum alias Philosophum appellant)."

[25] See Gesner (1545), fols. 105v-109r, for further information, especially as to Nifo's commentaries on Aristotle and Averroes. Gesner does not always cite the first edition, however.

totle could not be understood or even read without his Greek commentators.[26] Yet in his commentary on the *Physics* he admitted that he had followed Thomas Aquinas as his norm.[27] He also professed high respect for Aegidius Romanus, but was inclined to speak slightingly of Albertus Magnus and Jean de Jandun. Sometimes he confined himself to the bare meaning of Aristotle and avoided the further questions which the schoolmen had debated, yet he usually asserted that he had read them. He apologized for being unable to read Averroes in the Arabic but was critical of his interpretation of Aristotle. Nifo claimed to have spent much time upon his Aristotelian commentaries. In the preface to cardinal Cajetan to his commentaries on the *Prior Analytics,* published in 1526, he says that he has worked almost twenty years on them, "revolving the positions of Alexander and Philoponus."[28] In another preface he speaks of "sweating for many years over the *Poetic* of Aristotle, nor have we ventured to print our conclusions, for the monstrosities in it have frightened me from publication."[29]

Nifo's *De demonibus* was printed with his work on the intellect at Venice in 1503, 1527,[30] and 1554.[31] Judging from what we have heard him say in the *Causes of Our Calamities, De demonibus* was, like *De intellectu,* composed while he was at Padua in the closing decade of the fifteenth century. It should be noted, however, that the two works are dedicated to different persons, *De intellectu* to Sebastian Baduarius, a patrician of Venice[32] and *De demonibus* to Baldassar Milianus, a patrician

[26] See the passage quoted by Gesner (1545), fol. 107r.

[27] *Ibid.,* fol. 106v.

[28] *Ibid.,* fol. 105v.

[29] *Ibid.,* fol. 106v, from his preface to his translation of and commentary on the *Elenchi,* Venice, 1534.

[30] In the edition of 1527, of which I have consulted copies in the national libraries at Naples and Paris, *De intellectu* ends at fol. 68v, col. 2, and *De demonibus* covers fols. 69r-76r.

In the edition of 1503 *De demonibus* begins at fol. 76v and ends at fol. 80v, col. 2. There follows a table of contents for the entire volume on leaves incorrectly numbered 57 and 58. At the end of the volume we read: "Impressum Venetiis per Petrum de Querengis Bergomensem anno domini M.CCCCC.III die 3 Augusti."

[31] This edition I have seen in the Biblioteca Nazionale at Florence.

[32] Edition of 1503, fol. 1v, "Eminentissimo viro equestris ordinis Consulari pretorioque etc. Sebastiano Baduario honestissimorum omnium virorum benefactori pientissimo Augustinus

of Naples.[33] Moreover, they were composed in different places. *De demonibus* was written in leisure moments at Sessa,[34] according to Nifo's statement in it, though we have heard him describe it as written at Padua in his work on the *Causes of Our Calamities*. Perhaps the original version was penned at Padua and the revision composed at Sessa. The work on the intellect was completed at the university of Padua on August 26, 1492, according to a statement found at its close in the edition of 1503[35] but omitted in that of 1527, which, however, at the close of the work on demons adds a colophon stating that "this work of Augustine Niphus of Sessa" was consummated at Padua in 1492 and printed twice at Venice, first in 1503, and again in far more correct form on April 10, 1527.[36] In some boastful verses to his readers, which

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Niphus euthicus Suessanus Philotheus felicitatem. Dicaveram tibi anno superiori questionem meam de intellectu. . . ."

Ibid., fol. 2r, col. 1: "Augustini Nyphi liber primus de intellectu ad excellentissimum militem Sebastianum baduarium patritium Venetum Prohemium libri in quo declaratur intentio et modus procedendi. . ."

[33] *Ibid.*, fol. 76v, "Eutychi Augustini Nyphi Phylothei Suessani liber de demonibus ad equitem Baldassarem Milianum patricium parthenopeium. Mi Baldassar excellentissime cum te non tantum rerum naturalium perscrutatorem Noverim verum et rerum divinarum studiosissimum. . ."

In Naples VIII.F.55, a MS which may antedate the edition of 1503, the passage reads: "Eutici augustini Niphi philothei Suessani Liber de demonibus ad equitem baldasserem milianum patricium parthenopeyium.

Mi baldasar excellentissime quem (*sic*) te non tantum rerum naturalium perscrutatorem noucrim verum et rerum diuinarum studiosissimum. . ."

Gino Tamburini, Direttore of the R. Biblioteca Nazionale "Vittorio Emanuele III," has very kindly investigated whether there is any other MS of the work in that library and informs me that there is not.

[34] *Idem*, ". . . dabatur enim nobis Suesse parum ocii quo potius in his frui diximus." In the MS the passage reads, ". . . dabatur enim nobis Suesse parum ocii quo pocius in his frui volui quam in alio genere solacii."

[35] Following the last words of the text, ". . . declaravi enim multa que sunt occulta ("que prius occulta fuerunt" in the 1527 edition) the editio princeps of 1503 continues at fol. 76v, "Et sic consumatus est liber de intellectu 26 augusti 1492 In Patavino studio. Augustini Nyphi Eutychi Suessani Phylothei de intellectu liber finit. Finis." I used a copy of this edition at Paris, BN Rés. R.648 (1).

[36] In the edition of 1503 the work on demons closes at fol. 80v, col. 2: ". . . sed theologi multa addiiciunt que per revelationem prophetarum habent; Tu vero collige hec nostra et cum illis et in multis eris peritus. Que quidem igitur de demonibus dictat ratio naturalis Hec sunt.

Eutychi Augustini Nyphi Phylothei Suessani
Liber tertius de demonibus finit. Finis."

In the edition of 1527, at fol. 76r,

appear after the table of contents in both the editions of 1503 and 1527, Nifo implies that the treatise on demons was composed at a later date than that on the intellect.[37]

In the dedication of *De intellectu* Nifo alludes to the unfavorable stir which it, or perhaps both works, at first created by stating that he would have printed it then, lest the labors of his youth perish, had not jealous rivals (*emuli*) accused him of heresy. Now that the accusations have died away and his orthodoxy has been vindicated, he finally publishes but has re-arranged the argument in chapters following the suggestion of Hieronymus Mulelavellus. He has revised the work considerably but denies that he has omitted anything to satisfy theological opposition, contending that the book contained nothing contrary to the Catholic faith in the first place.

Gabriel Naudé, however, in his estimate of Nifo (*Judicium*

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col. 2, this has been altered to: ". . . sed theologi multa adiiciunt que supernaturali lumine acceperunt que nunc omittamus. Verum in iis omnibus illud est testandum quod in omnibus libris testamur nos esse locutos ut philosophos qui ex memoriis et sensibus loquuntur, ut theologi autem ea sentimus que romana sentit ecclesia queque in nostris theologicis dilucide explicabimus, non enim que theologi de demonibus tradunt sunt contra rationes naturales sed supra rationes naturales."

Then comes the colophon referred to: "Hoc opus Augustini Niphi Suessani de intellectu consummatum est Patavii 1492 Venetiis autem bis impressum semel 1503 Iterum vero longe emendatius opera et impensa Heredum quondam domini Octaviani Scoti civis Modoetiensis ac sociorum 1527 Die 10 Aprilis."

In the MS, Naples VIII.F.55, the closing words are identical with those of the 1503 edition except for the following slight variations of spelling, wording and arrangement in the final two lines:

"Eutici augustini Nyphi philothei
Suessani liber de demonibus finit."

[37] Qui prius egregios anime conscripsimus actus
Quique intellectus dogmata certa dedi
Demonia explicui cunctis occulta latinis.
Perlege lector opes munera prima deum
Nyphus ab augusti clarus cognomine dicor
Euthycus est patrius nota suessa locus.

In Naples VIII.F.55, where the dedication to Baldasar Milianus occupies a page by itself of which the lower third is left blank, the text opens on the next page without any intervening table of contents or verses as follows:

"Eutici aug. Niphy philothei li. p. de demonibus

Primum capitulum in quo narratur Intentio libri et genus demonis quo proceditur (?) in eo et utilitas Intentionis.

Dubitatum quidem est maxime in scola philosophorum circha demones primo an sint secundo quid sint tertio quales quarto propter quid sint . . ."

de Nipho), published in 1645, affirmed that Nifo denied the existence of demons or any separate substances other than the Aristotelian intelligences that move the spheres. Naudé stated that the friars were aroused by Nifo's denial of the existence of demons, and that he had difficulty in exculpating himself but was assisted by the bishop of Padua, Petrus Barocius. That he made changes in his book before it was printed in 1492, as may be inferred from what he says in its preface to Sebastian Baduarius. But Naudé seems mistaken in this assumption that the work was printed in 1492, and this makes us doubt the accuracy of the rest of his remarks, except that Nifo himself says that Barocius had helped to clear his reputation from the charge of heresy. Naudé goes on to say that a Tyberius Russilianus Sextus of Calabria in an oration subsequently to Leo X—Naudé does not date it more precisely—boasted, "Not long ago we snatched from the midst of the flames our most faithful alumnus of Sessa (i.e. Nifo) and Pomponazzi." But of this Russilianus one can find no mention before Naudé nor any work extant by him. Naudé, who in this is merely copied by Bayle and others, says that this Russilianus as a young man had, like Pico della Mirandola, proposed over four hundred theses for disputation in the universities of Italy. His inclination towards astrology was shown in such propositions as that Christ in his physical constitution and life and death was under the stars, that time and the sky are of eternal duration, and that a universal flood would keep recurring at fixed intervals. Naudé further states that he defended his opinions vigorously and even more sharply than was reasonable in a *Libellus apologeticus adversus cucullatos* (i.e. A Defense against the Monks or Friars).[38]

Returning to Nifo, it may be noted that on February 22, 1504, a little more than six months after the first printing of the *De intellectu* and *De demonibus,* he completed at his native town of Sessa a treatise on critical days[39] which he contrasted,

[38] *A. Niphi Opuscula moralia et politica cum Gabrielis Naudaei judicio de Nipho,* Paris, 1645. Bayle, *Dictionnaire,* 1730, IV, 107.

[39] Sudhoff (1902), pp. 36-38, describes the contents of the work with

as "written in our maturer age" and authoritative, with previous utterances which his dedicatee, Vicenzo Quirini, another patrician of Venice, recently his pupil but now his colleague, should accept in so far as they seemed good to him. "For we have said much from our youthful pen which we would withhold at a more advanced age."[40] Sudhoff has interpreted this passage as indicating a change in his attitude towards astrology because of the influence upon him of the work of Pico della Mirandola against that art. But in this very work on critical days near the close of its second book Nifo states that Peter of Abano and Pico della Mirandola write many things against Galen which he rejects as being frivolous. Moreover, Nifo continued after 1504 to be favorable towards astrology. In 1513 he published at Naples a commentary on the *Quadripartitum* of Ptolemy[41] which had originated in a course of lectures in the faculty of arts and medicine. In it he occasionally rebuts Pico's attacks on astrology,[42] as he had al-

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some fullness and gives full titles of the edition at Venice on the Ides of October, 1504, and at Strasburg by Sybold in 1528, but merely refers to that of Venice, 1519, which I have used both at the Bibliothèque Nationale, Paris, where there are three copies thereof, all on the réserve, and at the Academy of Medicine, New York. On the title page we read: "Emptor et lector aveto Augustini Nyphi Suessani medici ac astrologi excellentissimi de diebus Criticis seu decretoriis aureus liber ad Vicentium Quirinum patritium Venetum nuper editus et maxima cum diligentia impressus." On fol. 1 verso is a brief dedication to Vicentius Quirinus, "nuper discipulo nunc autem collegae," dated "Suesse. D.III.Idibus Februarii." On fol. 2r, col. 1, after another longer preface to the same Quirinus, the text opens. At fol. 10v, col. 2, after a parting paragraph to Quirinus comes the colophon: "Expletum Suesse M.D.IIII xxii Februarii ab Augustino Nypho philosopho Suessano. Venetiis impensa heredum quondam Domini Octaviani Scoti civis Modoetiensis ac sociorum 19 Ianuarii 1519."

Graesse, and E. Pèrcopo, *Atti d. Reale Accad.*, Napoli, XVII (1893-1896), ii, 33, would seem to be mistaken in listing an edition of 1500.

[40] *Op. cit.*, fol. 10v, col. 2: "Habes igitur mi Quirine libellum hunc quem diligenter legas que enim hic scripsimus nostra in etate maturiori prodimus que vero olim edidimus in tantum recipias in quantum tuo arguto videntur ingenio. Plura enim ex iuvenili calamo diximus que nunc proventiori retineremus."

[41] *Ad Sylvium Pandonium Boviani episcopum Eutichi Augustini Niphi Philothei Suessani ad Apotelesmata Ptolemaei eruditiones.* Impressum Neapoli per Petrum Mariam de Richis Papiensem Anno Domini MDXIII die vero xxiii Aprilis. 43 double columned leaves. I own a copy and have also seen the work at Paris: BN Rés. R.112 (1).

[42] *Ibid.*, fols. $3r^1$ and $4r^1$, $6v^1$, $9v^1$.

ready done in his work on the causes of the calamities of his age.[43] He esteems astrology as much more useful than metaphysics or sophistics to medical men, and asserts that the "Great Captain," Gonsalvo Hernandez de Cordova, had more than once been aided in winning his victories by his (Nifo's) astrological forecasts.

It also is dubious if the remark to Quirinus can be interpreted as having reference especially to the recently published works on the intellect and demons, although we have heard Nifo refer to the former as a labor of his youth. More probably the passage refers to what Nifo had said before on the subject in hand, critical days, or is merely a general observation without particular application. There is a similar passage at the close of his aforesaid commentaries of 1507 on *De substantia orbis,* in which he states that he had made other versions (*editiones*) at Padua in former days. "But since they were composed in our youth when we made many juvenile statements which we would not make now, fearing lest some ill-disposed person publish those, we have issued these first and we want these to be considered ours and would not have published them, had not some other accursed persons anticipated us. For at this time we do not dwell much upon the utterances of Averroes, being occupied with higher matters."[44]

Yet another instance of unfavorable reference by Nifo to his

[43] *Ibid.*, fol. 3r[1]: "quamquam multo altius contra Picum hac in re disputavimus in libro de nostrarum calamitatum causis." In *De nostrarum calamitatum causis,* itself, edition of 1505, see fols. 5r-v, 22v[1], 29r[1]. A typical statement is: fol. 5v, col. 1, "Quod vero Picus ait pace sua nihil est."

[44] *Op. cit.*, fol. 37r, col. 1: ". . . animadverte quod padue priscis diebus alias editiones fecimus. Sed quia in iuventute sunt composite in quibus multa iuveniliter diximus que nunc non diceremus, dubitantes ne aliquis malivolus illas ederet has preedidimus et has volumus esse nostras quas non publicaremus nisi alii malcdici prevenissent. Nam hac etate non multum in Averrois dictis insistimus occupati altioribus. Finis."

The aversion to Averroes here professed must be regarded as something of a pose, since only two years before in 1505 Nifo had printed at Venice both his *Defensio* of Averroes' *De mixtione* and his commentary on the *Metaphysics.* Copies seen: BN Rés. R.105. (4), Rés. 648. (2).

earlier writings is found in the preface to the 1526 edition of his commentary on *De generatione et corruptione,* addressed to Diomede Carafa, bishop of Ariano. Recently the commentary of Philoponus had come into his hands and led him "this year at Pisa" to revise his own. He continues, "Would that enough years might remain to permit me similarly to revise the other commentaries which we have written on the works of Aristotle."[45] This attitude was therefore a common pose with Nifo and did not have reference to any particular subject or belief.

It should be noticed, however, that the concluding words of both the seventeenth chapter of the third book on demons and its closing chapter have been modified or added to in the edition of 1527 as compared to that of 1503, the object apparently being to end on a more conciliatory note as to the relations between natural philosophy and orthodox theology. In this we may perhaps see the effects of Nifo's employment by the papacy in the interim between the two editions. The seventeenth chapter in the first edition ends by saying, ". . . these are what natural reason requires," to which the 1527 edition adds, "not indeed categorically but hypothetically."[46] However, this same idea had been expressed elsewhere in the earlier edition. In the 1503 edition the work ends with these words: ". . . but theologians add many things which they have by revelation of prophets. But so do thou digest our remarks and with these and in many points thou wilt be adept. For they are what natural reason states concerning demons." In the later edition this concluding passage has been modified and lengthened to read: ". . . but theologians add many things which they have received by supernatural light which we omit for the present. But on all these points this is to be testified, which we testify in all our books, that we have spoken as philosophers who speak from memory and the senses, but as theologians we think as the Roman church does, as we shall

[45] Gesner (1545), fol. 106v.

[46] *De demonibus,* III, 17: ". . . Hec sunt que de locutione ordine et obedientia ratio expostulat naturalis." Here the 1503 edition stops, while the 1527 edition goes on, "non quidem cathegorica sed hipothetica."

clearly explain in our theological writings, for what theologians say concerning demons is not contrary to natural reasons but above natural reasons."[47]

In *De intellectu* Nifo had played somewhat perilously with the Averroistic doctrine of the unity of the intellect, professedly opposing it but also overthrowing many arguments advanced by others against it. In the case of demons Nifo takes the position that theological doctrine concerning them is clear enough and that he proposes to discuss them "according to natural reasons and physical causes." Among philosophers it is a matter of the greatest doubt; first, whether there are demons; second, what they are; third, of what sort they are; fourth, for what purpose they exist. Some philosophers have denied their existence entirely and tried to explain by other causes the facts that seem to require their existence. Nifo compares such inferring that demons exist to the astronomical hypothesis of epicycles and eccentrics to explain adequately the phenomena of the heavens. But the appearances from which we conclude that there are demons are not commonly observed by all, like the phenomena of the sky, and do not happen to all men but only to one kind of men. Furthermore it is clear that in the case of demons "our method" is not certain demonstration but is mixed with credulity.

Next are reviewed in a series of chapters the opinions anent demons of Aristotle, Averroes and other Peripatetics, of Proclus, Pythagoras, Plato and Apuleius, with the net result that it is shown that there is no place for demons in the Peripatetic system of the universe, and that the Platonic or Neo-Platonic arguments do not prove the existence of demons either dialectically or demonstratively. Averroes met the argument that demons were needed as mediators between corporeal beings on the one hand and the eternal, impassive and incorruptible on the other, by holding that we already have the needed mean in the heavenly bodies, which are eternal by nature but in power variable and mobile. Hence some other avenue of proof must be sought. It

[47] For the Latin of the two passages see note 36 above.

is found in "the indubitable marvels of magic," such as speaking statues, images that transport one faster than a horse could, the revelation of hidden things by use of magic circles, incantations, and images, the interpretations of dreams, the art of augury. Some feats of the magicians pertain to the intellect, others "to the motive part." They can even render men invisible, as the inquisitor at Padua had informed Nifo. Hermes, Alexander of Aphrodisias, and others may contend that such feats can be explained by the use of the influences of the stars or the force of the magician's imagination without recourse to demons, but Nifo denies this, or perhaps merely pretends to do so.

For the reality of magic Nifo adduces *inter alia* an experience of his mother, "than whom is not found a more truthful person," who heard the voice of an old man who promised her such an abundance of goods that a place could hardly be found to hold them. They soon vanished, however, and only traces of them were left. "And I and our family are witnesses who saw the place and vessels and things converted into foreign substances."[48] Nifo was certainly right in representing his method as mixed with credulity. Neither his mother nor the inquisitor can be accepted as satisfactory sources for scientific data. Nor is it to be overlooked that he adduces an illusion which soon vanished as a proof of the reality of magic, just as he put the onus for magic rendering men invisible upon an inquisitor.

Having thus in his first two books "demonstrated" the existence of demons, Nifo turns in the third book to the other questions concerning them, citing the opinions or statements of various past authorities like Hesiod and Xenocrates as to their bodies, faculties, numbers, place, goodness or badness, and so on. The general impression given is that natural reason and method cannot determine such points with any certainty. Philosophers are

[48] *De demonibus*, II, 8, edition of 1503, fol. 79r, col. 2: "tradunt enim per tales imagines in circulis loquentes multos esse revelatos thesauros . . . et ne longe petam nostra mater (qua veridicior non est inventa) audivit vocem senis qui sibi copiam tantam bonorum pollicebatur ut quasi locus illius non inveniretur capax, quod cum revelasset evanuit copia bonorum et relicta sunt vestigia eorum et ego et nostri testes sunt qui locum viderunt et vasa et res conversas in externas naturas."

loath to concede them knowledge of the future, but Nifo finally concludes that they know it absolutely where there is no possibility of its being otherwise, and where it is contingent know as much only as arts of divination or prognostication reveal.[49] Whether they will torture the souls of men in hell, "we doubt on natural grounds."

Nifo's presentation of the subject is not always consistent. Thus in enumerating the questions concerning demons which he will consider, he says that he will leave to the theologians "how they speak to one another and how they are gathered to one, and how one obeys another."[50] Yet in a later chapter we find him "solving the three questions" as to their speech, order and obedience.[51] In another chapter which he recognizes as a disgression Nifo states the true Christian view (*veritas Christiane fidei*), "for love of telling the truth makes me digress from my original plan."

In the next and last chapter Nifo discusses the ceremonies of magic which are very essential either to obtain demon aid, to capture the celestial influences, or to strengthen the faith of the magician. To the question whether demons are coerced by these ceremonies, Nifo answers that they are not forced against their will and come not unwillingly but that they cannot do otherwise. While in their intellect and first operation they are not under the stars, in their secondary operation and end, which is to serve men, they are under the stars, some being saturnine, others mercurial, and they act according to their natures. Such is the view of natural reason and philosophy. But the Christian religion holds the opposite, that they are free agents in responding to invocations and performing feats of magic.

It is not easy to say how sincere or insincere Nifo is in this work, whether he writes in order to ventilate views which he professes to reject, or whether we are to take him at his face value. For us the most significant point is that magic is included

[49] *Ibid.*, III, 18.

[50] *Ibid.*, III, 2, ". . . quomodo vero inter se loquantur et quomodo congregentur ad unum et qualiter unus alteri obediat relinquo theologis."

[51] *Ibid.*, III, 17, "in quo soluuntur questiones tres de locutione ordine et obedientia."

as a ground—indeed, the sole ground—of proof in a demonstration supposed to rest upon natural reasons and physical causes. Moreover, in the discussion of demons magic constitutes about the only common meeting ground of the divergent views of ancient philosophy and Christian theology. Old mother Magic at the opening of the sixteenth century still receives filial obeisance from her son, Science, and her daughter, Religion.

Nifo himself was something of a plagiarist,[52] but in the case we are about to notice he seems to have been sinned against rather than sinning. In an unpublished manuscript of the Laurentian library at Florence is a work on demons addressed to pope Leo X by a Bernard Portinarius who had recently come to Rome for the first time to visit the churches of the apostles.[53] Perhaps he was of the same family as a Jacobus de Milisapris (?) de Portunariis, who in 1467 at the university of Padua, "in the street of the pigeons," copied a manuscript of the *Sphere* of Sacrobosco and the *Theory of the Planets* of Gerard of Cremona.[54] Bernard's dedicatory preface to Leo X appears to be his own. It contains an allusion to a column at Rome near the tombs of the apostles, Peter and Paul, which was supposed to have come from the temple of Solomon, near which Christ was believed to have stood, and which had the property of freeing those who were possessed by demons.

But the body of Bernard's treatise is a repetition of Nifo's work. It is true that Nifo's division into three books of nine, fourteen and twenty-two chapters respectively has been altered, and somewhat improved, into two disputations of eight chapters

[52] For his use of *The Prince* of Machiavelli see J. F. Nourrisson, *Machiavel,* 1875, pp. 227-34; of an astrological work by Albert Pigghe, see my "That Agostino Nifo's *De falsa diluvii prognosticatione* was not published until December 24, 1519," *The Romanic Review,* XXVI (1935), 118-20, or below, pp. 182-89, 193.

[53] Laurent. Plut. 84, cod. 22, 16th century, 20 lines to the page, unabbreviated writing, paper, in chains. Disputationes II de daemonibus ad Leonem X, opening, "Bernardus Portinarius Phylosophorum ac Medicorum minimus Leoni Decimo Pontifice Maximo Felicitatem. Cum preteritis diebus Romam venissem Pontifex sanctissime. . . ."

[54] MS offered for sale by Davis and Orioli, Catalogue LXVIII, No. 6. For a Vincent de Portonariis see below, chapter VII, note 31.

each. The true Christian view as to demons which appeared in Nifo's work as a digression (Lib. III, cap. 21) is made the concluding chapter of Bernard's treatise. But all the ideas and arguments of Bernard's two disputations are from Nifo, whose text is furthermore usually repeated word for word. Portinarius must have been unaware of the close relations between Nifo and Leo X to attempt so bare-faced a plagiarism of a work that had already appeared in print in 1503.

Nifo's treatment of demons may be profitably compared with an earlier medieval discussion by Witelo, known more especially for his work on optics composed about 1270. His discussion of demons takes the form of a letter written at the request of his brother Louis. Witelo was studying canon law at the time, wrote during the Easter vacation, and states his intention of going on or transferring to the study of theology. He had, however, already touched upon the subject of demons in a paper (*cartula*) "which I wrote for my associates on the parts of the universe." He writes later than 1265, since he alludes to a confession made by a woman to a priest at Padua in that year. His letter is on the primary cause of penitence in men and on the substance and nature of demons, whether they exist, what they are, and of what sort.[55] It will be noted that these questions are identical with the first three of the four put by Nifo.

On the portion of Witelo's letter which deals with penitence we need not dwell. He explains it Platonically as the regret of the soul when it strays from higher things and its yearning to return to them. He also alludes to superior intelligences and to the influence of separate intelligences upon minds joined with bodies, and affirms that he has often had dreams which fore-

[55] The work was published by A. Birkenmajer, *Studja nad Witelonem*, 1921, but apparently in the form of two treatises, with *De primaria causa poenitentiae* coming last. I have not seen this work but have read Witelo's letter in a MS at the British Museum: Sloane 2156, 15th century, fols. 148r-154v, H. Witelo, Epistola de causa primaria penitentie in hominibus et de substantia et natura demonum utrum sint quid sint et quales sint. "Domino et fratri suo magistro Ludovico in Leweberi H. Witelo plebanus ei se semper obedientem. Petistis ut scriberem vobis de rebus arduis . . . / . . . quia iuriste et maxime canonici iuris sunt grossissimi intellectus. Valete."

shadowed the future. This puts us in a proper frame of mind for his subsequent consideration of demons, which occupies the greater part of his letter.

The subject of demons is a difficult one. Plato is the only philosopher known to Witelo who has touched upon it, and his acquaintance with Plato seems limited for the most part to the commentary of Chalcidius on the *Timaeus*. Natural reason can accept no separate substances except the movers of the heavens. The doctrine of the fall of part of the angels may be an essential article of faith but is impossible according to natural reason and the order of the universe. Witelo finds no sure authority for it in the Bible, but accepts it on the authority of Gregory, other church fathers, and church councils.

Many supposed manifestations of demons are only apparent or imaginary, the product of sickness, bad humors, and hallucination. Epileptics often not only have strange visions but recall them afterwards, because only the first cavity of their brain, where imagination takes place, is diseased, while the third cavity or seat of memory remains sound. Those afflicted with apoplexy, on the other hand, suffer lesion of the entire brain and can remember nothing subsequently.

> In both these diseases, when the motions of the spirits have quieted down somewhat, and the rational soul is unoccupied with external objects of the senses, it may be carried beyond its essence and united to substances separated from matter. And thereby they are enabled to see the future in the present. And such men, especially epileptics, when they return to their senses, begin to prophesy.

Persons who have narrowly escaped death recite many things which they have not seen, "mixed with many lies." Or black forms seen in sleep as a result of melancholy are taken for demons. Or strong imagination, such as is excited by heroic love, may create illusions in the minds of persons who are wide awake. Religious recluses are apt to have beatific visions which are mere phantasies. Or a supposed apparition of a demon may be an optical illusion, the eye being deceived by reflection or as to distance and size, especially at night.

Witelo now turns from apparent to real demons which appear rarely but perform natural actions.[56] Their existence is called for to constitute with human beings the two means between the extremes of purely sensitive beings and purely intellectual beings. "As much as an angel exceeds a man, so much does a demon exceed a brute." Demons are both movers and moved, have both soul and body: in short, are animals. They are corruptible, for of incorruptible beings there is only one of its species, like the sun or moon. Being corruptible, they must likewise be generable, or the species would become extinct. Witelo inclines to believe in both incubi and succubi. Demons are, however, longer-lived than other animals. But their corruptibility may serve to explain why the old recipes in books of nigromancy often will not work today.

Next, seven objections to the existence of demons are answered one by one. How did Aristotle fail to notice them? Witelo answers that the argument from silence is not conclusive; that he believes that Aristotle and Averroes, if now living, would accept his evidence for the existence of demons; that the lost work of Aristotle on the genealogy of the gods may have dealt with demons. It is objected that if demons are made of air, they will lack the sense of touch and hence cannot be called animals. Witelo agrees that they must have some sense of touch, though probably less developed than in more material animals. A third objection is: if demons are nobler creatures than men, how is it that they cause men to sin? Witelo replies that they are not nobler but sin as men do. As for the problem of the shape or figure of demons, Witelo points out that human and animal anatomy is still little understood, so that it is unreasonable to expect certain knowledge in this regard as to demons, especially since the shapes which they assume before men are made by artifice. As to the kinds of demons, he accepts Plato's division into three classes found respectively in the ether, air, and lower

[56] Sloane 2156, fol. 152r, col. 2: "Visa itaque natura demonum apparentium non agentium aliquid naturalium rerum nisi per accidens seu per dispositionem accidentium anime que alterata corpus alterant. Restat nunc de aliis raro apparentibus et res naturales agentibus disserere."

air. As to their nutriment, he holds that they eat little. To the objection that possession by demons requires the coexistence of two animals in one place, Witelo replies by the analogy of worms in the human body. Finally it is objected: if demons are animals, how can they prophesy? The answer is that they prophesy much as men do, who are also animals, but that a greater percentage of demons are able to prophesy.

In concluding Witelo states that he does not wish what he has said to stand in the way of the views of abler men, "and especially of the revered Christian faith, in which I believe more than in any reasoning and of which I profess myself a faithful messenger."

If we compare our two authors on demons, we find that Nifo cites authorities more, while Witelo is more candid in stating his own views. Although Nifo professes to base his discussion on natural reason and physical causes, his attitude on the whole is more credulous than that of Witelo, who adduces scientific grounds for regarding most so-called diabolical manifestations as mere appearances, imaginations and illusions. Nifo brings in magic and astrology more, but Witelo too believes in nigromancy and prophetic dreams. Witelo is more outspoken in classifying demons as animals and makes them more material and corruptible. But both authors willingly subscribe to the Christian doctrine concerning demons, although they have shown that it does not agree with natural reason and philosophy. Nifo displays no advance in scepticism or enlightenment over his thirteenth century predecessor, and the comparison between them reflects no credit on the age of the so-called renaissance and of Medicean Rome.

Before terminating this chapter it may be well to set over against Nifo's argument for the existence of demons and its repetition by Bernard Portinarius, the discussion—much less favorable to demon activity—of another writer of the early sixteenth century, Andrea Cattaneo, and then yet a third attitude by Thomas Rocha of Aragon, neither of whom is noticed by Hansen.

Andrea Cattaneo of Imola is listed by Fabroni as ordinary professor of medicine—*physica,* which might include natural philosophy as well as medicine, since logic was then the only other subject listed in the curriculum outside the law and theology—at Pisa from 1501 to 1505.[57] He then passed to the university of Bologna, where he taught philosophy in the academic year 1506-1507 and medicine thereafter through the academic year 1526-1527.[58] There is in print by this Cattaneo a work on the intellect and the causes of marvelous effects without date or place of publication.[59] The preface opens with allusion to the author's having lectured the past year on the *De anima* of Aristotle but being now occupied with the art of medicine and in charge of the hospital of S. Maria Nuova—perhaps at Florence. This inclines one to place the composing and probably also the printing of the work in 1507.

Cattaneo chiefly follows Avicenna in the matters of which he treats but promises a new explanation of that author's views. He discusses the immortality and origin of the soul, whether it is immediately from God or from the mediating intelligences, what is the principle of the multiplication of souls, whether man can be generated from putrefaction as well as from seed, whether the rational soul is composed from the potential intellect and the active intellect, and whether the active intellect is a single intelligence. In a second section of the work Cattaneo treats of the happiness of souls and their separation from the body. Avicenna held that substantial forms were created by the tenth intelligence, which moves the moon and "which governs these inferiors simple and composite existing in the sphere of things active and passive."

The third and last section of the work is that which contains most of interest to us. It considers various problems concerning the nature of prophecy, incantations, fascination and divination of idols, and finally the nature of a phantasy by which

[57] Angelo Fabroni, *Historia Academiae Pisanae,* I (1791), 392 *et seq.*

[58] See Dallari, *I rotuli,* Vols. I and II under the years in question.

[59] Andrea Cattaneo, *Opus de intellectu et de causis mirabilium effectuum:* copy used, BN Rés. R. 1307.

one can easily solve almost any problem (*infinita fere problemata*). Cattaneo recognizes that his discussion, like other philosophical positions, may be alien from the Faith, but engages in it for its moral value and to acquaint the reader with Avicenna's genius. He ever submits himself to the judgment of holy mother Church and will soon publish a work reconciling Aristotle and philosophy with the Christian faith. Again at the close of the work he repeats that he admits that almost all these things are alien from the true Faith and from truth itself, "and in a question of faith composed by us we have faithfully rejected all these things as false and of no moment." In the interim, however, he has held that the human soul is the image and shadow of the celestial souls and of the active intellect itself (i.e. the tenth intelligence moving the sphere of the moon), and that therefore marvelous effects are not performed by virtue of demons but come from a vital principle which exists in the statues or idols and figures and other things of that sort which are fabricated by the magicians. Marvelous effects may also sometimes result from first qualities, sometimes from the imagination of men and angels, sometimes from the relation of things to one another.

Cattaneo discusses how we may receive science from the active intellect, and asserts that if a learned man is free from any bodily impediment he can open the thoughts of his mind to a disciple without uttering a sound. The same view was advanced by Trithemius. Cattaneo further affirms that the human soul can imagine what it has never experienced through the senses, and that the active intellect embraces past, present and future. Therefore it is clear how marvels can be accomplished in another way than by demons. Avicenna held that there were no other spiritual and intellectual substances than the intelligences moving the spheres and the human soul. It will be noted that these views are attributed by Cattaneo to Avicenna, not to Averroes, although they relate closely to what has commonly been called the Averroism of Padua. But in the late medieval and early modern centuries Avicenna, especially in his *Sextus naturalium*, was the Arabic philosopher most likely to be cited in favor of a natural,

or supposedly natural, and astrological explanation of the marvelous and occult.

In general the position of Cattaneo which has just been briefly outlined seems to forerun, and perhaps to have had some influence in forming, the views of Pomponazzi which will be set forth in more detail in the coming chapter.

Thomas Rocha, who speaks of himself as lord of the castle of Fortianello and last among the philosophers and who in 1501 had written on astrological medicine, in 1510 composed an *Epistle against Necromancers* in reply to an inquiry by a reverend doctor.[60] The question was whether the wind, rain, hail, and breaking and uprooting of trees on August fifth of that year, and the falling of the great bell in the high tower of the church of St. Paul in Zaragoza and similar happenings in other parts of Aragon were from the stars or by art of demons. Rocha concludes that they were by the power of demons, but this is proved not by reasons, although Aquinas, Albert and Augustine are cited for a page or so on the power of demons, but experience, since certain necromancers were caught and confessed that these things were done by art of demons and had been punished therefor, while others had fled. Rocha further concludes that the stars have power over all things below the circle of the moøn. For he contends that the demons were able to cause such storms, because the stars had prepared the natural forces requisite. The constellations had elevated exhalations on high, Mars ignited these, Saturn congealed a great part. For, as Aquinas says, Prima pars, Quaestio 116, demons cannot operate except by making use of nature. Thus while some thinkers of the sixteenth century tried to explain by the influence of the stars everything that was ascribed by others to demons, and while theologians and opponents of astrology often tended to attribute successful predictions of astrologers to demons, Rocha takes middle ground, admitting

[60] I have read it as printed at Burgos in 1523 with the *Digna redargutio* and other tracts by Rocha: *Thome Roche gottolani digna redargutio in libros tres Augustini Nimphi. . . . Et eiusdem Epistola contra necromanticos. . . .* Copy used: BM 8610.f.10.

the influence of both. But it would seem that he is more concerned to emphasize the influence of the stars. He notes, however, that some persons doubt it. He also affirms that astrology does not violate freedom of the will. It is true that some persons who make predictions are prompted by demons, and that others by demon aid perform evil deeds which have no cause from the sky. But who is in a position to discern this? An astrologer alone. Therefore pope and kings should value astrologers the more on this account. Rocha also refers to a prognostication for the years 1509, 1510, 1511, which he made at Naples at the request of the regent of that kingdom. We shall come later to his work on critical days of 1521 and his annual predictions for 1522 and 1524, and it is probable that he made others for the intervening years since 1501.

CHAPTER VI

POMPONAZZI ON INCANTATIONS

"quid revelationibus et miraculis semotis persistendoque pure infra limites naturales hac in re sentis?"

Pietro Pomponazzi (1462-1525),[1] the philosopher of Mantua who taught at Padua, Ferrara and Bologna, is well known for his work on the soul, which appeared in 1516, was publicly burned at Venice, and evoked various attacks and replies. The Averroistic doctrine of the unity of the intellect had been recently condemned at the Lateran Council of 1512, and many who had become accustomed to their Aristotle in a Christian guise were shocked to hear that the Stagirite did not accept the individual immortality of the human soul. Some suspected that Pomponazzi did not believe in it himself.

Luca Gaurico, who had studied under Pomponazzi at Padua, later described him as weak of body and almost a dwarf, with a beautiful face and large head, affable and smiling. He married thrice, as Gaurico claimed to have predicted, but had only one child, a daughter on whom he settled a dowry of twelve thousand ducats. He held the ordinary professorship in philosophy at Padua with Antonio Fracanzano as colleague, then taught at Bologna with Achillini and Nifo.[2] Some amendment must be offered of this account. Pomponazzi began his teaching at Padua

[1] Besides the well-known works on Pomponazzi of Francesco Fiorentino in Italian, 1868, and A. H. Douglas in English, 1910, may be mentioned the sixth chapter in C. C. J. Webb, *Studies in the History of Natural Theology*, 1915; Erich Weil, "Die Philosophie des Pietro Pomponazzi," *Archiv f. Gesch. d. Philosophie*, XLI (1932), 127-77; Ernst Breit, *Die Engel-und Dämonenlehre des Pomponatius und des Cäsalpinus*, 1912, Bonn diss.; Walter Betzendörfer, *Die Lehre von der zweifachen Wahrheit bei Petrus Pomponatius*, 1919, Tübingen diss.

[2] *Lucae Gaurici Geophensis episcopi Civitatensis Tractatus astrologicus in quo agitur de praeteritis multorum hominum accidentibus*, Venetiis apud Curtium Troianum Nauo, 1552, fol. 57v, 'Perectus Mantuanus magnus philosophus."

in 1488, but, when that university was closed by the war of the League of Cambrai, he was called to Ferrara in 1510 before he went to Bologna in 1511, where he remained until his death. Since Achillini died in 1512, he would have been Pomponazzi's colleague at Bologna for only a year, while the name of Nifo does not appear in the faculty rolls of that university.[3] But he and Pomponazzi apparently had been colleagues at Padua in the last decade of the previous century. At Bologna the name of Pomponazzi not only heads the list of ordinary professors of philosophy, but for a number of years he lectured there on moral philosophy on feast days.

Duhem has noted that Pomponazzi continued to write on favorite topics of the scholasticism of the fourteenth and fifteenth centuries, but refuted or disagreed with the Latin schoolmen, preferring, like Nifo and Achillini, to follow the Greek commentators on Aristotle. His *De intensione et remissione formarum,* published in 1514, refuted Suiseth. In *De reactione,* 1515, he rejected the conclusions of Albert of Saxony, Marsilius d'Inghen, Paul of Venice, James of Forlì, and Cajetan de Thienis. In *De nutritione et augmentatione,* 1521, he attacked the views of Gregory of Rimini.[4]

The discussion of intension and remission was published without Pomponazzi's permission and against his orders by Ioannes Vergilius of Urbino.[5] In the dedicatory epistle to Albert of Savoy, prince of Carpi, Pomponazzi recalls how Albert had delighted in Calculator's genius and they had had a long disputation, when Pomponazzi said that Suiseth's position by no means agreed with what Aristotle said. When in public disputations Pomponazzi further said that the Calculator was far from the truth and from the ancient philosophers, he was laughed to scorn by all, since the opinion of Suiseth was generally accepted. When asked to

[3] Dallari, *I rotuli.*

[4] Duhem III (1913), 120-23.

[5] He so states at fol. ii recto. At fol. lxvii recto we read: "Ego Petrus filius Ioannis Nicoli Pomponatii de Mantua finem imposui dicto tractatui anno Christianorum MDXiiii in civitate Bononiae annoque secundo Leonis decimi summi pontificis."

"Impressum Bononiae per Hyeronimum Platonidem de Benedictis civem Bononiensem . . . Anno domini MDXIIII die decimo Decembri." Copy used: BM 5306.aa.21.(1.).

set forth his own position in a treatise, he at first refused but finally gave in. In the Prohemium Pomponazzi adds that the two opinions which Suiseth refuted were generally believed to be those of Plato and Aristotle, and that many wondered how such learned men could be so mistaken. Some told Pomponazzi that they had seen a book by Giovanni Marliani of Milan in which he took the part of Aristotle, but that his defense had not satisfied them. They insisted that Pomponazzi state his view, but he often refused because of the difficulty of the subject which seemed to elude one's grasp like the proverbial eel.

While our primary concern in this chapter is not with Pomponazzi's treatise on the immortality of the soul,[6] there are certain features of it which we may do well to remark. In the prohemium Pomponazzi is represented as convalescing from an illness and visited by a Dominican friar, Jerome Natalis of Ragusa, who reminds him of having said in his lectures on *De caelo et mundo* that the position of Aquinas with reference to the immortality of the soul, though most true and most assured, by no means agreed with Aristotle. The friar therefore puts two questions to Pomponazzi. First, "setting revelations and miracles aside" and keeping within strictly natural limits, what he thinks in this matter? Second, what in his opinion the view of Aristotle was? It is remarkable that this proposal to disregard miracle and revelation and discuss the soul on a purely natural basis should be put in the mouth of a Dominican friar. Was it sarcastic or true to life? Bruno and Campanella were both friars.

As for Pomponazzi, he holds in the course of the work that

[6] Petrus Pomponatius, *Tractatus de immortalitate animae*, Bologna, Justinianus Leonardi Ruberiensis, 6 November, 1516. Fol. Rom. 18 leaves. I have chiefly, however, used an edition of 1525 for this and other works to be mentioned.

Petrus Pomponatius Mantuanus, *Opera. De intensione et remissione formarum ac de parvitate et magnitudine* (fols. 2r-20r). *De reactione* (fols. 21r-37v). *De modo agendi primarum qualitatum* (fols. 38r-40v). *De immortalitate animae* (fols. 41r-51v). *Apologiae libri tres* (fols. 52r-75v). *Contradictoris* [i.e. Nifo] *tractatus doctissimus* (fols. 76r-80v). *Defensorium auctoris* (fols. 81r-108r). *Approbationes rationum defensorii per fratrem Chrysostum Ord. Praed.* (fols. 108v-112r). *De nutritione et augmentatione* (fols. 113r-139v). Venetiis impressum arte et sumptibus haeredum Octaviani Scoti anno 1525 Kal. Martii, in-fol.: copy used, Columbia University library B195 P77 X.

canonical Scripture is to be preferred to any human reasoning and experience since it is given by God, and that the authority of Aquinas is so great with him, not merely in theological questions but in the interpretation of Aristotle, that he dares not affirm anything against him. However, he eventually ventures to do so, protesting that it is not by way of assertion but as one raising a doubt. His final position is not only that Aristotle did not regard the human intellect as immortal and pronounced the human soul absolutely mortal, mere form of the body and inseparable from it, but further that no natural reasons can be adduced to prove the immortality of the soul.

Among alleged natural reasons which Pomponazzi rejected and explained away were many "experimenta" or experiences, such as phantasms seen about graves, apparitions of ghosts, and remarkable utterances and predictions made by persons supposed to be possessed by demons. Pomponazzi dismisses many such recorded experiences as mere fables, others as illusions produced by the craft of evil priests. For others he attempts to suggest natural explanations. Phantasms in graveyards are accounted for by thickness of the air in such corrupt places, for the chapter on the rainbow in the *Meteorology* of Aristotle states that such air readily receives images of neighboring objects. The reputed demoniacs are really vexed by melancholy and insanity, do not know what they are saying, but are moved to predict by the influence of the stars. It was this line of argument which was to be further developed by Pomponazzi in the work which will form the main source for the present chapter. One more characteristic position may be noted from *De immortalitate animae*. Pomponazzi contends that mankind is naturally more sensual than intellectual, and that many men are more like beasts than human beings and unworthy to be called rational. He holds that this is even more the case with women, of whom none is wise except in comparison to others who are especially fatuous.

Among those who replied to Pomponazzi on the soul was Nifo,[7]

[7]Augustinus Niphus, *De immortalitate animae*, Venetiis, 1518: copy at the Biblioteca Nazionale, Naples, shelf-marked 85.N.25.

who not only argued that immortality was naturally possible and in accordance with Peripatetic doctrine, but, in his preface to Leo X, stated that what had finally induced him to reply to Pomponazzi was that he had earlier taken this same position in his *De intellectu*[8] and felt impelled to defend his position against Pomponazzi's counter-argument. This was in a sense literally true, but possibly Nifo wrote it with his tongue in his cheek. However, Pomponazzi seems to have taken him seriously, for he replied in a *Defensorium* which was much longer than Nifo's work of eighty-five chapters. In this *Defensorium* Pomponazzi said that Nifo's work alone of those directed against him deserved reply as being philosophical in tone and content. The *Defensorium,* however was written in controversial style and occasionally became rather abusive towards Nifo. A passage in it of some interest for us is that in the tenth chapter, in which Pomponazzi cites marvelous stories concerning animals, such as the pelican and Alexander's horse Bucephalus, to show that mere material form (*forma materialis*) can perform acts of piety and religion. Perhaps in order to insure publication of the *Defensorium* or to assuage the opposition to himself, Pomponazzi appended thereto a solution of Aristotle's arguments against immortality according to theology and the orthodox faith. These *Solutiones* are not by Pomponazzi, however, but by a Dominican, brother Chrysostom, who had urged Pomponazzi to answer Aristotle's arguments. But Pomponazzi had replied that a theologian could do it better. The *Solutiones* are not very long, covering only five leaves.

Another book by Pomponazzi, in which he again attempted to apply in a distinct and uncompromising manner purely Peripatetic principles, will henceforth concern us as more closely connected with the fields of magic and science, the natural and supernatural, namely, his *On the Causes of Natural Effects,* or, *On Incantations*. This book was written in 1520 in reply to a physician of Mantua who had asked his fellow townsman what explanation could be given on Peripatetic grounds for certain

[8] See the edition of Venice, April 10, 1527, fol. 68v, col. 2: "Id ergo quod accepimus a philosophis est animam rationalem perpetuam esse. . ."

marvelous cures and seemingly miraculous events. The reply of Pomponazzi, which is long and carefully thought out, seems not to have been printed before his death, perhaps because of the unfavorable stir created by his similar work on the soul. Indeed, it appears to have been first printed only in 1556 at Basel and under Protestant rather than Catholic auspices.[9]

This edition is introduced by a preface to the elector Palatine by Guglielmo Gratarolo, a physician of Bergamo and religious refugee from Italy who is known also as an editor of alchemical texts. Gratarolo confesses to fear that someone may think him either over curious or less Christian for publishing this book. He purchased it twenty years ago at Padua and brought the manuscript north with him when he left Italy six years since. The work has become very rare.[10] Gratarolo explains that while Pomponazzi has been accused of denying the immortality of the soul and Christian miracles, he actually only represents Aristotle as taking this position. Granting, however, that there may be something in the work which does not entirely square with Christianity, Gratarolo thinks that it should not be suppressed or withheld

[9] *Petri Pomponati Mantuani summi et clarissimi suo tempore philosophi de naturalium effectuum causis sive de incantationibus, opus abstrusioris philosophiae plenum et brevissimis historiis illustratum atque ante annos xxxv compositum, nunc primum vero in lucem fideliter editum. Adiectis brevibus scholiis a gulielmo gratarolo physico Bergomate,* Basileae per Henricum Petri, mense Augusto, an. MDLVI.

At the close of the text (pp. 348-49) we read: "Perfecta est itaque haec nostra lucubratio que de Incantationibus nominari potest per me Petrum filium Ioannis Nicolai Pomponatii Mantuani in felicissimo Gymnasio Bononiensi in capella sancti Barbatiani die 16 Augusti M.D.XX anno octavo Pontificatus Leonis X."

Webb, *Studies in the History of Natural Theology,* 1015, p. 329, is mistaken in stating that the work was not published until 1567.

[10] There are, however, a number of manuscript copies still extant, dating from the sixteenth century and very likely before the edition of Gratarolus. I list a few that I have happened to note, but doubtless there are others. Some of these copies are dated in the catalogues as written in 1520 and perhaps the autograph, but this is probably from a confusion with the date of composition as stated in the colophon even in the printed edition, given in the foregoing note.

At the Vatican Barberini latin 271 and 353 are both sixteenth century MSS of the *De incantationibus,* while Vatican latin 5733, fol. 234 contains something by Petrus Pomponatius.

At Arezzo Biblioteca della fraternita di S. Maria 389, dated as 1520 and as an autograph of cardinal Bonucci, a pupil of Pomponazzi, contains in addition to *De incantationibus, De fato et libero arbitrio,* and commentaries on

from the scholarly public, since it contains more solid physics and abstruse philosophy than do many huge commentaries of certain authors taken together. He has corrected some flaws in the style which he regards as the fault of a copyist, but otherwise lets Pomponazzi speak for himself except for some marginal heads and brief annotations which seem to emanate from the editor.

Turning to the text itself, we find the physician of Mantua stating that religions introduce demons to account for such marvels and miracles, and that Avicenna ascribed vast powers to the human soul. But Aristotle admitted neither the existence of demons nor that any agent could act without contact. Pomponazzi's friend further doubts whether words and characters can be the instruments of the heavenly bodies. Pomponazzi replies that since Aristotle has left in writing little or nothing on such matters, it is difficult to judge what he thought or would have thought. It is safer to answer in accordance with Christian beliefs, and it seems necessary to postulate demons in order to account for many things tested by experience (*ut salvemus multa experimenta*). Nevertheless, since the physician asks what the Peripatetics think, Pomponazzi will do his best to answer him.

The Peripatetics deny that such cures as the withdrawal of an

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the third book of the *Physics* and the *Parva Naturalia*, while MS 390 of the same library, also of the 16th century, contains Pomponazzi's "In libros Physicorum Aristotelis aurea expositio."

At Venice S. Marco VII, 14 (Valentinelli, XIV, 49), 16th century, 99 fols.

At Milan *Opera philosophica* of Pomponazzi, found in Ambros.A.52. inf., 16th century, and D.417.inf., 1521 A.D., may include the *De incantationibus* but are more likely to be the works listed above in note 6 and found in the 1525 edition. Ambros.D.201.inf., 1520 A.D., may be an autograph of the *De fato libero arbitrio et praedestinatione.*

In Escorial f.III.2, 16th century, the *De incantationibus* follows the work of Achillini on physiognomy and chiromancy at fol. 9.

At Munich CLM 201 is a 16th century MS of *De incantationibus*, while in CLM 239, 16th century, 182 fols., the "libri V de fato de libero arbitrio et de praedestinatione" are described as "finiti Bononiae anno 1528."

The *De fato, libero arbitrio*, etc., also seems to have been first published by Gratarolus together with a reprinting of *De incantationibus* at Basel in 1567.

Two other works by Pomponazzi which were printed later than the *De incantationibus* were *Dubitationes in quartum Meteorologicorum Aristotelis librum nunc recens in lucem editae*, Venetiis, Franceschi, 1563, in-fol. and *Commento inedito al De anima di Aristotile*, 1877.

arrow from a wound by an enchanter are worked by demons, for they hold that demons have no knowledge of particular objects. Nor do they accept the common explanation that demons are skilled in medicine through long experience and are able to transport drugs from any distant region in the twinkling of an eye. If these cures were effected thus, the presence of the drugs could hardly escape notice, although the demons bringing them might be invisible. In a later passage[11] Pomponazzi represents the theologians as conceding to demons the power to move bodies immediately by local motion but not to alter them except by means of other natural bodies. Therefore any alteration which demons accomplish by applying active to passive can be accomplished by men too. Pomponazzi is not positive that the opinion of Avicenna, rejected by his friend, is contrary to the doctrine of Aristotle, but he passes over this point, since the physician has not asked him to discuss Avicenna's thought.

Next are enumerated three ways in which herbs, minerals and parts of animals may alter other bodies. The first is by their manifest qualities, as when fire burns by its heat. The second is by their conversion into vapor, of which rhubarb is offered as an example. The third way is occult and invisible, as in the action of the magnet. Of this third occult type of action there is not merely one sort but an infinite variety, and it is this third kind of action which the common people attribute to act of God or to angels or demons. Further examples of it are the ability of the echeneis, which is only half a foot long, to stop a ship that is over two hundred feet in length; the shock given by the torpedo; the power of certain herbs and stones to produce or dispel rain and hail storms. Men too possess such virtues but differ greatly in this respect. Herewith Pomponazzi affirms that man is a microcosm, that he is influenced by emotion and imagination, and that tender children may be fascinated by frequent glances which are accompanied by a desire to injure. As the idea in the divine mind brought forth this sensible world without any instrument, so an idea in our minds may realize itself by means of such

[11] *De incantationibus*, cap. 3, p. 41.

corruptible instruments as blood and spirits and produce like effects in external bodies.

Presently Pomponazzi makes a suggestion which may have given Gabriel Naudé the idea for his treatise in the following century on great men who have been falsely accused of magic.[12] Pomponazzi says that many persons, like Peter of Abano and Cecco d'Ascoli, may have been reputed to be magicians and necromancers who really had no dealings with unclean spirits, indeed perhaps believed with Aristotle that there are no demons. This passage rather implies, however, that Pomponazzi had never read either Peter or Cecco with any great care, since the former repeats from Averroes the association of seven angels or intelligences with the planets, while the latter has much to say of demons and evil spirits.[13] It is true that Peter of Abano might be considered to accept only the Aristotelian Intelligences which move the spheres, but in that case he should not have applied Semitic personal names like Raphael and Gabriel to them. Pomponazzi goes on to advance the converse hypothesis that some men have been popularly esteemed saints who may have actually been criminals, though they employed good signs like that of the cross in order to deceive men.

Pomponazzi sees no reason why the exhalations from the bodies of certain human beings should not possess the virtue of removing arrows from wounds which we see in the herb ditanny. The fact that different so-called enchanters specialize in the cure of different diseases, one curing this and another that, doubtless relates to their several natural dispositions and individual occult properties. Thus magic sets an example of specialization for medicine and science. There are men whom snakes will not bite, or, if they do, they die and not the men. Other human beings can move their ears, swallow and regurgitate large objects, or imitate the cries of animals and songs of birds. The kings of France are able to cure scrofula. Pomponazzi further, as we have

[12] Gabriel Naudé, *Apologie pour tous les grands personnages qui ont esté faussement soupçonnez de Magie*, Paris, 1625.

[13] T, II, 900 and 964-65.

already indicated in speaking of fascination, inclines to attribute a good deal to the human soul, confidence and imagination, which by altering the blood and spirits in the agent's own body produce vapors and exhalations which act upon other persons' bodies insensibly and subtly through the pores but all the more potently, like infection in a pest.

Another possible explanation of the apparent extraction of arrows by incantations is that some men have exceptional manual dexterity. Or the supposed enchanter may employ confederates and mirrors or other fraud and deception and fool the eye. Years ago at Mantua and Padua, Pomponazzi saw a man named Reatius who performed such incredible feats that they were attributed to demons. When tortured by the inquisition, however, he confessed that they were entirely deceit and sleight-of-hand. Thereupon the inquisition released him, but he later met his death at the hands of one of his dupes.

In the fifth chapter Pomponazzi notes nine possible objections to the explanations he has been offering. In the sixth chapter he meets these objections. One was that the miracles of the Bible might also be so explained. Pomponazzi grants that some might be but adds that others, like the raising of Lazarus or cure of the man born blind, could not be. Another objection was that words, signs and characters have no operative virtue, but he contends that *per accidens* and indirectly they may give rise to marvelous effects through their action on the mind and credulity. A third objection was that Aristotle in the *Problems* had denied that health was contagious. Pomponazzi's reply is that the *Problems* are a work of doubtful authenticity, while the particular passages in question conflict with others in Aristotle's undisputed works and in other authoritative authors, and are further contrary to reason and experience.

To his own above assertion that the raising of Lazarus cannot be explained on natural grounds Pomponazzi in the next chapter advances the objection that even resurrection of the dead by natural means is recorded in pagan times, Pliny and others telling of herbs which restore men to life. It is further argued that such

phenomena as pagan oracles and animals speaking to men can be accounted for only by act of God, angels or demons, and that this very year, when unusually heavy rains afflicted Aquila, prayers to the local saint, Coelestinus, stopped the rain, and that the saint himself was seen in the sky. In rebuttal in the eighth chapter Pomponazzi denies that there were any genuine raisings of the dead among the Greeks and Romans, or, if there were any such, that they were effected by demons rather than by divine miracle. He admits, on the other hand, that pagan oracles were the work of demons. He grants that not all magic is natural but only that part which is concerned with the occult works of nature. The apparition of the saint at Aquila is left for treatment in a subsequent chapter.

Meanwhile the question is raised whether Aristotle ignored demons and angels. Pomponazzi contends that Aristotle denied both the existence of demons and direct divine action or *de novo*. Incidentally he mentions his own devotion to the study of Aristotle since tender years. Aristotle denied the existence of demons because it was not provable from evidence available to sense. Aristotle further held that the First Cause effected nothing in this sublunar world except by the mediation of the celestial bodies. Aristotle's moving intelligences were not demons but the forms of the celestial bodies. These last direct men by signs of the future both in dreams and while waking. Moreover, they endow certain men with the gift of prophecy and of marvel-working without training or toil. Peter of Abano states that Haly Abenragel knew by experience of the stars that a certain child would prophesy as soon as it was born. Likewise prodigies marking the birth of great men are natural and from the stars.

Pomponazzi next proceeds, turning somewhat in his tracks, to argue that even oracles can as easily be explained as the effects of the stars as of demons. And he questions once more whether demons can do more than men in applying active to passive or in utilizing the occult virtues of natural objects. Nor would Pomponazzi reject auguries and omens. Why a crow signifies evil and a dove or crane, good, is not soluble by human investigation but

is known from repeated experience, and we are equally ignorant how it is that the herb scammony purges bile. Chiromancy is not vain, and even geomancy may have a natural basis and not be without reason. An aged mechanic at Bologna by this art predicted to Pomponazzi for four days running the election of Leo X as pope. Love charms and the like seem to be called the figments of old wives by Aristotle in the *History of Animals*. But inasmuch as the Church and Plato and many very grave authorities believe in bewitching, Pomponazzi will endeavor to give a natural explanation of it without demons.

We need not follow the detailed ramifications of his argument but may note his conclusion that, "if anyone shall have considered the marvelous and occult works of nature, the virtues of the heavenly bodies, God, and the intelligences, caring for human and all other inferior affairs, he will see that there is no need of demons or other intelligences" (than those moving the heavens). Nor will he suppose the existence of genii and guardian angels. Genii are nothing but the genitures of men, and man's sole guardians are reason and sense which are continually at war with each other. Aristotle denied the resurrection and immortality of the human soul. Angels and demons have been introduced for the sake of the vulgar, who cannot comprehend the operation of God, the heavens and nature but must personify the Intelligences like men. The Old Testament is often not to be taken literally. Plato probably did not believe in angels and demons but introduced them in order to instruct rude men. Aristotle seldom spoke out on such matters, perhaps because he feared the fate of previous philosophers such as Socrates.

Once again nine additional objections to Pomponazzi's positions are set forth in the eleventh chapter and answered in the twelfth. Again he insists that God and the Intelligences act only through the instrumentality of the heavenly bodies, that seers and sibyls are inspired by the stars. He continues to speak of prophecy as if it were a physiological attribute. Elisaeus could not prophesy unless he first put his hand on the Psalter, just as some men cannot make love without first kissing and touching

the breasts to heat their blood and spirits. Seers are generally of a melancholy disposition. Nor does Pomponazzi agree with Aquinas, *De occultis naturae operibus,* that relics of the saints do not cure by any inherent virtue, or all would cure equally, and that therefore the cures are worked by God. Or that images, characters, rings and other objects made by art receive no virtue from the stars, and that therefore the marvels wrought with them are the work of demons. A cure by relics may really be caused by the patient's faith and imagination, which would have worked equally well had the bones been those of dogs or of souls in hell, and the patient not have known this. This passage concerning relics was noted by Thomas Fienus in his work on the power of the imagination,[14] who states that Pomponazzi "dared to write" that those who sometimes attain health by the cult of bones of the saints do this only by the virtue of their own imagination and their faith in the relics, so that, if they cherished the bones of dogs, believing them to be the bones of saints, they would equally attain health. In rebutting this opinion Fienus affirms that Pomponazzi spoke impiously, that therefore his book has been justly prohibited by the Holy See, and that the falsity of his view has been refuted at length by Bartholomaeus Pisanus in the prologue to his book of *Conformities*. But Pomponazzi also holds that there may be healing virtue in the bones themselves or the exhalations from them, those of one individual curing one disease, and those of another curing a different malady. The denial of Aquinas that artificial figures receive force from the stars is, Pomponazzi holds, contrary to the views of Ptolemy and the sages. Indeed, Pomponazzi finds reason to doubt if the *De occultis naturae operibus* is a genuine work of Aquinas.

As for the supposed miraculous intervention of Saint Coelestinus at Aquila, Pomponazzi argues that, just as many stones and herbs possess the property of warding off storms, so might the spirits and vapors of a great throng of people, especially when they were intent in prayer. For when prayer comes from the

[14] Thomas Fienus, *De viribus imaginationis tractatus,* Lovanii, 1608, pp. 98, 101.

depths of the heart, the spirits in the body function better. Moreover, as the imagination of a woman during conception affects the foetus, so those emanations and exhalations from the throng took the form in the air of saint Coelestinus, who was in the minds of the people as they prayed. And since the air was heavy from the rains, the image lasted for some time and perhaps even moved to and fro with the wind. Had the prayers been offered at Bologna by the Bolognese, the image would have taken the form of that city's patron, saint Petronius. Pomponazzi goes on to say that bells may repel storms either by stirring up the air, or because cast under appropriate constellations, or from some occult virtue resident in the metal of which they are made. He also affirms that a man may be born under such a constellation that he can rule sea, wind and storm, or heal demoniacs, which seems a rather strong hint that the miracles of Christ were due to the stars. Pomponazzi straightway warns his friend, however, not to reveal this to the vulgar or discuss it with unskilled priests (*imperitis sacerdotibus*), for philosophers have often been driven from cities or imprisoned or stoned and put to death for airing such views. Perhaps in order to soften the effect of his previous remarks, Pomponazzi then engages in some pious discussion of the value of prayer. He asserts that philosophers know how to pray better than the common crowd and have a higher ideal of the purpose of prayer. But then, returning to the problem of the apparition of Coelestinus, he doubts if the vapors in the air really took the form of the saint, and suggests that the resemblance may have existed only in the popular imagination.

In response to the fifth of the aforesaid nine objections, the problem of the existence of evil and the influence of the stars are discussed for some pages. Certain recent critics of astrology (a marginal heading, presumably by Gratarolo, states that Pico della Mirandola is meant) have not understood the subject, and except for verbal ornamentation Pomponazzi sees nothing in their works but arrogance and petulance.

It had been objected that transformations of men into birds and beasts could not be explained naturally and astrologically

but required the agency of angels and demons. Pomponazzi, however, points out—incorrectly, of course—that the stone coral is generated from wood and plants, that recently near Lübeck a bough with birds in a nest on it was found petrified in the sea. Therefore human bodies may be transformed naturally into birds and wolves, although transformation of the human soul into the soul of a wolf would be incredible.

It was also objected that, if pagan oracles were produced by the stars, they should not have ceased after the advent of Christ. Pomponazzi replies that they ceased because they went with the old gods, and with the new religion came new usages. But this very change itself was from the celestial bodies. Since it is very difficult to budge men from their accustomed ways, unusual and stupendous miracles are necessary to insure the success of a new religion. Hence at the advent of a new faith the stars give birth to men who perform miracles and combine in themselves by the gift of God and of the Intelligences all the virtues scattered through herbs, stones and animals, so that they are with reason believed to be sons of God. Religions have their growth and decay like other generated and corruptible things. For that which moves towards an end involves all things necessary to that end, whether they be precedent or consequent or concomitant. So such founders of religion are predicted by prophets for centuries beforehand. There are great prodigies at their birth, more stupendous wonders during their lifetime, and their followers, if the religion is to be of long duration, receive divine power either from the founder, as iron receives the power of attraction from the magnet, or from the same influence of the stars that affected him. They too cure diseases, bring rain, and perform incredible feats against those who attempt to resist them, for the stars fight for them. Similarly each successive religion has its own peculiar words and signs, like that of the cross. "Now that in our faith all grows cold, miracles cease except prearranged and pretended ones, for the end seems near." Philosophers regard the universe as eternal, but the rites which now prevail "were and will be and will not be." The histories of other religions record

miracles similar to those of Christianity, and Pomponazzi justifies his frequent citation of historians in a philosophical work as authorities for past natural events of rare occurrence. Such is the most detailed and carefully worked out, the most plausible and at the same time most sweeping expression of the doctrine of astrological control over the history and development of religions that I have seen in any Latin author.

Pomponazzi's thirteenth and last chapter is devoted to recapitulation of his main conclusions. Aristotle recognized no immaterial substances except the intelligences moving the heavens. He, Theophrastus, Eudemus and Alexander saw no need for demons with powers of altering or moving things locally. The celestial bodies and their moving intelligences suffice to account for all the phenomena and to accomplish far greater wonders than those ascribed to demons. It seems really laughable, says Pomponazzi in a burst of scornful eloquence, that the celestial bodies with their intelligences should govern and preserve the universe, move so great a mass of matter, generate and transmute so many men, so diversified animals, so many plants, stones and metals, and yet not able to produce such futile and inane effects, which happen but very rarely and are of no moment, as those attributed to the activity of demons.

The Peripatetics further deny direct divine action on this world and the immortality of individual souls. In these respects their doctrine is not true but deficient, since some things are done in this inferior world which cannot be explained by Aristotelian principles, for instance, the miraculous eclipse at the time of the crucifixion attested by Dionysius the Areopagite and others. Such miracles demonstrate the insufficiency of the doctrines of Aristotle and other philosophers and prove the truth of Christianity. Whatever is affirmed by canonical Scripture and universally decreed by the Catholic church Pomponazzi unquestioningly accepts and rejects whatever it condemns. He therefore piously admits the existence of angels and demons. But these last passages seem mere lip service. Throughout the volume his sympathy has been with the philosophers who, he declared in

one passage, alone are Gods on earth and as far removed from other persons of whatever order or condition as living men are from men in pictures. He has in the course of the work called into question directly or by innuendo the canonization of saints, the adoration of relics, the miracles of the Bible and of Christianity, the divine inspiration of prophets, and has subjected all religious history and manifestations of divine power to the courses of the stars and the rotation of the spheres.

The present-day reader may condemn Pomponazzi for having attempted at all a natural and rational explanation of reported occurrences which seem to us either misrepresented, exaggerated and fraudulent, or simply incredible and puerile. He may further criticize him for having stretched Peripateticism unwarrantably to include such doctrines as that of occult virtue, of sympathy and antipathy, and various theories of judicial astrology.[15] Let us remember, however, that he was able to cite from Aristotle such passages as that from the *History of Animals* on the remora being useful in lawsuits and love-charms as well as stopping ships. It may further be objected that his scepticism is not consistent or sweeping. It extends to demons and miracles, but not to marvels, occult virtues, and the influence of the stars. His scientific principles admit almost all the reputed phenomena of the miracle-mongers and the witch-hunters. He merely gives a different explanation which he regards as natural rather than preternatural or supernatural but which we must reject as occult and astrological. But these are faults of the age rather than of the individual, and are failings of science as then understood and constituted. And this may be said for Pomponazzi. Had his views prevailed, there would hardly have been any witchcraft delusion and persecution or religious wars.

[15] In his work on fate and free will, chapter six, Pomponazzi, according to the later Jesuit writer, Pererius (*De communibus omnium rerum naturalium principiis et affectionibus libri quindecim*, Cologne, 1595, IX, 8, p. 523), said that all effects which are called fortuitous have certain and determined causes. In other words, chance events are really under the stars.

CHAPTER VII

SYMPHORIEN CHAMPIER

. . . qui, médecin de profession, a affecté de paroître jurisconsulte, philosophe, orateur, grammarien, gentilhomme et chevalier
—MÉNÉTRIER

After five successive chapters which have been chiefly occupied with the attitude of as many Italians at the opening of the sixteenth century towards magic and experimental science, we turn in the next two chapters beyond the Alps to consider a French opponent of occult arts, Symphorien Champier, and then a German exponent of occult philosophy, Henry Cornelius Agrippa of Nettesheim.

Symphorien Champier (c. 1471-1537) was a very active personality, if not a very original mind, in Lyons and Lorraine during the first part of the sixteenth century. Educated at Paris and Montpellier, he practiced medicine at Lyons and in 1498 initiated a long series of publications there by an elementary textbook in logic. In 1502 he was at Tulle in Limousin. In 1507 he went to Lorraine and became physician to its young duke whom in 1509 he accompanied to the Italian wars. In 1515 he was knighted on the battlefield of Marignano and was not only himself, though a foreigner, admitted to the College of Physicians at Pavia, but by his persuasive eloquence and consummate assurance procured the admission also of the barber of the duke of Guise, although that tonsorial artist knew no Latin. Those who like to point out this or that in times past as the first appearance or dim adumbration of some "modern" or present-day invention, idea, institution or tendency may be able to see in this the germ of the granting of honorary degrees, or the practice of some universities today of establishing schools, offering courses and giving academic credit for any and every pursuit and calling in life,

or bestowing the A.B. degree upon those who know no Latin.[1]

Returning from Italy, Champier seems to have oscillated between Nancy and Lyons during the rest of his career. In 1527 he participated in the foundation of the medical college of Lyons[2] and became its first dean.[3] But when his house was pillaged in a riot of 1529 against the wealthy burghers of the city, he left Lyons for a time, although his books continued to be published there.

As Champier succeeded in other respects, he took unto himself titles of nobility, coats of arms, and family genealogies to which he had no right. It is to be feared that a similar unscrupulousness pervaded his writing and publications. Past testimony to this effect is not lacking. Julius Caesar Scaliger, who however himself was not always too trustworthy, accused Symphorien of attaching his name to the compositions of others, in which he merely altered a word or two here and there. A more impartial critic, father Ménétrier, a librarian at Lyons who from 1666 on spent some forty years collecting materials for a history of the church there, in describing those who before him had treated of the city's ecclesiastical history characterized Symphorien Champier as follows:

"A physician by profession, he assumed the rôle of jurisconsult, philosopher, orator, grammarian, gentleman and knight. He translated his own works under assumed names in order to praise himself with impunity. He wrote to all the learned to beg their eulogies (to print in front of his publications). He regaled us with fables in establishing in the church of Lyons a hierarchy similar to the celestial hierarchy."[4]

The judgment of Symphorien's more recent biographer[5] has

[1] In this connection may be mentioned Honoré Picquet, who in 1485 set up a rival medical school at Orange to give cheap degrees to all-comers, but was forbidden by a royal decree of the same year to give degrees to those who had failed at Montpelier. Nevertheless in 1495 he became a professor at Montpellier, then dean, and in 1502 chancellor. Wickersheimer (1936), p. 298.

[2] Ant. Fr. Delandine, *Manuscrits de la bibliothèque de Lyon,* 1812, I, 9.

[3] *Ibid.,* III, 333, MS 1392, "Décanats du collège des médecins de Lyon, et catalogue des docteurs reçus à ce collège jusqu'en 1700." Allut seems not to have known of this manuscript.

[4] *Ibid.,* III, 207.

[5] P. Allut, *Étude biographique et bibliographique sur Symphorien Cham-*

been less outspoken and more charitable but, one fears, less informed than Ménétrier's censure. Enthusiasts for the Italian and French Renaissance have accepted Champier as reflecting their interests, as one of the versatile and well-rounded men who represent that period. At least he shared with many humanists the capacity for self-advertising and for oratorical exuberance. So that when Scaliger called him "insolens, tumens, turgens," perhaps this should be interpreted as an indication that he was full of "the spirit of the Renaissance," that rare gas which the historical laboratory has never yet succeeded in holding in solution.

Indeed, we might call Champier a forerunner of the modern periodical or magazine, since his average volume is a hodge-podge lacking unity of subject and comprising several short treatises in various fields: some Platonism, some medicine, some history, some biography, a few letters to or from men of culture or reputation. Nothing is very long, nothing is at all thorough. Moreover, much the same set of topics is found in his next publication, which appears soon, too, like the periodical. The table of contents of a volume published by him in 1507 will illustrate this characteristic specifically.

The book of the quadruple life.

The theology of Asclepius, disciple of Hermes Trismegistus, with the commentaries of the same Symphorien.

The handbook of Sixtus, a Pythagorean philosopher.

The speech of Isocrates to Demonicus.

Forests medicinal of simples with some introductory points to the practice of the medical faculty.

Extracts from the *Practica* of Pliny Junior.

Trophy of the Gauls comprising their fourfold history.

Of the entry of Louis XII, king of the Franks, into the city of Genoa.

Genealogy of the kings of France.

Of Gauls who have been supreme pontiffs.

Various letters addressed to the same Symphorien.

To the historian of ideas it makes no great difference whether

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pier, Lyons, 1859. Where I have given no other reference for a date or fact in this chapter, it may be assumed that I have followed Allut.

Champier's numerous publications were his own work, or whether they are actually what they purport to be. If he was more of an editor and publisher than he was an author and composer, the fact remains that he put forth in printed form a large variety of works, extracts and fragments which he thought would attract attention and sell, and which therefore probably represent fairly well the intellectual interests of his time. Indeed, this would be the more apt to be true, if he were motivated not by an author's vanity over his more or less original efforts but by a piratical editor's or imitative hack writer's desire to make an acceptable selection from current subjects and literature.

Champier's publications may even be said to reflect diverse and contrary currents in the thought of the time and to appeal to different groups of readers. *La nef des princes et des batailles et la nef des dames vertueuses* is a French poem in the style of the fifteenth century. From his *Gate to Logic* (*Janua logice*), published in 1498, to the seven books on dialectic, rhetoric, geometry, arithmetic, astronomy, music, natural philosophy, medicine and theology, printed at Basel in the last year of his life, he issued works which adhered closely to the medieval Latin organization and interpretation of learning. On the other hand, his *De quadruplici vita* imitated Ficino's *De triplici vita*. He wrote a life of Mesue for the Lyons, 1523 edition of that writer and another of Arnald of Villanova for the Venice, 1527 edition of his works. Yet in his treatise on clysters of 1529 he advised to shun Arabic medical authors and to follow only Hippocrates, Galen and Dioscorides. In 1532 he printed *Castigations* or emendations of the pharmacists or apothecaries and of the Arabic medical writers, Mesue, Serapion, Rasis and Alfarabi, and of later medieval Latin physicians. In 1533 his *Epistola responsiva* defended the Greeks against the error of the Arabs.[6] In these last three works he of

[6] In this *Apologetica epistola responsiva pro Graecorum defensione in Arabum et Poenorum errata*, Champier was answering the *Apologetica epistola pro defensione Arabum medicorum ad praeceptorem suum Dominum Symphorianum Campegium* of Bernard Unger, professor of medicine at Tübingen and his former pupil. I have used the edition of Lyons, 1533, BM 775.a.1.

course was merely echoing the hue and cry which Leonicenus had raised forty years before.

History, both political and literary, was a field in which Champier was almost as active as in that of medicine. In 1510 he dedicated his *Chronicles of Austrasia* to the duke of Lorraine. He was the first in France to print, if not to compose, such works as those on famous men of Lyons and illustrious men of Gaul. He recorded the ancient inscriptions to be found in Lyons. He was something of a pioneer also in the history of medicine, publishing in 1506 a work in five parts on famous medical authors, although John Jacob Bartholoti had already in 1498 at the university of Ferrara given a sketch of the antiquity of medicine.[7] It must be added that Champier was almost totally lacking in historical accuracy, conscience, sense of chronology, or imagination, if by imagination we mean the ability to visualize past conditions and make them seem real to others. If by imagination is meant merely the reckless invention of falsehoods which appear to be unsupported by any original source, he probably displays it. Thus he asserts that Avicenna, who actually died in 1037 A.D., was poisoned by Averroes—who was not born until 1126 and died in 1198—but killed his poisoner before he himself perished. Champier thought that Avicenna flourished around 1149 A.D. His life of Arnald of Villanova in eight short chapters is a tissue of errors beginning with the assertion that Arnald was from Narbonnensis and not Catalonia. There seems to be no substantiation for his statement that Arnald, hearing that Peter of Abano was in difficulties with the inquisitors and fearing that he might fall into their clutches, fled secretly to Sicily. Champier himself says nothing of the incident in his notice of Peter of Abano in his book on famous medical writers.

A number of Champier's publications relate to the occult arts and sciences and thus attest the great interest which these had for his time. His own attitude here is rather more distinctive than usual, since he uniformly censures and criticizes magic, incanta-

[7] Lynn Thorndike, *Science and Thought in the Fifteenth Century*, 1929, p. 38, note 49.

tions, images, alchemy and even much of astrology. He printed, it is true, such a mystical work as the *Theology* of Asclepius, disciple of Hermes Trismegistus. But towards profane occultism he maintained much the same strict attitude as that of Gerson in the previous century. Indeed, his opposition to astrology, especially in medicine, was carried farther than even that of Gerson.

Symphorien Champier's *Dialogue in Destruction of Magic Arts* had appeared at Lyons shortly before the close of the fifteenth century.[8] This conversation of Symphorien with his pupil, Andreas, opens in a very simple and elementary style but improves as it goes on. Fascination is said to affect the heart through the blood and the spirits. Symphorien states that the spirit emits rays through the eyes as if through glass windows. The heart is in perpetual motion and drives the blood, and with it the spirits, through the whole body and thereby scatters sparks of light through the individual members of the body.[9] For the blood is a traveler.[10] In this, however, there is no intimation as to the circulation of the blood.

In dwelling upon the power of imagination, Symphorien gives us an explanation of the use of red bed-clothes in cases of smallpox, that vehement imagination towards red objects and gazing

[8] On the title page: "Dyalogus singularissimus et perutilis viri occulentissimi (*sic*) domini simphoriani lugdenen. in magicarum artium destructionem cum suis anexis de fascinatoribus de incubis et succubis et de demoniacis per fratrem Symonem de Ulmo sacre pagine doctorem et ordinis *minorum fideliter correctus*. Estque dyalogus liber in quo aliqui simul de aliqua re conferentes disserentesque introducuntur." At the close: "Impressum Lugduni per magistrum guillermum Balsarin xxviii die mensis augusti." But the year is not given. The year 1500 is usually suggested: see Copinger 1570, GW 6552, "um 1500." But Proctor suggests 1498 for the copy numbered IA.41789 at the British Museum which I have used. I have also made some use of the copy numbered Rés. E.2337 at the Bibliothèque Nationale, Paris. Hansen, *Quellen*, 1901, pp. 256-58, has printed extracts from this treatise.

[9] *Ibid.*, fol. (a vii) recto: "Tales autem sunt in nobis spiritus qualis est sanguis humor. Spiritus autem similis sibi radios per oculos quasi per vitreas fenestras emittit. Cor enim suo perpetuo quodam motu proximum quidem sanguinem agitans ex eo spiritus in totum corpus perque illos luminum scintillas per membra diffundit quidem singula."

[10] *Ibid.*, fol. a vii) verso: ". . . peregrinus hic sanguis."

at them moves the blood. Some ancient philosophers held that by intense imagination the souls of men could be united to the Intelligence of the moon, which, they said, ruled the four elements and everything from the sphere of the moon to the center of the earth. But Symphorien rejects this theory as absurd, contending that many things happen in these inferiors from their own nature and not from the influence of the Intelligence of the moon, and that the humors in the body may be so altered by imagination that seemingly stupendous changes follow. Some astrologers, like Albumasar and Peter of Abano, have said that prayers are answered under certain constellations and that astrological images are valid. "For those astrologers mixed many falsehoods with some truths." After further beating about the bush, Symphorien concludes that imagination cannot act on another body, and that he who holds the contrary "seems to suffer insanity in the faith of Christ."

The discussion then turns to witchcraft. Tales of witches' sabbats are, in Symphorien's opinion, usually either illusions or tricks of the devil. Although witches perform some injurious acts, their confessions contain more falsehoods than truth. Judges therefore should employ great caution, consult with men trained in theology and philosophy, and call in skilled physicians, in order that by inspection of the person's *complexio,* examination of his dreams, and judgment from the aspect of his body, it may be determined whether his phantasy is affected. If so, he or she should receive medical attention and treatment. And let their confessors persuade them not to credit such visions and use exorcisms and prayers against such.

Eight conclusions follow which deal chiefly with the powers of demons in magic. They can accomplish nothing against a man who does not believe in their figments and, conversely, are efficacious in magic only over men who have little trust in God. Men can be freed from diabolical magic by prayer, alms, confession and fasting. On the other hand, those things which are done by the action of separate substances like demons cannot be dissolved by natural virtues, because the power of separate

substances is greater than that of animals. But diabolical sorcery can be dissolved by the aid of good angels or, some say, by sorcery which employs demons of a superior order. It can also be dissolved by exorcisms of the church but not by such animal substances as the liver of a black cat. Champier gives the usual explanation of the action of incubi and succubi but notes further that among medical men incubus denotes a constriction or estoppage, as of movement, breathing or voice.

Next Champier turns to the distinction between divine, human, and angelic or demonic intellect and knowledge. The angelic intellect occupies a middle position between the human and the divine and neither knows itself through other things nor other things through itself, for it knows itself by essence and other things by species. Therefore in a melancholy person the speaking of languages previously unknown to him or hidden secrets are signs that he is possessed by a demon, although Aristotle gives a natural explanation even for such phenomena. As usual, Champier hesitates which side to take. But while he recognizes that one must guard against deception and fraud in such cases, and that astrologers refer such effects to celestial causes, he does not believe that such cases can be explained from melancholy or the stars alone, but that some angel or demon must be joined with the human soul. Aristotle may not have encountered any cases which he could not explain naturally, but the Bible and other early Christian works convince Symphorien of the existence of demoniacs.

Champier again touched on magic in the midst of his account of famous medical writers, where he gave an elaborate list of divisions and departments of magic with their respective inventors.[11] But it is taken entire from the earlier work of Thadeus of Parma in 1318, perhaps indirectly through Giorgio Anselmi who copied the classification from Thadeus in the fifteenth century. Champier also repeats stories of Vergil as a magician at Naples.

In his work on the quadruple life Champier, as Mönch has

[11] *De medicine claris scriptoribus*, 1506: copy used BM 541.c.21.

pointed out,[12] did not follow Ficino in the very favorable attitude towards astrology of *De vita coelitus comparanda* but took up a position more like that of Plotinus and Pico della Mirandola. He even questioned, if we believe Mönch, the influence of the constellations on diseases and their treatment, but I failed to find such a passage in this particular work of Champier.[13] He attacked astrological images again, as he had done in his book of the year before.

Astrology was further criticized by Symphorien Champier in his *De triplici disciplina,* printed in 1508.[14] In its *Orphic Theology,* book 2, chapter 8, he declares that the Christian religion is not from the stars, as astrologers erroneously affirm. In the *Theology of Trismegistus,* Particula 6, anent the assertion that Saturn strengthens the talent of contemplation through saturnine demons; Jupiter, that of governing; and Mars, magnitude of mind, Champier makes the comment that this is what Trismegistus and Plato say, but that in his time many persons, depraved by such doctrine, enter into secret pacts with demons and implicate their souls in the gravest errors. As for himself, he intends never to depart from the purity of the Catholic faith and he holds such assertions to be of no account. If he repeats them, it is only in the hope of discovering some small pearl of truth that may accompany the false notions. He insists furthermore that only Apuleius, and not Hermes Trismegistus, was a believer in animated statues.

In 1514 Champier wrote on the errors in the *Conciliator* of Peter of Abano,[15] the leading Latin medical text of the early fourteenth century. The motive does not seem to have been a humanistic turning away from medieval medicine to ancient texts, since the criticism is not literary or philological, while it

[12] Walter Mönch, "Der Arzt Symphorien Champier und seine geistesgeschichtliche Bedeutung für Frankreichs Frührenaissance," Sonderabdruck, *Fortschritte der Medizin,* 16. October, 1933, especially p. 10.

Champier's *Liber de quadruplici vita* I have examined in the edition of 1507: BM 544.g.1.

[13] We shall presently hear Champier criticize the astrological medicine of Peter of Abano.

[14] Copy used: BM 773.b.16.

[15] *Annotamenta errata et castigationes in Petri Aponensis opera.*

is admitted that Peter was a great man who said many things learnedly in medicine and philosophy. But even Homer sometimes nods. So Peter of Abano was occasionally overbold and curious in doctrine and made statements which Champier believes are superstitious, too close to magic, and contrary to either Judaism or Christianity. Peter is censured for alluding to the notory art without disapproval and for adducing other "magical experiments," which Champier believes can be accounted for only by pacts with demons. He further criticizes Abano for attributing cures to the use of incantations. Already in 1506 Champier had advised his readers to follow the *Decretum* of Gratian rather than Peter of Abano in regard to incantations. Champier further reproaches Peter with casting doubt on divine creation, when he asserts that nothing can be made from nothing. "O egregious crime!"

Passing to Peter's astrological doctrine, Champier rejects astrological images for the third time and also the theory of great conjunctions, more especially as having foreshadowed Noah's flood and the advent of the prophet Mohammed. Champier argues that classical astrologers like Ephestion (Hephaestion of Thebes), Julius Firmicus Maternus and Ptolemy knew nothing of this theory of conjunctions, and that the leading Arabic writers on astrology, such as Alcabitius, Albumasar and Messahala, disagreed in its detailed application. He further contends that the star of Bethlehem was a special divine creation and so not open to astrological interpretation. Finally, he notes how badly mistaken famous astrologers of the past have been in their predictions on the basis of great conjunctions: Albumasar, Arnald of Villanova, and Pierre d'Ailly, for instance. Champier then repeats from Pico della Mirandola or earlier writers certain arguments against astrology in general, such as that the practitioners of the art are themselves unfortunate, while those who reject it are better off. Various church fathers, Bonaventura, Plato and Aristotle are adduced as authorities against it. Champier admits, however, an influence of the stars on the weather, crops, disease, sedition and war, but opines that philosophers,

physicians, farmers and sailors can foresee these effects as well as astrologers.

The second and third books of Champier's exposé of Peter of Abano's errors list particular erroneous passages: seventeen in book two, and ten in book three. Peter is twitted for ascribing a highly curative medicine to the influence of Mars, the most hateful of the planets and a source of misfortune, and for his statement that physicians are apt to be men of bad character. His assigning seven intelligences to the seven planets, and to each of these a rule for 354 years of history is included as an error. So is his assertion that every mundane geniture depends on the planets as iron on the magnet. Even his observing the position of the moon in administering purgatives or in performing surgical operations is classed as an error, as is his explaining the existence of dry land by celestial influence. Indeed, his making the stars secondary causes and his ascribing human longevity to their influence are among the passages listed as erroneous. This treatise by Champier on Peter's errors was appended to some, if not all, subsequent editions of the *Conciliator*. It occurs at the close of the Venetian editions of 1520 or 1521, 1526, 1548 and 1564-1565, and in that of Pavia, 1523, and should have acted as a corrective for the reading public against the Conciliator's leanings towards astrology and other occult sciences. His astrological doctrine had commanded admiration more than censure hitherto, as in the case even of an inquisitor, Francis of Florence, writing against popular superstition.[16]

Champier evidently derived the idea of discussing Peter's errors from Giovanni Francesco Pico della Mirandola, who in his *De rerum praenotione* had asserted that a whole book could be collected of Peter of Abano's errors.[17] Francesco also from time to time specified particular instances of such slips on Peter's part: his theory in the ninth Differentia concerning the longevity of the patriarchs, his misdating Averroes (an error which Sym-

[16] T IV, 319-21.

[17] *De rerum praenotione*, III, 4, *Opera*, Basel, 1572-1573, II, 447: "iustus et integer liber ex eius erroribus seorsum colligi posset."

phorien seems not to have taken to heart), his making the lunar month 26 days and 12 hours in duration, omitting the three days during which the moon is obscured by the sun as a negligible time during which it exerted no influence.[18] Francesco Pico further noticed Peter's errors concerning critical days, his faulty effort to refer the circulation of the four humors to the planets, and the doctrine of invisible images in the decans of the zodiac.[19] Not all these points are repeated by Champier, nor are all his criticisms found in the work of Francesco Pico. But more than once Champier repeats the other's very words, as when he speaks of Peter as "once of good name among physicians . . . but a man of wide reading but very slight judgment,"[20] or touches upon his favoring attitude towards incantations,[21] or borrowings from the magic book of Picatrix.[22]

In 1517 Champier published a volume on wonders of the world which was geographical in plan and followed the maps of Ptolemy. It went a little farther north than Ptolemy but seems to contain no material reflecting the recent voyages of discovery. Indeed, everything in the text seems as old as Ptolemy or the phoenix.

A work on materia medica by Symphorien possesses more merit and gives some evidence of personal medical and pharmaceutical sense and knowledge. This was his *Castigations or Emendations of Pharmacists or Apothecaries and Arabic Physicians,*[23] of which the brief first book on medicinal simples is the best and was reproduced still more briefly in French as *Le Myrouel des appothiquaires.* As is indicated by the opening words of the Latin text, "Hermolaus Barbarus, Nicolaus Leonicenus, Ioannes Manardus, Petrus Barotius, Ruellius Gallus, Marcel-

[18] *Ibid.*, V, 4, p. 518.
[19] *Ibid.*, V, 11, pp. 521-22.
[20] *Ibid.*, VII, 7, p. 660; the wording continues identical in both works for several lines.
[21] *Ibid.*, V, 7, p. 552.
[22] *Ibid.*, VII, 7, p. 662.
[23] *Castigationes seu emendationes pharmacopolarum sive apothecariorum ac Arabum medicorum Mesuae Serapionis Rasis Alpharabii* (sic) *et aliorum juniorum . . . in quibus quicquid apud Arabes erratum fuerit summa cum diligentia congestum est . . .*, Lugduni apud J. Crespin, 1532, 8vo. Copy used: BN T[21].760.

lus . . . ,"[24] Champier to a large extent follows previous writers. He asserts, however, that he had made a collection of his own of errors of the Arabs, but that it was now scattered through various schools and universities of France in the hands of his disciples or in blind and dusty corners of his own library.[25] But Champier does not merely criticize Avicenna, Mesue and Serapion, or recent pharmacists and "junior physicians," by which expression he refers to medieval and recent Latin writers. He has to admit that these writers also had their merits, had found new uses for simples known to the ancients, and had discovered other "most noble and efficacious medicaments," of which the ancients were utterly ignorant.[26] Champier also sometimes speaks from his own observation and experience. He describes an herb he had seen at Chartres or tells of having just once seen genuine lignum aloes, in the apothecary shop of Renatus Villaterius at Lyons.[27] He had tried long and hard but in vain to see a green specimen of the dried root which was imported as turbith but whose provenance no one knew. It had proved perilous to many patients at Lyons and Chartres.[28] He also remarks concerning several different simples, "What I have been able to see thus far was far removed from the qualities of the genuine in color, substance and virtue," or "in odor, color and substance."[29] But employment of this stock formula is not very convincing evidence of repeated personal examination. Despite his generally unfavorable attitude towards occult arts, Symphorien allows at least one extreme instance of occult virtue in a simple to enter his pages when he says that some have written that the bodies of soldiers which fall in battle upon scordion do not rot for a long time, particularly those parts which touch the herb.[30] There are a number of resemblances between Champier's *Castigations* and an *Examen* which Brasavola published a few years after, and in that

[24] *Ibid.*, fol. xviiir.

[25] *Ibid.*, fol. xvir, in the dedication to Ioannes Galfredus.

[26] *Ibid.*, fol. lxiii recto.

[27] *Ibid.*, caps. 23 and 37, fols. 39r and 52r.

[28] *Ibid.*, cap. 25, fols. 40v, 42v.

[29] *Ibid.*, cap. 14, fol. 29v, concerning terra lemnia, and in caps. 33, 34 and 37 concerning scammony, bitumen Judaicum and lignum aloes.

[30] *Ibid.*, cap. 13, fol. 29v.

connection we shall have occasion to revert to it in a later chapter.

Champier touched again on astrology and other forms of occult science in a work published at Lyons on March 26, 1518[31] and addressed to two royal councillors and physicians, Albert du Puy and André Briau.[32] Although the text covers only 23 pages, it is divided into three books respectively devoted to the prognostications of prophets, of astrologers, and of medical men, and these into numerous chapters. In the book on prophets Champier also considers the Hebrew Cabala, natural magic against which he says Pico finally turned, poetic fury, the causes of pestilence, storms, sterilities and our other scourges, which like Francesco Pico he ascribes to divine wrath rather than to the stars, and a vision of St. Hildegard against astrologers. In the second book he contends that the Christian religion is not under the stars and criticizes Peter of Abano for relating the flood and final conflagration of the world to the constellations, Abraham Avenezra for predicting the advent of the Messiah from the conjunctions of 1444 and 1464—instead of which king Ferdinand expelled all the Jews from Spain—Arnald of Villanova for his prediction concerning the coming of antichrist, and Ludovicus Vitalis, the astrologer of Bologna, for predicting the death of pope Alexander VI. Champier notes that the astrologers had predicted an earthquake for the year 1524 but says nothing of any prediction

[31] *Pronosticon libri tres quorum primus est de pronosticis seu presagiis prophetarum Secundus de presagiis Astrologorum Tertius de presagiis medicorum. Peroratio. Devenimus tandem Alberte atque Andrea amantissimi ad optatum finem. . . Valete Lugduni regnante Francisco Francorum rege Christianissimo huius nominis primo Anno ab incarnatione Christi MDXVIII septimo calendas Aprilis. Finis librorum Pronosticon domini Symphoriani Champerii equitis aurati ac nobilissimi Lotharingie ducis Antonii primarii medici excusorum impensis Vincentii de Portonariis insubris bibliopoli nominatissimi.*

Vincent's name also appeared on the title page in a border enclosing a woodcut of an angel. Copy used: BN Rés. Z. Fontanieu 156. (5).

[32] "Ad dominum Albertum de Podio christianissime Gallorum regine Claudie consiliarium ac primarium medicum atque dominum Andream briellum christianissimi Gallorum regis itidem consiliarium ac medicum dignissimum Symphoriani Champerii Epistola."

For further details concerning Briau see Wickersheimer (1936), 23. The only Albert del Puig or du Puy listed by Wickersheimer was of the fourteenth century.

of a flood then. He terminates the book with discussion of the earthquake and eclipse at the time of the Passion. His third book is at first concerned chiefly with the medical prognostic of Hippocrates and Galen, then peters out into a pest tract.

Against the alchemists we have by Champier a letter of five pages which was printed late in his life in 1533.[33] This letter is addressed to three men: John Capellanus, N. Miletus, and Hieronymus Montuus. Champier tells how he dropped in on the evening of September 20, after visiting his sick patients, at the pharmacy of Renatus Villaterius, as was his custom. Thomas a Strata, a doctor from Turin, entered with a book on a hot spring near Grenoble and some brochures by the aforesaid Montuus. The discussion then turned to alchemy. Petrus Areodus[34] supposed celestial influence in the generation of sulphur, quicksilver and nitre, but Champier was not satisfied with his arguments for transmutation. There are three opinions as to the generation of metals: one that they are produced from vapors and exhalations by the action of first qualities and celestial heat; the second that of Francesco Giovanni Pico della Mirandola that they are produced from inferior matter by the force of that radiant heat; the third that of Champier that they were so created by God and remain unaltered. He asserts that silver and gold are not generated directly from quicksilver and sulphur, for the rich silver mines of Lorraine contain no trace of quicksilver. He repeats a statement already made in his life of Arnald of Villanova that

[33] *Epistola Campegiana de transmutatione metallorum contra alchimistas ad D. Ioannem Capellanum, N. Miletum et Hieronymum Montuum,* printed with his *Epistola responsiva pro Graecorum defensione in Arabum errata,* and other works, 1533, fols. 37r-39r.

[34] Pierre Areod was a physician of Grenoble who suggested sanitary measures to prevent a return of the pest, after it desolated that city in 1533, and who was one of those in charge of the representation of a mystery play in 1535. He appears to have been the author of the work on the hot spring alluded to by Champier. Adolphe Rochas, *Biographie du Dauphiné,* Paris, 1856, says that the work was directed against the system of Jerome Monteux, identical with the Hieronymus Montuus mentioned above by Champier.

Brunet, *Supplement,* I, 54, gives Areod's work on the hot spring near Grenoble as "Impressum Lugduni per Gilbertum de Villiers, 1525," and states that a copy was acquired by the Bibliothèque Nationale of Paris in 1865.

the founders of alchemy were an Arabic Hermes, not the ancient Hermes Trismegistus, and a most inept barbarian of putrid brain called Geber, and that the stories told of Arnald and John of Rupescissa are false and full of fables. He also affirms that both Arnald and Raymond Lull repented in later years their youthful attachment to the art. He closes with a verse at the expense of the "vaniloquos alchimistas."

As has already been implied and as subsequent chapters will reveal more fully, Champier was more peculiar among the learned of the sixteenth century in his rather sweeping hostility to the occult arts and sciences than he was in his frequent discussion of them, in which he well illustrated the age and catered to its weakness. His combination of hostility to things occult with utter disregard of literary conscience and historical truth may seem strange indeed, but we shall encounter many more such paradoxical attitudes before we are through with the men of the sixteenth century.

CHAPTER VIII

AGRIPPA AND OCCULT PHILOSOPHY

Nullis hic parcit Agrippa. Contemnit, scit, nescit, flet, ridet, irascitur, insectatur, carpit omnia: ipse philosophus, daemon, heros, deus et omnia.

—MELCHIOR ADAM

Neither is Henry Cornelius Agrippa of Nettesheim himself to be reckoned of much weight in intellectual history nor is his book on occult philosophy so important a work in the history of magic and experimental science as one might think at first sight. He was not a person of solid learning, regular academic standing, and fixed position, but rather one of those wayward geniuses and intellectual vagabonds so common in the later fifteenth and early sixteenth centuries. In 1509, when not yet twenty-three, he lectured at the university of Dôle on Reuchlin's *De verbo mirifico,* and had a controversy with a Franciscan who called him a Judaizing heretic on that account. Before this in 1507 he had carried on alchemical experiments at Paris and he resumed them in this same year 1509 at Avignon. From 1511 to 1517 he was in Italy, where in 1515 he lectured at Pavia on the Hermetic philosophy and Marsilio Ficino's commentary on the *Pimander.* We find him practising alchemy again at Metz in 1518 and 1519, as well as courageously defending a woman who had been hounded down by the mob and inquisitor as a witch. In 1520 he was at Cologne and at Geneva, where he married a second time. Presently he became municipal physician of Fribourg, although he had no medical degree. He never stayed anywhere long, generally contrived to get into trouble wherever he went, and, like Paracelsus, left in a huff. His interest in the doctrines of reformers and Protestants—in 1519 he corresponded with Jacques Le-

fèvre d'Étaples, in 1525 he possessed books of Luther and Carlstadt—also tended to lay him open to suspicion.[1]

Failing to hold any university teaching position permanently, Agrippa turned to the illicit practice of medicine or to the life of a courtier and office seeker. Having become physician to Louise of Savoy, queen mother of France, while she was at Lyons, he was left behind without pay on her departure, although he was never quite sure whether this was because he had predicted from the stars the success of the duke of Bourbon or because a letter had been brought to her attention in which he told a third person that she abused astrological judgments and was led on by vain hope and superstitious faith. A trip to Paris in an attempt to recover his favor at court was in vain. Next he appears at Antwerp practicing medicine again without a degree during a pestilence. When the plague was over, the local physicians forced him to desist. Birds of a feather flock together, so that we are not surprised to find Agrippa in 1530 addressing to the Grand Council of the Netherlands in session at Malines a defense of Jean Thibault, a contemporary quack and astrologer, against the attack of the physicians of Antwerp, whom he calls envious pigs and defends empiricism against their foolish rational and scholastic medicine. Agrippa would even prefer that mechanical operative medicine which Thessalus said he could teach in six months and which needs no dialectic or mathematics. He asserts that Thibault cured many cases which these doctors had abandoned as hopeless, and that the reason why they did not proceed against him during the epidemic was that they fled from the city at that time.

Agrippa next obtained the post of imperial historiographer, for which he was poorly paid and did little to be paid for. He complained that his work *On the Uncertainty and Vanity of the*

[1] For the chronology of Agrippa's career, as set forth in this and the two paragraphs immediately following, I have followed Aug. Prost, *Corneille Agrippa: sa vie et ses oeuvres,* Paris, 2 vols., 1881, 1882.

On his position in the history of philosophy there is a dissertation by Erich Halm, *Die Stellung des H. C. Agrippa von Nettesheim in der Geschichte der Philosophie,* Munich, 1923.

Sciences, now first printed in December, 1530, which aroused against him the faculties of Louvain and the Sorbonne, also lost him the imperial favor. Meanwhile in 1531 the first book of his *Occult Philosophy* was published at Antwerp and Paris, a quite inconsistent procedure, since in *De incertitudine* he had specifically recanted the views expressed in this work. But after he had withdrawn to the protection of the archbishop of Cologne, publication was resumed at that place in November, 1532. The inquisitor, Dominicans and theologians of the university of Cologne made difficulties and delayed publication, however, so that the full text of the three books appeared only in July, 1533, without name of place or printer. John Wier, who later wrote against the witchcraft delusion, was with Agrippa at Bonn in 1535 as pupil and amanuensis. The next year Agrippa again resumed his wanderings and met his death. Gesner, writing in 1545, states that Agrippa, a golden knight and doctor of both laws, had died in Grenoble within a decade or thereabouts reduced to extreme poverty.[2] Thus his troubled, chequered career, marked by no particular distinction but by poverty and bickerings, seemed to end in failure. But he had exerted considerable influence during his lifetime by a fairly wide correspondence with learned men, and, while his medical practice and genius had been far inferior to those of Paracelsus, he had succeeded in publishing his chief works before his death as Paracelsus had failed to do. These works rapidly became well known, perhaps more because they were generally prohibited and because they gave vent to two leading intellectual currents of the time, occultism and scepticism, than because of any intrinsic worth.

Before, however, we come to estimate the contents of Agrippa's *De occulta philosophia,* let us note further by a thumbing of his letters a few hints that all through his life the occult arts and sciences had been his major interest. Despite the professed recantation in *De incertitudine* and occasional expressed scepticism

[2] Gesner (1545), fol. 307r: "H. C. Agrippa ab Nettesheym a consiliis et archivis Inditiarii sacre Caesareae Maiestatis armatae militiae equitis aurati et utriusque iuris doctoris qui intra decennium aut circiter Gratianopoli in Gallia ad summam paupertatem redactus obiit."

as to astrology, he was not untrue to himself in printing, despite strong opposition, as probably his last publication towards the end of his life, this work begun in his youth and of which he had presented a first draft to Trithemius in 1510.[3]

Throughout his life Agrippa was a devotee of the Cabala. On April 30, 1512, he writes from Pavia to father Chrysostom that he sends him the cabalistic book he desired and assures him that "this is that divine science sublimer than all human striving" and that he should conceal in silence in his breast "this wholly sacred and divine art."[4] Or in May, 1525, a friend promises to bring Agrippa "the cabalistic art with many books of Raymond Lull."[5] Or in 1532 Agrippa writes to Bernard,[6] majordomo of cardinal Campeggio, that he counts upon him to obtain a copy of the *De arcanis* of Petrus Galatinus, the *Cabala* of Samuel, and the ancient Hebrew alphabet. Bernard replies that he is working day and night upon his mystic cabalistic system. He sends greetings to Ludovicus Lucena, from whom he hopes to have more secret light on the significance of the Hebrew letters. Later he writes again from Bologna to Agrippa that he has already sent the Hebrew alphabet attributed to Esdras and is sending from Venice the book of Galatinus. At Padua he met Franciscus Georgius, who has other books in which they are interested but who said that the *Cabala* of Samuel was disappointing. A Hebrew scholar named Aegidius who died the past month left other books on the Cabala which Bernard will try to procure. All this shows that the unfavorable opinion of the Cabala expressed in *De incertitudine* was either merely an assumed pose to conform to the sweepingly sceptical character of that work or represented but a passing mood from which in 1532 Agrippa returned again to his former favorite field of study.

On the much less dignified, less difficult, and less divine art

[3] An early copy of it is preserved in Würzburg University M.ch.q.59, concerning which and its enlargement in the printed edition see Josef Bielman, "Zu einer Handschrift der Occulta philosophia des Agrippa von Nettesheim," *Archiv f. Kulturgeschichte*, 27 (1937), 318-26.

[4] Ep. I, 31.

[5] Ep. III, 67.

[6] For the correspondence with Bernard, Ep. VII, 2, 7, 22.

of geomancy Agrippa had himself composed a treatise[7] and in 1526 sent to Metz for it and also for the work of Trithemius on steganography.[8] In another letter of April 27, 1530 Agrippa apologizes for his delayed arrival because he knows his correspondent is eager to see a geomantic table of Scepper which he is bringing with him.[9] Apparently Scepper's *Assertion of the Faith Against Astrologers* did not keep him from lapsing into a lower form of divination. Nor did Agrippa's own previous practice keep him from writing in *De incertitudine,*[10] after listing earlier geomancies by Hali, Gerard of Cremona, Bartholomew of Parma, and a certain Tundinus, "I too have written a geomancy quite different from the rest but no less superstitious and fallacious or, if you wish, I will even say 'mendacious.' "

Astrological prediction at times irked Agrippa and was called by him an unworthy artifice or idle superstition, but he seems to have done a good deal of it.[11] Rather characteristic is the letter in which he warns a Dominican, Petrus Lavinius, that judicial astrology is a vain superstition and not for a Christian, but at the same time sends him the judgment for which he had asked.[12] He also sent a prognostication to a friend in Chambery "from which you will judge how fine an astrologer I have become"—perhaps an ironic remark—and one to the queen mother of France, Louise of Savoy, and the next year (1527) to the duke of Bourbon.[13] For erecting figures of the sky he preferred Regiomontanus but used the *Alfonsine Tables* for most other purposes such as the movements and aspects of the stars, although he had tried Bianchini, John de Lineriis, and others.[14] In another letter he calls the *Speculum astronomiae* of Albertus Magnus a work not praised enough.[15] Late in life he refers to past eclipses, comets, earthquakes, floods and more recent prodigies and signs

[7] Although Prost himself mentions it once (see next note) he fails to note it again either in his Appendix IV, pp. 439-441, "Études et travaux d'Agrippa sur les sciences et les arts occultes," or in Appendix XXXIV, "Bibliographie des ouvrages d'Agrippa."

[8] Prost II, 101. Ep. II, 25 and 28.

[9] Ep. VI, 17.

[10] Cap. 13.

[11] Ep. IV, 29, 30, 36, 37, 44.

[12] Ep. IV, 19.

[13] Ep. IV, 4; V, 4, 6; Prost II, 111-112.

[14] Ep. III, 57.

[15] Ep. II, 19.

in the sky as all pointing to one conclusion, and declares that "I predict these things to you, not by doubtful methods of conjecture nor acting under the influence of mental perturbation contrary to true reason but from true arts of vaticination, oracles, prediction and foreknowledge."[16]

Agrippa's friends and correspondents looked on him as a fount of information concerning the occult arts. While municipal physician at Fribourg he instructed a number of prominent citizens in such sciences.[17] In 1527 or 1528 a friend asked Agrippa to send him books of chiromancy with which to amuse himself when exhausted by the din of court life.[18] On December 28, 1532, the majordomo of cardinal Campeggio alluded to a mirror that Agrippa had once showed him in which the dead seemed alive.[19] Another correspondent yearned to see Agrippa, to bathe in the waters of occult philosophy, and to unravel the enigmas and secrets of Picatrix and the Cabala.[20] Another wrote to ask for Agrippa's book of natural magic, which he said he had seen at the university of Pavia. This was what was developed by Agrippa into his three books on occult philosophy. At the time he sent an index or abstract, explaining that it would be sacrilege to publish it to the crowd, and that he reserved the key to it for himself and his friends.[21] Why Prost should interpret this usual profession of esoteric knowledge as showing ironical disbelief in astrology I cannot understand.[22] Again in 1527 came another demand for the work.[23]

As for alchemy, in 1526 the curé Brennonius writes from Metz to Agrippa that "our Tyrius," whose vocation was clock-making and avocation alchemy, "has discovered a sweet water in which every metal is easily dissolved by the heat of the sun." It was made from wine, for he separated the four elements and extracted from earth the nature of sulphur. Brennonius, however, had done the same from chelidonia and believed that the water

[16] Ep. VII, 20.
[17] Prost II, 39.
[18] Ep. V, 69.
[19] Ep. VII, 22.
[20] Ep. VI, 32.
[21] Ep. III, 55-56.
[22] Prost II, 36-37.
[23] Ep. V, 14.

could also be made from anything putrefied—eggs, flesh, bread or herbs of whatever sort.[24] Yet four years later in *De incertitudine* Agrippa was to declare that alchemy should be prohibited.

Perhaps we can see the reason for Agrippa's persistence in occult practices despite occasional scepticism or religious qualms in the following passage. "Oh! how many writings are read concerning the irresistible power of the magic art, concerning the prodigious images of the astrologers, the marvelous metamorphosis of the alchemists, and that blessed stone which Midas-like turns all to gold or silver at its touch. All which are found vain, fictitious and false as often as they are practiced literally. Yet they are handed down in writings by great and most grave philosophers and holy men whose traditions who will dare to call false? Nay it would be impious to believe that they have written falsehoods in those works. Hence the meaning must be other than the literal sense indicates."[25]

Agrippa's letters also show him interested for a time at least in machines, bridges and military engines,[26] while in *De incertitudine* he alludes to having once been put in charge of some mines by the emperor and having started to write a book on mining and metallurgy.[27] But he was to a large extent a dabbler and trifler who did not adhere to any given interest for long, just as he did not stay in any one place. Except that always he kept coming back to occult science. Even in *De incertitudine* he gives information and reveals his knowledge of the field of occult science, devoting a score of its 85 chapters to occult arts and listing past writers on such subjects as chiromancy and natural magic.[28] But it is of course to his *De occulta philosophia* that we especially turn for his attitude to the occult arts and sciences.

As was implied in beginning, it is a disappointing book. It is not a practical manual or even a general theory of the subject but merely a literary description and review, full of what the author doubtless flattered himself was erudite allusion and hu-

[24] Ep. IV, 27-28.
[25] Ep. V, 14.
[26] Ep. IV, 44; V, 20.
[27] Cap. 29.
[28] Caps. 35 and 42.

manistic eloquence, but vague, totally lacking in precision, and written in the pseudo-Platonic, mooning style of Iamblichus, Ficino and Reuchlin rather than the direct practical tones of Roger Bacon and Albertus Magnus. Cabalistic matter and manner far exceed any natural magic.[29] Despite the title, there is little philosophy to the work, and the author has nothing new to say on his subject. He has read widely in its past literature and is valuable in a scattering way for its bibliography. Yet even in this respect he has failed to achieve anything like an exhaustive or systematic review. Sometimes past writers are misquoted or misunderstood, as when it is asserted that Aquinas in his third book against the Gentiles admits that the human soul can be joined with the celestial intelligence and work marvels.[30] Or the dubious, if not spurious, *De fato* is cited to show that Aquinas held that works of art receive a certain quality from the stars, whereas really this is just what he explicitly denies in his works of undoubted authenticity.[31] While the book is diffuse and mystical, a much better and meatier encyclopedia of ancient and medieval magic might have been composed than Agrippa's, which seems a hasty rather than thorough piece of work, despite the fact that the author had been so long occupied with it.

Sometimes Agrippa's work may preserve bits from earlier writers that otherwise would not be extant, but this is not often the case. Richard Argentinus, writing in 1563, asserts that Cornelius Agrippa in his *Occult Philosophy* stole from the libraries of magic of John Torresius of Spain and Bellisarius Petrucius magic characters which he reproduced only faultily because of his ignorance of Syriac.[32]

The work divides into three books corresponding to the three worlds of the cabalists: elemental, celestial or mathematical, and

[29] Brucker, *Historia critica philosophiae*, 1742-1744, pp. 386-421, with no little propriety discussed Agrippa under the caption of Platonic-Pythagorean-Cabalistic philosophy.

[30] *De occulta philosophia*, I, 67.

[31] *Ibid.*, II, 35.

[32] Ricardus Argentinus, *De praestigiis et incantationibus daemonum et necromanticorum*, Basel, 1568, p. 61. Although not printed until 1568, the work is dedicated from Exeter in February, 1563.

intellectual. Magic is said to embrace the knowledge of all nature. Occult virtues are not of any element but a sequel of a thing's species and form. They are implanted in the species of things by the ideas from the world soul through the stars, and even individuals of the same species may receive different occult virtues from the stars. Sympathy and likeness are the guiding principle or key in the investigation of these occult properties. Agrippa then treats of the distribution of inferior things under the planets and how through natural things and their virtues we can attract the influences of the heavenly bodies and even penetrate to intellectual, demonic and divine forces. The last dozen chapters or so (58-70) of the first book deal with the magical possibilities of the human mind, soul and words, for although these might be regarded as more intellectual than elemental, they are presumably regarded as sunk and bound in this lower world of the elements and body.

The second book is first occupied with the symbolism and virtues of numbers and letters of the alphabet and then with astrology. If there are great occult virtues in natural objects, much more is this the case with numbers which are more purely form and closely related to the celestial bodies and separate substances. Scales are given for the numbers up to twelve. Take two, for example. For the archetype we have the name of God in two letters, in the intellectual world are angel and soul, in the celestial world sun and moon, in the elemental world earth and water, in the microcosm heart and brain, in the inferno Behemoth and Leviathan. Divination by attributing numerical values to letters, astrological images, geomantic figures, and the names of the planets to be employed in magic incantations are other features of the second book.

In an early chapter of the third book Agrippa hints that such ceremonies as excommunicating worms and locusts to save the crops or baptizing bells are relics of the perverse religions of the Chaldeans, Egyptians, Assyrians, Persians and Arabs of the past. But soon he is immersed in cabalistic lore of divine names. The subsequent discussion of demons lacks unity and is a hodge-

podge from previous writers, yet by no means covers the various descriptions and classifications of them to be found in classical, patristic and later medieval writers. After some consideration of necromancy and evoking the souls of the dead, we return again to the power of the human soul, to various forms of divination and to ceremonial observances. The work ends with an injunction of secrecy.

Whatever its defects, Agrippa's *De occulta philosophia* gave a more general presentation of the subject than could be found elsewhere, at least in print. Partly on this account, partly because of its daring enunciation of certain suspect doctrines such as that of a world soul, partly because of advertising which it received by being placed on various lists of prohibited books and *Indexes*, it found a number of editions[33] and readers during the next two centuries. In 1565 or 1567 was added an apocryphal fourth book of an extreme magical character which appealed further to prurient ears, although Wier defended Agrippa from the attribution of it to him.[34] Agrippa became the hero or villain of legendary tales in the handbooks on witchcraft. Delrio and Boquet tell of a pupil of his at Louvain entering the master's study during Agrippa's absence and opening a book of adjurations.[35] A demon promptly appeared, and the youth died either of fright or because attacked by the demon. When Agrippa returned and saw the dead body, he in turn invoked the demon, whom he forced to enter the corpse, to take a few turns about the square in the presence of other scholars, and then to leave the body which fell to the ground as if the youth died only then, thus clearing Agrippa of suspicion as the cause of his death. But his flight into Lorraine soon followed.[36] Boquet further asserts

[33] A list of these is given by Prost, II, 514.

[34] *De praestigiis daemonum*, Basel, 1564, p. 124; edition of 1583, pp. 165-66, II, 5.

[35] A partial basis for the tale may perhaps be seen in Wier's statement that when a pupil of Agrippa he once copied off several pages from his master's copy of the *Steganographia* of Trithemius without Agrippa's knowledge. *De praestigiis daemonum*, 1564, p. 130 (II, 6).

[36] Henri Boquet, *Six Advis en faict de sorcellerie*, 3rd edition of Lyon, 1610, p. 25, citing Delrio, *Disquis. Magic.*, I, 29.

that Charles V banished Agrippa and two companions from his court and territories.[37]

Rumor was also rife as to the relations between Agrippa and his dog. Bodin in his *Démonomanie* of 1580 called Agrippa the greatest sorcerer of his time and Wier not only his disciple but valet and servitor, "drinking, eating and sleeping with him, as he confesses, after Agrippa had repudiated his wife." Bodin added that Paul Jovius and others had written that Agrippa's black dog, which he called Monsieur, so soon as Agrippa passed away in the hospital at Grenoble, hurled itself into the river before everyone's eyes and was never seen again. Bodin concludes that Wier says that it was not Satan in the guise of a dog, as well as that he led it after Agrippa on a leash, and that the dog lay between him and Agrippa.[38] Wier appears to be slandered in this passage as much as Agrippa or the dog. In the passage to which Bodin alludes, Wier refers to the report that Agrippa's dog was a demon. He states that it was a medium sized black dog called Monsieur with a bitch named Mamselle. Agrippa used to fondle Monsieur excessively, and allowed him beside him at table and in his bed at night, after he had repudiated his wife of Malines at Bonn in 1535. "And when Agrippa and I were eating or studying together, this dog always lay between us." The fact that Agrippa, without leaving his quarters, knew what was going on in foreign parts was due to letters which he received daily from learned men in various regions, but was attributed by popular report to information received from the dog, acting as his familiar demon. Of Agrippa's end Wier says merely that he went from Bonn to Lyons where he was imprisoned a while by Francis I for having written against the queen mother. "Freed by the intercession of certain persons, after some months he fell asleep in the Lord at Grenoble in Dauphiné. At that time I was in Paris."[39]

[37] In his introductory letter to Albert, archduke of Austria.

[38] *De la démonomanie des sorciers*, 1580, fols. 219v-220r. Zwinger, *Theatrum humanae vitae*, 1604, p. 1332, cites Jovius's *Elogia* for the further detail that the dog wore a magic collar.

[39] *De praestigiis daemonum*, edition of 1583, II, 5; pp. 165-66.

Cardan, in connection with the horoscope of Agrippa, gave an estimate of him which is worth repeating. Born poor, he made a pretense to knowledge. Jupiter endowed him with comradery and urbanity to the point of scurrility. Mercury made him ingenious, versatile, mutable, deceitful, tricky and studious. But the tail of the dragon in the degree of the ascendent made him not apt for disciplines. Cardan regarded his *De occulta philosophia* as full of trifles and falsehoods and deserving to be burned. As for *De vanitate scientiarum,* Cardan thought its main argument bad, and that Agrippa showed his ignorance in treating things of which he knew nothing. "Yet the book pleases many as chaff does asses."[40] Tycho Brahe referred to Agrippa as "that most worthless fabricator of vanities."[41]

[40] Cardan, *Opera* (1663), V, 491: *De exemplo centum geniturarum.*

[41] *Astronomiae instauratae progymnasmata: Opera,* III (1916), 116, "vanissimus ille vanitatum effictor."

CHAPTER IX

VARIED APPROACHES TO NATURAL PHILOSOPHY

Consideraverunt librum hunc plurimi et viderunt quoniam esset foecundus nimium et de libro hoc ediderunt libros sine numero.
—TITELMANN

Nature was approached and considered from varied angles in the books of the earlier sixteenth century which we review in this chapter. Some viewed it only from a distance and obliquely, being primarily absorbed in religion, education or miscellaneous matters. Others dealt more directly with the world of nature but from some particular or restricted standpoint and interest such as curious questions or marvels. These varied intellectual attitudes towards natural science or philosophy seem of some importance to our investigation and understanding of the period.

The *Pearl Philosophic* of Gregorius Reisch, although its dedication bears the date, "Heidelberg, December 30, 1495,"[1] was first printed at Freiburg-im-Breisgau on July 15, 1503.[2] The book deals in dialogue form with all the liberal arts and with rational and moral as well as natural philosophy. It passed through numerous editions[3] and was much used as a brief encyclopedia and general textbook. Though brief and somewhat commonplace, the book might be expected to exert a formative influence upon the youthful minds of several generations. On the other hand,

[1] "Heidelberg 3 kal. Jan. 1496." Hain 13852; HL 21 (1847), 252.

[2] Klebs (1938), p. 282. I have examined a copy of the 1503 edition (c.54.c.14) at the British Museum and found it practically identical with my notes from the following later edition. *Margarita philosophica hoc est habituum seu disciplinarum omnium . . . perfectissima Cyclopedeia a F. Gregorio Reisch dialogismis primum tradita dein ab Orontio Finaeo Delphinate regio Paris. Mathematico necessariis aliquot auctariis locupletata,* Basel, 1583.

[3] Wilberforce Eames, *List of Editions of the Margarita philosophica,* New York, 1886.

the fact that it was intended primarily for youthful readers gives it a conservative, edifying and expurgated character which subsequent reading and advanced study might largely counteract.

The subjects of vision and perspective are subordinated to psychology in the tenth book, *De anima*. For perspective such medieval authorities as Alhazen, Witelo and Roger Bacon are cited.[4] In the same book the interpretation of dreams is opposed.[5]

As for astrology, we are told that theologians as well as philosophers concede the influence of the celestial upon inferior bodies, but that they except the human will from such influence. When the discussion turns to nativities, the arguments of the church fathers against astrology are rehearsed, and the master in the dialogue recommends Pico della Mirandola's twelve books against astrologers to the disciple. The latter, however, is not entirely tied to his teacher's apron strings and presently riposts with d'Ailly's *Concord of Astrology with Theology and History*. The master criticizes d'Ailly's work as really revealing a great discord of astrologers among themselves and from the truth of history. When the talk shifts to interrogations, even the disciple is represented as consigning this part of astrology together with nativities to confutation, condemnation and casting out from the congregation of the faithful. The caption of the next chapter is that the election of favoring times to initiate various works under certain constellations is in part conceded by Augustine and by divers medical authorities. But the text itself is less favorable, while in the following chapter choosing a day for marriage or a business undertaking is termed impious. It will be seen that the discussion is based more on religious than scientific or rational grounds. As for images, they have no astrological foundation and are all really necromantic, operating through the aid of demons.[6] Towards other species of divination a similarly orthodox attitude is maintained. Although the objects employed by necromancers do not coerce demons, yet they attract them as signs of pacts

[4] *Margarita philosophica*, X, ii, 13.
[5] *Ibid.*, X, ii, 28.
[6] For the discussion thus far, Gregorius Reisch, *Margarita philosophica*, VII, ii, 8, 10, 16-20.

with them. In words themselves there is no virtue. The notory art is illicit and vain.[7] Comets, however, are regarded both as terrestrial exhalations and as signifying coming sterility, pestilence, and seditions.[8] These utterances on the subject of astrology and other occult arts remained the same in the enlarged edition of 1583 as in the *editio princeps* of 1503.

A more favorable attitude was shown towards alchemy and the possibility of the transmutation of metals. In stating that water can be turned to stone by becoming congealed or coagulated by mineral virtue as it falls drop by drop, the *Margarita* cites Raymond Lull in the *Lapidary*, one of the alchemical tracts attributed to him. A few other alchemical authors and works are named: Hermes, Geber, Avicenna, Albert, Arnald of Villanova and the *Turba philosophorum*. The elements are said to be altered into one another or into compounds. Glass is made from herbs or sand. So there is no reason why metals may not be transmuted except that it is difficult for art to imitate nature. But those who promise riches to princes from alchemy never succeed, and one should beware of such deceivers who always remain poor themselves.[9]

The *Urban Commentaries* of Raphael Maffeius or Volaterranus were dedicated to pope Julius II and first printed in 1506. Frequent editions followed.[10] Of the thirty-eight books the opening twelve were devoted to ancient geography, the next eight to men of antiquity, and three more to moderns, pontiffs, and Roman emperors respectively. Four books then treated of man and other animals, plants, metals, pigments, stones, statues, buildings and costumes. After five books of commonplaces (*loci communes*) and three on the liberal arts and cyclic sciences, the three last concern works of Aristotle. The discussion of plants is professedly derived from Aristotle and Theophrastus. The percentage of books devoted to nature is thus distinctly in the minority, and the treatment in them is anecdotal rather than scientific. The spontaneous generation of certain animals is affirmed. Friend-

[7] *Ibid.*, VII, ii, 23, 26, 27, 29.
[8] *Ibid.*, IX, 23.
[9] *Ibid.*, IX, 24-25.
[10] I have used that of Paris, 1511.

ships and enmities between animals and their powers of divination are mentioned.

The four books on *True Philosophy* of Adrian Castellensis were compiled from the writings of the four great Latin church fathers: Augustine, Jerome, Ambrose and Gregory. Adrian was less concerned with nature than with scripture, religion and revelation, with what a Christian's attitude towards philosophy should be. He did not go into details concerning any system of nature. The work was printed at Bologna in 1507, and again at Cologne in 1540.[11] The author was bishop of Hereford, and then of Bath and Wells. He was made a cardinal in 1503 by Alexander VI but was deprived of that office by Leo X in 1518 and died not long afterwards.

An *Epitome* of natural and moral philosophy, astronomy and metaphysics by Nicolaus Francus Vimacius or Vimacuus, dated 1512, appears to have remained unprinted. It is largely based upon Aristotle and illustrated by many figures, diagrams, graphs, tables and charts.[12]

Some light is shed, albeit rather indirectly, upon our investigation by a miscellaneous work which found many readers in the century following its publication. This was the *Genial Days* of Alessandro Alessandri (1461-1523),[13] a jurist of Naples who became disgusted with the practice of law and turned to the gentler and more enjoyable composition of this work. The injustice, ignorance and arbitrary disregard of the laws shown by presiding magistrates had proved too much for him. He mentions several special cases to prove his statement that they torture the innocent and let criminals go free. The *Genial Days* may be said to be primarily concerned with Roman antiquities but also illustrates other interests of the author and his readers. Thirty-two chapters deal with legal topics, thirty with religious matters, twenty-seven with government, seventeen with grammar and textual criticism, sixteen with superstition, thirteen

[11] *Gesner* (1545), fol. 296v.

[12] Vatican Palatine lat. 1041, fols. 1r-236r.

[13] *Genialium dierum libri sex.* The British Museum catalogue lists an edition of Rome, 1522: BM 90.e.5.

with social customs, twelve with military affairs, ten with history, six with archaeology, and only two with philosophy, leaving two or three unclassified. It is the absence of any science, and the disproportionate attention given to superstition compared to philosophy, that seem significant for us. It helps to explain the witchcraft persecutions and delusion, when we see this correlation between the legal mind, general reading public and superstition. Moreover, there were separate reprintings of some of these superstitious chapters. The *Miracle of Tritons and Nereids* who have been found in various places in our time was thus published,[14] as were four chapters on wonderful things that had recently happened in Italy, dealing respectively with dreams, ghosts, illusions of evil demons, and haunted houses.[15] Apparently these recent marvels appealed to the cultured Latin reader even more than the Roman antiquities. The whole text of the *Genial Days,* however, seems to have had a wider circulation in France than in Italy, appearing in new editions at Paris in 1532, 1539, 1549, 1570, 1579 and 1586, and at Lyons in 1608, 1616. It may have particularly appealed to the French magistracy of the robe, among whom we shall find some ardent witchmongers, or distance may have lent enchantment to the view. The work was cited for one matter bordering on the realm of science by German authors, George Fabricius[16] and later Alsted, namely, a plant with leaves of pure gold. It also found learned commentators. André Tiraqueau, author of *De nobilitate,* composed critical notes upon it, correcting a number of errors. *Animadversiones* by Nicolaus Mercerius were printed in the edition of 1586. It is remarkable that lawyers like Alessandri, supposed to be trained in examining witches and expert in weighing evidence, should in this period be among the most credulous persons and delight in superstitious stories.

The *New Work of Questions* by Ambrosius Leo or Ambrogio

[14] It is the eighth chapter of the third book of the *Genial Days.* BM 8630.ee. 13.(2.) is tentatively placed at Rome, 1525 by the catalogue.

[15] *Dissertationes quatuor de rebus admirandis quae in Italia nuper contigere . . . ,* n.d. quarto minori, 12 pp. Copy used: BN K.5378.

[16] Fabricius, *De metallicis rebus ac nominibus,* Zurich, 1565, fol. 2r-v.

Leone of Nola, which was printed at Venice in 1523,[17] indicates in a rambling and miscellaneous enough manner, what were then points of interest and problems exciting curiosity concerning the world of nature. Doubtless, although its questions are more numerous, it is not a work to be taken so seriously or ranked so high for its time as the *Natural Questions* of Adelard of Bath are for the early twelfth century. But although somewhat more popular and less systematic than Adelard's composition, it is by and large not unrepresentative of its day and generation.

Ambrogio Leone was born at Nola and became a professor of medicine at the university of Naples. Besides the work under present consideration he translated Actuarius on urines, commented on Averroes, and composed a history of his native town.[18] He accused Averroes of passing off the opinions of the Greek commentators on Aristotle as his own and of inferiority in treatment when he lacked such guidance.[19]

The *New Work of Questions* includes four hundred and four problems of very miscellaneous character. The majority deal with medicine and natural philosophy, but we also find such as this, "Why Bacchus is represented with horns and a beard?" They are arranged in no perceptible order of subjects or otherwise, the author apparently resembling Aelian in preferring a variegated presentation. For example, the behavior of dogs is made the theme of more than one query, but these are widely separated. Question 14 asks why dogs raise their mouths when they bark. Question 30 inquires why, when they are indoors, they bark at strangers in the street, but when outdoors bark at no one. Problem 173 is why dogs always want to go ahead of one. Even such disorder is not absolute or without exception, since a number of questions concerning vision, metals, and missiles respec-

[17] *Ambrosii Leonis Nolani divini philosophi Novum opus questionum seu problematum ut pulcherrimorum ita utilissimorum tum aliis plerisque in rebus cognoscendis tum maxime in philosophia et medicinae scientia.* Venetiis per Bernardinum et Matthiam de Vitali fratres, 28 August, 1523, in-fol. 63 leaves. Copy used: BN Rés. R.81.

[18] Hirsch, *Biogr. Lexikon,* III (1931), 744; Gesner (1545), fol. 32r-v.

[19] *Castigationes in Averroym,* Venet., 1517, Praefatio ad Camillum filium, quoted by Gesner (1545), fol. 32r-v.

tively do occur together or at least near one another. A foreword to the reader urges him not to drop the book because he encounters some problems which have been treated elsewhere or because the questions in large part concern humble and even vile things. The reader is assured that he will find in the treatment subtlety, copiousness, variety, force, dexterity, clarity and brevity. Leone's usual method is to suggest several alternative explanations or answers to the question without stating his preference for any-one of them or rejecting any. A peculiarity of his text is that he regularly spells the Latin word for Why as *Qur* instead of *Cur*.

The character of the work may be best indicated by repeating a number of its questions. Asking why man abhors the sun in summertime, when other animals delight in it, Leone suggests that it is either because man is less used to it (peasants who work in the fields do not mind the sun) or has a more temperate body or a very hot heart. Why do old men like soft bread and shun hard? Why do wormy apples smell and taste better than others? Is it because the worm is hotter than the apple or makes the apple feverish? Or does the worm weaken the apple, so that the air ripens it quicker than others? Or is the case of the apple like that of a man who has a wound and thereby is purged of bad humors in other parts of his body? Why do the sounds of cannon carry farther in some places than in others? Why does one's foot go to sleep? Why are old soldiers so long-lived and healthy? Why do storks seem to fly very slowly yet cover great distances in a short time? Perhaps because they are so large or because they fly so high. Why does oil stain one's clothes when butter does not? Why are women more tenacious than men of old words and pronunciations? It is because they discuss only a few topics and use the same limited vocabulary over and over, because they tend to act contrary to their husbands, because they are less rational and more like brutes, or because they go about less and so have less occasion to pick up new ways?

Why does a vessel of water simmer before it boils and not after? Why an hour before a lunar eclipse does the eastern part of the moon shine less than the western part? Why do apples and

nuts keep better if on alternate days they are rubbed and shaken? In reply to the question why iron is drawn by the magnet Leone suggests that the phenomenon is rather one of the iron going to the magnet. Why do hairy animals lack the green coloring which those with feathers and scales possess? Why are sleepers awakened by even a slight noise? Why does the hair of boys and youths turn white from fright? Why does salt liquefy in water and explode in fire? Why are stones in the kidneys yellow and small, in the bladder white and large? Why do those who grow bald at an early age have healthy teeth, and those who keep their hair a long time have bad teeth?

Why do crowds collect at executions? Why, when one's hand is torpid with cold, if it is suddenly brought near a fire, do the fingers ache? Why is a dead man the coldest of all? Why is laurel never struck by lightning but the oak frequently? Why doesn't the water, which is retained in a water-clock lest there be a vacuum, rarefy and fall out? Why is gold uninjured and other metals consumed by fire? Why are the firstborn and firstfruits normally superior to others? Why do sailors vomit and runners not? Why does burned laurel wood leave no ash? Why do dissectors of human bodies feel their knives grow dull? Why are letters which have been written with onion juice invisible until dried at the fire when they appear golden?

Why do women prefer soldiers to civilians? Why are we more attached to talking and our opinions than any of our possessions? Why do swans sing most sweetly? Why are youths more amenable to correction than old men? Why are men of letters often called wise when they are absolute ninnies? Why is natural heat increased by exercise, lessened by labor? Why does a tower seem higher at a distance than near by? Why do persons carrying weights go faster? Why do we take pleasure in prying into the secrets of others? Why are sufferers from quartan fever cured straightway by being given a good fright? Why do we sense the nearness of a wall in the dark? Why are there such differences of language?

Leone's longest discussion of any single question is that of

the seventieth, which inquires why quicksilver, dissolved in oil or fat and used to anoint the heels or palms, within a week affects the gums and saliva. In this connection Leone gives a very good account of syphilis which deserves publication along with the other early tracts on that disease.

Books of secrets and experiments had been prominent in medieval manuscripts and were to flare forth again in the second half of the century in the *Secreti* of Alessio of Piedmont, of which Ferguson listed 56 editions between its first appearance in 1557 and the end of the century, the *Natural Magic* of Porta in 1558, and similar works. Meanwhile we may note a single specimen of this genre from the first half of the century.

Such a collection of *Experiments* by Joachim Fortius Ringelbergius was included in the 1531 edition of his works,[20] the preface to the *Experimenta* being dated at Paris, November 1, 1529. Ringelberg speaks somewhat slightingly of them as amusing tricks to while away the time, and not wholly useless, which he has learned from the vulgar between his trips to various universities. They include a way to stop nosebleed, a sign of conception, how to keep clothes free from moths, how to turn red roses white, and invisible writing. One trick is to break a stick which rests on two glass cups without disturbing them. Another item is that pregnant women, if frightened, draw their hand across their face to prevent the foetus from having a birthmark on the face. Almost without exception these experiments could be duplicated in the previous medieval books of experiments and secrets.

Nicolaus de Bousuit, an M.D. of Louvain, in 1528 published a discussion of three questions.[21] One was medical. The others inquired whether the torrid zone was habitable, and how among the Scythians men are changed into wolves.

The *Compendium of Natural Philosophy* of Francis Titelmann, a Franciscan from Hasselt who lectured on the holy Scriptures at Louvain, although by no means a major contribution in

[20] *Opera,* 1531, pp. 606–15.

[21] Nicolaus de Bousuit, *Orationes Quodlibeticae,* apud Gilb. Masium, 1528, 4to. Cited by Andreas, *Bibliotheca Belgica* (1643), p. 680.

the history either of thought, science, magic or civilization, is a significant book in several ways. First published at Antwerp in 1530, it was reprinted at Paris in 1545 and at Antwerp in 1570.[22]

For one thing the *Compendium* illustrates the tendency to abbreviate, simplify and popularize, on which we have already touched in our introductory chapter. In the dedicatory epistle to the faculty of liberal arts at the university of Louvain, his alma mater, Titelmann further introduces the characteristically modern argument of saving time in education. After spending some years in study at Louvain, he had entered the Franciscan Order and there taught the philosophical disciplines, evidently in weaker doses than he had received them under the Louvain faculty of arts. For the "simple brothers" of his Order, whose time was so taken up by their religious duties that only a minimum was available for the study of philosophy, and that insufficient to read "prolix and difficult commentaries," he drew up a brief and succinct compendium, being moved thereto, he says, by the lack of any such treatment in the field of natural philosophy. This last statement might seem to imply a strange oversight on his part of the *Philosophia pauperum* or *De negotio naturali,* attributed to Albertus Magnus. But of course Albert was a Dominican. On the other hand, Bartholomew of England, the thirteenth century Franciscan, had represented his encyclopedic *De proprietatibus rerum* as an elementary treatise for "the small and simple."[23] Apparently the simple brothers of the thirteenth century could digest more natural science than those of the sixteenth. Titelmann's statement may also seem to ignore the recent publication by Bartholomew of Usingen, an Augustinian, of the *Parvulus philosophiae naturalis* (essentially the

[22] Of these three editions, found in the British Museum, I have used that of 1545, BM 534.c.30: *Compendium naturalis philosophiae.* Libri duodecim de consideratione rerum naturalium earumque ad suum creatorem reductione per fratrem Franciscum Titelmannum Hassellensem ordinis fratrum minorum sanctarum scripturarum apud Lovanienses praelectorem. Parisiis apud Ioannem Lodoicum Tiletanum ex adverso Collegii Remensis, 1545, 8vo, 227 fols. A list of Titelmann's other writings, mainly religious, is given by Valerius Andreas, *Bibliotheca Belgica* (1643), pp. 244-45.

[23] T II, 402.

same as the *Philosophia pauperum*) in repeated editions of 1499, 1505, 1510, 1511, 1514, and 1516.[24] The *Summa on All Physics, that is, Natural Philosophy,* of another teacher of Luther at Erfurt, the Occamist Jodocus Trutvetter,[25] was perhaps too advanced and heterodox for Titelmann's purpose.

Titelmann goes on to defend the composers of compendiums as contributing to education "by reducing to orderly and compendious brevity by their industry and diligence what have been treated by previous writers with much prolixity and obscurity. For those who are deterred by involved prolixity and troublesome difficulty may often be won over to good studies by grateful brevity and compendious facility." The result of Titelmann's giving such a course in philosophy—which somewhat reminds one of the time allowed for English and History in present schools of engineering—was that many importuned him to publish his lectures. The reprinting of his book at a place opposite the college of Reims in Paris suggests that it was used in some of the colleges there as well as in the schools of the Franciscan Order. Titelmann assures its readers that with its aid they will be able to avoid wasteful expenditure of time, "most precious of all things."[26] In a compendium of logic composed in 1533 Titelmann expressed a similar solicitude "lest tender adolescents lose heart, terrified by the prolix multitude and involved difficulty of irrelevant matters."[27] This solicitude is the more remarkable, when we remember that the tender bodies of adolescents were beaten black and blue upon the slightest provocation by their teachers in this century.

Another feature of the *Compendium of Natural Philosophy*

[24] Nic. Paulus, *Der Augustiner Bartholomäus Arnoldi von Usingen, Luthers Lehrer und Gegner, ein Lebensbild,* Freiburg-im-Breisgau, 1893.

[25] G. L. Plitt, *Jodokus Trutvetter von Eisenach, der Lehrer Luthers, in seinem Wirken geschildert,* Erlangen, 1876.

Jodocus Trutvetter Isenachcensis, *Summa in totam physicen: hoc est philosophiam naturalem,* Erfurt, 1514.

[26] Praefatio in sequentes duodecim libros. It follows the Index alphabeticus, which had followed the Epistola nuncupatoria.

[27] From the Epistola nuncupatoria as reproduced by Gesner (1545), fol. 26ov. He mentions an edition at Paris and Lyons in 1539, while the British Museum has one of 1543.

is its frankly religious tone and character. Titelmann observes that some who treat of nature introduce many acute and subtle disquisitions, exciting the genius of others by a display of their own, but either neglecting or entirely omitting those matters in which there is richest prospect for piety. He pursues an opposite course, being brief in his first six books but fuller in the seventh on the sky and universe and the last five on the soul, subjects which seem more essential for knowledge of God and the truth. He also intentionally introduces divine and religious interests into his treatment of natural philosophy, "so that this treatise may not be one of pure philosophy, but an equal mixture of philosophy and theology. For God who created heaven and earth should not be absent from the works of any Christian writer."[28]

This religious character of the *compendium* is evidenced not merely by Titelmann's treating only so much of natural philosophy as seems ancillary to theology and piety, but also by "Psalms" of his own composition which are prefixed to the work as a whole and sandwiched in between its component books. Their character may be illustrated from the first, in which he sees a big pregnant book, whence many volumes were born without its bigness diminishing. It is the book of the universe, written by God, within which He resides, and of which many have attempted their conflicting explanations. "Magi, wise men and philosophers innumerable pored over its pages and by Thy aid found not a little of Thy Truth." But they also mixed in many vanities and, "saying that they were wise, were made foolish, because they gave not the glory to the God of the heavens who created all." Then in the fulness of time God sent his light which lighteth every man and enables us to read the book aright. What the ancient philosophers manifested Titelmann has retained where he found it consonant with divine truth. For matters above human sense and reason he has gone to men divinely inspired. His chief aim has been to offer to those who desire to philosophize a formula "by which they may learn to rule all their thought in Thee."[29]

[28] Praefatio, ut supra.

[29] Psalmus nuncupatorius, at fols.

In 1588 Giovanni Paolo Gallucci in his *Theater of the World and Time* commended Titelmann for having intermingled theological matters in his consideration of nature and for having referred all to the Creator. Yet, Gallucci added inaccurately, Titelmann was a most celebrated doctor in the university of Louvain with a crowd of admiring disciples.[30]

For all this stress on religion, it is the Aristotelian outline of natural philosophy, attenuated it is true and reduced to scarcely a skeleton, which Titelmann follows in the arrangement of his *Compendium* in twelve books. First come the principles of nature—matter, form and privation; then the causes; third, motion and its accidents; fourth, the infinite, space, vacuum and time; fifth, generation and corruption; sixth, meteorological impressions; seventh, of sky and universe; eighth, on the soul in general, the vegetative powers, and length and shortness of life; ninth, the external senses and their objects; tenth, the internal senses, and sleep and waking; eleventh, the intellect and its superior functions; last, sensitive appetite and the superiority of the will. There are also many traces of scholastic method, despite Titelmann's slurs upon the prolix obscurity and acute and subtle disquisitions of previous writers. There are queries and solutions, objections and replies to them. All this is subject to a pious gilding over, but the underlying natural philosophy is Aristotelian and scholastic.

Titelmann accepted the influence of the stars and constellations upon the body and upon sense appetite which is immersed in the body, but held that the human will was free to resist these.[31] The marvelous wisdom of God in all his works was seen in the placing of Saturn, most evil of all the planets in its effects, farthest from the earth, and in the interspersing of the benevolent planet, Jupiter, between the two malignant stars, Saturn and Mars.[32] Indeed, Titelmann was inclined to accentuate the marvelous side of natural phenomena, as when, describing

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AA ii-iii, preceding the Epistola nuncupatoria.

[30] Gallucius, *Theatrum mundi et temporis*, 1588, Praefatio.

[31] *Compendium naturalis philosophiae*, IX, 21; fol. 221r-v.

[32] *Ibid.*, VII, 21; fol. 100r.

the senses, he says that animals have external powers by which they can receive within themselves species and images of external objects without any real susception of their bodies.[33] He thinks of sound and color as affecting only the immediately adjacent air, while their species are passed on through the medium to the ear and eye.[34]

Titelmann was not the only one to write such manuals. Joachim Fortius Ringelberg or Joachim Sterck van Ringelbergh—whose *Experimenta* we mentioned above—wrote many of them on Latin and Greek, verse-making, dialectic, rhetoric, arithmetic, astronomy, cosmography, chronology, pedagogy and man. Their titles are trite, their contents brief and unoriginal. Concisely as Ringelberg wrote, he found that many persons said that adolescents could not understand his three books on the world, unless they had already learned the elements of astronomy elsewhere. He therefore composed a work on the *Sphere* in order that untutored minds (*animi adhuc rudes*) might more easily comprehend his astronomical institutes. He assured the reader that he had put absolutely nothing into this new book that could seem difficult to beginners.[35] Ringelberg would cover the entire field of knowledge in lectures during a stay of a month or two in a town, lecturing sometimes from sunrise to sunset, and advised the student to remain in no town for more than a half year or a year at most.[36] That his brief and cursory mode of presentation and instruction satisfied a want or created an appetite is indicated by collected editions of his *Opera* in 1531, 1538 or 1539, 1541 and 1556.[37]

Some further illustrations may be given of the prevalence of such compendiums. Simon Brosserius wrote at Vendôme in 1536

[33] *Ibid.*, praefatio ad librum IX; fol. 137r.

[34] *Ibid.*, IX, 7; fol. 142v.

[35] Gesner (1545), fol. 375v, quoting from the work.

[36] *Mémoires de Paquot*, IV, 440-48. Melchior Adam, *Vitae Germanorum philosophorum*.

[37] Paquot reported an edition of Antwerp, 1527, but H. Bosmans was unable to find it: *Biog. nat. de Belgique*, XIX (1907), 346-59. According to Bosmans, the editions of Lyons, 1531 and Basel, 1537 are incomplete, while those of Basel, 1541 and Lyons, 1556 are complete. Jöcher, III, 2103, lists further editions of collected works at Lyons and Basel, 1538, but possibly is in error. Jöcher dates Ringelberg's death in 1536.

and published at Paris *A Very Brief Epitome of All Natural Philosophy.*[38] In the prooemium he said that he followed Augustine.[39] As was often the case, the brevity of this work led to its enlargement by commentary. Hieronymus Rupeus of Metz wrote *Lucubrations* on it which were published in the same year by the same printer, Colinaeus, and also at Basel by Thomas Platter.[40] Jacobus Schegkius of Schorndorf (1511-1587), professor of philosophy at Tübingen and learned in both Latin and Greek, published in 1538 a manual of natural philosophy along Aristotelian lines.[41] Gesner used it in his teaching at Zurich and quoted its table of contents and dedicatory epistle.[42] Hieronymus Wildenbergius of Goldberg wrote at Thorn[43] in 1542 for the use of the school recently established there and dedicated to two princes of Silesia an epitome of natural philosophy covering the *Physics, Meteorology, De coelo et mundo, De generatione et corruptione,* and *De anima* of Aristotle. It was printed at Basel in 1544 by Oporinus,[44] and again in 1571 there as the second part of a *Digest of All Human Philosophy,* rational, natural and moral.[45] Wildenberg held that a star or planet was not fiery but a denser part of the orb in which it was moved. The stars produced heat by their common virtue of light, but by their own force produced other effects such as drying, moistening and chilling. Every other star received its light from the sun but also had a weak light of its own. Their seeming to scintillate or be hairy was because of their great distance. They did not give forth sound.[46]

In 1542 at Cologne were printed four books of *Elements of Physiology* by Ioannes Monhemius[47] dealing respectively with

[38] *Totius naturalis philosophiae brevissima epitome,* Paris, Colinaeus, 1536.

[39] Gesner (1545), fols. 598v-599r.

[40] *Ibid.,* fol. 328v.

[41] *Philosophiae naturalis omnes disputationes ac universa tractatio,* Tubingae, 1538, 8vo, in 2 parts. A copy is BM 519.a.18.(2.).

[42] Gesner (1545), fols, 362r-363v.

[43] *Ibid.,* fol. 329r: "Scripsit autem Turunii 1542 in gratiam Academiae recens illic a principibus institutae."

[44] Gesner (1545), fol. 329r.

[45] *Totius philosophiae humanae in tres partes nempe in rationalem naturalem et moralem digestio . . . iam denuo . . . aucta . . . ,* Basileae, 1571, 8vo. The part on natural philosophy covers pp. 121-272. Copy used: BM 527.c.24.

[46] *Ibid.,* pp. 174-75.

[47] *Elementorum physiologiae libri iv,* Coloniae apud Ioan. Gymnicum, 1542.

principia, the world, meteors, and stones and metals. The work was intended as a text for schoolboys. Gesner regarded it as too brief for any other purpose. In 1544 appeared a second volume in two books on the soul and on plants. Gesner objected that it had taken a great deal from his work on plants. A further book on animals was promised.[48]

In connection with Titelmann's *Compendium* may further be noted some examples from the second half of the century of writers who like him were outspoken in their purpose of writing down to the duller students, making it easy, and saving time.

John Paduanius of Verona in his *Garden of Mathematics* of 1563 claimed to have added something of his own to what the most learned mathematicians had already covered in many books, and to have so improved the order and method of teaching as to have given the art a new face and form. Yet he had written a compendium putting the subject in a nutshell to save the time of persons who did not wish to spend long on the subject. He also had taken pains so to state the most true precepts, verified of old for many centuries, that they could be perceived without error by the duller students and very easily by the bright ones.[49]

Sebastian Theodoricus of Winsheim, professor of mathematics at Wittenberg, writing in 1564, would have liked his students to study the elements of astronomy directly from the sources in the works of Ptolemy, Proclus, Cleomedes and the like. But "since not all are instructed in those things which are required" to read those authors intelligently, he attempted so to present the subject that anyone of mediocre ability, with some knowledge of numbers, and willing to work might understand it by himself without a teacher.[50]

[48] Gesner (1545), fol. 438v. BM 1135.g.7 is the first volume only.

[49] Io. Paduanius Veronensis, *Viridarium mathematicorum in quo omnia fere quae in rebus astronomicis desiderari possunt facillime pertractantur,* Venetiis apud Bologninum Zalterium, 1563, Proemium and, at p. 208, Conclusio ad lectorem. Copy used: BM 531.h.1.(3.).

[50] Seb. Theodoricus Winshemius, *Novae quaestiones sphaerae,* Witebergae, 1570, fol. A 5 r-v, in the Ep. dedic., dated anno 1564.

Valentin Nabod addressed "Three Books of Astronomical Institutes in which the elements of spherical doctrine are presented by a new method" to a noble of Transylvania to whose nephew he had been giving lessons. After lamenting the current neglect of other than material interests and the great contempt for geometry, Nabod argued that simple introductions to this art of astronomy are a great aid to its popular use, and that they should be suited to the average student (*communi numero discentium*). Then they would more easily be kept in all schools and would be learned more promptly by persons of mediocre talent.[51] Nabod had earlier published at Cologne a meagre little booklet containing the first book of Euclid's *Elements* and a few further propositions selected from the other books.

Giovanni Paolo Gallucci, in his *Speculum Uranicum* of 1593, dedicated to cardinal Giovanni Francesco Mauroceno, proposed to set forth briefly and most pleasantly what in other books was had with the greatest trouble and long expenditure of time, and in these most troublesome studies to intermingle what the eye could take in at a glance.

We now return to works on nature in the early sixteenth century. David Douglas, a young Scot at Paris, in 1524 published a brief work on marvels of nature.[52] These were mainly of a meteorological sort: marvelous apparitions and exhalations in air and sky, comets, strange effects of lightning, prodigious gales, terrible earthquakes, deadly wells, floating islands, triple suns, unusual hail storms. This opuscule appears to have been

[51] Val. Nabod, *Astronomicarum institutionum libri III quibus doctrinae sphaericae elementa methodo nova . . . traduntur,* Venetiis, 1580. Illustriss. principi ac D. D. Stephano Batoreo de Somlio Vaivodae Transylvaniae domino suo clementiss. Valentinus Naiboda S.D.

I was unable to see what is presumably an earlier edition of the same work, since it has the same number of pages: *Primarum de caelo et terra institutionum quotidianarumque mundi revolutionum libri tres,* Venetiis, 1573. The copy at the British Museum, 8652.aa.34, could not be found in the summer of 1938. Another copy is BN R.44753.

[52] *Davidis Douglasii Scoti De naturae mirabilibus opusculum cuius catalogum versa pagella docet.* Venales habentur Parrhisius e regione Collegii Coquereti sub signo duarum cipparum, 1524 cum privilegio. 4to minori, 7 quaternions. Copy used: BM 538.e.27. (1.).

Douglas's maiden effort, and he is naïvely and clumsily apologetic both at the beginning and close, where he admits that the work has suffered from his not giving it his undivided attention.[53] The arrangement of the text in hypotheses, propositions and corollaries is also rather clumsy and artificial.

Much use is made by Douglas of Jean Buridan's fourteenth century commentary on the *Meteorology* of Aristotle, which our author presumably read in manuscript, since it seems not to have been printed. Buridan's seeing a falling flame above the chapel of the college of Navarre is noted, his explanation why the death of kings follows the appearance of comets is given, as are his reasons why a universal flood is not naturally possible, and his experiences of weather going and coming between Avignon and Paris.[54] From Buridan too are repeated the theories that the earth has not the same center of gravity as of magnitude, and that the water encompassing the earth flows off to the hemisphere nearer the center of gravity, leaving dry land exposed on the other side. Also that the entire earth must eventually be moved, since rivers keep washing it into the sea, since existing mountains will eventually be levelled by erosion and new ones formed in their place, and since the ocean keeps shifting its position. Buridan estimated that in the space of ten thousand years the sea advanced ten leagues eastward and receded that much from the west.[55] If it be true, as some think, that hell is a natural and physical place about the center of the earth, then it will be true that the earth next to it will eventually change places with the present outer surface of the earth.[56] We have seen Leonardo da Vinci derive similar ideas from his reading of the fourteenth century commentators on Aristotle.[57]

[53] *Ibid.*, fol. (F iv) verso: ". . . hoc tamen intelligas velim me non omnia mature satis et ex deliberato (quod aiunt) animo literarum monumentis commisisse sed usqueadeo incurius fui ut raptim et ex tempore ferme omnia vel inter locandum etiam aliqua prelis demendavi quo fit ut non possim ingenue non fateri me compluria (partim mei ipsius incuria) partim etiam temporis parsimonia omisisse que nunc pulchre ad rem fecissent. . . ."

[54] *Ibid.*, fols. A ii verso, B iii verso, F recto, E ii r-v.

[55] *Ibid.*, fols. F ii verso-F iii verso.

[56] *Ibid.*, fol. (F iv) recto. Douglas does not expressly attribute this "corollary" to Buridan.

[57] Duhem I (1906), 9-14, who, however, represents Leonardo as indebted

Douglas cites other authorities, such as Pliny, Oribasius and Albertus Magnus. He quotes "Babtista Fulgosius" concerning a ship found far from the sea and a hundred cubits underground, with the bodies of forty men and broken sails and anchors.[58] But Buridan is his main reliance, and perhaps the chief significance of his book is to show that the great schoolman of the fourteenth century was still influential at Paris in the early sixteenth, and that there were other channels available for passing on his ideas than the circulation of Leonardo da Vinci's notebooks in manuscript.

Douglas occasionally adds examples from his native heath and sometimes states his own opinion. For instance, anent the belief that animal life might be generated in the clouds and fall in rain, he says that he does not see how the semen of large animals could be raised in evaporation by the force of the sun, although Avicenna states that a calf once fell from the clouds, which he attributes to the influence of the stars. Or William of Conches might attribute it to a strong wind, such as he says in the third part of his *Philosophia* raises frogs and fish aloft from bodies of water. But for the most part animals generated aloft are minute, like those which appear in rain water, if it is allowed to stand for some time. The pest in 1348 is said to have been caused by showers of such minute forms of animal life (*bestiole*).[59] Here again, in the case of William of Conches, Douglas cites a medieval author who had not yet been printed.[60]

While Douglas repeated Buridan's arguments against the

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to Albert of Saxony rather than Buridan for most of these notions. Duhem does not anywhere mention Douglas.

[58] *De naturae mirabilibus*, fol. (F iv) recto. Douglas very likely used the Paris, 1518 edition of Ghilini's Latin translation of Fregoso's work: *Baptiste Fulgosi de dictis factisque memorabilibus collectanea a Camillo Gilino latina facta.* The story there occurs at I, vi, fols. 47v-48r. The discovery was made in a mine near Berne in 1460.

[59] *Ibid.*, fol. (E iv) r-v, "Tertia propositio de minutis quibusdam animalibus in altum generatis."

[60] The editio princeps of the *Philosophia* was in 1531. It was cited subsequently as to the origin of winds by Stefano Breventano Pavese, *Trattato de l'origine delli venti nomi e proprieta loro*, In Venetia appresso Gioan Francesco Camotio al Segno della Piramide, 1571, fol. 4r-v [BM 538.e.27.(3.)], who, however, preferred the view of 'moderns' who agreed with Aristotle and Seneca.

natural possibility of a universal flood, he held that a universal conflagration was even less likely in the natural course of events. When cold planets come together in wet signs, particular floods are likely to occur such as have in time past changed dry regions to wet. He is very fearful of some such effect from the recent conjunction of February 14, 1524, in Pisces. It is not easy to predict just what events will follow it, and Buridan has shown that the same conjunction does not always have the same effect. But of one thing Douglas feels sure, that these great conjunctions of the planets "never portend any good."[61]

Commentaries of the early sixteenth century on the natural philosophy of Aristotle may be briefly illustrated by that of Ludovicus Coronel on the *Physics*, first printed at Paris about 1511[62] and reprinted at Lyons in 1530.[63] Duhem has given a number of instances of Coronel's views on physical questions and citation of previous medieval authors, so that we may merely add a few bearing on our particular interest. Coronel more than once alludes to the influence of the heavenly bodies on inferiors but leaves fuller discussion to his commentary on *De coelo et mundo*.[64] He still accepts such traditional beliefs as that diamonds cannot be cut by iron but only by the blood of a goat,[65] and that a lynx can see through a mountain. His explanation of the latter phenomenon is that there is some light diffused through all matter, and that no body is so opaque but that its interior parts receive light. He notes, however, that Albertus Magnus denies the lynx this ability.[66] Coronel himself denies that the salamander lives in the sphere of fire. It is a terrestrial animal but the coldest of all and so offers the most resistance to the activity of fire.[67]

[61] *De naturae mirabilibus*, fols. F. recto-F ii recto.

[62] Duhem III (1913), 134-35, *et passim*.

[63] *Physice perscrutationes egregii interpretis magistri Ludovici Coronel hispani Segoviensis*, Lugdini in edibus Iacobi Giunti in vico Mercuriali, 1530. This is the edition whch I have seen and cite.

[64] *Ibid.*, fols. 49v, 103v.

[65] *Ibid.*, fol. 49r.

[66] *Ibid.*, fol. 83r.

[67] *Ibid.*, fol. 92, col. 1.

CHAPTER X

ASTROLOGY OF THE EARLY CENTURY

Nihil est aliud quam naturalis philosophiae absoluta consummatio
—IOANNES AB INDAGINE

Our next few chapters will deal primarily with the subject of astrology. The warfare over astrology which had blazed forth in the last decade of the fifteenth century with the attacks upon the art by Pico della Mirandola and Savonarola, and the defense offered by such men as Lucius Bellantius, continued into the sixteenth century. In our fourth volume we have already mentioned the defenses of astrology from the pens of Jacob Schonheintz and Gabriele Pirovano, physicians of Würzburg and Milan respectively, which were printed, the former at Nürnberg in 1502, the latter at Milan in 1507.[1] France and Spain were represented by Gondisalvus of Toledo, physician to the French queen, Anne of Brittany, who prefixed to his edition of the *Amicus medicorum* of Jean Ganivet, published at Lyons in 1508, a four page letter defending astrology addressed to his son, Anthonius, on November first of that year.[2] In it he advises opponents of astrology, whom he does not specify by name, to read Bellantius and Schonheintz[3] as well as older authors like Albertus, Aquinas and Vincent of Beauvais. Meanwhile Giovanni Francesco Pico della Mirandola had continued his uncle's assault on the art in the fifth book of his *De rerum praenotione,* written in 1502 and printed in 1506-1507.

[1] T IV, 541-43.

[2] *Gondisalvus Toledo serenissime Francorum regine medicus Lugduneñque pro rege electus Anthonio Toledo filio suo prospera virtutum studia insectari. Epistola astrologie defensiva* . . . Vale. Ex Lugduno prima Novembris a. d. 1508: copy used, BM 8610. c.5.

Concerning him consult further E. Wickersheimer, *Dictionnaire biographique des médecins en France au moyen âge,* 1936, I, 209-10, Gonsalve de Toledo.

[3] "Lucium Bellantium Senensem et Jacobum Gohonhemem ostofranci natione teutonicum."

Annual astrological predictions were as marked a feature of the early sixteenth[4] as of the preceding fifteenth century. Such men as John of Glogau, Domenico Maria Novara, Leymbach, Parson, John Stabius, Wenceslaus Faber, Marcus Scribanarius, Pietramellara, and Johann Virdung von Hassfurt, who had issued them before 1501, continued to do so. For 1502 appear such new names as Gaurico, Arlunus, Johann Muntz, Otto Raut and Hans Schrotbanck. And so on. But these predictions have already been listed by Hellmann through the century, and we shall not repeat the names of their authors unless there is some further reason for considering them. Their authors might be also of some importance in medicine or astronomy. Thus Stephanus Rosinus of Augsburg, a canon and master in Vienna, not only issued various predictions, of which those for 1504 and 1507 are extant, but calculated a table of the declinations of the fixed stars.[5] Hellmann has also reprinted various works of weather observation or prediction which we need not review.[6]

Magnus Hundt the Elder, who taught at the university of Leipzig and in 1500 had edited or commented upon the *Parvulus philosophiae*,[7] in 1501 published a work on man.[8] In it he states that the stars exert more influence upon the human body than on other composites of the elements,[9] and includes some human physiognomy and chiromancy as well as anatomy. Rather oddly he cites Pico della Mirandola's work against astrology for the relation of the seven planets to parts of the hand.[10]

Possibly the first treatise on astrological medicine to appear in

[4] Alphabetical lists of the authors of such predictions by countries and composite tables of them by decades are given in G. Hellmann, *Versuch einer Geschichte der Wettervorhersage im XVI Jahrhundert*, Abhandlungen d. preussischen Akademie d. Wissenschaften, Jahrgang 1924, Physikalisch-Mathematische Klasse. This will usually be cited as Hellmann (1924).

[5] Hellmann (1924), p. 29; Gesner (1545), fol. 604r.

[6] In his *Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus*, 15 vols., Berlin, 1893-1904.

[7] *Introductorium in universalem Aristotelis phisicam Parvulus philosophiae naturalis vulgariter appellatum*, 1500: BM IA. 12224.

[8] *Antropologium de hominis dignitate natura et proprietatibus . . .*, Liptzick, 1501. Copy used: BM IA. 22560.(1.).

[9] *Ibid.*, cap. 1, fol. B i verso.

[10] *Ibid.*, cap. 38.

the sixteenth century, as well as the first book of any kind to be printed at Montpellier, that olden fane of medieval medicine, was by Thomas Rocha, a master of the university, in 1501. The publication was strictly speaking a pair of opuscula, the one dealing with astronomical terminology, the other with astrological election of fitting times for administering medicines or bleeding the patient.[11]

A prediction for 1502 by Hieronymus Arlunus of Milan[12] is peculiar in being confined to a single topic, but an all-absorbing one at that time, the pest. The question to which Arlunus devotes all his space is whether the existing pest will mitigate during the coming year. First he traces its astrological causes, then shows that the constellations for the ensuing year are either largely favorable or indicate other ills than pestilence. He closes with nine conclusions.[13] I turned to histories of Milan to ascertain whether this prediction that the pest would mitigate there was justified by the event. Rosmini writes that in 1501 and 1502 Lombardy enjoyed unusual peace and tranquillity, and that the pest, which had begun at Rome, was kept within limits.[14] Verri says that in the years 1502 and 1503 the pest spread from Rome to Milan.[15] My question thus remained unanswered. But, unless Arlunus composed his prognostication well after the year

[11] *Compilatio quedam terminorum astronomie. Compilatio quedam in eligendo tempus corpori humano in exibitione medicinarum ac fleubotomia exequenda utile.* Published in facsimile with introduction, notes, and a biographical notice by Felix Desvernay, Lyons, 1904.

In reviewing this edition in *Janus,* X, 44-45, P. Pansier pointed out that Rocha was not "étudiant à l'université," but master.

The work was printed again at Burgos, 1523, with Rocha's *Digna redargutio in libros tres Augustini Nimphi* and other tracts by him.

[12] His name is not included among those listed by Hellmann (1924).

[13] Hieronymus Arlunus Mediolanensis, *Prognosticum anni 1502,* 4 fols., without date, place or printer. Copy used: BM c.27.h.23.(1.). The author is not listed in Argellati, *Bibliotheca scriptorum Mediolanensium,* 1745, although three other bearers of the family name, Arlunus, appear there, namely, Bernardinus, Jacobus, and Joannes Petreius. Motta, however, mentions the death of a medical Gerolamo Arluno on April 20, 1538. Cf. "Morti in Milano dal 1452 al 1552," *Archivio storico lombardo,* 18 (1891), 255.

[14] Carlo de' Rosmini, *Dell' Istoria di Milano,* Milan, III (1820), 290.

[15] Pietro Verri, *Storia di Milano,* II (1835), 133.

1502 had begun,[16] it would appear that the historians might have profited by a perusal of his tract, which represents the pest as already a very alarming matter at Milan.[17]

It was presumably about this time that another astrologer, Hieronymus Cutica, was expelled from Milan by the French because of his true predictions, if we accept the statement to that effect made later by Ranzovius.[18] Cardan who included Cutica's horoscope among his collection of one hundred genitures, says nothing of it. He placed Cutica's birth on September 27, 1476, and described him as one who "from astronomy had gained the priesthood." He was a person of no little ability, acumen and thought, religious and of mellifluous words, slow yet venerated by many, but liable to diseases from phlegm, melancholy thoughts and other perils.[19]

Agostino Nifo again gave his support to astrology in two treatises which were both finished in 1504 at his native town of Sessa, the one on February 22, the other on July 20, although the second was not printed until the next year. In the former treatise Nifo attributed critical days in disease to the stars,[20]

[16] Such annual predictions of course often began with the vernal equinox in March. Arlunus notices a conjunction of Saturn and Mars on February 27, which must, my colleague Ian Schilt, professor of astronomy, kindly informs me, have been in 1502, not 1503.

[17] It opens, "Deus venie largitor populum Mediolanensem ad te concurrentem propitius respice ut dum tibi deditus et tota mente devotus extiterit ab eo flagella nephande pestis ammoneas [ammoveas?].

[18] Ranzovius, *Catalogus virorum excellentium in arte astrologica*, 1580, p. 48. No annual predictions by him are noted in Hellmann (1924).

[19] Cardan, *Opera* (1663), V, 497. I should imagine that there may be other references to Cutica in Cardan's works but I do not happen to have noted them.

[20] I have used the edition of 1519 both at the library of the Academy of Medicine, New York and at the Bibliothèque Nationale, Paris: BN Rés. R.105(5), *Augustini Nyphi Suessani Medici ac astrologi excellentissimi de diebus criticis seu decretoriis aureus liber ad Vicentium Quirinum patritium Venetum. Expletum Suesse MDIIII xxii Februarii ab Augustino Nypho philosopho Suessano. Venetiis impensa heredum quondam Domini Octaviani Scoti civis Modoetiensis ac sociorum 19 Ianuarii 1519.* 15 fols.

For the full title of the editio princeps of "1504 Idibus octobris" see Sudhoff, *Iatromathematiker* (1902), 36-38, who however himself used an edition of Strasburg, Sybold, 1528, and merely refers to the above edition of 1519 without giving its title.

in the latter work he sought a similar explanation for the calamities of his time.[21]

The work on critical days is addressed to Vicenzo Quirini, a patrician of Venice, whom Nifo describes as "once a pupil, now a colleague." The work divides into four books containing respectively 22, 18, 8 and 4 *enunciata* each. Nifo states that he uses the observations of physicians and the explanations of astronomers. He professes to be the first to treat the subject of critical days from both the medical and astrological standpoints, but this claim to priority can hardly be allowed. He feels that to understand critical days one must know the peculiar individual properties of the twelve signs and seven planets. He cites such astrological authors as Albumasar and Alcabitius, John of Eschenden, Leopold of Austria and Guido Bonatti, and makes such assertions as that a disease is lethal which begins in a year when a conjunction of two or three superior planets is in the ascendent in the annual geniture or conversion of the patient. In the fourth book he turns from his strict subject of critical days to astrological election of medicaments, laying down such precepts as that the force of purgation is dulled when the moon is in conjunction with Jupiter.

In the other treatise Nifo looks back wistfully from recent days of war and pest to those years of leisure at Padua when he was occupied with philosophical writing and Aristotelian and Averroistic commentaries. "Now amidst so many toils and calamities another kind of writing suggests itself." He lists the recent calamities and misfortunes: various diseases, acts of violence, immoralities, the crimes of Caesar Borgia. Then he divides their causes into four books: the first on eclipses—there have been ten visible in Italy within a decade—the second on comets, the third on synods and annual conversions, the fourth

[21] *Euthici Augustini Niphi Philotei Suessani de nostrarum calamitatum causis liber ad Oliverium Carafam Cardinalium maximum. Venetiis exactum mandato et expensis heredum quondam nobilis viri domini Octaviani Scoti civis Modoetiensis Per Bonetum Locatellum Bergomensem presbyterum 1505 tertio nonas Aprilis.* 33 fols. Copy used: BN Rés. R.107.

on the 119 conjunctions. In both works Nifo made occasional allusion, generally unfavorable, to the arguments against astrology of Pico della Mirandola.

Giovanni Francesco Pico della Mirandola eventually replied with a work on *The True Causes of the Calamities of Our Times,* in which, however, he did not mention Nifo by name and which was not printed until 1519.[22] Francesco Pico dated the beginning of these calamities from the year which saw the death of his uncle, of Ermolao Barbaro, and of Poliziano. He denied severally all the astrological causes proposed, or that the ills were the work of chance and fortune. He found their causes in the providence of God, the crimes of men, the discord and wars of kings and peoples. Incidentally he pointed out that the Italians were now outclassed in warfare by the Swiss and German infantry and the French cavalry. The work seems to have been written in 1514[23] and was addressed to pope Leo X.

If north of the Alps such a generally used schoolbook as the *Margarita philosophica* was none too favorable to astrology, categorically condemning several parts of it, in Italy before the Catholic reformation astrology was a subject still taught in the universities. Orations were delivered in its praise at Padua and Ferrara in 1506 and 1507 respectively by Bartolomeo Vespucci of Florence, a doctor of medicine, and by Luca Gaurico, the famous astrologer. Vespucci's oration in praise of the subjects of the *quadrivium* in general and astrology in particular constituted the opening lecture of his public course. It was printed two years later.[24] Vespucci spoke of man as a microcosm. After

[22] *Ioannis Francisci Pici Mirandulae domini Concordiaeque comitis Liber de veris calamitatum causis nostrorum temporum ad Leonem X pont. max. Nunc primum prodidit ex incognita Mirandulana editione anni MDXIX brevem Pici notitiam adiectam Ferdinandus Calorius Caesius.* Mutinae apud Antonium et Angelum Cappelli, MDCCCLX. 76 pp. BN D.9264.

I have also used the original edition printed at Mirandola by Joannes Mazochius in August, 1519: BN Rés.Z.640 (2.).

[23] *Ibid.*, p. 13, speaking of his uncle's death, Francesco says, "a cuius obitu iam vigesimus annus praeteriit."

[24] *Bartholomaei Vespuccii Florentini Oratio habita in celeberrimo gymnasio Patavino pro sua prima lectione A. D. 1506 laudes prosequens quadrivii ac praesertim astrologiae quae ibi publice profitetur,* 1508; copy seen, BM c.80.b.11.(2.). I have also used the text

reviewing the various liberal arts he distinguished between observation of the movements of the stars and "the other part of astrology which consists of judgments and prognostications." A third supreme part of astrology concerned with images and seals, in which the natives of India excelled, "would be a science not to be despised." But Vespucci represents discussion of it as forbidden by "our holy religion" and therefore passes over it, together with its sister subjects—magic, necromancy, geomancy, augury and chiromancy—and returns to true astrology. This was in high esteem among the ancients. Against those who contend that it is contrary to the Christian faith Vespucci argues that it harmonizes better with Christianity than philosophy does. Other arts depend on astrology: for example, a carpenter must learn from an astrologer what times are unfavorable for cutting wood.

The oration of Gaurico at Ferrara on the inventors and praises of astrology was printed at Venice in 1531,[25] if not before, and again in his collected works as published at Basel in 1575.[26] The speech opened with definition of astrology and its division into parts. Gaurico held that its opponents had already been sufficiently answered by the ancient Roman writers, Manilius and Firmicus, or by the recent Italians, Bellantius and Pontano, and by Paul of Middelburg. He tried, however, to explain away Cicero's utterances against the Chaldeans in *De divinatione,* and repeated Vespucci's argument that astrology is more nearly in accord with the Christian religion than is philosophy. After going into the ancient history of the subject, Gaurico listed

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of it included in the collection to be mentioned in the following note and have further seen it in an earlier similar collection printed at Venice, 1518, and noted by B. Boncompagni, *Delle versioni fatte da Platone Tiburtino traduttore del secolo duodecimo,* Rome, 1851. It seems to have been commonly included in such collections on the *Sphere.* Zinner (1938), p. 224, item 100, gives the full table of contents for such a collection of Venice, 1508, in which Vespucci's *Oratio* is the first tract.

[25] *Oratio de inventoribus et astrologiae laudibus habita in Ferrariensi academia,* Venice, 1531, included in a collection of treatises on the *Sphere* edited by Gaurico: copy used, BM 532.k.1. See Pèrcopo 16.

[26] Soldati (1906), 104, and the works there cited.

various medieval and recent supporters of astrology: Peter of Abano, Albertus Magnus, Aquinas, "divine Leopold," Henry of Saxony (perhaps John is meant), Guido Bonatti of Forlì, Alfonso X, Giovanni Bianchini, Campanus transalpinus (an odd designation if he means Campanus of Novara), Michael Scot, George of Trebizond, George Valla, Nicholas of Cusa, Pierre d'Ailly, Robert Grosseteste bishop of Lincoln, Paul of Middelburg, Ficino, Lorenzo of San Miniato (i.e. Bonincontri), Bellantius, Nicolaus Leonicenus, Jacobus Faber Stapulensis, Prosdocimo de' Beldomandi, Giovanni de' Dondi Orologio of Padua, Pontano, Francesco Capuano (da Manfredonia), Agostino Nifo, and Iohannes Abiosus.[27] Gaurico complimented Leonicenus, who would seem to have been present in person at this oration, in fulsome terms, calling him easily the first of all physicians and astrologers who are or who henceforth will be in other years. The speech concluded with a rhapsody on magic, not that profane and detestable necromancy which employs demons and has been utterly exploded, but the celestial and natural variety first invented by Zoroaster, in which he taught the art of fabricating images in which those eternal celestial visages and their virtues are "dearticulated" and by which mortals are healed. This was the magic of the three Magi who came to the Christ child. This was the magic that enabled Pythagoras to live for one hundred and twenty years, by which Solomon acquired his great wisdom, and so on and so forth. Thus Gaurico defended the use of astrological images which Vespucci had declared prohibited by the church.

Gaurico appears to have printed his first annual astrological prediction at Venice in the first year of the century, the prognostication being for the following year, 1502. From that time on until his death in 1558 at the advanced age of nearly eighty-three other learned and scientific publications alternated almost annually with his astrological predictions.[28] For example, be-

[27] Concerning Abiosus see T (1929), 144, n.7, and the Index of the present volume.

[28] See Pèrcopo. Some astrological compositions by Gaurico found in manuscript are not noted by Pèrcopo,

tween his prediction for 1503 and prognostication of 1505, addressed to cardinal Ascanio, came his edition of the *Perspectiva communis* of John Peckham and his Latin translation of the commentary of Ammonius on Porphyry. Presumably of about the same date as Gaurico's oration praising astrology and magic, since both were composed while he taught at Ferrara, is a *Question* whether the earth is inhabited below the equator.[29] In this work Gaurico simply repeats the old arguments pro and con of Albertus Magnus, Avicenna, Averroes, Ptolemy, Aristotle and Peter of Abano until the very end when, in reply to the argument of Ptolemy that men of the northern hemisphere had never penetrated beyond the equator, he notes that "in our time many Portuguese, Spaniards and Italians have sailed there and brought back spices to us." But he raises no question as to the astrological bearings of the voyages of discovery or the relations of the lands and peoples of the southern hemisphere to the courses and influences of the planets. Despite his constant concern with astrology, this was apparently too new or unfamiliar an idea to strike him.

Gaurico seems to have founded a school of astrology, since several contemporaries speak of themselves as his disciples. One was Antonio Campanazzo in his prediction for the year 1507,[30] addressed to no less a person than pope Julius II, to whom a special chapter is further devoted.[31] In it Campanazzo states that

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such as that on the nativity of Georgius de Eltz in April, 1475 (Vienna 5002, 16th century, fols. 150r-151v), or his prediction concerning Ferdinand, king of the Romans, for the years 1532-1535 (Vienna 7433, 17th century, fols. 11r-21r). But possibly these are excerpts from his printed works. Vienna 5002, fol. 158r *et seq.*, also includes an astrological treatise written about 1507 by Simon Gazius of Padua, who is not mentioned by Hellmann.

[29] It is found in the above mentioned 1531 edition of works on the *Sphere:* BM 532.k.1, fols. 56r-57r.

[30] It is a tract of four leaves in Italian, opening, "Havea determinato Iulio Papa Beatissimo dar fine . . ." and closing, ". . . Vale. Composto per Antonio campanazo discipul d'luca gaurico"; copy used, BM c.27.h.23.(7.).

A geniture of Campanazzo, drawn up by Gaurico in 1509 near Bologna, is preserved in a MS at Padua: Antoniana XXI, 497, "Antequam Antoni dulcissme ad divinae tuae geneseos prognosticon accingar . . . / . . . datum in rure Marani ad V lapidem ab urbe Felsinea anno 1509 per Lucam Guaricum Neapolitanum."

[31] "Del summo pontifice Iulio Secundo."

although it is not licit to read the nativity of his Holiness, yet his most happy enthronement indicates long life, easy victory over his foes, and so forth. This was far from being Campanazzo's first annual prediction, since he informs the pope at the start that he had determined to make an end of his prognostications but had been prevailed upon by the prayers of relations and friends to issue one more. As a matter of fact, he seems to have issued yet another for 1508.[32] Another astrologer to call himself Gaurico's disciple was Giovanni Carlo of Bologna, of whose prediction for 1519 we speak in another chapter. A third was Ioannes de Rogeriis in a prediction for 1537 addressed from the city of Rome to the most Christian king of France, Francis I. The prediction is chiefly political.[33] One wonders if these disciples followed Luca in his acceptance of astrological images and magic as well as in their annual predictions, which of course involve only the astrological doctrine of revolutions and conjunctions, not nativities, elections or interrogations. Gian Luigi de' Rossi, at least, in his annual prediction for the year 1504, asserted that he had learned geomancy as well as rhetoric, poetry, arithmetic and astrology from Gaurico.[34]

Gaurico had as a colleague at Ferrara Pellegrino Prisciano who is said by the eighteenth century historian of the university to have excelled him in astrology.[35] Prisciano was furthermore not only court astrologer and librarian of duke Ercole I but well versed in poetry and philosophy, a doctor of laws and a historian. His *Antiquities of Ferrara,* filling nine folios in manuscript, were dedicated to the future Ercole II,[36] while his *Ortopascha* was

[32] Hellmann (1924), 34, lists four annual predictions by him between the years 1504 and 1508.

[33] Ioannes de Rogeriis, *Ad chrisianissimum Gallorum regem Prognosticon anni 1537.* Datum Romae Calen, Ianu. 1537: copy used BM c.27.h.23.(17.). Hellmann (1924), 34, lists no other annual prediction by de Rogeriis than this for 1537.

[34] Pèrcopo 12; Hellmann (1924), 34. This Johannes Aloisius de Rubeis may have been a descendant of John de Rubeis, physician to John, duke of Burgundy and author of astrological predictions in the early fifteenth century: see T IV, 94.

[35] Guarino's *Supplementum* to Borsetti, Bologna, 1740, II, 36: cited by Pèrcopo 17.

[36] Jöcher, III (1750), 1780; Dresden MS F.67, 17th century, Ferrarię regiminis liber primus cum proemio ad Herculem Estensem sec. (1508-1559).

dedicated to Leo X at some time after 1513. In it he says that, desirous of pontifical commendation, he has not hesitated to go from Ferrara to Rome.[37] Another erstwhile astrologer at the court of Leo was Clementius Clementinus.[38] Previously he had taught at Padua. Medical works by him were printed at Rome in 1512[39] and at Basel in 1535,[40] but the latest astrological prediction extant by him seems to be that for the year 1501.[41]

Returning to Ferrara and its astrologers, we may note that the last extant annual predictions by Pietro Buono Avogaro are for the years 1503, 1504 and 1505. For 1506 Augustino took up his father's mantle with a prognostication addressed to Alfonso, duke of Ferrara and Modena.[42] In another prediction of 1509 Augustino states that he has been stimulated thereto by the teaching of Gaurico at Ferrara the previous year.[43] Meanwhile there had been addressed to the duke and published at the university of Ferrara a prediction for 1507 in Italian by one Clirosastre Sponnela, who further styled himself "a wanderer of the aerial region." Not without notable cause had this bird of passage interrupted his vagabond career long enough to set down the effects of the stars, specifying the future for more states and provinces than was customary.[44]

A note by a purchaser of the volume at Rome in 1739 states that it is the first of the nine volumes of the *Antiquities of Ferrara.*

[37] Venice, S. Marco MS VIII, 26 (Valentinelli XI, 100). I follow Valentinelli's description.

[38] For his fifteenth century publications see T IV, 482.

[39] *Clementina medicina:* copy at BM 776.m.1.

[40] *Lucubrationes:* copy at BM 776.m.2.

[41] He is not mentioned by Hellmann (1924) or Sudhoff (1902).

[42] *Alo Illustrissimo & excellentissimo principe e signore Signore Alfonsio Duca de Ferrara e de Modena iovictissimo* (sic) *pronostico de M. Augustino fiolo de Maistro pierbono advogaro in lanno de la gratia MCCCCCVI,* 4 fols.: copy used, BM c.27.h.23.(5.). This prediction is not noted by Hellmann (1924) and he lists no Augustinus Advogarius, ascribing the prediction for 1509 to Caesar Advogarius.

[43] It is in Latin, whereas that for 1506 was in Italian, and opens: "Cum superiore anno Dux Potentiss. D. Lucas Gauricus Neapolitanus in tuo florentissimo gimnasio . . ." : copy used, BM c.27.h.23.(9).

[44] *Alo Illustr. et excel. principe signore don Alphonso duca de ferrara etc. Pronostico di Clirosastre sponnela regione aerea errante M.CCCCC.VII.* Opening, "Non senza admirabile causa Illustrissimo principe dal mio continuo vagabundo supplitio remosso a scrivere delle stelle li effecti et influentie mi sono inclinato. . ." "Editum Ferrarie in felici gymnasio Ferrariensi Anno

In 1510 Matthaeus Binius Thomasius of Venice published there a treatise of divine and natural conclusions followed by another of medical conclusions.[45] The latter seems rather elementary, although it alludes to such topics as intension and remission and cites such authorities as Conciliator, Turrisianus and James of Forlì. The introductory treatise maintains the Aristotelian descending ladder of God, moving intelligences and celestial bodies. The last are eternal and cause all generation and corruption in this inferior world. Thus the fundamental hypothesis of astrology is reaffirmed.

Antonius Gazius (1461-1528), a physician of Padua, is especially known for his *Florida corona medicinae* in three hundred chapters. He composed it in 1490; it was first printed at Venice in 1491, and was reprinted in 1500, 1534 and 1541. He traveled widely in Europe and became physician to Sigismund I of Poland.[46] The *Florida corona* consists chiefly of rules for the preservation of health and contains little or no astrological medicine.[47] In 1511, however, Gazius copied with his own hand a number of astrological works, chiefly on nativities and by John of Glogau.[48] He therefore appears to have believed in

legis gratie 1507 die decimo quinto Ianuarii," 4 leaves: copy used, BM c.27.h.23.(8.).

Hellmann (1924), 34, lists the author merely as Clirosastre.

[45] Matthaei Binni Thomasii Veneti IA.F. (for Iacobi filius), *Divinarum ac naturalium conclusionum tractatus: Medicinalium Conclusionum Tractatus,* Venetiis in aedibus Ioannis Tacuini mense Decembri MDX.: copy used, BM 1172.h.1.(1.).

[46] Giuseppe Vedova, *Biografia degli scrittori Padovani,* 2 vols., 1832-1836, I, 444-46, lists other medical works by Gazius published and unpublished and a number of religious treatises. Fourteen religious tracts by him are contained in Venice, S. Marco MS III, 7 (Valentinelli, IV, 60). According to Frati the following treatise in medicine is not noted either by Vedova or Haller, *Bibl. medic. pract.,* I, 471-72: BU 27 (12, Busta II, cod. 9), 16th century, item 1, fols, 1-15v, Divi Antonii Gazi Patavini medici. . . . Ars clinica.

[47] It includes instructions for religious celibates whom it advises not even to read its preceding chapters on sexual intercourse—a caution that might better have been given before these chapters.

[48] Venice, S. Marco VIII, 89 (Valentinelli, XI, 112). BL Canon. Misc. 23, 16th century, is perhaps a fuller version, since it has ten treatises instead of eight as in the Venice MS. The form of incipit given by Coxe, "Erecta nativitatis figura et per modos plus (prius?) et postea per contemplationem rectificata . . ." seems more correct than Valentinelli's "De recta nativitatis figura et per animo. . . ." Tables of nativities of illustrious men and other as-

astrology to the extent of nativities, but he may have had a personal rather than professional interest in the art.

From the Italian peninsula we may pass to Germany in the company of Lorenz Beheim (1457-1521), who returned from Rome to Germany after the death in 1503 of pope Alexander VI, whom he had long served as a master of artillery and a participant in various sieges.[49] Reicke has shown that Beheim's correspondence of 1505-1520 with Wilibald Pirckheimer is full of astrology, including a horoscope which he once drew up for Caesar Borgia in Rome.[50] Pirckheimer in an unpublished writing defended astrology against the attacks of Pico della Mirandola and said that Beheim had shown him a very old book from which Pico had taken most of his arguments.[51] In October, 1506, Beheim is found at Bamberg, addressing to Johann Schöner, who at that time was a resident of that city, an astrological treatise on the significance of directions of the planets.[52] He first distinguishes directions as left or right according as they are with or against the succession of the signs of the zodiac. In the former case they signify what man will do, in the latter what he will suffer or have happen to him. Directions may also be divided in four ways: from one planet to another, from a planet to fixed stars of the first magnitude which are near the zodiac, between planet or fixed stars and the angles of the *figura coeli,* and from the degrees in which the planets are in the nativity. Beheim then takes up in turn the directions of each planet to the others. For example, when the direction of Saturn comes to the moon

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trological matter in yet another MS, BL Canon. Misc. 24, early 16th century, are also perhaps by Gazius.

[49] On Beheim's biography see E. Reicke, "Der Bamberger Kanonikus Lorenz Beheim, Pirckheimers Freund," *Forschungen zur Geschichte Bayerns,* 14 (1906), 1-40; E. Zinner, *Die fränkische Sternkunde,* 1934, pp. 84-85. He was in the service of cardinal Borgia before the latter became pope.

[50] Reicke, *op. cit.,* pp. 16, 17, 20, 25-26.

[51] *Ibid.,* pp. 25-26.

[52] Vienna 5503, fols, 174r-177r: "Laurentii Behem Nurenbergensis doctoris utriusque iuris Directionum significata Ad Iohannem Schonerum," opening, "Omnes mundi mutaciones status negotia opera factiones complexiones fiunt a directionibus . . ." and closing, ". . . accusabitur alicuius maleficii vel tradimentum occultum. A doctore Lau. Behem Anno 1506 in octobri."

or to its evil aspect, it signifies damage in partnerships and vassals and serfs and beasts, also the death of a man or losses at law or of crops from storms. When it points to its good aspect, it signifies corresponding advantages.[53] His tract is thus limited to the first of the four methods. Tables of the stay of the child in the womb by Beheim are preserved in another Vienna manuscript.[54]

A criticism of astrology from within rather than an attack upon it from without is seen in the *Speculum astrologicum* of Johann Essler of Mainz. It was first printed at Mainz in 1508[55] and appears to have been composed during the two preceding years, since it refers first to 1506 and then to 1507 as the current year.[56] That it exerted some lasting influence is suggested by its republication at Basel in 1573 and in 1596. The theme of the treatise is indicated by the sub-title, "Of the causes of errors in astrology resulting from neglect of the time equation." The experience of past years has shown that astrological predictions are often far from the truth. Essler prefers to follow the *Alfonsine Tables* rather than Thebit ben Corat and Thebit rather than Ptolemy. In the time of Ptolemy the greater declination of the sun from the equator was 23 degrees, 51 minutes: in the time of Regiomontanus (*17 primi Epitomatis*[57]), 23 degrees, 28 minutes.[58] But the common herd of astrologers misunderstand or neglect Ptolemy, Alfonso and Peurbach alike.[59] Essler believes in astrological medicine,[60] citing in its favor not merely Hippocrates and Galen but so superstitious a book of

[53] *Ibid.*, fol. 175v.

[54] Vienna 4988, fols. 318r-319v: Laurentius Beham, *Tabule more infantis in utero.*

[55] I have not seen this edition (quarto, Johann Schoeffer, Proctor 9849) but have used that of Basel, 1573: *Ioannis Essler Maguntini Speculum Astrologicum . . . de causis errorum in astrologia ex neglecta temporis aequatione provenientium.* The preface opens at p. 213, "Quum multis ab hinc annis experientia docuerit Astrologia prognostica suis in promissis non parum deviasse a veritatis tramite. . ." The text begins at p. 217, "Ne propriis in viribus velut arundineo baculo confidens . . . ."

[56] Edition of 1573, pp. 229, 245.

[57] The citation is to Peurbach and Regiomontanus's *Epitome of the Almagest.*

[58] Edition of 1573, p. 248.

[59] *Ibid.*, p. 260: "Astrologorum vulgus a Ptolomaei intellectu recedens Alphonsinum nucleum haud intelligens neque Purbachii dictum advertens."

[60] *Ibid.*, p. 246.

magic as Hermes, *De speculis et luce*. A *Theory of the Planets and Eighth Sphere* by Essler was printed in 1509 at Basel with the *New Theories of the Planets* of Georg Peurbach.[61] Essler's name appeared with that of Georg Ubelin as editors of the revised edition of Ptolemy's *Geography* by Johann Schott at Strasburg in 1513, but most of the work on the maps had been done by Martin Waldseemüller of Freiburg-im-Breisgau, to whom credit was given only by the later editor, Laurent Fries, in 1522.[62] Giovanni Francesco Pico della Mirandola addressed to Essler a letter on the *Geography* of Ptolemy.[63]

In 1513,[64] and again in 1517[65] was published a brief introduction to astrology explanatory of the almanach of Cracow and containing some chapters on astrological medicine. The author was Michael of Breslau, a teacher in the university of Cracow. He seems chiefly to have written textbooks, publishing an introduction to logic at Strasburg in 1515[66] and an *Epitome of Theological Conclusions* as an introduction to the *Sentences* of Peter Lombard at Cracow in 1521.[67] He is further said to have commented on hymns and to have composed *Dubia* in natural science.[68] He died in 1533.

Henricus Grammateus, Scriptor or Schreiber was born at Erfurt towards the close of the fifteenth century. He studied at Cracow and Vienna and taught in the latter university. In 1514

[61] Houzeau et Lancaster, I, i, 2349: G. Purbachius, *Theoricae novae planetarum*, Basileae, 1509, una cum J. Ezleri *Theorica planetarum et octavae sphaerae*.

[62] C. G. A. Schmidt, *Laurent Fries de Colmar, médecin astrologue géographe*, 1888, pp. 46-48.

[63] Felice Ceretti, *Sulla geografia di Claudio Tolomeo. Lettera del conte Giovanni Francesco II Pico della Mirandola al Dr. Giacomo (sic) Essler, tradotta dal latino nell' italiana favella da Ercole Sola*. In *Nozze Cristini-Zani*, Mirandola, Grilli, 1901.

[64] Michael Vratislaviensis, *Introductorium astronomie Cracoviense elucidans Almanach*, Cracow,, 1513, 4to: BM 8610.bb.34.

[65] *Introductorium astronomiae*, Cracoviae (Johannes Haller), 1517, 24 fols. I assume, but perhaps erroneously, that this is the same work as the foregoing.

[66] *Introductorium dyalectice*, Argentorati, 1515, 4to.

[67] *Epithoma conclusionum theologicalium pro introductione in quatuor libris sententiarum magistri Petri Lombardi . . .* , Cracow, 1521, 4to.

[68] Jöcher, III, 509. His name appears neither in Sudhoff (1902) nor in Hellmann (1924), unless Michael a Vislicza, who made an annual prognostication for 1533, be he.

he published at Cracow a brief quarto of eight leaves on arithmetic and music,[69] and four years later at Vienna a booklet on rules for measuring the contents of vessels.[70] To these mathematical works he added in 1524 *Tables for Knowing the Humors According to the Motion of the Planets*.[71] He does not, however, appear to have issued any annual astrological prognostications.[72]

Among the numerous works on critical days written in the sixteenth century was that of Thomas Rocha on critical days and the crisis and the prognostication of diseases dated October 15, 1521. This was seemingly a different work from his treatise of 1501 in the field of astrological medicine, but I have been unable to consult it. A colophon in the Burgos, 1523, edition of various works by Thomas speaks as if the work on critical days had just ended, but the work itself is not found in the volume which I used.[73] In this colophon Rocha calls himself a Catalan (Gottolanus) of the region around Tarragona, a knight and doctor of arts and medicine. His work is described as compiled from the utterances of the most approved authors in medicine and in astrology. It was completed after the horrid battle of Pampeluna in which the invading French were beaten. Thomas gives the positions of the planets at the time the French entered Navarre.

The oft printed *Introductiones apotelesmaticae* of John ab Indagine, of whose chiromantic and physiognomic sections we

[69] *Algorithmus proportionum una cum monochordi generis dyatonici compositione*. Impressum Cracovie per Volfgangum de Argentina, a.d. 1514 die 29 Julii.

[70] *Libellus de compositione regularum pro vasorum mensuratione*. Vienna, Jo. Singrenius, 1518. 4to.

[71] *Henrici Grammataei tabulae cognoscendorum humorum secundum motum planetarum*, s.l. 1524. 4to. Noted by Sudhoff (1902), p. 49.

[72] His name does not appear in Hellmann (1924).

[73] BM 8610,f.10. The Latin text of the colophon which I think occurs at the leaf with the signature b iii reads in part: "Finem capit opus istud de diebus criticis et de crisi et de morborum prognosticatione mei Thome Rocha gottolani Tarraconensis plagi oriundi militis artium et medicine doctoris quod ex autorum dictis approbatissimorum tam medicorum quam astrologorum fuit ordinatum atque compositum . . . quinta decima Octobris anno MDXXI post horridum prelium Pampilonense. . . . Ipsi Galli Navarram ingrediuntur oppositione Saturni cum Marte vigente Saturnus in Aquario reperitur Mars 15 Leonis gradum possidebat."

have already treated in another chapter, opens with a dedicatory preface, dated June 1, 1522, to Albert, archbishop of Mainz. In this introduction John inveighs equally against "those dogs who calumniate astrology" upon the one hand, and against "that most inept theology which they call scholastic, that is, the Thomist or Scotist," on the other hand. He wishes that the dogs would either stop their barking or at least behave with more moderation. But his attack on scholastic theology, though common and popular at the time, ignores the fact that both Aquinas and Scotus had accepted astrology in large measure. Some would-be innovators in education and social science in our own day have been guilty of cognate inconsistencies and have spoken under like misapprehensions. John ab Indagine seems further in error in affirming that the art of astrology was condemned by the Roman pontiffs, since papal bulls against it came only later under Sixtus V and Gregory XIII, while the popes of the early sixteenth century—Julius II, Leo X, Adrian VI and Paul III—were all patrons of astrologers. At any rate John served as ambassador to the pope for archbishop Albert and his own work was subsequently put on the *Index* by Paul IV.[74] While John seems unfair to the popes and schoolmen, his prejudice against medieval thought does not extend to the Arabic astrologers whom he cites liberally.

Indagine perhaps initiated a distinction which was to be increasingly employed later in the century when he stated his preference for what he called natural astrology to the artificial variety than which it is more faithful and less superstitious. Yet he lists among its inventors the same men who "were the authors of magic," of which also he therefore would seem not to have disapproved, though here again he perhaps has in mind the natural variety. As for natural astrology, it is naught else than the perfect consummation of natural philosophy. John cannot see the reason for investigating the movements of the heavens, if the stars effect nothing by their motion. A chief distinction for John between natural and artificial astrology is

[74] See the article on Johann ab Indagine in the *Allgemeine Deutsche Biographie.*

that, where the latter in drawing up horoscopes determines in detail the positions of all the planets, natural astrology observes merely the movements of sun and moon. These two luminaries, however, never themselves have the lordship of a person's nativity but, if it falls in the house of either, pass it on to the planet ruling the next house. It would seem that John's efforts to emend and simplify astrology have made it more arbitrary and artificial rather than more natural. He makes the usual qualification that the stars merely incline man to action, and that we can resist them, if we follow reason. But he cannot see why the influence of the stars, which is admitted for the rest of the world of nature, should be denied in the case of the human body. Consequently he gives canons for relieving the sick according to the aspects of the signs and asserts that what many physicians have failed to accomplish with the most potent drugs an astrologer has effected by use of a simple herb through intelligent observation of the access and recess of the signs.

The varying attitude of the humanists and Oxford reformers towards astrology and the occult may be briefly indicated. Sir Thomas More mildly satirized astrologers in some of his epigrams, his favorite jibe being that the star-gazer could not foresee or detect his own wife's infidelity.[75] Thomas Linacre, Greek scholar and president of the College of Physicians, wrote on June 10, 1518, to Guillaume Budé, the leading French humanist, that he was sending him some rings consecrated by the king as charms against spasms. Budé replied a month later that he had distributed them to married women of his acquaintance, telling them that they were amulets against slander, which would seem to be taking their virtue (the rings' I mean) rather lightly.[76] Erasmus often ridiculed superstition in his writings but did not always maintain a like attitude in practice. He wrote Mosellanus in 1519 that the bitter dissension at the university of Louvain

[75] Thomas More, *Opera omnia,* 1689, pp. 239, 243. Edition of 1566, pp. 22-23.

[76] R. Crawfurd, "The Blessing of Cramp-Rings; a Chapter in the History of the Treatment of Epilepsy," in Charles Singer's *Studies in the History of Science,* I (1917), 165-88, especially pp. 173-74.

between the adherents of the old and new learning must be either due to a conspiracy or to fate. "I have consulted a number of astrologers," he continued, "men illustrious in their profession. They refer the cause of the evil to last year's eclipse. This occurred, unless I am mistaken, in Aries. Aries moreover pertains to the head. Furthermore Mercury is vitiated by the influence of Saturn. Hence this evil most potently afflicts those who are under Mercury, among whom they number the inhabitants of Louvain." Erasmus thus seems to have consulted the astrologers in all seriousness, although he also thought that he detected a conspiracy.[77]

A municipality like Basel had its own astrologers around the year 1520,[78] and a well educated burgher of Basel and Strasburg, Rudolf von Huseneck, who helped Petermann Etterlin polish up the style of the first Swiss chronicle to be printed—in 1507—had books of astrology and magic in his library.[79]

[77] Latin quoted in full by Johann Friedrich, *Astrologie und Reformation*, Munich, 1864, p. 27, n. 1, from *Erasmi Opera*, 1540, III, 240.

[78] R. Wackernagel, *Geschichte der Stadt Basel*, III (1924), 296.

[79] *Ibid.*, pp. 259-60.

CHAPTER XI

THE CONJUNCTION OF 1524

Levate igitur viri christianissimi capita vestra
—STOEFFLER

In 1645 the moral and political opuscula of Agostino Nifo were printed at Paris accompanied by an estimate of him by Gabriel Naudé, the distinguished librarian.[1] In connection with Nifo's treatise, *De falsa diluvii prognosticatione,* Naudé noted the fears of another flood which were aroused by the approaching conjunction of all the planets in the sign Pisces during February, 1524. He also gave some description of other writings on the subject by contemporaries of Nifo like Cirvelo, professor at the university of Alcalà, Peter Martyr, Paul of Middelburg, Nicolaus Peranzonus, and Thomas Philologus of Ravenna. In 1914 G. Hellmann published in his *Beiträge zur Geschichte der Meteorologie* a paper of roughly one hundred pages on the heyday of astrological weather prediction ("Aus der Blütezeit der Astrometeorologie") with the sub-title, "J. Stoefflers Prognose für das Jahr 1524."[2] He gave as full bibliographical details as possible concerning the fifty-six authors and one hundred and thirty-three editions which were elicited by the conjunction of 1524,[3] and some account of the contents of a number of the works. I in turn have examined a number of these works directly and from a standpoint somewhat different from that of Hellmann, although I have not only found his monograph an exceed-

[1] *Augustini Niphi Opuscula moralia et politica cum Gabrielis Naudaei judicio de Nipho,* Paris, 1645.

[2] It is No. 273 in *Veröffentlichungen des Königlich Preussischen Meteorologischen Instituts, Berlin,* 1914, and No. 1 of *Beiträge zur Geschichte der Meteorologie,* pp. 5-102. This volume will henceforth be cited as "Hellmann (1914)."

[3] Thirty of these treatises from Hellmann's own library were offered for sale by L'Art Ancien, Zurich, in its Short List 6 (1935), items 138-172. I purchased several of them.

ingly helpful guide but shall occasionally utilize it for works to which I have not had access.

While this conjunction or series of conjunctions in 1524 has received especial attention, it should be kept in mind that much of the discussion of it occurred in annual predictions which would presumably have been written and published anyway, and that on the other hand conjunctions of Saturn and Jupiter occurring roughly every twenty years had for a long time past excited especial attention from astrologers and aroused public apprehension. That of 1503-1504 had figured largely in the very widely read *Prognosticon de eversione Europae* of Antonio Arquato or Torquato. As early as 1474 John of Lübeck[4] had predicted that the birth of antichrist would follow it in 1506. John Abiosus of the kingdom of Naples, a doctor of arts and medicine, and professor of mathematics, disputed this in 1494 but predicted ills especially for the years 1503, 1544 and 1702.[5] Two years later in 1496 he foresaw such cataclysmic disasters for both 1503 and 1524 that he rejoiced in the invention of printing and multiplication of books to preserve and transmit the learning of the past through that coming troubled period.[6] John of

[4] For Arquato and John of Lübeck see T IV, index. Here may be further noted a letter addressed to Arquato by three astrologers, Carolus Drusianus, Odoardus Famiensis and Americus Polonus, who are commonly represented as in the service of Matthias Corvinus, king of Hungary, who died in 1490. It was printed at Bologna about 1493: GW 9061. I have seen an Italian version without name of printer or date or place of printing bound in a chronologically arranged sequence of prognostications between one for the year 1503 and another for 1506, with "1504" written at the top of its first page: BM c.27.h.23.(4.). This letter of the three astrologers is an elucidation, justification and repetition of Arquato's famous prediction and is concerned especially with the conjunction of 1504. It predicts the fall of the Ottoman Empire for about 1507. It was referred to by Gaspar Torrella in an astrological judgment composed for Caesar Borgia but not printed until 1507: *Iudicium universale* . . . , Roma per Ioh. Besicken, 1507: copy used, BM 1039.k.33. Also by W. Lazius, *Fragmentum vaticinii*, 1547: copy used, BM 1315.c.4.(14.). Undaunted by the continued existence of the Ottoman Empire, Lazius explained in marginal notes how later events had borne Arquato out.

[5] Joh. Bapt. Abiosus, *Dialogus in defensionem astrologiae cum vaticinio a diluvio usque ad Christi annos 1702*, Venetiis, per F. Lapicidam, Oct. 20, 1494: GW 6, Hain *24.

[6] *Epistola verarum scientiarum speculatoribus*, Venice, 1496, printed with Regiomontanus, Joa. *Epitome in Almagestum Ptolomei*, Venice, Johann Hamann or Herzog, 1496: Hain-Cop. *13806, Proctor 5197.

Glogau, one of the teachers of Copernicus at the university of Cracow, was another who had written on the conjunction of 1504.[7] In an anonymous manuscript the question was raised "Whether the configurations of the stars and planets" in the years 1503 and 1504 "will effect and cause the advent of marvelous things, changes of sects and religions, vicissitudes of kingdoms, inundations of waters and rivers, fear of war and contradiction, diverse state of mortal affairs in this inferior world."[8]

Four main features may be discerned in the literature connected with the conjunction of 1524: first, the perennial tendency to predict great ills from such conjunctions; second, a more recent tendency to decry the stress laid by Arabic astrologers upon such conjunctions and to revert to the Ptolemaic emphasis upon eclipses; third, the separate question of the possibility of a second deluge or *Sindflut,* with its moral and theological as well as astrological and meteorological interest; fourth, a number of personal controversies and literary duels between persons who were more often rival astrologers than defender and opponent of the art. For although the question of a flood might seem to give theologians or other opponents of astrology an opening for attacks on the art, it was rather disagreement among the astrologers themselves that especially marked the outburst of writings on the subject.

But first we must settle the problem when and how the general

[7] MS Vienna 4756, fols. 152r-160v, opening, "Utrum stellarum et planetarum . . ." and closing, ". . . modificanda est sententias (*sic*)."

In this manuscript the treatise is accompanied by a letter from Nicolaus Ellenbog to Bernard Adelman dated March 11, 1522, from Ottobeuern, in which he says that John of Glogau was his teacher in astrology at Cracow in 1502, and that the passage of twenty years since has more and more confirmed the truth of his prediction. For the effects of great conjunctions do not appear immediately.

[8] BMsl 3130, paper quarto, ff. 54-58: "Utrum stellarum et planetarum configurationes . . . anno 1503 et 1504 venturis rerum mirabilium adventum sectarum et legum permutationes regnorum vicissitudines aquarum et rivorum inundationes guerrae et contradictionis metum diversum mortalium statum in mundo inferiori (ut Albumazar voluit) efficient et causabunt." The MS is in the handwriting of Christopher Klauser, by whom there is a *Liber receptarum* in BMsl 3129, paper octavo, 16th century, ff. 1-83.

controversy originated. It was not uncustomary, as has just been indicated in speaking of the conjunction of 1504, for astrologers to take notice of such celestial phenomena some years before their actual occurrence. The remote cause of our controversial literature anent the conjunction of 1524 has generally been traced to a brief passage looking forward to that conjunction in the *Ephemerides* of Johann[9] Stoeffler of Justingen who with Jakob Pflaum in 1499 at Ulm had issued an *Almanach nova plurimis annis venturis inserviens,* which attained much popularity and was reissued at Venice in 1504, 1506, 1507, 1513, 1518, 1521 and 1522. This passage made no prediction of a flood,[10] although many writers from Naudé on have so stated, but may be roughly translated as follows:

In this year we shall see eclipse neither of sun nor moon. But in this year will occur positions of the planets well worthy of wonderment. For in the month of February will occur twenty conjunctions, small, mean and great, of which sixteen will occupy a watery sign, signifying to well nigh the whole world, climates, kingdoms, provinces, estates, dignitaries, brutes, beasts of the sea, and to all dwellers on earth indubitable mutation, variation and alteration such as we have scarce perceived for many centuries from historiographers and our elders. Lift up your heads, therefore, ye Christian men.

From this brief passage in Stoeffler's widely circulated work and its mention of sixteen conjunctions in a watery sign, someone appears to have jumped to the conclusion that there would be a second universal deluge. But the prediction of this by the vulgar herd of astrologers, whether in print in treatises no longer extant

[9] Not Justin as stated by Hellmann, probably by a confusion with Justingen. See A. Moll, *Johannes Stöffler von Justingen,* Lindau, 1877, pp. 27-31.

[10] Hellmann clearly recognizes this fact. Yet the L'Art Ancien Short List 6 heads its notice of the volumes from Hellmann's library, "J. Stoeffler's 'Prediction of the Deluge' for 1524" and then goes on to speak of "Stoeffler's absurd prediction that the Deluge would be repeated in the year 1524." Furthermore Günther Franz, *Der deutsche Bauernkrieg,* 1933, p. 147, although he cites Hellmann's monograph, can still write: "Der Tübinger Mathematiker Stöffler hatte schon 1499 aus dieser ungewöhnlichen Konstellation geschlossen, dass in diesem Monat eine allgemeine Sintflut über die Welt einbrechen wurde." So persistent are historical errors.

or by word of mouth, and its wide currency in popular rumor and panic, we have to take largely on faith from Pigghe, Nifo and others who opposed it. So much for the remote, now for the direct cause of our controversy.[11]

This controversy concerning the conjunction of all the planets in Pisces in February, 1524, has hitherto been represented as initiated in 1517 by the printing by Agostino Nifo of his treatise *On the False Prognostication of a Deluge.* I propose to show that this work was rather first printed at Naples on December 24, 1519, that it was not composed by Nifo until that year, and that he probably derived the idea for it from a treatise dedicated to him by Albertus Pighius, or Pigghe, of Kampen in Holland and composed and printed at Paris about March 18, 1519.[12]

The reputed edition of 1517 cannot now be found but is listed by Graesse (*Trésor,* IV, 678) as follows: "De falsa diluvii prognosticatione quae ex conventu omnium planetarum qui in piscibus contingit anno 1524 divulgata est LL. III ad Karolum primum divino afflatum spiritu Caesarem. Flor. Phil. Junta, 1517 mense Septembris in 4°." This entry appears to be a confusion with the edition of Florence, September, 1520, from the copy of which in the Bibliothèque Mazarine, Paris, I quote the following description: "Augustini Niphi philosophi Suessani de falsa diluvii prognosticatione quae ex conventu omnium planetarum qui in piscibus contingit anno 1524 divulgata est libri tres Ad Karolum primum divino afflante spiritu Caesarem semper Augus-

[11] The conjunction of 1524 had also been looked forward to with dread by John of Bruges, *De veritate astronomiae,* a work devoted especially to conjunctions, composed in 1444 and printed later in the fifteenth century, fol. (b iv) verso. Copy used: BN Rés. p.V.186.

John spoke of a conjunction then only of the three superior planets and did not predict any particular ills from it, but saw no hope of improvement with the change of *triplicitas* in 1544. "Indeed I do not see any hope of prosperity for the entire human polity to be expected in the future so far as celestial influence is concerned."

But John of Bruges seems not to have been cited in the literature on the conjunction of 1524.

[12] This and several of the following paragraphs reproduce or are based upon two notes which appeared in *The Romanic Review* in 1935 and 1936: "That Agostino Nifo's 'De falsa diluvii prognosticatione' was not published until December 24, 1519," XXVI, 118-21, and "The First Edition of Nifo's 'De falsa diluvii prognosticatione,'" XXVII, 27-28.

tum. . . / . . . Florentiae per Haeredes Philippi Iuntae Anno domini MDXX mense Septembri Leone X Pont. impressum ac ultimo revisum." Charles V was not even king of the Romans in 1517 and would not have been addressed as Caesar then. The superior Latin of the title which I have quoted from an actual copy of the work (*divino affiante spiritu* is preferable to *divino afflatum spiritu,* and *Caesarem semper Augustum* to a mere *Caesarem*) further suggests that Graesse's title was not taken from an actual copy of the work. That Charles should still be called the First, his numeral as king of Spain, after he had become emperor may seem a little strange in a work printed at Florence, but would be a not unnatural form for Nifo, himself a native of the kingdom of Naples and subject of the king of Spain, to use in a work published at Naples on December 24, 1519, after Charles had been elected emperor on June 28, 1519, but before he had been crowned at Aix-la-Chapelle on October 23, 1520.

Moreover, it would seem more likely that Nifo would first publish his work at Naples than at Florence. His commentaries on the *Quadripartitum* of Ptolemy had been printed at Naples on April 23, 1513, by Peter Maria de Richis of Pavia.[13] His *De regnandi peritia* was also printed at Naples in 1523 and dedicated to Charles V.[14] His *Libri doi (sic) de le figure dele stelle helionorice alla illustrissima Maria Sanseverina principessa de Nola* appeared at Naples in 1526. He finished composing his commentaries on the *Meteorology* of Aristotle at Salerno on April 15, 1523.[15] It is true that this work was printed at Venice (in 1531), which was also true of many other works by him, for example, his reply to Pomponazzi on the immortality of the soul, published in 1518. But Nifo's earlier association with the Venetian univer-

[13] *Ad Sylvium Pandonium Boviani episcopum Eutichi Augustini Niphi Philothei Suessani ad Apotelesmata Ptolemaei eruditiones.* Impressum Neapoli per Petrum Mariam de Richis papiensem a. D. MDXIII die vero xxii aprilis. Copy BN Rés. R. 112 (1).

[14] See Nourrisson, *Machiavel,* 1875, pp. 227-234. I have examined *De regnandi peritia* only in the 1645 edition of Nifo's *Opuscula* mentioned in a preceding note.

[15] *Augustini Niphi Medices Philosophi Suessani in libris Aristotelis Meteorologicis Commentaria. Eiusdem Commentaria in libro de mistis qui a Veteribus Quartus Meteororum Liber inscribitur,* Venice, 1531. But at fol. 146v, at the close of the text, we read: "Finis Salerni. 1523 15to Aprilis."

sity town, Padua, had led him to publish at Venice since 1503. He would seem to have had no such association with Florence until 1519-1521 when he taught at the University of Pisa for the huge salary of 1225 florins, although Leo X, a Medicean pope, also is said to have called him for a time to Rome. His presence at Pisa might account for printing at Florence in 1520, but not in 1517.

Hellman was unable to find the reputed edition of 1517, but thought that the treatise of Pigghe, dated on its title page "1518," proved the previous existence of Nifo's work. This is not the case. Pigghe, who writes *A Defense of Astrology Against the Herd of Prognosticators Who Issue Annual Predictions and Misname Themselves Astrologers,* and who address it to "Augustinus Niphus of Sessa, chief of the philosophers of our age and restorer of a truer astrology,"[16] does not once allude to a *De falsa diluvii prognosticatione* by Nifo, although he mentions other writings by him. And there is nothing to indicate or suggest that the work of Pigghe was inspired by a previous work of Nifo on the conjunction of 1524 and false prognostication of a flood. Pigghe says that he has been encouraged to dedicate his work to Nifo by another native of Sessa, Galeatius Florimontius, a representative of Antonio Colonna at the court of Francis I and a man skilled in both astrology and philosophy.[17] The reason that Pigghe calls Nifo the restorer of a truer astrology is because he has cleared up the difficulties of the Ptolemaic astrology (for which Pigghe wishes to abandon Albumasar and other Arabic astrology) in his book on the causes of our calamities (published at Venice in 1505)[18] and his commentaries on the *Quadripartitum*[19] (pub-

[16] *Alberti Pighii Campensis Philosophi Mathematici ac Theologiae baccalaurei formati adversus prognosticatorum vulgus qui annuas predictiones edunt et se astrologos mentiuntur Astrologiae defensio ad Augustinum Nyphum Suessanum philosophorum nostrae aetatis principem et Astrologiae syncerioris restauratorem.* Parisiis Ex officina Henrici Stephani 1518. The Columbia University library has a rotograph of this edition.

[17] *Ibid.*, fol. 3r.

[18] *Euthici Aug. Niphi Philothei suessani de Nostrarum calamitatum causis liber ad Oliverium Carafam cardinalium maximum . . . / . . . Completum Suesse MDIII julii xx die.* Printed at Venice for the heirs of Octavian Scot by Bonetus Locatellus of Bergamo, 1505 "tertio nonas Aprilis." Copies BN Rés. R. 107, 108 et 646 (1).

[19] Pighius, *Astrologiae defensio,* fol. 19r.

lished, as we have said, at Naples in 1513). Pigghe also expresses the wish that Nifo would translate all of Ptolemy into Latin.[20]

In the works to which Pigghe refers, Nifo had praised Ptolemy highly and professed to follow him primarily and as a norm;[21] although citing many other authors. He had used a Greek codex of Ptolemy which he regarded as much superior to the Latin translations and an anonymous Greek commentator whom he cited repeatedly.[22] On the other hand he tended to criticize the "Punic" or Arabic astrologers and commentators on Ptolemy, especially Albumasar, and also the Latin writers on astrology of the later medieval centuries,[23] and to question their stress upon conjunctions of the planets rather than eclipses, although he did not reject the doctrine of conjunctions entirely. He accepted as genuine the *Centiloquium* ascribed to Ptolemy which was more favorable than the *Quadripartitum* to the theory of conjunctions. But, as in his work on critical days, he laid great stress in interpreting the heavens upon the figure of sixteen sides—to which

[20] *Ibid.*, fol. 4r.

[21] *Calamities*, 1505, fol. 8r, col. 1; "sed hec positio est et contra observationem Ptholomei et contra rationem naturalem"; col. 2, "Ego vero hoc non esse ad Ptholomei preceptum extimo." *Comm. Ptolemy*, 1513, fol. 30r, col. 1, "Quicquid velint recentiores hec est indubitata Ptolemei sententia ut ex Porphyrio et Greco sine nomine aperte colligitur."

[22] *Calamities*, 1505, fol. 2v, col. 2, "et a nobis grecoque sine nomine expositore"; fol. 24v, col. 1, "Hec sunt que ex greco sine nomine accepimus." *Comm. Ptolemy*, 1513, fol. 6v, col. 1; fol. 43v, col. 2, "usus meus est cum Greco sine nomine nam ipse fideliter Ptolemei verba exposuit licet breviter satis."

Possibly he had reference to the following text, published at Basel by Hieronymus Wolf in both Greek and Latin in 1559: "In Cl. Ptolemaei quadripartitum enarrator ignoti nominis quem tamen Proclum fuisse quidam existimant": BM 532.i.2.

[23] *Calamities*, 1505, fols. 9r-v; 16r, col. 2; 16v, col. 1, "recentiores Albumasarem secutos omnino in errores labi"; 29r, col. 1, "hec verba Ptolomeus tradit que punicus interpres minime olfecit"; 33v, col. 1, "Iuniores et Albumasar et alii multa scribunt de his que nos vana et superstitiosa et contra philosophiam et Ptolomei astronomiam reputamus." *Ibid.*, III, 8, fols. 25r-26r, Nifo has more difficulty in upholding Ptolemy against the modern hypothesis of two zodiacs and a ninth sphere, and has to admit that Ptolemy was unacquainted with Thebit's theory of trepidation. In the treatise on helionoric figures, which Pigghe did not cite because it was not printed until 1526 and so probably unknown to him, Nifo made further strictures on the doctrine of conjunctions but granted (fol. 26v) that the observations "of the juniors" were not always to be given second place, although Ptolemy's were more dependable.

reference is made only in the *Centiloquium*.[24] He also decried recent annual predictions, stating that it was no wonder they were guilty of so many errors and ravings, since they were alien to Ptolemy's precepts, partly because of the difficulty of Ptolemy, partly because of the faulty translations of him, but especially because of the easiness of the doctrine of Albumasar.[25]

The work of Pigghe was not printed in 1518, but in March or April, 1519. The "1518" on its title page is the result of the printer's following the practice at Paris of not beginning the new year until Easter. Now in 1519 Easter did not occur until April 24. Pigghe, on the other hand, distinctly states in the text that he reckons the years by the Roman, not the Gallic, usage.[26] His volume of 32 leaves, after title page, contents, preface to Nifo, and brief general introduction, divides into three parts. The first attacks current annual predictions,[27] especially one of Jaspar Laet. The second and shortest is against the prognosticating by many astrologers from the conjunction of 1524 of unprecedented disasters including a second flood.[28] The third and longest is an annual prediction by Pigghe himself on Ptolemaic principles for the year 1519 and based chiefly upon the recent solar eclipse of June 8, 1518.[29] The preface to Nifo is dated December 30, 1518 ("Ex Parisiis III. Cal. Ian."). At the end of the third part and whole treatise is the date March 18, 1519 ("Finis. XV. Calendas Aprilis. 1519").

Now if Pigghe makes no reference to a preceding *De falsa dilu-*

[24] Verbum 60: "Super aegrotis criticos dies inspice ac lunae peragrationem in angulis figurae sexdecim laterum, ubi enim eos angulos bene affectos inveneris bene erit languenti, contra male si afflictos inveneris.

[25] *Calam.*, IV, 2, fol. 33v.

[26] *Astrologiae defensio*. fol. 24r "(Romano non Gallico more annos computo)."

[27] *Ibid.*, fol. 6r, "Pars Prima. Aniles fabulas esse annorum prognostica quę annis singulis emittuntur nec Astrologiam quicquam in his cognoscere."

[28] *Ibid.*, fol. 13v, "Pars Secunda. Vana esse quae vulgus Astrologorum toti orbi comminatur ex eo qui futurus est omnium planetarum conventu in signo piscium Anno Domini M.D. XXIIII. De universali fere diluvio et tam horrendis quae nobis tam infauste ominantur."

[29] *Ibid.*, fol. 19r, "Pars Tertia. In qua describuntur significationes illius Solaris Eclipsis quae fuit anno M.D. XVIII. Octava Iunii cuius significationes anno praesenti M.D. XIX apparebunt praecipue Cum particularium etiam constellationum eodem anno occurentium explicatione."

vii prognosticatione of Nifo, it is equally true that Nifo in that work makes no allusion whatever to Pigghe. It therefore may be asked, why do I accuse Nifo rather than Pigghe of failure to recognize the earlier work of another? The answer is in the first place that Pigghe, who gives every sign of good faith, who dedicates his work to Nifo, praises him, and mentions other of his works, would have been only too willing to mention the *De falsa diluvii prognosticatione,* had it existed and been known to him. Indeed, it would have been foolish for him not to mention it in a work so much like it, especially as he was dedicating that work to its author. With Nifo the case is different, since he has already in another connection been shown to have been something of a plagiarizer. His *De regnandi peritia,* which he also dedicated to Charles V and printed in 1523, has extensive parallels with *The Prince* of Machiavelli, which as yet had not been printed but circulated in manuscript form.[30]

There is another cogent reason for thinking that Nifo's treatise was not published until December 24, 1519, at Naples. It is that of all the 56 authors and 133 odd publications which Hellmann says were called forth by this controversy, only the works of Nifo and Pigghe appeared during the three or four years, 1517-1520. Yet the work of Nifo represents the opinion as already widespread that a flood will follow the conjunction of 1524. It also represents others as already arguing against this notion. Public interest was, therefore, already aroused, and the ground was prepared for controversy. Why was it delayed for two or three years more after 1517? Why was it that there were no re-editions of Nifo's treatise during 1518 and most of 1519, whereas Hellmann counts some six editions at Florence, Bologna, Augsburg, and perhaps Naples in the single year 1520? The answer is that these reprintings followed immediately upon the first print-

[30] Nourrisson, *Machiavel,* 1875, pp. 227-234. The *De regnandi peritia,* which I have examined in Naudé's 1645 edition of Nifo's *Opuscula,* contains such chapters as these: III, 3, How Louis XII in occupying Italy erred in many ways; III, 9, How Caesar Borgia mollified those whom he had often injured; IV, 1, Whether a prince should be liberal to conserve his princedom; IV, 4, Whether a prince should be feared or loved.

ing of the work at the end of 1519, and that after Nifo had popularized an idea which Pigghe had broached, other writers increasingly entered the lists on one side or another in 1521, 1522, 1523 and 1524.

Examination of the excessively rare edition[31] of Nifo's work of Naples, December 24, 1519, of which a copy is preserved in the Biblioteca Nazionale at Naples,[32] confirmed all these previous suspicions and arguments. The *titulus* of the Florence edition of September, 1520, simply reproduces the wording of the Naples edition. Moreover, in the dedication to Charles in the Naples edition his recent election as emperor is mentioned.[33] It also is evident that Nifo has just composed the work and now publishes it for the first time as a gift to the young emperor and a contribution to the general rejoicing over his election by an attempt to lessen the widespread fear which has grown up of a flood from the coming conjunction of 1524.[34]

Pigghe then, rather than Nifo, was the first author, so far as we know, to allude to the prevalent fear that the conjunction of 1524 would produce a second deluge. Nifo undoubtedly derived this idea from him.[35] But the false prognostication and general

[31] L'Art Ancien, Short List 6, 1935, item 147, states that the copy which it offers for sale from Hellmann's library is the only other besides that at Naples.

[32] This is the copy I have examined. On the title page we read: "Augustini Niphi Philosophi suessani de falsa diluvii prognosticatione quae ex conventu omnium Planetarum qui in Piscibus continget Anno 1524 diuulgata est: Libri tres: ad Karolum primum diuino Afflante spiritu Caesarem: semper Augustum." At the top of fol. 2r the same legend is repeated with some minor divergences in spelling and capitalization. An illustration occupies the verso of the title page. Beneath the repeated titulus on fol. 2r the text of the dedication opens: "Parthorum reges ut auctor est Armeus sine munere salutare nemo poterat. . . ." The colophon of the work at fol. (D vi) recto reads: "Impressum Neapoli in Bibliotheca Ioan. Pasquet de Sallo Anno domini M.D. XIX. Die Sabbati xxiiii mensis Decembris."

[33] " . . . tuam ad Imperii fastigium divino afflante spiritu celebratam electionem."

[34] "Ut ergo tot gentes a tam gravi terrore securos reddamus libellum hunc elaboravi quem celsitudini tuae dedico ut in tanta communi omnium hominum hilaritate quam in hac divina tua electione omnes celebrant te visitem venerer adorem ac cum ceteris (ut decet phylosophum) conleter." I have quoted this dedication to the emperor in full in the second article mentioned in note 12 above.

[35] It is true that in *De figuris stellarum helionoricis*, to which Nifo says he gave the finishing touches in 1511, it is stated that in the conjunction of

fear of a flood did not figure in the title of Pigghe's work nor constitute its main contention. It was a matter of rather secondary interest, Pigghe being more concerned to criticize the doctrine of conjunctions and other features of recent annual predictions. In this feature of his treatise he was indebted to Nifo's publications of 1505 and 1513. He also initiated the series of personal controversies connected with the conjunction by his criticism, not to say abuse, of his contemporary, Jaspar Laet.

Since Jaspar Laet and Pigghe were both Netherlanders, the one from Holland, the other from Brabant, and since Jaspar's annual predictions had been translated into French as early as the previous century, while Pigghe composed and printed his prediction for 1519 at Paris, there may have been some personal rivalry and feeling between them. Whereas Simon de Phares, writing in 1494, had associated Jaspar Laet with Louvain and Liège,[36] Pigghe calls him a physician of Antwerp. He admits that this name is celebrated among the French but asserts that Laet has injured astrology among both the French and Germans, and that his great reputation is due to human blindness and ignorance, since for many years he has sold his lies with impunity and imposed upon mankind. Incidentally Pigghe alludes to Antwerp as a city, where "no one dares to practice medicine unless he divines with the rest."

In his prediction for 1519 Jaspar Laet had abandoned his previous practice of basing his annual predictions upon the revolution of the year or entry of the sun into Aries. He had instead gone back to the conjunction of Saturn and Jupiter which preceded the deluge by 279 years and which he had dated to the day and minute. This prediction by Laet does not seem to be extant,

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all the planets in Pisces in 1524 the conjunction of Saturn and Jupiter is of most importance and that Jupiter, which produces winds and drought, dominates, so that Christians need fear no flood: *Enuntiatum* IV, fol. 14v. But the work was not printed until 1526, and this passage is almost certainly a late insertion. And Pigghe, as we have seen, in 1519 appears to have had no knowledge of this work.

[36] *Recueil des plus celebres astrologues*, ed. Ernest Wickersheimer, Paris, 1929, p. 267. Phares says that Jaspar's annual prognostications "courent par le pays de Flandres et en vient en France, toutefois mal translatées."

and it is hard to judge it from Pigghe's attacks on it, but this recourse to the conjunction preceding Noah's flood raises the suspicion that Laet may have been more responsible than Stoeffler for arousing the fear of a second such flood. Pigghe objected to Laet's exact dating of the biblical deluge, holding that such precise chronology was impossible and contending that there was no agreement on such matters among historians. He equally censured the practice of predicting from the entry of the sun into Aries, asserting that this could not be determined exactly from existing astronomical tables. Apparently astrologers of the early sixteenth century were not in the habit of observing it carefully for themselves with large astronomical instruments, as Jean de Murs had done in the early fourteenth century.[37]

Pigghe further abuses Laet for having said that a recent solar eclipse would not begin to exert its influence until 1525, and that another coming on October 23, 1519, would not take effect for eleven years. Pigghe, on the contrary, affirms that since the recent solar eclipse lasted for about two hours and thirteen minutes, its influence will endure for two years and about three months, a method of determining the duration of the effect of eclipses which he asserts is Ptolemaic. But had it been a lunar eclipse, its influence would last but two months and a fraction. On the other hand, Pigghe interprets the *Quadripartitum* of Ptolemy, II, 6, as teaching that, for each hour or twelfth of the distance across the sky that an eclipse is distant from the eastern horizon, a month should be reckoned after the occurrence of the eclipse before its influence will begin to be felt, regardless of whether the eclipse be solar or lunar. Therefore since the recent solar eclipse had taken place less than an hour's distance from the eastern horizon, its effects would mature within a month, whereas Laet had deferred them for over six years. Thus is illustrated the great divergence in astrological rules, procedure and technique that there might be at this period between two astrologers making annual predictions.

While Pigghe may have been animated by personal feeling

[37] T III, 294-95.

against Laet, he was also opposed to the medieval and Arabic doctrines of revolution of years and conjunctions of planets, and would return to classical or Ptolemaic astrology. He would not attempt to determine the time of the sun's entry into Aries but would rather predict from the full moon or *interlunium* immediately preceding it. Or he would predict for each of the four seasons rather than the entire year, as if this procedure were not then quite commonly followed in annual predictions. He considered eclipses of sun and moon far more significant than conjunctions of the three superior planets, and condemned the doctrine of conjunctions of Saturn and Jupiter as unknown to Ptolemy. He objected to the ascription of events distant in time to the influence of a great conjunction rather than to other celestial phenomena which were closer to the events in point of time. Even the coming presence in February, 1524, of all the planets in the same sign of the zodiac, with as many as sixteen different conjunctions between them, failed to impress him as of great significance. He argued that their differing properties would counteract one another. Or, if such a complex of conjunctions had never happened or been heard of before, how could its outcome be foretold now? On the other hand, he blamed contemporary astrologers for neglecting a lunar eclipse of August 25, 1523, which would increase the force of the conjunctions following it in February. He cited Ptolemy and even certain Arabic astrologers that sun and moon were more influential than the other planets. But he was not ready to agree with Pico della Mirandola that other stars than sun and moon exerted no influence on inferiors.

Another general criticism by Pigghe of contemporary astrology, of which we have already given some illustration, is that the attempt is made to predict future events too particularly and minutely. Thus he censures other astrologers for presuming to predict the weather day by day throughout the coming year or season. Or he rails against contemporaries for making specific predictions concerning particular cities, the date of whose foundation is unrecorded or disputed, and whose genitures or ruling planets they consequently cannot know. Or he holds that particu-

lar predictions as to crops are sortilege, not astrology. Yet he himself ventures to predict that next year wine will be good and cheap, but that the outlook is bad for vegetation which requires moisture rather than sunshine. But this sort of prediction he regards as general and natural.

Pigghe did not merely criticize extreme astrologers and contemporary charlatans. More learned men and works of the past also incurred his censure. To the chronology of the *Alfonsine Tables,* which counted 2,242 years between creation and the deluge, and 3,102 years between the flood and the birth of Christ, he preferred that of *The Book of Genesis,* which allows only 1,656 years before the flood, and true Hebraic history, which suggests about 2,300 years from the deluge to the beginning of our era.[38] Thus he adds a biblical fundamentalism to the reactionary classicism seen in his reversion to Ptolemy's *Quadripartitum.* Or he is astounded that cardinal Pierre d'Ailly in the previous century should have subjected Christ to the stars, "a blasphemy against God and our holy religion." He goes to the opposite extreme and proclaims that true astrology is ready to ascribe preternatural events, especially those to punish human sin like the flood, to direct divine action unconstrained by the laws of the heavens.

An explanation of the tides given by Pigghe may be worth noticing. It is that the waters of the ocean always rise towards the rays of the moon. Therefore the tide begins to flow as the moon mounts above the horizon, increases until the moon reaches the zenith, and ebbs as it passes to its setting. Moreover, the waters are attracted not only by direct radiation of the moon but by its reflected rays from that part of the sky which is diametrically opposite to it. Therefore, after the moon has sunk below the horizon, the tide begins to rise again, until the moon reaches

[38] In this connection it may be noted that at the close of the edition of the *Alfonsine Tables* published by Luca Gaurico in 1524 we read: "Printed by Lucas Antonius Junta in the year of the Saviour 1524, the month of November, the year of the world, moreover, 6723 according to the decrees of the Church, but according to king Alfonso 8509." For the Latin see Pèrcopo, XVII, ii, 22. The figures obviously do not agree with those given by Pigghe, but the main point is the same.

below the earth a position which is directly opposite to our zenith.

Those portions of Pigghe's treatise which bear especially upon conditions at Paris may be reserved for treatment in our chapter on Astronomy and Astrology at Paris. Even without them, the miscellaneous and scattering character of his work[39] has been sufficiently indicated. Other matters largely occupy him, but he does mention the predictions of a flood from the conjunction of 1524, and their deleterious effect on the minds of the simple. He himself, he says, is witness that many have been deterred thereby from action and from undertaking some useful business.

Nifo took up this topic which Pigghe had already broached and made it the central and main theme of his work, from which he excluded the other issues discussed by Pigghe. He furthermore set forth the question rather impartially pro and con, admitting that the astrological arguments for a flood were impressive. He pointed out what seems not to have been realized by many at the time and by most subsequent writers on the controversy, who have represented the flood as predicted for the year 1524 itself,[40] namely, that if this conjunction is like that which is said to have announced Noah's flood, its effects may not be felt for a century or so, in which case there is no cause for immediate alarm. But Nifo, like Pigghe, testified to the existence of such alarm, stating that many excellent men could have no peace of mind until that year should pass, that some had decided to climb high mountains, while others were preparing to build arks, ships and other "machines" by which they might escape the flood. Nifo also, like Pigghe, quoted "the author of the Ephemerides," i.e., Stoeff-

[39] He himself admits in the preface to Nifo (fol. 3v) that it was "tumultario tantum et trium quatuorve dierum studio conscripta."

[40] See, for example, Karl Hartfelder, "Der Aberglaube Philipp Melanchthons," *Historisches Taschenbuch*, 1889, p. 262, "Es sollte den 25. Februar eine zweite Sündflut beginnen"; p. 265, "die von einer Sündflut oder grossem Gewässer hätten gesagt, so Anno 1524 kommen sollte." Or Hellmann (1914), p. 19, notes that no unusual weather at Bologna in February, 1524, was recorded in the meteorological journal kept by Andrea Pietramellara, son of Giacomo, the astrologer. Melanchthon himself in his preface to the 1553 edition of Ptolemy's *Quadripartitum* speaks of "great humidity such as there was in the year 1524 on account of a conjunction of many planets in Pisces."

ler, concerning the great changes to follow the occurrence of so many conjunctions in Pisces, and implied that the fear of a second flood somehow developed out of this passage in Stoeffler,[41] from which Pigghe twice quoted verbatim.[42] It is difficult to understand how this brief and vague pronouncement, which was not especially terrifying or sweeping compared to many other astrological predictions, led to such general alarm as Pigghe and Nifo assert, but apparently we must take their word for it.

Nifo's treatise was in three books. The first set forth the common belief that there would be a flood following the conjunction of 1524. After a short first chapter had repeated what had already been explained in the preface to Charles V, that this belief was an outgrowth from Stoeffler's brief prediction for 1524, a second chapter cited the Arabic astrologers, Albumasar and Messahalla, on the effect of conjunctions. The third chapter argued that, even if one held the Ptolemaic view that conjunctions were of no account apart from eclipses, yet two preceding lunar eclipses of 1523 would lend their support to the prediction of a flood. The fourth chapter was on the agreement of astronomers and theologians as to a flood, the theologians being represented as holding that God produces sublunar effects only through the concurrence of secondary causes (i.e. the heavenly bodies), and that the sins of men today cry out for divine punishment even more than they did in the days of Noah, an argument which almost convinces Nifo himself.

In the second book Nifo first states certain arguments against the prediction of a flood only to reject them. He then lays down various basic propositions of his own as to conflagrations as well as floods. One of them is that if the eternity of the world were assumed, the number of particular floods would be infinite. Nifo next proceeds to his own refutation of the false prognostication of a flood, and finally makes his own prediction from the approaching constellations in the third and last book. We shall not enmesh ourselves in the intricate network of his scholastic argu-

[41] See Nifo's preface to Charles V. [42] *Astrologiae defensio*, fols. 5r-v, 14r.

mentation but note a few leading thoughts. He rejects any astrological prediction of a universal flood like that of Noah's time, first because of the divine promise betokened by the rainbow that such a deluge should not recur—a point already made by Pigghe—second because a universal flood is naturally impossible, supernatural and hence unpredictable from the stars. Similarly he states that a universal and cosmic conflagration is not subject to the virtues of secondary causes, because God can produce it without them. On the other hand, he has held that, while it may be that a cosmic and universal flood is not subject to secondary causes, it can be subjected to them by God's power so providing and ordaining.

One cannot quite make out whether Nifo inwardly believes that a universal flood is astrologically predictable, or whether he wishes to call the reality of the biblical deluge into question by such arguments as that there is no rain without previous evaporation, that a time of flood must be preceded by a corresponding period of drought, and that there are places in the tropics and torrid zone where clouds never gather. Professedly he rejects the conjunctions mentioned by Albertus Magnus as favorable to a universal conflagration, but he notes that a pupil of Albertus Magnus, Henry of Malines (i.e. Henri Bate), in his commentaries on the work of Albumasar on great conjunctions stated that by the tables of Malines he was able to date Noah's flood in 3382 B.C. Nifo attributes universal diseases, if not such cataclysms as cosmic flood and conflagration, to conjunctions of the planets. The *morbus gallicus* is such a disease, affecting alike kings and pontiffs, friars and burghers, rich and poor. It arose from the conjunction of Saturn and Mars in Pisces in January, 1496.[43] The Black Death of 1348, too, unlike the provincial pests which Hippocrates and Galen record, was a cosmic epidemic covering the whole world and sparing only one-fourth of the population. It was produced by the conjunction of Saturn, Jupiter and Mars. As for floods, Nifo at least believes and plainly

[43] We have heard others attribute it to the earlier conjunction of Saturn and Jupiter in 1484.

states that a provincial, local, particular flood is both naturally possible and predictable from the stars.

That Nifo's *De falsa diluvii prognosticatione* was no attack upon astrology may be further seen from his own interpretation of the significance of the constellations in 1524. Jupiter predominating over Saturn in the conjunction in Pisces indicates fecund rains, beneficial winds, and a moderate flow of streams retained within their banks. The influence of Venus largely coincides, but Mars will produce some stormier weather. Nifo grants that the time of year when the conjunctions are to occur is favorable to excess of waters, as is the preceding eclipse of 1523 and the planets associated with it, except that in this case Mars will reduce the amount of rainfall. So, despite his title and pretense of allaying public fears, he concludes that, considered from every angle according to Ptolemaic precepts, the conjunction signifies an excess of waters. There will be local floods, not destructive of all life but more like those of 570, 586 and 589 A.D. or that of 1503, when there was a conjunction of the three superior planets. Thus for a "false prediction of a flood" Nifo has merely substituted his true prediction of floods. After so much astrology we are surprised to hear him say in his closing chapter, "For it may be that I have conceded little or nothing to astronomy, that which we think probable we have based entirely on the doctrine of Ptolemy." There even seems to be considerable humbug in this professed attachment to Ptolemaic astrology, in which Nifo follows Pigghe. Actually he seems much more favorable to the Arabic doctrine of planetary conjunctions than Pigghe was.

The suspicion will not quite down that Nifo was now playing with the belief in Noah's flood as he had once discussed the problems of the intellect and of demons, and that he was equally insincere in his reply to Pomponazzi on the immortality of the soul, which, like his treatise on the false prognostication of a flood, was addressed to Leo X. Was he now using prognostications from the conjunction of 1524 as a stalking-horse against the truth of biblical tradition of a universal flood, whether regarded as a natural possibility or as a divine miracle? If so, such scepti-

cal irony was peculiar to him and not a general characteristic of other participants in the literature centering about that conjunction. Whatever side Nifo may be thought to have taken in the controversy—personally I incline to think that he tried to take several sides at once—his treatise hardly acted as a sedative either to public fears or astrological prediction. It ran through a number of Latin editions at Florence, Bologna, Rome and Augsburg, chiefly in the single year, 1520, with an Italian translation of Venice, 1521, and a Spanish version printed at Seville. Thus its many-sidedness was well received and suited the times. Furthermore a host of other treatises followed it, and to these we now turn.

Brother Michael de Petrasancta, although a Dominican of the Observance, doctor of sacred theology as well as of arts, regent in the convent of S. Maria sopra Minerva, and professor of metaphysics in the university of Rome, came to the assistance of the astrologers who had predicted from the conjunction of the planets in Pisces. His *Defense* of them was finished on July 12, 1521, at Rome and was printed there twice the same year.[44] The copy used by me at the Biblioteca Nazionale of Florence[45] was bound with the Florence, 1520, edition of Nifo's treatise, to whose arguments Michael makes some reference and retort, but whom he characterizes as "a man great in every kind of science." Michael dedicated his treatise to cardinal Giulio de' Medici.[46] It is illustrated with several astrological figures or diagrams.

The treatise of Petrasancta is professedly devoted to discus-

[44] Hellmann (1914), pp. 46, 86-87, lists the editions. The one not used by me was offered for sale in Short List 6 (1935), No. 156, of L'Art Ancien, Zurich. It is by the same printer, Silber, but in only 24 leaves.

[45] FN shelf mark 12-5-246: "F. Michaelis de Petrasancta ordinis Predicatorum de observantia, artium et sacre theologie doctoris clarissimi, regentis studii in conventu Minerve Ac in Romano Gymnasio Methaphysicam profitentis libellus in defensionem astrologorum iudicantium ex coniunctionibus planetarum in piscibus M.D. xxiiii . . . / . . . Et sic finis presentis opuscoli ad laudem dei anno M CCCCC XXI die xii iulii Rome in conventu sancte Marie super Minervam. Impressum Rome per magistrum Marcellum Silber alias Franck anno domini MDXXI die vii octobris." 32 fols.

[46] The dedication opens, "Ptolemeus solertissimus astrologie indagator. . . ."

sion of the specific question whether an astrologer can know the predetermined time of rains or snows which seem to be indicated by the conjunctions of the planets in the month of February, 1524.[47] But it also includes considerable debate of the much more general question whether astrology is licit. After stating his problem and explaining his title, Michael gives the opinions of others: Pico della Mirandola, contemporary theologians, Hali Heben Rodan or ibn Ridwan, the author of the *Ephemerides,* i.e. Stoeffler, whose words are once more quoted, and finally Augustinus of Sessa, i.e. Nifo. Of these the first three are concerned with the general question of the licitness of astrology rather than with the particular problem of 1524. After stating his own opinion on the latter point, Michael lists over eighty arguments to the contrary. Of these again many are directed against astrology in whole or part rather than immediately concerned with the question at hand. Finally he rebuts these adverse arguments. We shall abandon this scholastic arrangement and note first one or two points with reference to the general question of the validity of astrology, then Petrasancta's position as to the conjunctions of 1524 in particular.

Michael states that the theologians of his time hold that no trust should be placed in astrological predictions, that divination by the stars is contrary to the Bible, canon law, church fathers and councils, and that civil law punishes it with death. But Michael, himself a doctor of theology, insists that these prohibitions are aimed solely against that astrology which asserts fatal necessity and denies human free will. He admits, however, that individual astrologers predicting from the stars or even writers on astrology like Albumasar have sometimes exceeded the proper bounds of astrology. With reference to Albumasar's placing the conjunction that brought on the Noachian deluge 279 years before the event, Michael comments that it is ridiculous to maintain that such a conjunction would take effect only after so many

[47] "Queritur utrum astrologus possit scire tempus determinatum pluviarum vel nivium quas insinuare videntur coniunctiones planetarum mense Februario anni MDXXIIII." These words form the *incipit* of the text proper.

years. He also rather inclines to agree that cardinal d'Ailly should not have submitted religious events and the birth of Christ to the stars. He further grants that no faith is to be put in astrological interrogations unless the questioner was moved by the sky and did not act of free choice in putting his question to the astrologer. On the other hand, he defends the practice of elections with Ptolemy and even thinks that artificial objects fashioned at the proper moment may receive some special power from the stars. He quotes the *Speculum astronomiae* of Albertus Magnus with approval and the more recent dialogue of Abiosus in defense of astrology.

As for the fear of a flood from the coming conjunctions of 1524, Michael affirms that no educated astrologer believes that there will be a universal deluge. The most that they predict is a great deal of snow and certain particular inundations in watery regions. This is said directly in reply to Nifo's arguments and perhaps still more to the implication of his title, for Michael recognizes that at bottom he and Nifo are in substantial agreement on this question. Michael notes, however, that in saying that the influence of the planet Mars will reduce the amount of precipitation Nifo is in disagreement with Messahala who states that a conjunction of Saturn and Mars signifies abundance of rain. Michael's own opinion is that the coming conjunctions of February, 1524, signify a great amount of rain and snow.

The astrologer Junctinus or Guintini, in a work published in 1573, looked back upon Michael à Petra Sancta, a theologian of the Observantine Friars Preachers, as having with Bellantius sufficiently answered the arguments against astrology of Pico della Mirandola and the reformer Savonarola.[48]

If the *Defense* of Petrasancta was in some measure a reply to Nifo, much more direct and bitterly personal was the controversy between Marcus Beneventanus and Pighius. Marcus Beneventanus, of the Order of the Celestines, had already in the last decade of the fifteenth century edited such works of the schoolmen as William of Ockham's *Summulae on the Physics*

[48] Franc. Junctinus, *Speculum astrologiae,* Lugduni, Phil. Tinghi, 1573.

of Aristotle and the commentary of Aquinas on the *Second Book of the Sentences*. In 1507 at Rome and again in 1508 he edited the *Geography and Planisphere* of Ptolemy with a compendium of geography or *New Description of the World*, in which he separated the new world from Asia as a distinct continent.[49] He was cited with approval as to the movement of the moon by Rheticus in the *Narratio prima* in 1540.[50] Now in 1521 at Naples appeared on March 9 an *Apologeticum opusculum* by him against the ineptitudes of an anonymous "Cacostrologus" or bad astrologer,[51] and on August 12 a *Novum opusculum* directed against the same person.[52]

Of these two works I have seen only the second. It says that certain new documents have recently come to light concerning things celestial. Were they true, as they seem at first sight to be, they would render every representation of the sky utterly false and all prognostication of the future therefrom would be lies. For they insist that every calculation according to the *Alfonsine Tables* is off five points in longitude. At first Beneventanus does not disclose the name of the author of this criticism, merely stating that the work came from Gaul. But in the end he drops the veil of anonymity and names Pigghe as the author. He is very indignant with him, since not merely Alfonso X but also Peurbach and Regiomontanus, "men never praised enough", are accused by "this one little man." Marcus further notes that Pigghe attacks Stoeffler and exclaims, "Oh, if these things should come to the ears of Johann Essler, against whom this man in-

[49] L. Gallois, *De Oronto Finaeo gallico geographo*, 1890, p. 90, states that it was attached to both the editions of 1507 and 1508, but the British Museum catalogue specifies it only in the latter.

[50] "Ut doctissimus Marcus Beneventanus ex Alphonsinorum sententia refert": Kepler, *Mysterium cosmographicum*, 1611, p. 103; Prowe, *Nicolaus Coppernicus*, II, 309.

[51] Marcus Beneventanus, ord. Caelest., *Apologeticum opusculum adversus ineptias Cacostrologi Anonimi subcensentis recentioribus Astrophilis ac autumantis erratum esse in determinatione Aequinoctiorum ex Ephemeridibus partorum. Necnon editio nova motus octavae sphaerae secundum recentiorum observationes.* Impressum Neapoli per Ant. de Frizis Corinaldensem Anno 1521 die 9 Martii.

[52] *Novum opusculum Marci Beneventani . . . iterum scribentis in Cacostrolagum referentem ad eclypticam immobilem abacum Alphonsinum.* Impressum Neapoli per Antonium de Frizis Corinalden. Anno domini MDXXI die xii Mensis Augusti.

veighs so boldly, not to say insolently." From this it becomes apparent that the new documents from Gaul to which Beneventanus's *Novum opusculum* refers are not Pigghe's *Astrologiae defensio*, in which Essler is not mentioned and Stoeffler is merely quoted, not specifically named, but another treatise which Pigghe says he had written on the ignorance and errors of the astrologers of his day, in which he demonstrated that they were five days at variance with the *Alfonsine Tables*, and that those *Tables* do not give the true positions of the stars. From its title, Beneventanus's *Apologeticum opusculum* might seem to be a reply to the attack on annual prediction from the vernal equinox contained in Pigghe's *Astrologiae defensio*. But it refers to the author as anonymous, whereas in the Paris edition the name of Albertus Pighius is the first thing that meets the reader's eye. But perhaps Beneventanus had seen another anonymous edition of the work. Pigghe replied to Marcus Beneventanus in an *Apologia* published at Paris in May, 1522, and, like his *Astrologiae defensio*, dedicated to Nifo.[53] From the full title of this work also it appears that the controversy between Pigghe and Marcus Beneventanus had little direct connection with the conjunction of 1524 and the question of a flood.

In a Spanish prognostication for the years 1521-1525 by Diego de Tores, a friar, doctor in arts, and master of sacred theology, there is no allusion to a conjunction of all the planets in Pisces in February, 1524, although mention is made of four planets being together in one astrological house. On this account there will be a long spring, continuous heavy rain, and various disasters.[54]

In 1521 there was printed at Strasburg a *Practica* for the three

[53] *Adversus novam Marci Beneventani astronomiam quae positionem Alphonsinam ac recentiorum omnium de motu octavi orbis multis modis depravavit et secum pugnantem fecit Alberti Pighii Campensis Apologia in qua tota ferme Alphonsina positio, hactenus a paucissimis recte intellecta, a Purbachio etiam in multis perperam explicata, mathematice demonstrata est.* Paris, A quinto nonas Maias, Simon Colinaeus, 1522. 70 numbered leaves.

[54] *Pronostico o Iuyzio nueva y sutilisimamente sacado por el muy Reverendo padre fray Diego de tores de la orden de sant Bernaldo doctor en artes y maestro en sacra theologia:* reprinted by G. Hellmann, *Neudrucke*, 12 (1899). The text proper covers only two pages.

following years, 1522-1524, by Conrad Gallianus, mathematician and licentiate of sacred theology. In the repetition of this combination of interests we have proof that the opposition of theology to astrology was more a matter of theory or preaching than of practice. Discussing "the dreadful inundation and other fearful things which certain astrologers predict in 1524 from the sojurn of the planets and stars in Pisces," Gallianus contents himself with prediction of a partial flood. Hellman was unable to discover Gallianus's place of origin, but there was an edition of his work in German the same year.[55]

Johann Carion, astrologer at the court of the elector of Brandenburg, of whom we shall have more to say in our chapter on The Circle of Melanchthon, published in 1521 a *Prognosticatio und Erklerung der grossen Wesserung*. Three more editions of it appeared during 1522.[56] Hellman tells us that Carion set a definite date, July 15, 1525, for the coming flood and that on that day the elector with his wife took refuge on a mountain. When four o'clock in the afternoon arrived without any sign of rain, at his wife's request the elector ordered his coach to return to his castle, where the four horses and coachman were struck by lightning as they entered the gate.[57] According to Strobel, besides an inundation Carion predicted a complete alteration and reformation of the church, great bloodshed of Christians, the birth of antichrist in 1693, and another great crisis as the result of one of the greatest conjunctions and the completion of the revolution of Saturn in 1789. This last date was still seven years in the future when Strobel wrote.[58]

[55] I have not seen the *Practica trium annorum* of Gallianus but follow Hellmann (1914), p. 34, in this paragraph.

[56] Hellmann (1914), pp. 15, 27-28. At p. 70 is a facsimile.

[57] Hellmann (1914), p. 20, derived this anecdote from a work published by Gronau in 1794, *Versuch einiger Beobachtungen über die Witterung der Mark Brandenburg besonders in der Gegend um Berlin*, p. 59. Gronau in turn took it from the *Microchronicon Marchicum des Rektors Haftiz*, written in 1599. I have verified the original source in Adolf Riedel, *Codex diplomaticus Brandenburgensis*, 4 Hptl., I Bd., N. 3, Berlin, 1862, p. 90. But I suspect that I have merely tracked a lie to its lair, and not the truth to its source.

[58] Strobelius, *Miscellaneen literarischen Inhalts*, VI (1782), 151.

In 1520 Johann Virdung of Hassfurt[59] had written on meteoric apparitions at Vienna from January 3 to 7 of that year.[60] Hellmann regarded it as the most important of the *Flugschriften* elicited by these phenomena and characterized it as "ein erster Grundriss der meteorischen Optik."[61] Virdung also regarded these signs in the sky as a warning of what the stars would effect in 1524.

Of this coming conjunction of 1524 he treated in a *Practica* dated from the university of Heidelberg on November 11, 1521[62] and dedicated to the emperor, Charles V, as well as to the elector Ludwig. A letter to an Adam Wernher von Themar or Chemar, doctor of both laws, seems to refer to a *Practica* in Latin verse, but the versions I have seen were in German. Virdung states that the effects of the conjunction will endure for forty years until 1563. Some things indicated by it will begin after thirteen years and last for five years and four months. Others will begin after fifteen years in 1540 and last five years and eight months. Others will begin after twenty years and last for eight years. Others will begin after 1553 and last until 1563; others, after 1556 and last five years and four months. But Virdung fears that some significations of this conjunction will be felt already in 1523 before it, and others in the very year of the conjunction, 1524, notably excess of waters destroying the fruits of the earth and ships at sea. He believes that there will be a small partial deluge like that in Achaea in the time of the patriarch Jacob, or in Thessaly at the time of Moses, when men fled to the slopes of Parnassus, but not a universal flood like that in the days of Noah, nor even so large as to inundate an entire kingdom. About 1526 this work of Virdung was reprinted at Strasburg together with the older popular prophecy of Lichtenberger or "Bilger Ruth"

[59] Concerning Virdung see T IV, 456-57; *Isis* XIX (1933), 364-78; XXV (1936), 363-71. I have some further MS data as yet unpublished.

[60] *Ausslegung und Beteutung der Wunderbarlichen zeichen,* Oppenheim, probably 1520.

[61] Hellmann (1914), pp. 14-15.

[62] *Practica Teütsch über die neüwe erschröckliche vor nie gesehen Coniunction . . . im Iare M.CCCCC.XXIII. . . .* Gedruckt zu Oppenheym, 1521. Copy used: BM 8610.bb.9.

from the conjunction of 1484 and solar eclipse of 1485[63] In 1542 it was again printed at Augsburg with the prophecy or *Weissagung* of Johann Carion for the years to 1560.[64]

Another Italian to measure swords with Nifo was Thomas Philologus of Ravenna who, moved by the error already in print of the philosopher of Sessa, addressed to the emperor Charles V a treatise *On the True Prognostication of a Flood for the Year 1524,* which was printed at Rome in 1522.[65] I have not seen this work but may give some further information as to its author. Philologus, also known as Thomas Janothus or Tommaso Giannotti Rangoni, had issued an annual astrological prediction as early as 1515.[66] He must have been quite young then, for he did not make his will until 1576 at Venice. He taught logic at Padua for the small stipend of twenty florins and then astronomy in 1518, when he left to enter the employment of count Guido Rangoni, the noted general.[67] He seems to be alluded to in Pietro Aretino's burlesque *Judicio over pronostico de mastro Pasquino quinto evangelista de anno 1527* as "quel bestiolo che sta col conte Rangone."[68] Tiraboschi states that Philologus's first printed book was on human happiness against Aristotle, Averroes and other philosophers.[69] In the manuscript collection at the library of St. Mark's, Venice, in a volume which consists largely of printed matter, is an undated oration by Philologus addressed to count Guido Rangoni on mathematics and the praises of astrology.[70] It also sings the praises of Philologus himself. He has spent his entire life to date on the virtues and secrets of nature, first as a student lecturing publicly on astrology

[63] *Ausslegung der Coniunction aller Planeten in den Fischen anno MDXXIIII geschehen:* copy used, BM 8610.bbb.4.

[64] *Practica vom XLIII Jar an biss man zelt LXIIII. . . . Practiciert auss der grossen Coniunction der Planeten in den Fischen, Anno* 1524 *etc.:* copy used, BM 8610.cc.1.

[65] Hellmann (1914), pp. 56-57, 97, for this and other editions.

[66] Hellmann (1924), p. 34, knew of three annual predictions published by him between 1515 and 1524.

[67] Riccoboni, *De gymnasio Patavino,* 1598, fol. 28r-v, represents Philolgus as still professor of mathematics at Padua in 1520.

[68] Pèrcopo, *Luca Gàurico ultimo degli astrologi,* 1896, p. 25.

[69] Tiraboschi VII (1824), 959.

[70] S. Marco VII.37 (Valentinelli XIV, 36) and Valentinelli's description, V, 107-9.

at Bologna, then as physician to cardinal Grimani, after which Leo X called him for a year to Rome as public teacher of astronomy. He next taught logic for two years at Padua with private or public instruction on the side in astronomy, medicine and philosophy. Thereupon he was made professor of sacred astrology, and the enthusiastic students carried him around town on their shoulders. For several days thereafter nothing was heard but shouts of "Philologus" resounding on every side, while his name was written all over the walls of buildings. He proceeds to enumerate his scientific achievements and discoveries.

"First within or without Italy I adapted all and several movements, whether of fixed stars or planets, to solid bodies; I discovered the transverse poles of the three superior planets in their epicycles; the well nigh unimaginable movement of Mercury and Venus of oval figure I recently ascertained and the direction given each by its Intelligence, and I found the varying movement of the single axes and the proportion of auges and opposites just as they are in the sky. Many problems in nature have been unknotted by us. I pass over in silence many errors of Aristotle and Averroes who did not understand this science." This passage seems even more conceited than an utterance by Nifo, "Thus far I have written so accurately of things of nature that among Latin writers who have labored in this field for the past thousand years I am not the least."[71]

Giovanni Martinelli, in a letter to Philologus which Tiraboschi cites, spoke almost as well of his teaching as Philologus had himself, remarking that in years past he exercised the office of public lecturer in the universities of Rome, Bologna and Padua with the highest praise and admiration of all his hearers. Philologus displayed further interest in education by endowing a college at Padua for thirty-two students from Ravenna, and he restored churches and other buildings at Venice. In later life he published several medical works, among them one in 1550 on prolonging human life beyond one hundred and twenty years, and in 1575, the year before he made his will, a tract on syphilis

[71] Aug. Niphus, *De re aulica*, II, 10, p. 352 in *Opuscula*, 1645.

(*malum gallicum*) at Venice. The twenty-three chapters of the work on prolonging human life[72] are crammed with classical erudition, historical examples, citations of the Arabs and Peter of Abano, and astrological passages including the seven spirits of the seven planets. While no previous pontiff has attained the years of the apostle Peter, it is predicted that Julius III will do so. He was, however, to reign only five years.

Joseph Grünpeck's prognostications extend from one based on the conjunction of 1484 in the previous century to a prediction for the years, 1532-1540, which seems to have been first printed in German in 1530. He treated of the conjunction of 1524 in an epistolary dialogue addressed to Charles V which was printed in Latin and then in German at Landshut in 1522.[73] In it an Arab astrologer of the Turkish Sultan is represented disputing with a Mameluke concerning the Christian faith, the sect of the Turks, and then of inundations of wars and waters, famine and pestilence.

A minor controversy concerning the conjunction of 1524 developed at Louvain and Liège. In 1522 Thomas Montis, whom Hellmann called a physician of Liège[74] who also issued annual astrological prognostications, printed at Antwerp a *Quodlibet* on the significations of the conjunctions of the superior planets which would occur in February, 1524.[75] It was further described as collected by him from various authorities and delivered in the arts courses at the university of Louvain. He promised to pursue the subject further in his annual prediction for 1524.[76] In his

[72] Tommaso Rangoni, *De vita hominis ultra CXX annos protrahenda*, 1550. Copy used: BM 1039.i.4.

[73] Hellmann (1914), p. 36.

[74] "Arzt in Lüttich": but perhaps this is a slip for Louvain.

[75] *Quodlibet Magistri Thomę Montis Medici & astrologi de significationibus coniunctionum superiorum planetarum quę erunt anno M.CCCCC.&.XXIIII. in Februario, Per eundem ex diversis auctoritatibus collectum ac responsum in alma vniuersitate Louaniensi in scolis artium.* Impressum est hoc opusculum Antwerpie in aureo Missali per Adrianum Bergñ. Anno domini M.CCCCC.et.xxii. die decima Octobris. 7 fols. Copy now owned by me: listed as No. 46, Short List 6, L'Art Ancien, Zurich.

[76] Hellmann (1914), pp. 39-40, whom I follow, was unable to find this prediction for 1524. In his work of 1924 he lists only a prediction in French for 1546 by Thomas Montis, "Arzt in Lüttich."

dedication to the chancellor of the university and professor of theology, Nicolas Coppin of Mons, Thomas replies to arguments advanced against astrology and astrological medicine. On the eighteenth of December, 1521, at 3 P.M. Thomas had responded to three quodlibetical questions put to him by the lord of Quodlibeta. Two, which were of a medical character, he omits in the present publication, which is limited to the third astrological problem whether inundations could be caused by the approaching conjunctions of the superior planets in 1524. Thomas cites repeatedly from Arabic authorities like Albumasar, Messahala, Alcabitius, Haly, and Abraham ibn Ezra as well as from Ptolemy. He also cites such medieval Latin writers as John of Seville and Perscrutator. He points out that a passage in Albertus Magnus, *De proprietatibus elementorum,* II, 9, has been misinterpreted by those who argue that the conjunctions of 1524 will herald a flood of practically the entire habitable land. He ascribes great effects to these conjunctions but lists some astrological factors which will diminish their influence. He also gives reasons why the effects of the conjunctions will not all occur in the same year but gradually during a number of years. In adducing past instances of the great influence of conjunctions of the planets Thomas credits Paul of Middelburg with having foretold the advent of the Spanish, Gallic or Neapolitan disease (syphilis) from the conjunction of Saturn and Jupiter in 1484.

The *Quodlibet* of Thomas Montis was attacked in a letter of five pages by Damianus Ferrarius de Fenaco, a canon of Liège, written at Liège on November 26, 1522, and printed at Antwerp on December 22, 1522. Ferrarius accused Thomas of having held that motion was not productive of heat, censured him for stating that the effects of the conjunctions would be diminished, as if the effects would not correspond to the vehemence of the cause, and criticized him for extending the influence of the conjunctions beyond the year or time of their occurrence. The attack of Ferrarius seems in large part a personal one and

perhaps was further motivated by local rivalry between Liège and Louvain.[77]

From the Netherlands we turn to the Spanish peninsula. Thomas Rocha, of whom we have spoken in the preceding chapter, in 1523 printed at Burgos a miscellany of the type dear to the heart of Symphorien Champier. Besides a letter against necromancers and some military history on the recent revolt of the communes and the war against the French in Navarre, it comprised a compilation of astronomical terms, a tract on election of favorable times for drugging or bleeding the human body, annual predictions for the past year 1522 and the coming year 1524 respectively, a "Worthy Rebuttal of the Three Books of Augustinus Niphus which he addressed to Charles, Caesar," and a letter addressed to the chancellor against the fatuous writings against astrology of Ferdinand Anzinas or Encinas. It is with the two last named treatises that we are here concerned, but we have not yet indicated their precise position in the miscellany of 1523 which the *Digna redargutio* against Nifo opens, while the letter against Encinas ends the volume. Incidentally it may be mentioned that Thomas or his printer never lists the component treatises of the volume twice in the same words, to say nothing of the same order, while there is a colophon for a work on critical days which does not appear in the volume.[78]

The reply to Nifo was dedicated to the future pope Adrian VI while he was still a cardinal and to the grand admiral Federigo Enriquez de Cabrera, who shared with him the government of "farther Spain." Therefore the work must have been originally written in 1522 or earlier, presumably in 1521, since Thomas

[77] *Epistola Damiani Ferrarii de Fenaco qua quaedam a Thoma Montis in opusculo de diluuio anno quarto-vigesimo futuro conscripta falsificantur.* Simon Cocus & Gerardus Nicolaus Cives celeberrimi oppidi Antuerpiensis commorantes in vico vulgariter nuncupato die Bocxsteghe iuxta monasterium diui Augustini excudebant. Anno humanae salutis Millesimo quingentesimovigesimosecundo xxii die mensis Decembris. Copy now owned by me, listed Short List 6, L'Art Ancien, Zurich, No. 143.

[78] *Thome Rocha gottolani digna redargutio in libros tres Augustini Nimphi Suessani* . . . etc. etc., Impressum fuit hoc opus in regali civitate Burgen. per expertum virum Alphonsum de melgar Anno incarnationis dominice MDXXIII: copy used BM 8610.f.10.

says that the work of Nifo first came into his hands in March, 1521, that he spent four days in reading it, and, observing how many erroneous conclusions it contained, especially in its second book, could not abstain from answering it. In fact, he informs us precisely that he finished his reply in the town of Tordesillas five days after the battle of Villalar, which occurred in April, 1521. Some of Rocha's criticisms of Nifo indicate either that he had read him none too carefully or that he was so stupid that he had misunderstood him. Thus he interpret's Nifo's treatise as directed against the author of the *Ephemerides* and is at pains to point out that that author had not mentioned a flood. Or he ascribes to Nifo the view that little or no influence is to be attributed to other stars than the sun and moon, and that they were created for ornament rather than as causes of things. This was rather the opinion of Pico della Mirandola to which even Pigghe had refused to subscribe. Rocha cites various authorities, including Albertus Magnus and Thomas Aquinas, to the contrary. In other criticisms Rocha apprehends Nifo's arguments better. He holds that the presence of Mars in conjunction will augment rather than remit the amount of rainfall and flood. He denies that a corresponding period of drought must precede one of great rainfall. He objects to the assertion that the Antipodes have other stars, constellations and astronomy than we. He does not agree that conjunctions are of slight account unless strengthened by the virtue of an eclipse. He deprecates Nifo's censure of Albertus Magnus and claim to predict on Ptolemaic principles.

The letter against Ferdinand Encinas was composed later than the reply to Nifo, on May 1, 1523. Encinas, who also commented on the logic of Petrus Hispanus, had addressed to Ferdinand of Aragon, duke of Calabria, a letter in which he proved to be vain what the crowd of astrologers threatened the whole world with from the coming conjunction of 1524.[79] He largely followed Pigghe in this. Rocha in his letter defended Albumasar against Encinas, insisted that Ptolemy accepted the

[79] For the full title see Hellmann (1914), p. 33.

doctrine of conjunctions, advised Encinas to read Hermes, and held that it was absurd to argue that the stars forboded no ill for 1524.

Another Spaniard to discuss the conjunction of 1524 was Pedro Cirvelo, professor of theology at Alcalà, in an annual prediction for 1524 addressed to the archduke Ferdinand. It had a wide and rapid circulation. The original text was in Spanish; then followed Latin editions in 1523 at Alcalà, Antwerp and Nürnberg, with an Italian translation in 1523 and a German translation at Nürnberg in 1524.[80]

Cirvelo's prognostication is dictated by the consideration that men of learning should warn others of future evils which threaten either from a natural series of causes or from the plottings of infernal demons and of wicked men who serve Satan. Philosophers, physicians and astrologers can give warning in the case of events having natural causes, while theologians should guard against spiritual evils. Regarding the conjunction of 1524 Cirvelo distinguishes three different opinions of astrologers. The first which predicts excessive rains and floods is that of the German and some Spanish astrologers. The second, which is the opinion of the Italian astrologers, with whom Cirvelo confuses Pigghe, goes to the opposite extreme of minimizing the danger and denying that great conjunctions have much force. A third opinion, which is that of Nifo, predicts excessive rain from an eclipse of August 25, 1523, in the tenth degree of Pisces rather than from the conjunctions of February, 1524, although these will increase the force of the eclipse. This opinion is astrologically unsound, since the virtue of the eclipse cannot extend more than three and a half months and so will expire before the conjunc-

[80] Hellmann (1914), 28-30. He was unable to find the Spanish original or the Alcalà Latin edition. See L'Art Ancien, catalogue 22, items 153-154 for the two Nürnberg editions. I purchased the Latin edition, of which the title page reads: "Magistri Petri Cerueli Hispani, Theologi & Astrologi insignis, ad serenissimum Principem Ferdinandum Hispaniarum Infantem et Austrię Archiducem, ac Imperatoriae Maiestatis locum tenentem, ex Hispania transmissum, & in latinum de Hispano idiomate conuersum, in Annum vicesimum quartum, attentione dignum Prognosticon." The verso of the title page is blank. 10 fols., numbered in ink from 197 to 206.

tions. Also Nifo's prediction for Toledo from the eclipse is far from the truth. Cirvelo esteems the astrologers of Germany in his time more skilful than those of Italy, but believes their prediction of floods exaggerated. The second opinion of Pigghe is false astrologically and full of danger in that it lulls the public into a false sense of security.

Cirvelo's own prediction is that the months of November and December, 1523, and of January and February, 1524, will be very rainy but not so that there is danger of cities and other places being submerged, and especially not in Spain. He therefore advises the people not to sell their possessions or leave their homes and transport their effects, but to lay in supplies and make provision for the care of the poor. Farmers should plant on highlands rather than low-lying regions where the crops may be destroyed by heavy rains, and shepherds should seek high pastures. Sailors should not navigate during the aforesaid months when heavy gales are to be expected. It will also be better not to eat fish during the coming year. The religious should pray God to diminish the threatening ills. It is hard to see why Cirvelo predicts rain for months most of which precede rather than follow the conjunction except that this was the most likely time of year for rain.

Adrian VI was the recipient of more than one work concerning the conjunction of 1524. Joannes Elisius or Elysius or Elisanus dedicated to him as pope a curious tract or combination of tracts under a cumbersome title of which the first words may be translated, *Most True Liberation From the Fearful Enough Flood.*[81] Elisius was a physician of Naples and wrote on baths. His present work was published at Bologna on September 8, 1522, and at Naples on March 25, 1523. Although Elisius plays up to the interest in a flood in his title, and in the dedication to Adrian VI alludes to the great dissension among astrono-

[81] *Satis metuendi diluvii verissima liberatio Elisianum fragmentum praesagitionis Bononiensis adversus quorundam putativum diluvium anni MDXXIII ac MDXXIIII cum Elisianis annexis ad Adrianum VI Pont. summum ac universum Christianum orbem.* 8 fols. See further Hellmann (1914), p. 32. Copy in the Staatsbibliothek, Munich.

mers as to the approaching conjunction of all the planets in February, 1524—many asserting the prognostication of a flood to be false, and others defending it hand and foot as true—his first three chapters are really a prediction for 1523, based chiefly on two lunar eclipses in March and August. It is a pessimistic prognostication, opening with the statement that the present year, 1523, must be regarded as thoroughly bad. It is twice suggested, however, that if the pope can stop the strife between Christian princes and induce them to unite against the Turk, the situation may be much improved. Only with the fourth chapter does Elisius turn to the conjunction of 1524. Its influence also will be evil. Deaths of princes are first predicted; then excessive humidity, rains and inundations with resultant putrefaction and poisoning. These effects will begin immediately after the conjunction and will continue until the next major conjunction of Saturn and Jupiter in 1544 passes from watery into fiery signs. These effects will be felt especially from the first of June until the end of the year in 1531, 1538, 1539 and 1545—the last possibly a misprint for 1543. Elisius is unusual in including the southern hemisphere and the new world in the scope of his prediction. He states that the effects of the conjunction will be especially felt in the south and west, that is to say, in the Mediterranean basin and from the Red Sea south to the Cape of Good Hope and then westward. Finally, in a very brief chapter which is hardly more than an appended note Elisius warns that no one should believe that astronomers can predict the end of the world from natural causes or a universal deluge whether by water or fire. But they can well forecast the greatest alterations for particular places.

Therewith ends the prediction proper. But then we come to "Elisian Annexes," or tables of contents of a work "On Presages of the Wise," which Elisius proposes to publish or to write and publish, if he receives sufficient papal encouragement. Four Differentiae deal first with astrological predictions, second with the forecasts of seers and prophets, third with medical presages, and fourth with various problems. The fourteen chapter headings of the first Differentia begin with a defense of astrology, cite Lucius

Bellantius, Pontano, Leopold of Austria, Aquinas and Albertus Magnus. The seventh chapter heading incorrectly ascribes the prediction of a flood from the conjunction of 1524 to the author of the *Ephemerides*. Various opinions are to be rehearsed including those of Gaurico, Nifo, Michael Petrasancta, Thomas of Ravenna, and certain Ultramontanes. Finally the fourteenth chapter will set forth the scientific opinion of Elisianus (as he is now called) himself, saving not only Italy but the entire habitable world from this putative flood and fear thereof.

In the seven chapters of the second Differentia are included the question whether religious change and the advent of prophets are under the stars, a discussion of natural magic and the Hebrew Cabala, of poets and sibyls with a digression on the Elysian fields, the nature of prophecy in general, the reasons for our present catastrophes and scourges, and the exposition of particular prophecies. In the fifteen chapter heads of the third Differentia "Elysius," as the name is now spelled, refers to his son Andrea, who appears to have been a budding physician. But most of the chapters are concerned with Hippocrates. The last two deal with presages of future pestilence and with measures against the plague. In the ten chapters of the closing section are questions concerning Noah's flood and other deluges, the waters above the firmament, and two other questions raised by Henricus Euforbiensis, a follower of Albertus Magnus, in his *Cathena aurea omnium entium*, V, 4. These are: why men are sprinkled with holy water, and why water is used in baptism. If these "Annexes" were never developed further, at least they present the sort of topics that were then of interest. Many of them were suggested by previous writers on the conjunction of 1524; others were of more perennial attraction.

By a coincidence this work of Elisius was printed at Bologna on the same day, September 8, 1522, as another prediction addressed to Adrian VI by Ludovicus Vitalis, professor of astrology at the university of Bologna. Of the general run of his annual predictions we treat in our next chapter on Astrology at Bologna. That addressed to Adrian VI was entitled, *A Prognostic for the*

Year 1523 and concerning the Significance of the Greatest Conjunction of almost all the Planets under the sign Pisces in February of the year 1524 of the Incarnation.[82] Raising the question whether the force of the planets is increased by their conjunction, Vitalis concludes that it is, if they are productive of like effects, but that if they exert dissimilar effects, they tend to counteract each other's influence. This seems a blow to the doctrine of conjunctions as then commonly held. In his brief tract of a little over six pages Vitalis further discusses the two eclipses of 1523, and the future for Florence and Bologna. Vitalis dealt more particularly with the question of a flood in a work of twelve leaves printed the next year.[83] It is said to have been directed against Philologus. Again at Bologna in 1524 he addressed to pope Clement VII a *Pronosticon* for that year.[84]

Returning to Adrian VI, we may note the dedication to him at Perugia on December 1, 1522, of a prognosticon of sixteen leaves for the year, 1523-1524, by Vincentius Oradinus or Oreadinus[85] and Hieronymus Bigazinus of Perugia. Yet another astrologer to address Adrian VI on the significance of the conjunctions of 1524, "which according to some denote a deluge," was Francesco Rustighello, who made various annual predictions and later became a professor at the university of Bologna. Our present text appears to be an extract from his forthcoming prediction for 1524. The entire prediction was printed at Faenza on December 12, 1523, after the death of Adrian VI on September 14 of that year. The extract was printed by Livio Francesco Brusoni together with his own *De futuro diluvio Vaticinium.*[86]

[82] Ludov. Vitalis, *Pronosticum anni 1523 et super significata maxime coniunctionis omnium ferme planetarum sub signo Piscium in Februario anni ab incarnatione 1524 incepti,* Bologna, 8 Sept. 1522, no printer named: copy used BM c.27.h.22(12.). This does not seem to be noted by Hellmann, while neither of the following are in the BM volume.

[83] *Dialogus de diluvii falsa prognosticatione mediis naturalibus et astronomicis refertus,* Bologna, Hieronymus de Benedictis, 1523: Hellmann (1914), p. 63.

[84] *Beatissimo . . . d. D. Clementi Septimo Pont. max. Pronosticon anni mille cinque cento vintiquatro,* Bologna, 1524: Hellmann (1914), p. 63.

[85] It is spelled Oradinus in the dedication to the pope, but Oreadini in the title as reproduced by Hellmann (1914), p. 44.

[86] For their full titles see Hellmann (1914), pp. 26, 69.

Among those who defended the prediction of a flood from the conjunction of 1524 was another Dominican, brother Sebastian Constantinus of Taormina, Sicily, who, however, wrote at Rome to cardinal Nicolaus de Flisco. Constantinus is styled a professor of sacred theology as well as a mathematician, so that once more we have a theologian not opposing but defending astrology. Aroused by the many writings which he had seen concerning a future flood which were not consonant with truth and were pernicious to the human race, and spurred on by the prayers of his disciples, he composed this "Book on the Power of the Stars and Scientific Pronosticon . . . in which are overcome those offending astrologers who by frivolous arguments strive to belittle the celestial causes of great effects and the fear of God himself."[87] Men are always prone under demon suggesting to disregard divine warnings, as was shown at the time of Noah's flood. In like manner today they think there will be no flood next year. "Wherefore we too gladly undertake the task of writing concerning the coming flood." In other words he defends the prediction of an immediate flood against those astrologers who have attacked it.

Divine warnings may come through the stars as well as by angels and prophets, as was shown when a new star informed the Magi of the distant birth of Christ. Constantinus hence concludes that it is proper to persuade men that there will be a flood and improper to persuade them that no flood is coming. After discussing the general question whether the heavenly bodies act on these inferiors, and much citing of Albertus, Aquinas, Avicenna, Simplicius and Aristotle, Constantinus lists twenty-three objections by his adversaries to the celestial causes of this year producing a flood and other great effects. He admits that evils threatened by the stars are not always fulfilled. He then explains the method to be followed in making astrological annual

[87] Frater Sebastianus Constantinus, *Liber de potestate syderum ac scientificum pronosticon . . . quo convincuntur obloquentes astrologi qui frivolis rationibus magnorum effectuum coelestes causas ac in ipsum deum timorem demere nituntur,* Romae quarto nonas Ianuarias MDXXXIIII: copy used, BM 8610.bb.30. As Hellmann (1914), pp. 30, 73, has suggested, the date, MDXXXIIII is presumably a misprint for MDXXIIII.

predictions. Whereas some of our authors have stated that there would be no eclipses in 1524, Constantinus adverts to a solar eclipse on February 4 at 2.47 in Ulm and at 3.07 P.M. in Rome. It will be in the house of death with the tail of the dragon increasing the evil influence. At the same hour all three superior planets will be in the tenth degree of Pisces in the house of Jupiter which receives the unfortunate planets and especially Mars, to which it is inimical, whence the virtue of the evil stars is the more increased. Some argue that because Pisces is the house of Jupiter, because the exaltation and triplicitas are of Venus, and the terminus in the meeting-place of the planets, the evil force of the conjunction is lessened. Really these factors only increase the evil influence of Saturn and Mars. Moreover, Saturn will rise directly above Mercury, which according to Haly signifies an inundation of waters, although some assert that Mercury dispels rains by its heat and dryness.

Constantinus professedly follows Ptolemy, especially in his astrological technique, but is also much influenced by the commentator on Ptolemy, presumably the Arabic writer Haly who has just been mentioned. He insists that Ptolemy was not opposed to the doctrine of conjunctions but prognosticated either through great conjunctions of the superior planets alone, or by these concurrently with conjunctions or eclipses of sun and moon. Some have erroneously held that Ptolemy reproved or excluded the former method, but Constantinus contends that the three superior planets are nobler, more efficacious and more universal than sun and moon, produce greater effects, and operate not merely by their light and motion but also by a certain spiritual quality which is not proportioned to their quanity of light. He further states, however, that the doctrine of conjunctions has been much developed since Ptolemy's time by observation and experience.

Constantinus grants that a universal deluge cannot happen naturally, because it is prevented by the universal virtue of the world as a whole, although otherwise the celestial bodies might cause one. But a particular deluge is now greatly to be feared.

He then draws six conclusions as to what may follow from the conjunctions and eclipses of 1524, but these predictions are less terrifying than his gloomy diagnosis prepared one to expect. Finally his last three pages are devoted to answering the twenty-three arguments of his adversaries.

Doctor Ioannes Copp composed a prediction for 1523 and part of 1524 which was printed in German at Leipzig but dated at the close of the preface in Erfurt on September 15, 1522.[88] Hellmann notes three other editions and two of a *Practica Deutsch* for 1524.[89] Though the eclipse and conjunction in Pisces threaten great change, Copp trusts in view of the rainbow of promise that God will not send a world flood again. But there will be much snow and rain, wind, thunder and lightning, and peril for folk inhabiting islands and valleys. There will be such war and bloodshed as there has not been for a thousand years. In fact, Copp cannot and will not try to describe the coming evil. He warns, however, that the full effects of the conjunction are not to be expected within the space of the next two years but God alone knows when. Prayer to God may obviate some of the impending disasters, and Copp urges the reader as his brother in Christ to turn with him like little children to the heavenly Father.

Paul of Middelburg, the veteran astrologer who since 1494 had been bishop of Fossombrone, had, he says, for many years abstained from issuing prognostications and been occupied with better studies. But as the rumor grew from the predictions of the astrologers that there would be a very great deluge, he felt moved to enter the lists again to oppose it. This he did in a *Prognosticum* addressed to pope Clement VII, in which Paul held that neither a universal nor a provincial flood was signified by the conjunctions of all the planets to occur next year in Pisces. This work appears to have been printed in Latin at Fossombrone and Rimini in 1523, the next year at Augsburg in Latin and also

[88] J. Copp, *Wass auff diss dreyundtzweyntzigist unt zum teyl vierundtzweyntzist iar des hymmels lauff künfftig sein*, Leypssgk, 4°; at fol. 2r, "Geben zu Errfordt am xv tag des Herbstmons 1522": copy used BM 3905.f.30.

[89] Hellmann (1914), pp. 30-31, 74.

in German translation.[90] A letter to like effect to the duchess of Urbino was printed at Venice in 1526 with the *Lunario* of Camillo Lunardi and again in 1532,[91] when people apparently still feared the effects of the conjunction of 1524, as indeed they might well do, according to astrological doctrine, until the next great conjunction in 1544.

Indeed John Plonisco, in a judgment dedicated on January 20, 1524, to Andreas Critias and printed at Cracow, predicted for the next forty years on the basis of the conjunctions of 1524, although he opposed the forecast of a deluge from them.[92]

Very favorable, on the contrary, to the prospect of a flood was Nicolaus Peranzonus de Monte Sancte Marie in Cassiano in his "Prediction and true Declaration of a Future Flood with twenty-one memorable inundations before and after the flood of Noah. Also a Determination of the last days of this world with praises of astrology and other occult matters taken from the innermost science of the mathematicians and cabalists." This was published at Ancona in 1523.[93] In the dedicatory preface to the bishop of Castellamare (presumably Adriatico) who was likewise governor of the cities of Recanati and Fermo, Peranzonus says that the prelate will doubtless be surprised that he, after so long serving as a schoolmaster in diverse places among clamoring boys, scoldings, ferules, straps and rods, should now on the verge of old age have ventured to direct his mind to the most sacred and almost divine science of mathesis. He further advises the bishop to pay no attention to the opponents of astrology. Another shorter preface follows, addressed to the senate and people of Recanati. Praises of astrology then fill some twenty-two pages. It is lauded for its antiquity, inventors and professors, the list of whose names fills two double columned pages, for its truth, its subject and its utility.

[90] Hellmann (1914), pp. 37-38, 78.
[91] *Ibid.*, p. 39.
[92] *Ibid.*, p. 47.
[93] *Vaticinium de vera futuri diluvii declaratione cum una et viginti inundationibus memorabilibus ante et post diluvium Noeticum necnon cum determinatione ultimorum dierum huius mundi cum laudibus astrologie aliisque rebus occultis ex intimarum mathematicarum cabalistarumque scientia depromptis*, Ancona, Bernardinus Gueralda, 1523: copy used, BM 8610.a.49.

After defining a flood, Peranzonus cites various opinions as to the beginning and even more as to the end of the world. We are given the views on this last point of the cabalists, the Erythrean sibyl, Aquinas, the astronomers, and the *De vetula* of the pseudo-Ovid. Then comes an account of past floods. Despite the title, none before that of Noah is mentioned. Concerning particular floods are noted the medieval opinions of Albertus Magnus, Peter of Auvergne and William of Conches. Finally the flood to follow the conjunctions of 1524 is reached, and Peranzonus goes so far as to quote the words of a spirit from Cecco d'Ascoli. He then enumerates the various astrological factors in 1524 making for a flood. The conjunction of Saturn and Jupiter which will last for several days will pour down continuous inundations of waters and particular floods over almost the entire northern part of the world. The conjunction of the three superior planets on February 4 at 13.38 P.M. portends earthquakes, imprisonments, search for treasure and alchemical quests, building of edifices, investigation of hidden things, administration of inheritances, and very great floods with rivers at high water mark. Their renewed conjunction on February 5 at 7.17 P.M. signifies numerous other ills and will increase the floods of water. The conjunction of Jupiter and Venus on February 2 will also produce rain. So will that of Mars and Venus on the sixteenth, of the sun and Mercury on the seventeenth, and of Saturn and Mercury on the nineteenth of the same month. Of four other conjunctions three will cause winds and the fourth bring rain. Peranzonus proceeds to predict floods from an eclipse, from the revolution of the year, and from the ruling intelligence, namely, Sammuel, the mover of Mars, who also presided at Noah's flood. Thus the prospect of floods is unrelieved. Yet though many predict this, their prognostications as in the days of Noah are derided as idle dreams of sick minds. Peranzonus specifies when these floods will occur: at the time of the conjunctions, in 1533, in 1534, and from 1524 to 1530 (possibly 1534 to 1540 is meant).

Besides such familiar names to the student of the history of

astrology as Zael the Israelite (Sahal Israelita), Abelard, Peter of Abano, Oresme, Henry of Hesse, and Petrus Bonus Avogaro, Peranzonus mentions less known authors: George of Paris, Hieronymus Bigazius (presumably identical with the Bigazinus whom we mentioned as co-author with Oradinus of a prognostication for 1523-1524), Ladislaus Oracomensis, Marianus Euscathius and Odinton, by whom Walter of Odington may be meant. Peranzonus also alludes to an early sixteenth century astrological prediction by a Moses of Gerunda. He gives its date of publication as 1215, but 1512 or 1515 must be meant, since the events therein predicted were of 1516, 1524, 1530 and 1536. A work by a Nicolaus Perazonus on the notory art and memory which was placed on the Venetian *Index* of 1554[94] was presumably by our author, whose mind would seem to have been wide-open to the occult. Perhaps the poor schoolteacher found therein a relief from the theory and practice of secondary education in his day.

Abiosus of Bagnoli in the kingdom of Naples, some of whose earlier predictions were referred to at the beginning of this chapter, also discussed the conjunctions of 1524 in a *Vaticinium* for 1523 composed at Naples on March 3, 1523, and published on June 12 of that year.[95] It is longer than the average annual prognostication, being divided into two parts of six and twelve chapters respectively. It takes into account a lunar eclipse of 1523 and some twenty conjunctions in 1524 but predicts a particular rather than universal flood. The coming positions of the planets do not denote a universal flood, which is indeed naturally impossible, that in Noah's time having been a divine miracle. That there will be heavy rains is indicated by meteorological and ani-

[94] Reusch, *Indices librorum prohibitorum,* Tübingen, 1886, p. 166. I have also consulted this *Cathalogus librorum haereticorum,* Venice, 1554, directly in BM 3902.aa.11.

[95] " . . . in aedibus D. Catherine de Silvestro xii Iunii anni predicti excusum." The author is given as "Ioannes Abiosus regni Neapolis ex Balneolo philosophus non plebanus artium et medicinae doctor ac astrologiae professor": copy used, FN 3227.10. Some chapters are so badly printed as to be illegible. In the second part there are two chapters numbered ten, making 12 rather than 11 chapters in all in this part.

mal signs as well as by astrology, but Naples will not be submerged. Abiosus is further now a supporter of Arabic astrology, holding that many things have been discovered since Ptolemy, whom the Arabic authors have both elucidated and added to.

Although Abiosus termed the biblical deluge a divine miracle, he holds that the advent of antichrist and end of the world may be investigated by natural reasons not repugnant to holy scripture. Moses was born with the horoscope in Cancer in the exaltation of Jupiter and house of the moon. Jupiter made him a lawgiver, while the moist influence of Cancer and the moon caused him to be cast upon the waters but not drowned, and later to divide the waters of the Red Sea by a divine miracle. Abiosus similarly treats of the sign in the ascendent in antichrist's geniture and of other signs preceding his advent. In closing he submits all his vaticinations to the correction of the Christian religion, but recommends theologians to keep in mind the favoring attitude towards astrology of Duns Scotus the Minorite and the two great Dominicans, Albert and Thomas. A long chapter of seven pages is devoted to a most marvelous medicine which may be more fitly considered in our chapter on alchemy.

George Tannstetter, also known as Collimitius, was a medical man and mathematician of the university of Vienna who in 1514 had edited Peurbach's *Tables of Eclipses* together with considerable biographical materials as to past men of science at that university. Now, on March 20, 1523, he printed and addressed to the archduke Ferdinand[96] a *Libellus consolatorius,* "in which the attempt is made to extirpate from the foundations the opinion which now for some years has been spreading from the divination of certain astrologasters as to a future deluge and many other dreadful dangers for the year 1524."[97] Tannstetter

[96] Albin Czerny, "Der Humanist und Historiograph Kaiser Maximilians I, Joseph Grünpeck," *Archiv für österreichische Geschichte,* 73 (1888), 327, speaks of "der Leibarzt des Erzherzogs Ferdinand, Georg Thanstetter."

[97] *Georgii Tannstetter Collimitii Lycoripensis medici et mathematici libellus consolatorius quo opinionem iam dudum annis hominum ex quorundam astrologastrorum divinatione insidentem de futuro diluvio et multis aliis horrendis periculis xxiiii anni a fundamentis extirpare conatur,* Viennae Austriae per Ioannem Singrenium impressum 20 Martii anno M.D. XXIII: copy used, BM 1395.g.15.

says that amid the grave calamities of Christendom such as Turkish invasions, religious dissent, civil wars, the death of Maximilian, and amid many prodigious signs in the sky, the rumor has grown of a flood in 1524, because then, as the author of the *Ephemerides* says, there will be a conjunction in February in an aqueous sign. As a result men are selling their lands for money which they can transport more readily to mountain tops or are hesitating to begin any new undertaking. Since Tannstetter is paid a stipend by Ferdinand to teach astronomy at Vienna, he feels that it is his duty to give his view concerning that conjunction and its influence, although Augustinus Niphus and Albertus Pighius have already said all that one could desire. A great chart or broadside which has recently been circulated with a picture of prodigies and with terrible predictions for 1524 he considers a disgrace to astrology and not the work of any learned man but rather the figment of some printer or barber. Thus the sixteenth century had its sensational annual predictions as we today have our "yellow journalism."

This fulmination should not blind us to the fact, of which Tannstetter presently informs us, that he himself had been issuing annual astrological predictions for twenty-one years past. But his have always been learned, sober and restrained. He complains that last year someone issued falsely under his name an idle and lying prediction of the fall of the city of Vienna. He has always made it a point to abstain from particular predictions as to kings, princes and cities, in order not to alarm the people or foment revolution. Yet Ranzovius wrote in 1580 that Tannstetter had predicted the death of Maximilian six years beforehand on account of an eclipse that occurred or was to occur in July, 1518, the emperor dying on January 12, 1519.[98] Tannstetter goes on to say that he never predicted from the exceedingly rare and plainly ominous radial impressions at Vienna from the beginning of the year 1521, although many most noble men begged him to do so, and although he had forecast these celestial phenomena long in advance. Some things are innermost

[98] Ranzovius, *Catalogus imperatorum*, 1580, p. 49.

mysteries of philosophy and are not to be made public. He then hints darkly that these recent signs in the sky bore especially upon affairs in the Near East, and that the end of the evil is not yet. In other words, he too could be sensational, if he would.

Returning to the conjunction of 1524, Tannstetter declares that God will not permit another universal flood because of His promise to Noah. Nor is the end of the world and last judgment announced by this conjunction. This he professes to prove by both sacred and gentile writings, but his chief arguments are that it is not ours to know the times and seasons, and the belief that the end of the world will be by fire. To show the physical impossibility of a universal deluge he chiefly repeats arguments of Pigghe and Nifo: that some regions have no rain and few clouds, that this conjunction would occur during the summer season south of the equator, that the sign Pisces would be earthy and dry there instead of cold and humid, and that, while Jupiter and Venus are the dominant planets here, Mercury would lord it there. In any case all three of these planets are favorable and will prevent even a particular or provincial flood.

Tannstetter also attacks the doctrine of conjunctions, to which he says that he attributes less than does the author of the *Ephemerides*. He criticizes Albumasar and Pierre d'Ailly, and advocates a return to Ptolemy. He then reviews a number of past instances when most of the planets were in Pisces but no great floods are recorded in history. In 670 A.D. there were precisely the same planets in Pisces as there will be in February, 1524, with an even worse preceding lunar eclipse on July 17, 669. Many astrologers predicted a flood from the conjunction of 1503-1504, but the Danube was never so low before. This review of past conjunctions is the most distinctive feature of Tannstetter's treatise. He was aided in it by his pupil and assistant, Andreas Perlach of Styria, who compiled the essential data from the *Viennese Tables* of John de Gmunden, the astronomer of the early fifteenth century. Perlach had already published in 1518 a work on the use of the almanach or ephemerides from the commentaries of his teacher. He became professor of mathe-

matics at Vienna in his turn, and it was at his instigation that Johann Schröter of Weimar published a work on weather prediction and astrological medicine in 1551.

Having damned the efforts of other astrologers, Tannstetter engages in weather prediction of his own. On August 26, 1523, there will be a universal lunar eclipse whose effects will not begin to be felt until the following April. He cannot deny that this eclipse portends great inundations in some regions with loss of property. These effects will be heightened by the fact that the conjunction in February, 1524, will occur in almost the same degree of the same sign as the eclipse. Furthermore Saturn will be located directly between two watery fixed stars, although they are of only the fourth magnitude. Hence throughout February there will hardly be a glimpse of clear sky. All this does not sound very consoling, despite the title of Tannstetter's treatise. But he tells his readers not to be afraid, that Jupiter and Venus will exert a counteracting influence, and that they should not flee to ships or mountains, even if it rains for a number of days and the rivers overflow their banks. He promises later, when he issues his annual prediction for 1524, to specify the coming weather more particularly by days. Yet Pigghe, whom Tannstetter professes to follow, had ridiculed this practice.

After stating that the Christian religion does not depend on the stars, that the significations of the sky are not inevitable, that prudent men ought not to discuss the fate of the emperor and other princes, but that men's minds as well as their bodies are affected by the stars, Tannstetter predicts conventicles, conspiracies, tumults and seditions. There will be revolutionary leaders and tricky demagogues, but they will have no lasting success, since their significator, Mercury, is dejected and the weakest planet of all. There will be a difficult and long contention as to monarchy and aristocracy, alteration in the laws and administration of justice. Turning to the Turkish menace, Tannstetter finds some comfort in the fact that Charlemagne won in the East under similar conjunctions. He then successively dis-

cusses what diseases the constellations portend, what human nativities will be especially subject to this conjunction and what animals other than man, the state of the crops, what places have most to fear, and the duration of the effects of the conjunction. These effects will be spread over the period to 1540, after which time, because of a solar eclipse in Aries, a new conjunction in Scorpio in 1543, and four more eclipses in the single year, 1544, much more formidable events may be expected than those from the present constellations. Moreover, in the years which intervene between 1524 and 1540 many eclipses in unfavorable houses presage more dreadful occurrences than any learned astronomer can foresee from the present eclipse and conjunction. Such is the doleful ending of Tannstetter's *Libellus consolatorius*. His chief consoling thought would seem to be that there is worse to come.

The author of the *Ephemerides*, Johannes Stoeffler, now in his seventy-second year, who had hitherto maintained silence with reference to the controversy which he is supposed to have precipitated, was stung by Tannstetter's references to himself into publishing the same year at Tübingen, "An Expurgation from the Suspicions of Divinations as to the year 1524 unjustly cast upon him by certain persons and more particularly by George Tannstetter Collimitius Lycoripensis, medical man and mathematician, in that booklet which he entitled Consolatorius."[99] In the dedication of November 1, 1523, to a noble student aged only thirteen Stoeffler says that he has hitherto said nothing concerning Tannstetter's numerous errors and defects in his editions of Peurbach's *Tables of Eclipses*, Regiomontanus's *Problems of the Primum Mobile*, and Albertus Magnus, *De natura locorum*, and in the treatise which he sent to the Lateran Council on the correction of the date of Easter. He also taunts Tannstetter with

[99] *Iohannis Stoeffleri Iustingensis qui et Ephemeridum autoris expurgatio adversus divinationum XXIIII anni suspitiones a quibusdam indigne sibi offusas nominatim autem a Georgio Tannstetter Collimitio Lycoripensi Medico et Mathematico in eo libello quem ipse consolatorium inscripsit*, Tübingen, Ulrich Morhard, 1523. I now own the copy listed in L'Art Ancien, Short List 6, No. 161.

having waited twenty-four years until he had grown old before attacking him. In the subsequent text he denies that he ever predicted a flood or encouraged superstitious astrology. He quotes various passages from Tannstetter and replies to them. In particular he defends the doctrine of conjunctions, denies that the conjunction of 670 A.D. exactly corresponded to that of 1524, and holds that there was no lunar eclipse on July 17, 669, as Tannstetter had said. In a second section of his work he gives his own guarded conclusions as to the significance of the coming conjunctions and criticizes much that Tannstetter had prognosticated.

A story as to Stoeffler and his astrological prediction was told years later in 1558 by Hieronymus Wolf in a dialogue on astrology. Stoeffler had foreseen from the stars that on a certain day he would be in danger from a ruin or falling body. Since his house was firmly built, he decided to spend that day indoors and called in some other learned men to drink and dispute with him. In the course of their discussion he reached up for a book to settle some point. The shelf on which the books stood was loose, and his movement precipitated it upon his head and inflicted a serious wound.[100]

A longer work than most of the preceding was that of Cornelius Scepperus or Schepper, entitled, "Assertion of the Faith Against Astrologers or Concerning the Significations of the Conjunctions of the Superior Planets in the year 1524." It was first printed at Antwerp in 1523, while I have used a later edition of 1548.[101] This work in some six books is rather obscurely couched in the form of a dream. One reason for its length is its frequent allusion to the arguments of previous writers. It refers to the controversy between Nifo and Philologus and attempts to demonstrate by what sounds like uphill reasoning that the assump-

[100] Hier. Wolfius, *Admonitio de vero . . . astrologiae usu*, Augsburg (?), 1558, n.p. Copy used: BM 718.e.8.(3).

[101] *Adversus falsos quorundam astrologorum augurationes Cornelii Scepperii Assertio, Ad reverendissimum cardinalem D. Erhardum à Marka archiepiscopum Valentinum episcopum Leodiensem ducem Bulionium comitemque Lossensem.* Libri sex. Coloniae Agrippinae, 1548. Copy used: Col. 156.4 Sce66.

tions of Philologus are contrary to those of previous astrologers. Johann Virdung is likewise criticized at length, and Gallianus is mentioned. Nifo and Pico della Mirandola are represented as defenders of the faith against astrology and against the Arabic astrologers who attributed Noah's flood to a conjunction which occurred 279 years before it. In the preface, however, Scepperus professes to owe little to either Pico or Nifo. Later he argues at length against Lucius Bellantius of Siena who had replied to Pico. He shows a wide acquaintance with other authors, past or near: John of Saxony on Alcabitius, Hermannus on rains, Pontano, George of Trebizond, Leopold, Alkindi, Regiomontanus, Roger Bacon, Adelandus Sarracenus (whoever he may be), Bonatti, d'Ailly, count Guido Rangoni, Albumasar, Peter of Auvergne, Albertus Magnus, Leonicenus, Vives, etc. A number of chapters are particularly devoted to the theories of Perscrutator of York in the early fourteenth century.

Scepperus states that he does not write against astrology but against those who by false predictions have turned the whole world against them. He attempts to show, however, that in the past floods could not be deduced by astrological rules, and that conjunctions of the superior planets are not of great importance. Somewhat inconsistently, perhaps, he insists that far greater ills should have been inferred from the conjunction in 1513 of Saturn and Mars than from the coming conjunction of all the planets in 1524. He denies that the outbreak of syphilis in Italy was predicted from the conjunction of Saturn and Jupiter in 1484, or that human diseases from ulcers are signified by conjunctions of the superior planets. He adds many minor criticisms of astrological rules and technique, and even doubts if tides are caused by the moon. In brief, he leaves very little to astrological prediction and may almost be classed with Pico as an opponent of astrology in general, rather than merely of certain particular predictions made from the conjunction of 1524. Most criticism at that time, as we have seen, was less sweeping.

On January 19, 1524, there was printed at Faenza a tract of six leaves addressed to pope Clement VII "Against the false

threats of those playing the astrologer from the conjunction of the planets in the sign of the Fish in the year 1524."[102] At its close the author, count Rambertus de Malatestis, says that he wrote it hurriedly in two days because he heard that he together with others had predicted a deluge, a misrepresentation which he wished to correct. By the same printer we have a four leaf *Prognostication* for 1524 printed at Faenza on January 11, 1524, and dedicated to the bishop of Chiusi and governor of Romagna, Nicolaus Bonafides.[103] The printer has evidently striven to give the impression that count Malatesta is the author, but the prediction is actually the composition of his secretary and the tutor of his children, Franciscus Ruffus. So apparently this is the unauthorized publication which caused the count to rush into print with his actual or revised views.[104] The treatise of January 11 may have really been printed without his knowledge or consent and have misstated his views, which he therefore sets forth correctly in that of January 19. Or his views as set forth with his knowledge and approbation may have met with so unfavorable a reception that he found it advisable to disown them. The fact that the same printer published both treatises makes this latter hypothesis appear the more likely. He had published a prediction in Italian for 1524 by Francesco Rustighello under the date, December 12, 1523.[105]

Giacomo Pietramellara, professor of astrology at the university of Bologna, of whose annual predictions in general we treat in the

[102] Rambertus de Malatestis Soliani comes, *Adversus falsas astrologantium minitationes ex conventu planetarum in signo piscium anno MDXXIIII epithoma,* Faventiae per Ioannem Mariam de Simonetis, 1524, 6 fols. Hellmann (1914), p. 37, incorrectly gave this date as 1523. L'Art Ancien, Zurich, Short List 6(1935), No. 145, corrects this to 1524.

[103] (Franciscus Ruffus), *Illustrissimi ac excellentissimi domini Ramberti Malateste Sogliani comitis Prognosticon anni MDXXIIII ad reverendum dominum Nicolaum Bonafidem episcopum Clusinum Romaniole presidem,* Impressum Faventiae per Ioannem Mariam de Simonettis Cremonens. die 11 Ianuarii MDXXIIII.

[104] Hellmann (1914), pp. 37, 50, 91, dated the count's work in 1523 and so did not entertain this possibility, but it had already occurred to me in 1934 (without seeing either work) that either 1523 in the one or 1524 in the other might be a misprint, so that the secretary's work would have been printed eight days earlier and that it, as the Art ancien catalogue of 1935 also suggests, probably gave rise to the rumor that the count had predicted a deluge. Now both are seen to be dated in 1524.

[105] Hellmann (1914), p. 50.

following chapter, also wrote on the conjunction of 1524. Versions in Latin and Italian both appeared in 1523. He noted in retrospect the great effects of the conjunction of 1365 and the letter of John de Muris to Clement VI concerning it.[106]

To the controversial duels already noted may be added that of Lorenz Fries and Pamphilus Gengenbach.[107] The latter, who was a poet and printer of Basel, ridiculed Fries in a satiric comedy. Fries replied by calling Gengenbach all sorts of names in his *Prognostication* from the conjunction of 1524. He asserted that Gengenbach had not even read Tannhaüser and Dietrich of Bern, yet dared insult astrology. The *Prognostication* of Fries must have been composed some time before the event, since it was still in the year 1523 that Gengenbach replied to it with *A Christian and True Practica against an Unchristian Godless Untrue Practica*. Both works were in German. Gengenbach had published at least one previous prediction for 1515.[108] Fries predicted great inundations in Lydia, Cilicia, Pamphilia, Portugal, Numidia and elsewhere, but not in Germany. Still in the same year 1523 Fries again adverted briefly to the question of a flood in another tract devoted primarily to showing from the stars that the end of the world was still far off.

No prognostication by Luca Gaurico for the year 1524 or as to the conjunction then has been preserved, but in a prediction for the following year, 1525, addressed to Clement VII,[109] he complains that an inept judgment for the preceding year, full of fables, had been forged under his name in the city of Naples, which he left twenty-seven years ago. It was in Italian because its fabricator was ignorant of Latin. Indeed, it was not at all in Gaurico's distinctive style. To show how ducats differ from lupini Luca offers the present prediction, partly in Italian, partly in Latin, partly in verse and partly in prose. Individual predic-

[106] Hellmann (1914), pp. 45-46, 85.

[107] C. G. A. Schmidt, *Laurent Fries de Colmar*, 1888, p. 39 *et seq.;* Hellmann (1914), pp. 33-35, 76-77; Hellmann (1924), p. 27.

[108] Hellmann (1924), p. 27.

[109] *Al Clemente 7 pontifici clementissime L. Gaurico Prothonotario Apostolico Salutem:* copy used, BM c.27.h.23 (12.). This appears to be the same prediction which Pèrcopo, *op. cit.*, p. 21, on the indirect authority of a letter of Antonio Magliabechi cited by Nicodemo, says was printed at Bologna, "per Benedictum de Benedictis," on November 28, 1523.

tions for cardinals occupy two of the eight pages. From a nativity of the pope which Luca drew up afresh on May 25, 1525, he predicts that he will triumph over his foes, that the king of France will come to terms, that Venice will cooperate against the Turk, and that after some setbacks the perfidy of Martin Luther will be scotched. There will be marriages of the pope's kindred. The pontiff should beware of things pestiferous and poisonous, and all will turn out happily for the rest of the year to May, 1526. Gaurico further beseeches the pontiff to force Paolo (Pietro?) Aretino to do right by himself (i.e. Gaurico).[110]

What injury or insult Gaurico had suffered from Aretino is not clear. Later, at the end of the year 1526 Pietro Aretino lampooned him in his pasquinade on annual predictions,[111] in which he ridiculed the astrologers generally for their recent prediction of a flood. Aretino dedicated this work at Mantua to the marchese Federico Gonzaga.

Marcus Scribanarius of Bologna is another astrologer by whom no prognostication for 1524 seems to be extant but whom we find looking back in his prediction for 1526 to the conjunction of 1524. He says that it signifies change of rulers with much tribulation and the apparition of sects and men of great authority who will produce marvelous effects in some states with impetuous war. Rebels will rise against their betters, and many will perish by the sword. There will be failure of crops, corruption of the air, and mortal diseases. Because the sun was not in aspect to this conjunction, its effects will not appear immediately but gradually until the next conjunction of Saturn and Jupiter in 1544. There will be signs in the air, comets with and without tails, earthquakes, and humidity at unusual seasons with inundation but no such flood as the populace fears. The fact that Jupiter is oppressed by Saturn and Mars indicates that some prelates and wealthy nobles will perish by steel or other catastrophes. Those who dwell by rivers, swamps or mountain torrents may suffer harm from them. To such mild proportions had the pros-

[110] Pèrcopo does not note this complaint, as he had not seen this prediction for 1525.

[111] *Judicio over pronostico de mastro Pasquino quinto evangelista.* Pèrcopo, *op. cit.*, p. 25.

pect of a flood been reduced by the end of 1525. Scribanarius repeated the same remarks except for a few verbal changes in his annual prediction for 1529.[112]

Against the jaunty and irresponsible assertions of later sceptics like Naudé and Bayle that, despite all the predictions of flood, the year 1524 was unusually dry, we have a contemporary record of the weather for that year, kept day by day by Andrea Pietramellara, son of the aforesaid Giacomo.[113] On the whole, this justifies the previous astrological predictions rather than their critics after the event. It is true that during the month of February itself, when the conjunctions in Pisces occurred, the weather was mostly fair at Bologna, so that on the last day of that month, February 29, Andrea wrote: "These are the happenings for this month at Bologna, contrary to the expectation of many, since many were fearful of earthquake, excessive rain and other things hateful to mankind. Although we have not felt or seen such, yet there was a rumor that outside Italy and especially at Naples and in the mountains long rains had occurred, and there had been earthquakes, also rivers had submerged houses and villas not without great calamity to mortals." As we have remarked before, a great conjunction must be allowed some time to fulfill its effects. These were not long in reaching Bologna. On March 19 heavy rain awoke Andrea several times during the night. By May 12 all the clergy were offering prayers to God in their churches that He give fair weather, lest the grain and other crops necessary for human sustenance be lost. These supplications were repeated on the thirteenth and fourteenth. On May 21 winds and thunderstorms moved the clergy to ring the bells to ward off the storms, while on May 25 they did so twice. The bells were rung again for this purpose on June 12, but with the unsatisfactory result that on the night of the thir-

[112] These predictions for 1526 and 1529 are the sixth and seventh tracts in the collection of predictions by Scribanarius contained in BM c.27.h.21.

[113] Nerio Malvezzi, "Il diario meteorologico di Andrea Pietramellara per l'anno 1524," *Atti e Memorie della R. Deputazione di Storia Patria per le Provincie di Romagna*, Terza serie, II (1884), 432-86: text at pp. 445-86. Andrea notes other events than the weather, offering occasional glimpses of daily life then. Hellmann, *Neudrucke*, 1901, No. 13, pp. 19-25, printed only a little of it.

teenth there was hail, wind and a tremendous thunder shower lasting an hour with so much noise and lightning that the people were terrified. Again on June 30 the clergy rang the bells, while on July 14 a thunderstorm at night forced them to get out of bed to do so. On July 20 a very hard rain and hail stones as large as grapes, chestnuts and hens' eggs alarmed men and twice aroused the clergy to ring the bells. But there were more thunder and hail storms on the 22nd and 23rd and more sounding of the bells. By this time many were convinced that there was really going to be a flood.

Cases of the pest now began to appear and increased in number in August, September and October. About the end of August there was so much rain that many animals in the neighborhood were killed, both bipeds and quadrupeds, while men were compelled to abandon their dwellings. After rain on September 6, 7 and 8, supplications that it cease were offered in the churches on the eighth. On the ninth and tenth both the rain and supplications were continued. At last the eleventh of the month was fair, but then there was heavy rain on the twelfth. In October and November there were still sounds of abundance of rain, until streams overflowed and did much damage. Supplications and bell-ringings went on as before. Finally in December the weather took a turn for the better, and there Andrea's record ends.

Stadius, writing in 1556, also testified that 1524 had been a wet year as a result of the conjunction of the planets in wet signs.[114]

Kilian Leib, prior of Rebdorf, who kept a record of the weather from 1513 to 1531 in his copy of Stoeffler's *Almanach*,[115] which he thought was by Regiomontanus,[116] often pondered over its passage on the conjunction of 1524.[117] At the time of its occurrence he recorded rain and snow for most of the days of February but noted that earthquakes as well as floods were expected from

[114] *Ephemerides novae . . . 1554-1580*, Cologne, 1556, fol. A 3 verso.

[115] Karl Schottenloher, "Der Rebdorfer Prior Kilian Leib und sein Wettertagebuch von 1513 bis 1531," *Riezler-Festschrift, Beiträge zur bayerischen Geschichte*, Gotha, 1913, pp. 81-114, 444-46.

[116] Because in his copy it was bound after the 1488 edition of the *Almanach* of Regiomontanus, while its own first 30 pages were missing.

[117] Schottenloher, *op. cit.*, pp. 84, 94.

it.[118] After the event he connected the conjunction with Luther.[119]

The conjunction of 1524 does not seem to have impressed historians as it did astrologers. Marco Guazzo opened his *History of All Deeds Deserving Memory* with the year 1524,[120] but the entry of Francis I into Italy in October, rather than the conjunction of February, was his starting-point, and he apparently does not allude to the conjunction in the subsequent course of his work. Yet he included some physicians among "men prominent at this time,"[121] although he chiefly deals with the Italian wars.

The most striking, and even surprising, finding of this survey of the literature of the conjunction of 1524 has been the disagreement among the astrologers, the fact that they were the severest critics of one another and even of astrology itself, while theologians discussed the subject not to oppose but to support the more traditional and even extreme sort of astrological prediction. Another point is that while much lip-service was paid to Ptolemy, Arabic astrology and the doctrine of conjunctions as developed during the middle ages on the whole held their ground. Several allusions to the cabala and cabalists have suggested its presence in the thought of the time. Finally, although such disagreement among the astrologers might be supposed to lessen the faith of the public in them, even the sharpest critic of others usually did not desist from predicting himself. There was no apparent let-up in the urge towards divination and it must have catered to a correspondingly great public demand. The tracts and predictions which we have discussed were addressed to popes, cardinals and other prelates, to the emperor Charles V and other secular rulers. They were composed by friars, doctors of theology, physicians and philosophers, by university professors in various fields, by historian or editor of scientific works, as well as by professional astrologers.

[118] *Ibid.*, p. 109, "horrenda quaedam terraemotus scilicet et diluvia fore praedicerentur pariter et formidarentur."

[119] *Ibid.*, p. 94.

[120] *Historia di tutti i fatti degni di memoria nel mondo successi dall' anno 1524 fino a questo presente*, Venice, Gabriel Giolito di Ferrara, 1546. I examined the earlier edition of 1540 (BM 582.f.20) but failed to note its printer and place of publication. The British Museum also has editions of 1544, 1545, 1548 and 1552.

[121] *Ibid.*, fols. 11v-12r (ed. of 1540).

CHAPTER XII

ASTROLOGY AT BOLOGNA

Et hoc anno naturaliter Bononienses intenti erunt speculationibus rerum naturalium et ad literarum exercitia.

—LUDOVICUS VITALIS

Astrology at Bologna was closely connected with the university. Most of the annual predictions issued there during the sixteenth century and extant today were by those professors who taught astronomy or astrology in its faculty of arts and medicine. A row of five volumes on the shelves of the British Museum,[1] which once formed a part of the library of prince Baldassare Boncompagni, comprises a sufficient number of such tracts, collected and bound together, to constitute a representative corpus.[2] We shall, however, supplement it to some extent with further materials.

Of the seven component tracts in the first volume five are annual predictions for the first four years of the century by Dominicus Maria Novara, doctor of arts and medicine, who had taught astrology at Bologna in the morning as ordinary professor ever since 1483. In 1504 he ceased to teach and apparently died that same year.[3] Cherubino Ghirardacci in his *History of Bologna* states that Domenico and Cocles, the writer on chiromancy, died in the same month, August, of that year. He adds that Domenico had correctly predicted the time of his death.[4] Rheticus tells us that Copernicus studied with him. He is said by Gassendi in his life of Copernicus to have taken middle ground between Peurbach and Regiomontanus as to the obliquity of the

[1] In 1934 they were shelf-marked C.27.h.19, C.27.h.20, C.27.h.21, C.27.h.22 and C.27.h.23 respectively.

[2] For example, there are twenty-seven annual predictions by Vitalis for the years from 1506 to 1540, whereas Hellmann was able to enumerate only fourteen by him.

[3] According to the epitaph quoted by Alidosi, *I dottori forestieri*, 1623, he died in 1514, however.

[4] Muratori, *Scriptores*, 33 (1915), 332.

ecliptic, which he estimated at 23 degrees and 29 minutes, while he held that the altitude of the pole had altered since the time of Ptolemy.[5] Thus new measurements or fertile ideas in astronomy might be combined with traditional beliefs in astrology in the same person, and science advance while keeping step with magic.

Domenico's prediction for 1501, addressed like the others to Giovanni Bentivoglio, spends its first page in meeting an objection to astrology raised by Minus Roscius, a senator of the city of Bologna, that the stars could not effect so much in the single instant of observing them as was predicted therefrom. Turning next to the question, What the period of the conjunction portends, which presumably has reference to the continued influence of the past conjunction of 1484 and not to the future effects of that of 1504, Domenico says that what he wrote on this point last year will hold for the present year. He proceeds to such other usual topics of Italian annual predictions as lunar eclipses, the beginning of the year, the state of citizens and peoples, diseases, crops, wars, Bologna, Venice, Florence, Pisa, the despot of Faenza, the sultan ("tyrant of the Turks"), and conjunctions and oppositions of the sun and moon.

The prediction for 1502 answers another question of the same senator as to the power of imagination, with the usual reference to Avicenna, how the stars affect imagination in dreams, and so forth. The same general plan is then followed as in the prognostication for 1501. In that for 1503 there is a preliminary paragraph on free will and natural inclination. For 1504 we have both a Latin and an Italian version. For nearly two pages out of eight are discussed such questions as whether the stars affect externals as well as intrinsic things like the temperament of the body, and whether past experience has covered the long period involved in the slow return of the stars to their former positions. In the prediction proper some space is given to the conjunction of 1504.

In the same volume with these predictions by Dominicus

[5] Gassendi, *Opera*, V(1658), 499. On this see further Jacoli, *Intorno alla determinazione di Domenico Maria Novara dell' obliquita dell' eclittica*, Roma, 1877.

Maria Novara follow two others by a Dominicus Maria Castaneolus for 1519 and 1521.[6] Since Novara died in 1504 or 1514, Castaneolus must be a different person as well as name. Whether he was connected with the university does not appear. His predictions, however, have somewhat similar introductions to those of his more illustrious namesake. That for 1519 begins with a page and a half on the influence of the stars on the foetus, while that for 1521 discusses whether the generation of animals is from ideas as the Platonists hold. The views of the Peripatetics are also aired, spontaneous generation is mentioned, Avicenna is cited on the giver of forms (*datrix formarum*), and Ptolemy on astrology. The closing paragraph on the pope affirms that "all the celestial globes are trying to help this pontiff, Leo X. He will triumph over his enemies, he will gather much gold. He will grieve at the misfortune of a relation but he will rejoice at the death of enemies. He is very well disposed for journeys. He will think of increasing his domain more than usual and in this he will employ great prudence and he will augment his power by the means of certain mercurial men."

Retracing our steps chronologically, we may note that for the year 1502 another prediction than that of Dominicus Maria Novara was penned by Jacobus Benatius of Bologna, doctor of arts and medicine, in honor of the university and entire city and its venerable Senate of Sixteen, but especially to the praise of Giovanni Bentivoglio. Benatius describes himself as a pupil of Dominicus Maria Novara and as a tender tyro in astronomy. He distinguishes three kinds of prognostication: divine or prophetic, medical, and astronomical. Some would add a fourth variety produced by melancholy, but Benatius doubts if it can be scientifically reduced to natural causes, unless one takes refuge in occult properties. So he passes it over in silence except to add that perhaps true Christians would place it under the first or divine and prophetic variety of prediction. Benatius assigns miraculous and supernatural events to God, natural happenings

[6] All seven predictions from 1501 to 1521 are or were catalogued at the British Museum under the name Castaneolus.

to the influence of the sky, and voluntary actions to human will. But he holds that the astronomer can predict more perfectly than the medical man. The topics of his actual prediction are the usual series, except that the last page deals with groups of men whose temperaments correspond to the planets: saturnine, jovial, and so on. Benatius addressed a similar prediction for 1503 to the same Giovanni Bentivoglio from the same dear university of Bologna.[7]

This Jacobus Benatius taught at the university of Bologna from 1501 to 1528. Until 1506 he lectured on astrology in the morning "on continuous and ordinary days." Thereafter he lectured on the practice of medicine until 1524, when he taught medicine on feast days until 1528. He has been confused by Hellmann with Lactantius Benatius, whom Hellmann represents as issuing annual astrological predictions from 1502 to 1540.[8] Lactantius, like Jacobus, taught at Bologna but he did not begin to do so until the academic year, 1537-1538, when he taught "astronomy" on feast days.[9] It is probable that his astrological predictions started about the same time. I have seen such by him for the years 1539 and 1540.[10] On the other hand, those of Jacobus Benatius had very likely ceased when he transferred his attention to medicine in 1506.

Iacobus Petramellarius or Giacomo Petramellara,[11] doctor of arts and medicine, had been teaching "astronomy" at Bologna

[7] These two predictions by Jacobus Benatius are the second and third tracts in the collection shelf marked C.27.h.23 at the British Museum.

[8] Hellmann (1924), p. 33.

[9] For the academic tenure of both Benatii and other professors at Bologna treated in this chapter consult the index of Dallari, *I rotuli*.

[10] That for 1539 is the twentieth tract in the set of annual predictions bound together at the British Museum with the shelf-mark C.27.h.23. It is in Latin. That for 1540, in Italian, is the twenty-third tract in the same set and volume.

[11] These seem the preferred forms of the numerous spellings of his name in his predictions and in the *Rotuli* of the Bologna faculty. Petramelarius also occurs in the prediction for 1536, while Dallari's index further lists Petramellaria, de Petramellaria, de Petramelaria, de Petramellara, and de Petramelara. His first name always seems to be spelled in Latin with an I rather than a J. The British Museum old printed catalogue gives the Italian form, Giacomo Pietra Mellara, Malvezzi calls him Giacomo Pietramellara, while Hellmann, whom I regret to have followed in *Magic and Experimental Science*, IV, 483, gives Jacobus Petramellario (Pietromellaria).

since 1496, and a prediction is extant by him for the last year of the fifteenth century. Of predictions made by him during the sixteenth century one of the volumes at the British Museum contains eighteen in Latin or Italian for years from 1505 to 1536,[12] while a prediction in Italian for the year 1510 is found bound in a separate volume.[13] The name of Petramellarius appears for the last time in the faculty lists of the university of Bologna in the same year as his last prediction, 1536. In those cases where we have predictions for the same year in both Latin and Italian by Petramellarius, the Italian version is sometimes briefer and considerably different, so that it would seem that they were issued independently rather than that one was the original version and the other a mere translation. They are usually addressed to the governor or vice-legate of Bologna or to the legate of all Romagna. In either case the official so addressed was normally a bishop or cardinal. That for 1505, however, was addressed to Giovanni Bentivoglio who was still prince or despot of Bologna. In this prediction he tells that prince that for many years past he has shown him that the science of the course of the stars is of no small utility to man.

In both his predictions for 1505 and 1506 Petramellarius refers to the foes of astrology and he opens that for 1509 by replying for more than a page to the opponents of astrology. Then under the caption of general considerations in making prognostications he deals with five points. The first is the conjunctions in Cancer of 1503 and 1504 which, as he had noted elsewhere, will continue their effects for many years to come. The second is the conjunction of Jupiter and Mars in 1509. The third is the conjunction of Saturn and Mars in 1507, of which the influence

[12] BM C.27.h.20. Nerio Malvezzi, "Il diario meteorologico di Andrea Pietramellara," *Atti e Memorie della R. Deput. di Storia Patria per le provincie di Romagna, Bologna,* Terza serie, II (1884), 436-39, lists 22 prognostications by Giacomo Pietramellara as they were in the library of prince Boncompagni before its sale. Numbers 210, 216, 230 and 231 of Boncompagni's collection, containing predictions for 1524 and 1527 in Latin and for 1532 in Latin and Italian, are not found in BM C.27.h.20. Nor are the predictions in this volume arranged in the order either of Malvezzi's list or of Boncompagni's numbering, while no one of the three seems to be strictly chronological.

[13] BM 8610.c.36.

will last until their next conjunction in December of the coming year. The fourth point is an eclipse of the sun; the fifth, the revolution of the year. Then follow predictions for the four seasons and for the usual topics, rulers and states.

In the separately bound prediction in Italian for 1510 Petramellarius alludes to Luca Guarico (which, rather than Gaurico, is his spelling) as lecturing publicly on astrology at Bologna, and to Piero Avogaro as his own master and now deceased. In our volume of collected predictions the next after that for 1509 is that for 1517. In that for 1519 we find Petramellarius again considering the effects of the conjunction of 1504. In the prediction for 1526 he alludes to another not contained in our collection, composed from the conjunction of 1524 for the twenty years following, and repeats part of it which applies to the present year.

In his prognostication for 1529 Petramellarius displays a disinclination for his task, but it would probably be going too far to attribute this attitude to waning faith in astrology. He states that the stars began to exert influence upon mankind only after the fall. He finds prediction for the ensuing year so difficult that he is tempted to write nothing, but the repeated prayers of many friends have forced him to resume his accustomed labors which, he grumbles, he has in the past found more complimented than rewarded (*magis laudatis quam praemio ornatis*). He further warns that a long fever which has afflicted him during the past year may make his forecast inferior to his previous predictions.

The opening sentence of Petramellarius's prediction for 1531 again alludes, as some of his earlier predictions had done, to sceptics as to the influence of the stars. He says: "Those who think that the sky, adorned with so many and so great stars, exerts no effect on those things which are included within its circuit, expose themselves and their knavery shamefully." His prediction for 1533 refers back to that for 1532, which is not contained in our volume, stating that last year he enumerated many effects of the stars and of meteorological impressions in this and following years, and told what comets and three suns seen in Apulia would announce. The next and last prediction in our

volume, that for 1536, is briefer than usual both in its introduction and remaining three pages of prediction. It also is by a new printer, Ioannes Baptista Phaellus of Bologna, whereas Justinianus de Ruberia had printed Petramellarius's previous predictions, at least from 1517 on.

In the next volume on the shelf[14] are seven predictions for the years 1507, 1511, 1514, 1516, 1518, 1526 and 1529 by Marcus Scribanarius who had already issued such prognostications during the closing decades of the previous century.[15] His case would hardly suit the purpose either of those who contended that all astrologers came to some bad end, or as they grew old became sceptical as to their art, or of those who told stories of astrologers who had failed to foresee their own death or, having foreseen the danger, had failed to avoid it. For he seems to have survived unscathed to a green old age, and the span of his astrological predictions covered half a century from 1479 to 1529. He is not listed as a member of the faculty of the university until 1513, but all seven predictions seem to have been printed at Bologna. Like those of Petramellarius they are sometimes in Latin, sometimes in Italian. All are addressed to the papal legate or governor of Bologna at the time of writing who in most cases was also a cardinal.

The prediction of Scribanarius for 1507 was directed to Galeotto da Rovere, cardinal of San Pietro in Vinculis, vice-chancellor of the Holy Roman Empire, and legate of Bologna. After nearly a page of introductory generalities, its eleven chapters deal with conjunctions of the superior planets, past and present, and solar eclipses, with crops, diseases, war and soldiers, prelates and nobles, princes and magnates, the populace and persons of various conditions, with Venetians, Florentines, Bologna, and the weather for the coming year. The other predictions follow about the same plan, although the number of chapters varies. That for 1511 expands the treatment of conjunctions and eclipses into three chapters on the continued effects of the conjunction of 1504, the lunar eclipse of October, 1511, and the conjunction

[14] BM C.27.h.21.

[15] T IV, 451, 480.

of Saturn and Mars. That for 1518 introduces two new topics: women and effeminate men, and mercurial persons.

Our fourth volume of annual predictions[16] contains thirty-seven tracts by Ludovicus Vitalis, or Lodovico di Filippo Vitali, for years falling between 1506 and 1540. Symphorien Champier, writing in 1518, charged Ludovicus Vitalis with error in a treatise he had written on an earthquake,[17] This was printed at Bologna in 1508[18] but I have not seen it. According to a horoscope which Vitalis himself gave to Luca Gaurico, he was born on August 23, 1478, at 17.08 P.M. He was, Gaurico says, tall and thin and had a right club foot.[19] In 1505 when the Bentivoglio family was still in power Vitalis addressed his prognostication for 1506 to Annibale and alluded to a treatise on earthquakes —presumably that already mentioned—which he had dedicated to Annibale's brother, Alessandro Bentivoglio. The other twenty-six predictions for years from 1509 to 1540 are addressed, as in the previous cases of Petramellarius and Scribanarius, to bishops or cardinals who were governors of Bologna or papal legates, except when an exception is made in favor of the pope himself. The prediction for 1523 is addressed to Adrian VI, that for 1530 to Clement VII, and that for 1539 to Paul III. After 1527 the forty senators of Bologna—in 1502 there had been only sixteen—were usually associated with the governor or legate in the address.

Vitalis followed the not uncommon practice of writing an introduction discussing some general astrological theory or problem before opening his actual prediction for the coming year or years. In his prognostication for 1506 he affirms that the sky acts upon inferiors in four ways: by its motion, light, influence and figure. That by varying figures of constellations "a marvelous dissonance of effect" is produced. In the prediction for 1509 the probability of different fates for twins is discussed for a page and a half. In that for 1515 Vitalis debates whether astrological

[16] BM C.27.h.22.

[17] Symphorien Champier, *Pronosticon libri tres,* 1518, II, 6. Copy used: BN Rés. Z. Fontanieu 156.(5).

[18] *Trattato de terraemotu,* Bononia, 1508, 4to.

[19] Luca Gauricus, *Tractatus astrologicus,* Venice, 1552, fol. 74r.

elections are advantageous. In 1517 the introductory problem is whether there is any efficacy in the method of verifying nativities by the moment of conception. In 1518 the question is whether demons and the human intellect are under the stars. It is argued therefor that maniacs and demoniacs are afflicted according to the moon's phases, and that demons are invoked at certain hours under certain constellations. Vitalis, however, takes the usual position that the mind is only inclined by the stars and not subjected to them. Demons come at certain hours in order to induce man to worship them and because they have power over our bodies only as God permits. Hence they await a time when the sky is favorable to them in order that with the aid of natural forces they may the more infest bodies which are not in a state to resist them. Incidentally Vitalis claims to have tested successfully the old remedy for stone (at which, however, theologians like Gerson looked askance) of a figure of a lion in gold sealed when the sun was in the sign Leo. Marcellus Garzo, a person trained in natural science and medicine, is his witness, he says, that the seal worked without suffumigation, exorcisms or imprecations.

The introduction to the prediction for 1519 deals a blow at the doctrine of conjunctions by interpreting the sixty-fifth dictum of the *Centiloquium* ascribed to Ptolemy as having reference to conjunctions of the sun and moon rather than to those of the three superior planets. Vitalis none the less devotes a chapter in his prediction for 1522 to the current conjunction of Saturn and Mars, while in its introduction is discussed the bad effect of love and hate on prognostication. In 1527 Vitalis decries the ascription of divine effects to natural causes and opposes fatal necessity, a tenet of which he holds the ancients Firmicus and Manilius guilty.

In a prediction of December 14, 1528, for the ensuing three years, 1529 to 1531, Vitalis is the more alarmed by the prospect from the stars because the genitures of those in high places in Christendom are evil, because the morals of the present age are depraved, and the fear of God neglected, so that there is little

good to offer resistance to the evil influence of the stars. After this three year prediction it was the intention of Vitalis to abstain for two years from prognosticating, one reason being, he states, that he was oppressed by the multitude and noise of others who in various ways predicted the future. Nevertheless he finally addressed a prediction for 1530 to Clement VII. Another for 1531 followed, and in September of that year he published a prognostication on the comet. Yet in his prediction for 1533 we find him again threatening to desist, this time because of the neglect by his contemporaries of the subjects forming the *quadrivium* which he defends.

In the introduction to his prediction for 1536 Vitalis answered the arguments of the opponents of astrology. In that for 1537 he traced the way in which the heavens influence the world and man. That for 1538, on the other hand, opens with a political disquisition on the demoralizing effect of either wealth or want in a state. Addressing Paul III in 1539, Vitalis compared the relation between the numbers one and eight with that between the spheres of the moon and fixed stars, and discussed the virtues of justice and temperance. He then expressed a hope that the pope would settle the strife between Charles V and Francis I, would unite Christians against the Turks, and would extirpate heresy. In the introductory remarks to his prediction for 1540 Vitalis noted the occult virtue in the magnet and other inferior objects and asked why anyone should doubt the influence of the sky.

Most of the annual predictions by Vitalis were made for the ensuing calendar year rather than from the vernal equinox. In that for 1527 he adopted the Ptolemaic method of reckoning from the eclipse, conjunction or opposition of sun and moon preceding the winter solstice in this case (rather than that preceding the vernal equinox) and so began the new year on December 18, 1526. In that for 1539, on the other hand, he reckoned from the opposition preceding the entry of the sun into Aries and so began the year on March fourth. In the section devoted to the city of Bologna by its astrologers, however, the year is

generally predicted from May 22, the day of the city's instauration or restoration by Theodosius. These paragraphs of annual prediction for Bologna by astrologers who were on the spot might supply further information as to local conditions from year to year to one who had already studied in some detail the history of that city during that period. It would probably be rash for anyone else to attempt to interpret them.

The three astrologers of whom we have been speaking were for many years colleagues in the teaching of their subject at the university of Bologna. Petramellarius taught from 1496 to 1536. Vitalis took the place of Dominicus Maria Novara after 1504. I do not include Jacobus Benatius here, because he transferred from the teaching of astrology to a chair in medicine as early as 1506. With the academic year, 1508-1509, Petramellarius and Vitalis were transferred from the morning hour as ordinary professors to lecture on feast days, which would seem to indicate a dropping of astronomy and astrology to a place of less dignity and frequency in the academic program. Possibly there was some connection between this and the discouraged attitude which they later at times display in their predictions. However, another teacher of these subjects was added to the faculty in 1513 in the person of Scribanarius, whose name continued to appear on the university rolls until the academic year 1529-1530. The name of Petramellarius also disappears after 1536, but as we have seen Lactantius Benatius took his place in 1537-1538. Vitalis continued to teach until 1554, and although the latest annual prediction found by Hellmann for Lactantius was for 1540 and for Vitalis for 1542, they probably continued to issue them annually. Orlandi mentions one for 1552 by Vitalis, whose death he puts in 1554,[20] as does Alidosi. To these two professors of astronomy and astrology Franciscus Rusticellus or Rustighello was added from 1539 to 1552, and Nicolaus Simus from 1548 to 1564, after which Lactantius Benatius was the sole occupant and lectured on feast days only. After his retirement or death in 1572[21] the

[20] *Notizie degli scrittori Bolognesi*, Bologna, 1714, p. 195.

[21] Alidosi, *I dottori bolognesi*, p. 133, says that he died in October, 1572. He

chair remained vacant. Thus the teaching of astrology as such had ceased at Bologna before Sixtus V issued his bull of 1585 against the art.

The span of extant annual predictions by Rustighello is given by Hellmann as from 1522 to 1540. We may note two specimens for 1531 and 1540 respectively, one before and one after he became connected with the university. It was springtime in Italy when he composed the former, and, true to his name, he says, he was rusticating, "oppressed by new thoughts," when a veiled lady appeared to him in a dream. She turned out to be poor Italy, widowed of her princes. Overcome by her prayers and arguments, he composed this rude and disordered judgment. Omitting the astrological grounds on which it is supposedly based, it consists of a number of brief predictions which average less than a line of type each.[22] The prognostication for 1540 has no such romantic and allegorical prologue but praises the cardinal legate *a latere* and hopes that he may save Bologna from its misfortunes and its evil revolution. The bad constellations noted in Rustighello's prediction for the previous year will continue, but the coming revolution of the Bolognese year beginning May 22 will be favorable to money-making and business. "But in my judgment this will not be without deception," which would seem a shrewd enough guess.[23]

Pietro Riccardi in his *Biblioteca matematica italiana*[24] listed a treatise on elections and weather prediction by N. Simi, printed at Venice in 1554,[25] but Hellmann had not seen it.[26] Hellmann mentioned, however, an annual prediction in Italian for 1551 by Niccolò Simi, professor of mathematics at Bologna.[27] His

states that he published a work, entitled, *Conventiones et oppositiones et quadraturae duorum luminarium.*

[22] Copy used, BM C.27.h.23.(14.): "Impressum Bononie per Iustinianum de Ruberia A.D. 1530 die 7 Decembris."

[23] BM C.27.h.23.(26.): "Bononie apud Vincentium Bonardum et M. Antonium."

[24] In two parts and an appendix, Modena, 1870-1880; in 4 vols., Modena, 1893.

[25] N. Simi, *Tractatus de electionibus, de mutatione aeris . . .*, Venice, 1554.

[26] Hellmann (1924), p. 50. There was no copy of it at the British Museum in 1934.

[27] *Ibid.*, p. 34, citing Houzeau et Lancaster, 14710.

name appears there in the faculty rolls from 1544-1545 to 1563-1564, for the first four years as a teacher of arithmetic, thereafter of astronomy.[28] Philip Apianus (1531-1589), who succeeded his father, Peter Apianus, as professor at Ingolstadt in 1552, is said by Melchior Adam to have used together with other mathematical and astronomical textbooks *The Theory of the Planets* of Nicolaus Simi.[29]

There were other Bolognese astrologers who never became teachers at the university. Giovanni Carlo Grato of Bologna, who styled himself a disciple of Luca Gaurico, addressed a prediction for 1519 to cardinal de' Medici of Bologna, legate and vice-chancellor.[30] By Floriano Turchi of the same city I have seen others for 1539[31] and 1540,[32] while Hellmann lists two more by him, the last for 1556. These were not all in Italian, as Hellmann states and as might be expected from non-academic authors, that of Turchi for 1540 being in Latin. Grato, too, makes a show of learning by citing Thomas Aquinas and the *Secret of Secrets* attributed to Aristotle in favor of astrology. He does not hesitate to predict particulars, stating that the duke of Urbino, Lorenzo de' Medici, will be injured by a horse, have a very fortunate son, lose one of his women by death, be unlucky at play, but in general increase his wealth. There is nothing noteworthy about the forecasts of Turchi, unless it be that in that for 1540 he contrives to write an introduction of a page and a half without saying anything.

An astrologer not mentioned by Hellmann and by whom I have found only one prediction, preserved in a manuscript at Vienna, was Costanzo of Bologna. His prognostications for the year 1535 were based chiefly upon the revolutions of the nativities of various rulers such as Charles V, Ferdinand, Paul III,

[28] Dallari, *I rotuli*, II, 106-59.

[29] "Theorices Nicolai Simii." Houzeau et Lancaster list N. Simi, *Theoricae planetarum in compendium redactae et pluribus figuris auctae*, Venice, 1551; Basel, 1555; 4to, 185 pp. There is no copy of the work in the British Museum.

[30] It was, however, printed at Rome: BM C.27.h.23.(11.).

[31] BM C.27.h.23.(22.): "Dato in Bologna alli 17 Ottobre 1538."

[32] BM C.27.h.23.(25.): "Bon. impress. ex officina Vincentii Bonardi Parmensis et Marci Antonii Carpensis Sociorum anno 1539 mense Decembri."

the kings of France and England, Francesco Sforza and Ercole d'Este, but conclude with chapters on Milan, Venice and Bologna.[33]

Although the teaching of astrology as a distinct subject had ceased at Bologna in 1572, and lectures henceforth and all through the seventeenth century were limited to the theory of the planets and the "astronomy of Ptolemy," and although Sixtus V in 1585 and Urban VIII in 1631 had issued bulls against astrology, the influence of the stars still received recognition in the large volume on monsters and in the *Musaeum metallicum* edited as posthumous works of Aldrovandi in 1642 and 1648 respectively by Bartholomaeus Ambrosinus, professor of medicinal simples in the university of Bologna and prefect of the natural history museum and botanical garden. Both works appeared with the approval of the ecclesiastical authorities, and of course it should be kept in mind that the papal bulls were only against prediction of the future, not astrological medicine or the influence of the stars on nature.

Even in the preface of the publisher, Antonius Bernia, to the grand duke of Tuscany, Ferdinand III, it is said that monsters are likely to be generated in any region, "if it has an unfriendly sky." In the text the extreme theory of Avicenna that after a universal flood the stars would generate men anew from the old cadavers is rejected on the ground that men are too high an order of beings,[34] but the mere fact that this old Arabic doctrine, which medieval Latin Christian writers had likewise rejected, is adduced at all, shows the respect still entertained both for the generative force of the stars and for medieval authority. Further on come illustrations from Georgius Venetus of the doctrine that from a man's physiognomy can be told what planet he is under, and of the assignment by astrologers of national divergences to

[33] Vienna 4756, fols. 169r-174r: Constantius Bononiensis, Prognostica de anno 1535, "Astrorum scientiam et eorum effectus . . . / . . . in bonis aspectibus existentium."

A "Pronostico di Constantio Bolognese di alcuni principi et ci tate nel anno 1536," was listed by John Cochran, *A Catalogue of Manuscripts . . . now selling*, London, 1829, item 411.

[34] Ulysses Aldrovandi, *Monstrorum historia*, Bologna, 1642, p. 43.

the stars under which different regions and peoples lie.[35] In the body of the text is also discussed more fully the question of the influence of the stars upon the generation of monsters to which the publisher's preface alluded.[36] Sarcastic reference is made to "the opinion of those who persuade themselves that a most noble body such as the sky effects nothing in these inferiors but produces merely light and through light heat." Yet Aristotle asserts in his *Meteorology* that all these inferiors are governed by celestial virtue while elsewhere he says that man is procreated by man and the sun. Our text therefore holds that many effects are produced in these inferiors from the varied movements of the heavens and aspects of the stars, and that the heavens act not only by their light and motion but also by other occult virtues and influences. This was the opinion of Saint Thomas, of Albertus Magnus, of the Conciliator (i.e. Peter of Abano), of Paul of Venice, of John Grammaticus and many more, except a few recent persons who deny it without any reason. As for the generation of monsters, Albert explains that when the luminaries come to certain places in the sky, they prevent the contents of the womb from assuming human form.

Comets are considered under the caption of celestial monsters.[37] Past comets are reviewed to show what they presignified, and arguments against their indicating the death of princes are answered. But it is recognized that the comet or new star of 1572 was not a terrestrial exhalation but located in ethereal regions, since it had no movement of its own and no parallax. Allusion is made to observations through the telescope. Yet our text still accepts the influence of conjunctions of the planets as well as of comets, noting particularly the remarkable conjunction in 1564 of almost all the planets, with the moon progressing continuously from conjunction with one planet to that with another. The influence of this conjunction was felt for many years. Our text further quotes Cornelius Gemma (1535-1579) on the significations and effects of various other celestial phenomena. In his

[35] *Ibid.*, pp. 92-93.
[36] *Ibid.*, pp. 391-92.
[37] *Ibid.*, pp. 723-33.

work on insects, published during his lifetime in 1602, Aldrovandi similarly cited Cornelius Gemma for swarms of butterflies in August, 1562—and others in August, 1551 noted by Gemma's father in his *Ephemerides*—as probable signs of corruption of the air and approaching tempestuous weather, as apparently related to the movements of the planets, Saturn and Venus, but as not yet sufficiently investigated.[38]

In the *Musaeum metallicum* the astrologers are cited as to the relation of the metals to the planets and to parts of the human body.[39] Furthermore an astrological amulet and an astrological image are repeated from Gaudentius Merula. If the moonstone is suspended from one's neck by a silver thread, when the moon is in Taurus or Cancer, it will produce effects such as the moon itself causes.[40] The bezoar stone, if it is Jovial and is carved with the image of a scorpion, while the moon is traversing the sign Scorpio, will resist the stings of scorpions.[41] We are told that recent medical men infer from the fact that gold is purified by nothing better than by antimony, that man the microcosm may be purged by it of noxious humors. And their reasoning is supported by experience.[42]

To divide the responsibility for such matter between Aldrovandi and his editor, Ambrosinus, seems difficult. Much of it dates from Aldrovandi's time, but the fact that such astrological discussion is more noticeable in these posthumous volumes suggests that Ambrosinus is partly or largely responsible. In any case, both its publication and the publisher's preface as above quoted show that this attitude was still congenial to many in the middle of the seventeenth century. In this and the reaffirmation in mid-seventeenth century of Aristotelian and thirteenth century tenets we may perhaps read between the lines a shifting in attitude on the part of ecclesiastical authority and orthodox learning. In their alarm at Galileo's advocacy of the Copernican and helio-

[38] Aldrovandi, *De animalibus insectis*, Bologna, 1602, p. 257.

[39] *Musaeum metallicum*, 1648, pp. 3, 9, 11.

[40] *Ibid.*, p. 685.

[41] *Ibid.*, p. 808.

[42] *Ibid.*, p. 191.

centric system, they may have tended to revert to Ptolemaic astrology as well as astronomy as a natural accompaniment of the geocentric theory, and to half-forget or minimize the papal bulls of 1585 and 1631 against the extremes of judicial astrology. In the ashes of Bolognese astrology, at any rate, still lived its wonted fires.

Orlandi tells us that Giorgio Capponi, doctor of philosophy and medicine, member of the academies of the Gelati at Bologna and of the Umoristi at Rome, and founder in 1610 of the academy of the Selvaggi, was also public lecturer in astrology.[43] His name, however, does not appear in the faculty rolls of Bologna.[44] Orlandi adds that he published *Discorsi astrologici* from 1622 to 1627, left a work on astrological medicine in manuscript,[45] was dear to princes, cardinals and king, predicted future events including his own death in 1629 at the age of forty-three.

Magini who was professor of mathematics at Bologna, where he taught from 1588 to 1617,[46] when he died of apoplexy, published in 1607 at Venice with the approval of the Council of Ten, after consultation with the university of Padua and the inquisitor, a commentary on Galen's discussion of critical days and a treatise on the legitimate use of astrology in medicine.[47] In the dedication and preface he took the position that superstitious Arabic astrology and the prediction of nativities about human acts dependent on free will were justly condemned by the church but that astrological medicine was permissible.[48] He makes much use of genitures and horoscopes for this latter purpose. Yet he was a progressive astronomer who made observations of his own, corresponded with Tycho Brahe, and as early

[43] Fr. P. A. Orlandi, *Notizie degli scrittori Bolognesi,* Bologna, 1714, p. 143.

[44] Gio. Battista Capponi who taught from 1645 to 1676 was a different person. Orlandi, *op. cit.*, pp. 153-54, seems to have confused some of his works with those of Giorgio.

[45] *Consultationes medicae xx. De virtutibus et natura syderum pro iudicandis iis quae ex ipsis coniici possunt.*

[46] See Dallari, *I rotuli,* Index.

[47] *Io. Antonii Magini Patavini mathematicarum in almo Bononiiensi gymnasio professoris De astrologica ratione ac usu dierum criticorum seu decretoriorum ac praeterea de cognoscendis et medendis morbis ex corporum coelestium cognitione,* Venetiis, Apud haeredem Damiani Zenarii, MDCVII.

[48] The pages of the dedication to Francesco Gonzaga, prince of Mantua and Montferrat, are unnumbered. The preface in question occurs at fol. 39r-v.

as 1588 had printed *New Theories of the Celestial Orbs Agreeing with the Observations of Copernicus.*[49] Tiraboschi spoke of him as one of the best astronomers of the time and a friend of Kepler.[50] Tomasini represented him as making correct predictions to the leading men of Bologna from their nativities, as abandoning the Alfonsine hypotheses for the Copernican theory, and as addressing his new *Tables* to Gregory XIII and influencing that pope's calendar reform.[51] He was also in high favor at Mantua and refused a call to the court of the emperor Rudolph. In 1582 he published *Ephemerides* for the years 1581-1620 with an animadversion against Stadius, an introduction to judicial astrology, and further tracts on the use of *Ephemerides,* annual revolutions, and the fixed stars. In 1585 appeared his *Tabulae secundorum mobilium coelestium* for the longitude of Venice according to the observations of Copernicus and the Prutenic canons. He also commented on the *Geography* of Ptolemy. In his work of 1607 on astrological medicine he followed Tycho Brahe rather than Copernicus in determining the revolutions of nativities.[52]

[49] G. A. Magini, *Novae coelestium orbium theoricae congruentes cum observationibus Nicolai Copernici,* Venice, 1589, 4to.

[50] *Storia della letteratura italiana,* Milan, 1824, VII, 713.

[51] Jac. Phil. Tomasini, *Illustrium virorum elogia iconibus exornata,* Padua, 1630, pp. 283-85.

[52] *Op. cit.,* cap. 10. See the Index in vol. XV of Dreyer's edition of the *Opera* of Tycho Brahe for Tycho's correspondence with Magini and other allusions to him.

CHAPTER XIII

THE COURT OF PAUL III (1534-1549)

Gérard de Crémone et Platon de Tivoli ont plus fait pour les sciences que tous les princes du quinzième et du seizième siècle.
—LIBRI

Paul III was far from being the only pope during the sixteenth century before the Catholic Reformation who was given to the occult sciences. It would not even be safe to call him the most superstitious. Leo X, son of Lorenzo the Magnificent and often lauded as a patron of the Renaissance, would at least run a close second. Pèrcopo calls him "superstizioso credente anch' egli nei pronostici."[1] A story was current that his accession to the papacy had been assured him by chiromancy or other form of divination at a time when his fortunes seemed to be at their lowest ebb. The astrologer Gaurico stated that by his advice the future pope had his palm read for three days by Fra Serafino of Mantua, prior of the convent of San Francesco, "an old man and doctor of theology, not ignorant of astronomy but remarkable as a chiromancer." When Leo after his election wished to show his gratitude, the friar preferred a reward of fifty gold pieces to a green hat.[2] Pomponazzi, writing in 1520, told of a similar prediction being made to himself by the art of geomancy at Bologna by an aged mechanic who, after the death of Julius II and while the cardinals were in conclave but no one thought of or mentioned cardinal de' Medici as a possibility, predicted for four successive days that he would be elected.[3] Certain similarities between the story as told by Gaurico and Pomponazzi will be noted, but it will also be observed that the latter,

[1] Pèrcopo, "Luca Gaurico, ultimo degli astrologi," *Società reale di Napoli, Atti della Reale Accademia di arch., lett. e belle arti,* 17, ii (1896), p. 19.

[2] Luca Gaurico, *Tractatus astrologicus,* 1552, fol. 19.

[3] Petrus Pomponatius, *De naturalium effectuum causis sive de incantationibus,* Basel, 1556, pp. 191-92, Historia de sene geomantico.

although a native of Mantua, places his version in Bologna. To Leo X, also, as we shall see in a subsequent chapter, were addressed alchemical works in verse and prose by Augurellus and Pantheus, not to mention astrological predictions and astronomical treatises of Raggius of Florence,[4] Francesco Sirigatti,[5] and others.

According to Piero Valeriano (1477-1558), the favorite astrologer of Leo X after he became pope was Franciscus Priulus.[6] Of him the pope was accustomed to remark that astrology, once extinct, had at last revived in the single person of Priulus. In a book on the pope's nativity[7] the astrologer had deduced from the stars many past secrets of his life which Leo thought were known to himself alone, while his prediction of coming events had always proved exact, generally even to daily happenings. The pontiff was meditating the promotion of Priulus when the astrologer committed suicide. After unsuccessful efforts to drown himself, to jump into fire, to kill himself with a scythe, and by leaping out of a window, he finally refused food and starved to death. No publications by him seem to be known.

Stories and reports aside, we have seen that Pellegrino Prisciano, the astrologer of Ferrara, dedicated his *Ortopascha* to Leo X some time after 1513, that Thomas Philologus was called to Rome by that pope, that Clementius Clementinus was his physician, that Castaneolus predicted concerning him, that Nifo was in close relations with him, and that Bernard Portinarius addressed to Leo the work on demons which he had plagiarized from Nifo.

Similarly we have seen various astrological predictions, whether annual or concerned with the conjunction of 1524, addressed to Adrian VI and to Clement VII, popes intervening between Leo X and Paul III. To Clement VII was even dedicated the *Triompho di Fortuna* of Sigismondo Fanti of Ferrara,

[4] T IV, 453.

[5] *De ortu et occasu signorum libri duo,* Naples, 1531; Lyons, 1536.

[6] *De litteratorum infelicitate,* I, 55.

[7] Possibly it may be identified with an anonymous "Natalis celi constitucio Leonis decimi pontificis maximi exactissime per veramque viam et modum nativitates humanas stabiliendi calculata," in Lucca 1473, a MS of 44 leaves, "egregie scriptus picturas pulcherrimas in marginibus habet."

a work of chance divination by reference to a series of tables, although a pretense is made of natural science and astrology.[8]

Nor should it be thought that Paul III was interested merely in astrology and other occult sciences. More strictly scientific works were dedicated to him: the *De revolutionibus* of Copernicus, the fifteen books of Colombo on anatomy and the *Introduction* to the same subject by Massa, Nifo's commentary *De animalibus,* and the poem of Scipio Capicius, *De principiis rerum.*[9] Giovanni Francesco Brancaleone of Naples opened his dialogue on baths with the words, "Hearing of the learning and holiness of Paul III, we came to Rome."[10] Alphonsus Ferrus of Naples, first surgeon to Paul III, composed a treatise, *De ligni sancti multiplici medicina et vini exhibitione,* which was printed at Rome in 1537, with subsequent editions at Paris in 1539 and in 1547, 1566 and 1728. The third of its four books dealt with syphilis. His work on wounds from cannon and arquebuses appeared at Rome in 1552 and in later editions.[11] It was while teaching mathematics at Rome during the pontificate of Paul III that Taisnier exposed the error of Aristotle that a large lump of gold or lead would fall faster than a small one.[12] An astrologer

[8] *Triompho di Fortuna di Sigismondo Fanti el quale tratta delli accidenti del mondo si per scienza naturale come per astrologia da Mercurio Vannullo romano fedelmente esposto.* Venegia, 1527, in folio.

[9] Printed first, according to Tiraboschi, in 1542; at Venice, 1546; then at Paris, 1548 with the work of cardinal Contarini on the elements, at fols. 90r-119r, opening in imitation of the *Aeneid,* "Naturae mundique cano quae semina primum. . . ." There was another edition at Naples in 1594.

Concerning the author, Scipione Capece, see Tiraboschi VII, iv (1824), 2130-32; N. Cortese in *Storia della Università di Napoli,* 1924, pp. 299, 317.

[10] Somewhere I have seen an edition of Rome, 1534 listed: Joannes Franciscus Brancaleus, *Dialogus quam salubria balnea sint ad sanitatem tuendam et ad morbos curandos,* 4to. But the earliest mentioned by Gesner (1545), fol. 417r, is at Paris apud Wechelum, 1536, 8vo, with a dedicatory epistle to Paul III dated at Rome in 1535. Later the work was reprinted in the collection, *De balneis omnia quae extant,* Venetiis apud Iuntas, 1553, fols. 240r-246r, where the author's name is spelled, 'Braucaleo.' Jobst (1556), p. 156, spells it 'Branchaleonis' and calls him a physician at Rome under Paul III. Tiraqueau (1574), fols. 127v and 136r, spells it 'Branchaleon' but in the 1617 edition, 'Brancaleon.'

[11] See Jobst, Gesner, Tiraqueau and the British Museum catalogue.

[12] Jean Taisnier, *De motu,* Cologne, 1562, p. 25.

like Luca Gaurico wrote on other learned subjects. During the pontificate of Paul III he published at Rome in 1540 an introductory grammar and in 1541 an arithmetic. Indeed, for the sixteenth century astrology itself was still a science, although it was recognized that some astrologers did not treat it scientifically. Also it had its opponents, but so had scholastic theology.

Of astrological activity at Rome during the pontificate of Paul III we may note a number of specific examples.[13] By Alfonso Pisano there is a prediction in Italian for the year 1538, "in praise of the supreme pontiff, pope Paul III, vicar of Christ."[14] When in the course of this prognostication as to various states and potentates Pisano comes to the papacy, he says that at first he was minded to omit the pope as not subject to the celestial signs, but that the planets promise him great prosperity. A prediction for the following year, 1539, was addressed to cardinal Alessandro Farnese by Thomas Griphus or Gryphius of Spoleto but issued from his house at Rome.[15] After asserting that the effects of the eclipse of 1534 will still be felt, and that the present year, 1539, will be bad for "the masses and all men generally," and predicting as to other classes of men more particularly, Griphus comes to the cardinals. As to them he expresses his intention to maintain silence, partly because in several cases he does not know their nativities, partly because he has already made prediction by their revolutions of years to those whose nativities were known to him. Griphus also has a paragraph concerning Paul III but will say more in "the revolution of his Holi-

[13] The two volume work on Paul III by C. Capasso, *Paolo III,* Messine, Principato, 1923-1924, has nothing on his learned circle and interest in astrology, nor does Pastor dwell upon such matters much. Johann Friedrich touched on Paul III's relation to astrology briefly in his *Astrologie und Reformation,* Munich, 1864. Léon Dorez, *La cour du pape Paul III,* 1932, refers to only three of the numerous authors mentioned in this chapter, namely, Aguilera, Adam de Invidia, and Gaurico, and that very incidentally at I, 49, 85, 230.

[14] Alphonso Pisano, *Pronostico de lanno del 1538 . . . in laude del sumo pontifice Papa Paulo terzo vicario de Christo,* 4 fols. Copy used: BM c.27.h.23.(18.). It is the only prediction by Pisano noted by Hellmann (1924).

[15] "Labente anno MDXXXIX ad almae urbis finitorem examinatum Prognosticon. Datum Romae in aedibus nostrae habitationis Kal. Decembris MDXXXIX." 6 fols. Copy used: BM c.27.h.23.(21.). It is the sole prediction by Griphus noted by Hellmann (1924), p. 34.

ness." Paris Ceresarius, a jurisconsult of Mantua and a most celebrated astrologer, is said by Stadius and Tucci to have predicted both Paul III's accession to the papacy and his death.[16] Bettinelli says somewhat differently that Paride Ceresara, who died in 1532 at the age of sixty-six, was praised by Cardan for his horoscope of cardinal Farnese, in which he predicted that he would become pope and concerning the death of Pierluigi. Also that Paride was considered a nigromancer, and that the magnificent palace which he built in 1527 was popularly known as the devil's house.[17] Pontus de Tyard wrote in 1558[18] that Paris of Mantua upon the death of Leo X predicted to Alessandro Farnese his accession to the papacy twelve years later, peril from drowning in seven years and his death after twenty-seven years. We have already distinguished this Paris from Tricassus Cerasariensis Mantuanus who edited Cocles.

The astrologer, Luca Gaurico, who had twice predicted in 1529 and 1532 the papacy for Alessandro Farnese, was summoned to Rome by him as Paul III, made his table companion and knighted. Although Gaurico had addressed an astrological prognostication for 1525 to the previous pope, Clement VII, at which time he was an apostolic protonotary, he seems to have received little in return. At any rate he conceived a strong dislike for Clement, alluding to him as "quel poltrone di papa Chimenti," and to Paul III as "homo iustissimo et penitus contrario a papa Inclemente."[19] In 1539 or soon after, Paul III made Gaurico bishop of Giffoni and in 1545 transferred him to the see of Civitate nella Capitanata.

In a treatise on the miraculous eclipse at the time of the passion, addressed to Paul III in 1539,[20] Gaurico not only affirmed

[16] Joannes Stadius, *Ephemerides novae . . . 1554-1570,* Cologne, 1556, fol. A 4 recto. Tuccius Tuccius, *De parte horoscopante,* Lugduni apud Bartholomaeum Honoratum, 1585, 4to, 88 pp., p. 67.

[17] L'abate Saverio Bettinelli, *Delle lettere e delle arti mantovane: discorsi due accademici,* Mantova, 1774, pp. 62, 118.

[18] In his *Mantice ou discours de la verité de divination par astrologie,* p. 67.

[19] Pèrcopo (1896), pp. 28-29.

[20] *De eclipsi solis miraculosa in passione Domini celebrata; De anno mense die et hora conceptionis nativitatis passionis atque resurrectione eiusdem,*

its miraculous character but endeavored to prove that the crucifixion occurred on March 25 and the seventeenth day of the moon, and that therefore the eclipse was the more naturally impossible than if the day had been the fifteenth or full of the moon. In this Gaurico disagreed with another bishop and astrologer, Paul of Middelburg, who had died in 1533. Gaurico accused him of having incorrectly placed the crucifixion at full moon, since there was no full moon on a Friday during Jesus' life. Paul had made Jesus live thirty-six years, while Gaurico stated the length of His life as thirty-three years and three months. Another disputed point was whether the number of hours that elapsed between the crucifixion and the resurrection was thirty-three or thirty-nine. Gaurico further criticized Paul for saying that leap-years before Christ do not correspond to those after Christ, the latter being 4 A.D., 8 A.D. etc., while the former according to Paul were 1 B.C., 5 B.C. etc. There was a tendency to put the Annunciation or conception of Christ on the same day as the crucifixion. After citing such authorities as Campanus of Novara, Bernard of Modena who made a cabalistic suggestion, and Antonius Dulciatus, a hermit of Florence,[21] Gaurico asserts that Jesus was conceived, adored by the Magi, baptized and crucified on Friday, but was circumcised and rose from the dead on Sunday.

Other works of a more distinctly astrological character by Gaurico were printed in 1539 but not dedicated to Paul III. *Predictions on All Future Eclipses,* based on observations made at Venice in 1533, together with the translation of the treatise of Proclus on eclipses by Lorenzo of San Miniato, presumably Bonincontri, a commentary on the part of Ptolemy's *Quadripartitum* dealing with eclipses, and further astrological matter, were dedicated to the feudal lord of Giffoni who recommended

Romae, 1539. I have used an edition of Paris, 1553: *De eclipsi solis miraculosa in passione Domini observata . . .* etc.

[21] Dulciatus addressed a work on the calendar in five chapters to Leo X in 1514. He was born on September 6, 1476, according to an autograph manuscript, Gaddi 663, of August 19, 1528. For these facts and a list of other works by him see Leonardo Ximenes, *Del vecchio e del nuovo gnomone Fiorentino,* Firenze, 1757, pp. civ-cv.

Gaurico for its episcopate.[22] A treatise on the nativities of men and women, which Gaurico had composed at Venice in 1532, was printed at Rome in Italian in 1539[23] with a dedicatory epistle from a Claudio Artù of Lyons to Ippolito d'Este,[24] cardinal of Ferrara, who had been made a cardinal by Paul III on December 20, 1538. This work appeared next year in Latin at Nürnberg together with the fourteenth century work on nativities of Antonius de Monte Ulmi.[25] Gaurico's treatise is a collection of aphorisms drawn partly from Ptolemy and other authors, partly from Gaurico's own experience. The twenty-seven headings under which they are arranged are in part the usual topics of prediction according to the twelve houses, parents, disease, matrimony, profession, etc., in part matters of astrological technique such as the effects and natures of the signs and planets, the signification of the planets in each house, of the twelve signs in the ascendent, and so on. Their purport may be indicated by one or two random selections. "When Saturn misfortunes the sun, the father will die of melancholy fever or from bad and noxious humors." If Jupiter is in aspect with Mercury, the child will become a doctor of laws. If the sun is in the ninth house, it

[22] *Ad illustrissimum dominum Alfonsum Davolos de Aquino . . . Lucae Gaurici servuli Praedictiones super omnibus futuris luminarium deliquiis. . . . Figurae coelestes Venetiarum Bononiae et Florentiae. Paraphrases et annotationes in C. Ptolomaei libro II Apotelesmatum super luminarium eclypsibus. Procli Diadochi . . . decreta eclypsium utriusque luminaris quae in quolibet signorum decano accidere possunt interprete Laurentio Miniatense.* Romae, A. Bladus Asulanus, 1539. BM 1395.f.7.

[23] Pèrcopo, pp. 20-26 (misnumbered), gives the title as, "Trattato di astrologia giudiziaria sopra la natività degli omini e donne, Stampata in Roma, in Campo di Fiore, per M. Valerio Dorico et Luigi fratelli, bresciani, nel anno MDXXXIX."

Gabotto, "Alcuni appunti per la cronologia della vita dell' astrologo Luca Gaurico," *Archivio storico per le Province Napoletane,* 17 (1892), p. 200, gives the closing words as "degli uomini e delle donne." He had not seen a copy and calls the work very rare in this Italian edition. Pèrcopo says that it was reprinted in 1550 by Gaurico with many additions.

[24] Quoted by Pèrcopo, p. 26.

[25] *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.

In the copy which I have used, Col 156.4 G236, the second treatise is missing.

produces a great prelate and man of religion. If it is also in Leo, Aries or Sagittarius, he will be a cardinal or pope or great prince. He will fear God and be constant in faith. He will be honored on long voyages and in his profession. His dreams will for the most part be true.

In 1543 Gaurico was commissioned by Paul III to select the favorable moment for laying the corner stone of the building about the church of St. Peter or "third restoration of the city." Vincentius Campanatius of Bologna assisted him, inspecting the sky with an astrolabe and announcing in a loud voice when the propitious moment had arrived.[26] "And straightway Ennius Verulanus, cardinal of Albano most reverend, clad in a white stole with a red tiara on his head, set in the foundation a huge marble block beautifully polished and with the mark of Paul III, the holy pontifex maximus."

In 1548 there was printed in the vernacular at Genoa a brief astrological *Tree of Good and Evil* by Luca Gaurico, but since he is not spoken of as a bishop in it but simply as a noble of Naples, perhaps it is merely a reprint or Italian translation of some work published earlier in his life.[27]

An anonymous astrological manuscript, which seems to have been written about 1541,[28] possibly bears some relation to Paul III. One of its diagrams of the heavens is for the meridian of Rome,[29] while for one person it is predicted that he will be the cause of the elevation of two popes, from whom he will receive

[26] *Lucae Gaurici Geophonensis episcopi Civitatensis Tractatus astrologicus in quo agitur de praeteritis multorum hominum accidentibus*, Venetiis, 1552, fol. 7r: cited by Pèrcopo, p. 27 (misnumbered).

[27] Luca Gaurico, *Opera nvova astronomica intitolata Arbore del bene & del male laquale insegna a sapere tutto quel che e stato e che sara di vn huomo. . . .* Stampata in Genoua per Antonio Bellono nel Ano del nostro Signore 1548. 16 unnumbered leaves.

Described more fully in Sales Catalogue No. XXVII of Joseph Martini, Lugano, Switzerland, pp. 42-43, which states, "This curious and interesting book of astrology is apparently unique, as no bibliographer mentions it among the works of Gauricus." It seems not to be noticed by Pèrcopo.

[28] Rome, Angelica 163 (B.6.16), fols. 152r-178r, 181r-v, then ruled but blank pages to 187. This portion of the MS is on vellum and the first page is illuminated. The text opens, "Cum divina providentia cuncta nobis evenire. . . ."

[29] *Ibid.*, fol. 154r, "Luminarium diameter precedens nativitatem MDI die prima Iunii hora 3 minutiis xxxviii post Romanum meridiem."

wealth, power and honors.[30] Of the same or perhaps another person it is said that a very close friend of his will be raised to the highest power of ecclesiastical dignity.[31] This treatise or elaborate nativity alludes to the coming conjunction of Saturn and Jupiter in Scorpio on September 25, 1544,[32] and gives figures of a nativity for June 14, 1501, and what appear to be revolutions or recurrences of this nativity for each year from 1541 to 1548. It is predicted of the person in question that he will live to be ninety-six and will reform his morals late in life. Arabic astrological writers are utilized as well as Ptolemy.

Paul III was associated in a number of ways with the controversy as to critical days which went on in medical and astrological circles during the first half of the sixteenth century.[33] It was his physician, Andrea Turino, who had earlier been in the service of Clement VII and of Louis XII and Francis I,[34] who composed *A Defense of Hippocrates and Galen Against Hieronymus Fracastoro Concerning the Causes of Critical Days*, a work which was first printed at Rome in 1542 and then at Bologna in 1543. Turino held that the crises in diseases were not caused by the moon but by the expulsive force of nature, although he admitted that the occurrence of critical days imitated the four quarters of the moon. Turino also had been implicated in the controversy as to bleeding in pleurisy. Gesner lists three works by him on this subject, of which the second was addressed to Paul III in 1537. To Paul III he further addressed his treatise on the wholesomeness of water in springs and in cisterns for rain water, which was printed at Bologna in 1543.[35]

[30] *Ibid.*, fol. 166r.

[31] *Ibid.*, fol. 181r. Since this paragraph is for the fifty-first year of the man's life and the last previous written leaf (178r) was the 48th revolution of the nativity, I take it that it concerns the same person, and that the intervening leaves 179 and 180 would have been devoted to prediction as to the forty-ninth and fiftieth years of his life, and the blank leaves ruled after fol. 181 to subsequent years.

[32] *Ibid.*, fol. 152v.

[33] The matter has already been discussed somewhat in my *Science and Thought in the Fifteenth Century*, 1929, pp. 119-21. See also Sudhoff (1902), pp. 54-57, for those works in which we are now especially interested.

[34] Jobst (1556), p. 143.

[35] Gesner (1545), fol. 41v. The other two works by Turino in the controversy as to bleeding were directed against Matthaeus Curtius.

In 1544 Michelangiolo Biondo, doctor of arts and medicine, whose work on physiognomy was published the same year, addressed to Paul III a reply to Turino's treatise on critical days. Not that Biondo agreed with Fracastoro, but he held that Turino had misinterpreted Galen, and he affirmed that the moon was the cause of crises in acute diseases. While Biondo posed as a defender of Hippocrates and Galen and opponent of new-fangled writers (*Neoterici*), he showed that he still adhered to Arabic astrology by adding to his volume the treatise of Abraham ibn Ezra on the luminaries and critical days.

Biondo's work on physiognomy, printed at Rome in 1544, is a treatise of thirty-six leaves and three brief books which scarcely deserves the encomiums that are lavished upon it in its full title.[36] It may be noted incidentally that the author was impressed by the high state of learning and many erudite men in Italy at that time.[37] In the closely related field of chiromancy is a work which may be associated in a way with Paul III, since its author, in the dedication to Lotharius de Comitibus, alludes to the summer which they spent together at Capracola in the household of cardinal Alessandro Farnese, the future pope. The author of this work in three books on *Inspection of Hands* was Antonio Piccioli or Rapitus Renovatus, a jurist of Ceneda in the province of Treviso, who may probably be identified with Antonius Franciscus de Picciolis de Carpo who was extraordinary lecturer on the *Decretals* at Bologna in 1530-1531.[38] The work, howover, seems not to have been printed until 1587 at Bergamo,[39] and it was written or revised late enough to cite both Agrippa and Cardan.

[36] Michel Angelo Biondo, *De cognitione hominis per aspectum: opus vere in hoc genere compendiosum aliis etiam praestantius quia et distinctius et accuratius et uberius scripsit caeteris colligens quicquid cum Arist. tum Hypp. vel Gal. cum aliis Testamentis sparsim omiserunt addens de maculis totius corporis quod apud Latinos phisionomantes adhuc relictum testamento non probatur, Cum auctoritate divi Pauli III M.P. et illustriss. Senatus Venetiarum privilegio in decennium,* Rome, 1544.

[37] *Ibid.*, fol. 29r.

[38] Dallari, *I rotuli,* II, 63.

[39] *Antonii Piccioli seu Rapiti Renovati Cenetensis Iurisconsulti ad illustrissimum Lotharium de Comitibus De manus inspectione libri tres,* Bergomi Expensis Io. Bapt. Clotti Senensis, 1587, 210 pp.

The attitude of Piccioli towards chiromancy is rather peculiar. He represents himself as writing "in derision of these vanities," but his method is to set them forth rather than to antagonize their adherents from the start by seriously assailing them. But he sets them forth in Latin, so that women and the populace may not understand. In the preface he complains that all the occult science of the distant past, whether connected with demons, souls and spirits, or with the sky, stars and elements, has been smothered by posterity with fallacies, superstitions and vain ceremonies, or has been fouled by Satan. He rejects the cabalistic method of dealing with numbers, letters, diacritical marks, lines and points. He complains of spurious books and authors. He views with suspicion magical ceremonial, astrological technique, and the endlessly complicated processes of alchemy. He thinks it no wonder that some have abandoned occult science entirely, that Pico della Mirandola wrote against astrology, and that Pico's nephew has gone on to attack magic, dreams, auspices, augury, portents and predictions generally. But in the opinion of Piccioli both they and such writers as Cardan and Agrippa would have done better to indicate what there was good rather than what there was bad in occult science. Piccioli had hoped to do this himself, but the care of six younger brothers and other distractions prevented, so that he limits himself for the present to the field of chiromancy and writes "not to philosophize but for laughter and sport."

Both Agostini[40] in the eighteenth and the *Bibliotheca curiosa*[41] in the seventeenth century ascribed to Biondo an earlier edition at Rome in 1528 of an *Epitome* from the books of Hippocrates of the new and ancient art of healing and concerning critical days.[42] But both the British Museum and the Bibliothèque Nationale of Paris contain only the 1545 edition of this epitome. In the same year, 1544, as his reply to Turino, Biondo had published a treatise of astrological character, *Annual Tables Con-*

[40] *Scrittori Veneziani,* II (1754), 488.

[41] Joannes Hallevoordius, *Bibliotheca curiosa,* Frankfurt, 1676, p. 272.

[42] *Ex libris Hippocratis de nova et prisca arte medendi deque diebus decretoriis epitome,* Rome, 1528.

cerning the Anticipation of the Fixed Stars with their Significations in Disposing and Constituting Human Works.[43] As this volume combined astronomy and astrology, so he combined science and magic in his editions of the works of other authors: in 1547 the *Concordances of Poets, Philosophers and Theologians* by John Calderia, and the *De originibus* of William Pastrengo; in 1548 the *Physiognomy* of Peter of Abano and the pseudo-Hippocrates on astrological medicine in the thirteenth century translation by William of Moerbeke; in 1549 the three books of Theophrastus on plants in an Italian translation. Evidently he had no prejudice against medieval as compared with renaissance or classical authors since he edited three of the first as against one each of the other two.

Returning to Paul III and the controversy as to critical days, we next have Gaurico addressing to the pope a long dialogue in twelve books, entitled *Super diebus decretoriis axiomata,* which was printed at Rome in 1546. Pico della Mirandola's arguments are answered, the second book refutes Fracastoro, the fourth examines the work of Lucius Bellantius, the sixth gives the teaching of Paul of Aegina as to critical days, the tenth deals with the Hippocratic writing on dreams of the sick, and the twelfth offers a new version of the pseudo-Hippocratic tract on astrological medicine. On the death of Paul III in 1549 Gaurico retired to Venice, but his literary and astrological activity did not cease.

Meanwhile the book of Angelo di Forte on the marvels of human life had been dedicated to Paul III and printed at Venice in 1543,[44] the year of the publication of the more justly famous works of Copernicus and Vesalius. The organs and functions of the body are associated by Angelo with the planets, fixed stars, Milky Way, and head and tail of the dragon. The pulsing blood is compared with the course of the sun in the circle of the year. The disposal of food and drink is for Angelo consonant with

[43] *Tabulae annuae de anticipatione stellarum fixarum cum suis significationibus in disponendis vel constituendis operibus humanis,* Rome, 1544.

[44] Angelus Fortius, *De mirabilibus vitae humanae naturalia fundamenta,* Venice, Bernardinus de Vianis, 1543, 44 fols.: copy used BM 1039.e.3.(1.).

the work of the moon, but the grounds for this parallel were not entirely evident to me. The body of each individual differs according to the constellations of fixed stars. The planets exert an influence on the human saliva. But the sage has the power to avail himself of the forces of the stars and of the above information and much more like it purveyed by Fortius. He also wrote in Italian a brief treatise on medicinal invention, which was printed at Venice in 1544 and is bound in the copy at the British Museum with his work on the marvels of human life.

We have already had occasion to speak of one of Paul III's physicians, Andrea Turino. Another, Augustinus Ricchus, is said to have confirmed by his frequent and very successful employment of it in cases of pestilential fevers the marvelous virtue of a reputed unicorn's horn for which Paul III had paid merchants of Ragusa the price of twelve thousand gold pieces.[45] This Augustinus Ricchus, Richius or Ricci had earlier published at Paris a treatise on the motion of the eighth sphere in which he had cited Jewish authorities so liberally as to suggest that he was of Jewish extraction himself.[46]

Petrus Pitatus of Verona seems first to have issued his *Ephemerides* or *New Almanach* at Tübingen in 1544, carrying the *Ephemerides* of Stoeffler on from 1551 to 1556.[47] A dedicatory letter to the bishop of Verona and papal legate alludes to parts of the volume as dedicated to Paul III. A subsequent prooemium defends astrology at some length. Pitatus had observed the vernal equinox at Rome in 1520 and 1521 with Paul of Middelburg, and alludes to other observations of his own on July 22 and November 30, 1535.[48] He anticipated the calculations of

[45] Joannes Baptista Silvaticus, *De unicornu, lapide bezaar, smaragdo et margaritis eorumque in febribus pestilentialibus usu*, Bergamo, 1605, p. 14.

[46] *Augustini Ricii de motu octavae sphaerae*, Lutetiae, Simon Colinaeus, 1521.

[47] *Almanach Novum Petri Pitati Veronensis mathematici superadditis annis quinque supra ultimas hactenus in lucem editas Ioannis Stoefleri Ephemerides 1551 ad futurum Christi annum MDLVI. Isagogica in coelestem astronomicam disciplinam. Tractatus tres perbreves de electionibus revolutionibus annorum et mutatione aeris. Item horariae tabulae per altitudinem solis in die ac stellarum in nocte ad medium sexti climatis.* Tubingae, MDXLIIII, Ul. Mor. Copy used: BM 532.d.36. The frontispiece is a picture of Stoeffler at the age of 79.

[48] *Ibid.*, fols. IV, 2V-3I.

Stoeffler by about twenty minutes. His *Almanach Novum* distinguishes six types of great conjunctions and includes an introduction to astrology and treatises on elections, revolutions and weather prediction, so that it seems a general handbook on astrology rather than an almanach or ephemerides strictly speaking. Among the previous authors utilized are Leopold of Austria, Guido Bonatti, Regiomontanus and Stoeffler. One of the elections is to choose a favorable time for alchemical experiment. The work was reissued in 1548, 1552 and 1553. Pitatus published another book bearing upon calendar reform and the fixed stars in 1560[49] and again in 1568.[50]

Vincentius Franciscucius Abstemius was probably not connected with the court of Paul III, since what appears to be the one work extant by him is an oration delivered at Fano, which would seem to have been his native place, upon the occasion of a papal visit. But the oration sheds so strong a light upon that pontiff's devotion to astrology that we may well consider it here. The speaker glorifies that art almost as fulsomely as he eulogizes the pope himself, and his screed found its way into the Vatican library.[51] Abstemius approved of prediction both from the revolutions of years of the world and from the genitures of individuals. He regarded astrology as the basis and source of other kinds of divination. He pictures astrology as having lain in darkness, disrepute, barbarism and sordid squalor for many centuries past, and as condemned by some Latin writers of his own time. But like other disciplines it has been restored by Paul III who not merely cultivates it but loves and cherishes it and devotes no small part of his time to it. His shining example has led many

[49] Petrus Pitatus, *Compendium . . . super annua solaris atque lunaris anni quantitate Paschalis item solennitatis juxta veteres ecclesiae canones recognitione Romanique calendarii instauratione deque vero Passionis Dominicae die ortu quoque et occasu stellarum fixarum in tres divisum tractatus,* Verona, 1560.

[50] *Verae solaris atque lunaris anni quantitate . . . denuo revisum,* Basel, 1568.

[51] Vatic. lat. 3687, a paper bound brochure in MS, leaves unnumbered, 27 fols. of text by my count: Vincentii Franciscucii Abstemii ad Paulum Tertium Pont. Max. oratio de laudibus astrologiae, opening, "Magna diu questio fuit magna Pont. Max. inter mortales disceptatio. . . ."

On an earlier Polish Abstemius (1442-1494) see L. A. Birkenmajer, *Mikolaj Wodka z Kwidzyna zwany Abstemius,* 1926, 163 pp.

others to study and venerate the art, so that Abstemius does not despair of its most obstinate opponents, now reduced to a few, correcting their error. Such optimism was unusual among astrologers of the sixteenth century. Abstemius continues that in return for Paul's patronage of astrology the stars are showering every grace and benefit upon the pope. Ultimately we discover that Abstemius too is looking for something in return for his flattery of the pontiff and praises of astrology. The town of Fano wishes to found a university in order to occupy the minds of its youth with something other than civil discord. But it cannot finance the project without papal aid.

Juan de Aguilera or Giovanni de Anguilera in 1542 addressed to Paul III a prediction for the pope's seventy-fifth year.[52] He admitted that the revolution of that pontiff's nativity for that year was bad but held that no great harm would ensue because of the very favorable character of Paul's original nativity. However, he inquired what was to be hoped and feared for the coming year of the pope's life in considerable detail: first, from the sign of continuation (*profectionis*) from the ascendent of the nativity and its lord; second, from the limit (*terminus*) of division and its *asquebutar* or *algebutar;* third, from the position of the moon; fourth, from the direction from the hilegial places to the encounter of favorable or unfavorable planets. He measured the times in which the effects would be completed by three methods: from the contact of the continuation (*profectionis*) with the bodies and rays of the favorable and unfavorable planets, from the contact of the direction of the ascendent to such places with equal computation in the zodiac for every day 59 minutes and 8 seconds, and from the contact of the degrees *hilec* with the favorable and unfavorable places. That Aguilera had no objection to Arabic astrology is shown not only by his use of such terms as *hileg* and *algebutar,* but by his citations. Haly

[52] Vatic. lat. 7180, fols. 366r-373v. There are two successive leaves numbered 366. The former carries on its recto a figure of Paul III's nativity in 1468, on its verso that for the revolution of his seventy-fifth year in 1542. On the second fol. 366r begins the text: "Beatissimo ac Sanctissimo domino nostro Paulo Papae III Ioannes de Aguilera.

Abenragel is his prime favorite, even more so than Ptolemy. He also cites Aomar on nativities, Abraham Avenezra, the *Centiloquium* of Hermes, Bethem, and the medieval Latin, Guido Bonatti.

In the last years of Paul III's life and pontificate astrological judgments concerning himself and other members of the Farnese family were addressed to him by Marius Alterius, whose recently deceased father, Julius Alterius, had held some position under Paul to which the son hoped to succeed. The father appears to have been a poet, since his son prefixes an elegy and epigram by him in praise of Paul III to the geniture of Alexander Farnese, elder of the twin sons of duke Octavius and of Margarita, daughter of Charles V. These twins were born on August 27, 1545, but the settling of his father's affairs delayed Alterius in the composition of their geniture, and he adds revolutions of Alexander's nativity for each of the three following years, though the work must have been finished and presented to the pope at least before the last of these three dates. Although he outlined the characteristics and destiny of Alexander in great detail to his sixty-eighth or seventy-fourth year, Alterius drew up no separate prediction for the other twin, Carolus, since he had been informed that not more than eight minutes elapsed between their births, and their ruling planets would therefore be largely identical. Marius had been trained from childhood in astrology, probably by Luca Gaurico, whom he calls "doctor meus," whom he prefers to all the astrologers of Rome in the science of prediction, and indeed regards as "facile princeps of the astrologers of our time."

That Marius succeeded in maintaining the favor with the pope which his father had enjoyed is seen from his second judgment on the eighty-first year of Paul's life, in which he expresses his gratitude for the honorific place in which the pontiff has constituted him. With this judgment he combined an annual prediction for the current year, 1548. Finally, in the course of this same year, 1548, Alterius submitted to Paul III a horoscope of Orazio Farnese, duke of Castro, and a prediction from the sev-

enteenth revolution of his nativity in February, 1548. In opening it he alludes to the other two previous judgments.[53]

"The vulgar opinion" was that the year 1548 would be an evil and perhaps fatal one for Paul III, partly because it was his eighty-first year and so enneatic (i.e. a multiple of nine) and partly because of an eclipse of the moon on April 22 in which the moon would be in a position opposite to that which it occupied in the papal horoscope. Alterius opposes these views, pointing out that many men have safely survived an enneatic year combined with a climacteric year, and that the pope's death had been bruited, professedly on the authority of great astrologers, from another eclipse of the preceding October when the moon was in a totally different position. But the vulgar crowd has not the capacity to distinguish who are authoritative astrologers. Alterius assures the pope that no ill of any moment will befall him in 1548. Indeed, on pursuing the matter further he has found that Paul III need fear no year until his ninety-third. This discovery so rejoiced Alterius that he forgot his sorrow over the recent death of cardinal Jacopo Sadoleti. Despite this assurance, Paul III died the next year, 1549. In the meantime, for his eighty-first year Alterius still predicted appetite for women, very great and long rejoicing because of women and nephews, and the celebration of great nuptials which "will overwhelm your spirit with singular pleasure."[54]

[53] These three judgments by Marius Alterius occupy three Latin MSS in the Vatican library which are numbered successively but in the reverse of their chronological order, Vatican 3689 being the Genitura Horatii Farnesii Castri ducis ad Paulum III; Vatican 3690, De revolutione anni octogesimi primi aetatis Pauli III; and Vatican 3691, Genitura Alexandri Farnesii Octavii ducis maioris natu filii ex Margarita imp. Caes. Caroli V Augusti filia. The last named but earlier composed MS is also the longest and most elegant in the form of the three, with gilt-edged leaves and captions in golden letters. Perhaps it was hoped that the young Alexander might one day succeed to the possessions of Charles V.

[54] Vatic. 3690, fol. 9r, ". . . Venus anni domina optimo loco sita lactitiam vestes munera amicorum commoda ac lucra mulierumque appetentiam designat"; fol. 10r, "At Iuppiter ad domum Veneris radicis in revolutione devolutus non modo honoris et famae augumenta designat sed maxima etiam et longa gaudia mulierum et nepotum causa percipienda"; fol. 9v, ". . . cum ex mulierum causa portendit tum vero Sanctitatem Tuam magnis quibusdam nuptiis celebrandis intentam facit ex quibus Horoscopus natalis ad septi-

Like Aguilera, Alterius made much use of Arabic astrology. In the geniture of Alexander Farnese he cites Haly Abenragel, Almansor, Abraham Judaeus, Albubater and Messahala as well as "the Arabs" generally. He employs such terms as *hyleg* and *alcocodea,* and suggests another duration for the life of the child's father than that based upon Ptolemy. In the judgment for the pope's eighty-first year he puts Ptolemy first among astrological authorities, but also cites Albumasar and uses the Arabic term, *fridaria.* In the geniture for Orazio Farnese, however, he professes to follow Ptolemy, although he says that certain contemporary astrologers reject the Ptolemaic method of prediction. Alterius was bold in listing towns and regions under signs of the zodiac. Under Taurus and Scorpio he put Scotland, Switzerland, Valencia, Treviso, Aquileia, Padua, Verona, Brescia, Crema, Genoa, Bologna, old Ferrara, Rimini, Fano, Sinigaglia, Ancona, Camerino, Siena, Pistoia, Urbs vetus (Orvieto?), Capua and Salerno.[55] Among places governed by Virgo and Sagittarius he listed Brindisi, Cumae, Modena, Pavia, Novara, Toulouse, Avignon, Narbonne, Toledo, Heidelberg, Stuttgart, Basel and Cologne.[56]

Physical and Astronomical Considerations is a literal translation of the title of a book dedicated to Paul III by Fortunius Affaydatus or Affaytatus, an Italian natural philosopher, physician and theologian.[57] The opuscula or essays which compose the volume, however, deal mainly in a curious spirit and tone with human physiology and psychology and with the influence of the stars. The book was printed at Venice in 1549 and had apparently been composed, at least in part, two or three years before, since an eclipse and a comet of 1547 are discussed as phenomena which have not yet occurred. Affaytatus was from Cremona but is said to have taught mathematics in London about 1548 and to have died there at the age of forty-five.[58] There is nothing about

mam domum profectus et Iuppiter eo loci praerogatum habens animum tuum singulari devincient voluptate."

[55] Vatic. 3690, fol. 8r.

[56] Vatic. 3691, under the caption, De itineribus (leaves unnumbered).

[57] *Ad Paulum III Pontificem . . . Fortunii Affaytati . . . Phisicae ac Astronomicae Considerationes,* Venice, 1549.

[58] Adelung, *Fortsetzung zu Jöchers Lexicon,* I, 283.

our volume, however, to indicate that it was written outside of Italy. Gilbert in 1600 criticized Affaytatus as having written "ineptly enough" on the magnet[59] but Gilbert cited many Italian and other writers who were never in England.

The first essay in the volume considers whether a woman can conceive without sexual relations with a man. Merlin was said to have been so born in the year 446 A.D. Averroes stated that it had happened in his day through the medium of water in which there had been mixed bathing. Thomas Aquinas declared it a fact which he explained through the agency of demons who acted first as succubi and then as incubi. Within a few years a case had been reported at Cremona, and Affaytatus on inquiry from midwives and matrons of good repute found that it was attributed to Lesbianism with a married sister immediately after her husband's departure. Against the explanations of Averroes and Aquinas Affaytatus holds that the semen would be sterilized by passage through water or air, and that it is very difficult for natural scientists to concede the existence of demons and their corporeal activity. He also rejects the recent explanation and advances as his own solution the existence of hermaphrodites or Androgyni who combine in their own persons the functions of both sexes. In proof of this contention he adduces instances of change of sex from female to male, as in the case reported "in chronicles of our time" of a married woman named Aemilia who in 1456, after twelve years of matrimony, "was changed to Aemilius," had her dowry restored by order of Ferdinand, king of Sicily, and wedded a wife. In one of the later essays in his volume Affaytatus refers to those who have wrongly interpreted his *Androgynus* as an attack upon Christianity and the Virgin Mary. It would seem to have that covert implication. A work on hermaphrodites is ascribed to Affaytatus and is said to have been printed at Venice in 1549, but perhaps his *Androgynus* is meant.

The same interest was seen a score of years or so later in a volume published at Lyons on the androgyn born at Paris on July 21, 1570, illustrated by Latin verses of Joannes Auratus or

[59] William Gilbert, *De magnete magneticisque corporibus et de magno magnete tellure,* London, 1600, p. 6.

Jean Dorat, with a French translation of these and a preface by J. de Chevigny.[60] This poet Auratus also lent his muse to the belief in astrology which he shared with our Affaytatus. Latin verses of his accompanied a prognostication for the year 1570 by Jean Brochier.[61] But to return to the court of Paul III.

At the close of the *Androgynus* Affaytatus promises to write Paul III within a few days why the celestial pole attracts the magnet to itself, a phenomenon which certain philosophers to this day ascribe to an occult cause. In fulfilling this promise in the next treatise in our volume, he states by way of premise that the final cause why earth seeks the center of our universe is not gravity, although we so term it, but to avoid and flee from the circular motion of the heavens, to which earth's coldness, dryness and opaqueness are directly opposed. For the same reason the magnet, moving north and south instead of parallel to the equator, seeks the poles which are "absolutely immobile." The magnetic needle turns to the north pole rather than to the polar star. Those who have navigated beyond the torrid zone say that there the magnet turns towards the south pole, which proves that it does not seek the polar star. As for the attraction of iron by the magnet, Affaytatus in a later opuscule explains it on the ground that like attracts like, and that neither iron nor the magnet could indulge in its peculiar tendency to move towards the poles without the other.

In the first chapter of the treatise on the magnet Affaytatus alluded to the eclipse of 1547 as good, not bad, in its influence and as portending union with the Mohammedans in one faith under one holy pastor. He has more to say of this eclipse in a subsequent paper. Galen and his followers are there represented as holding that the effects of an eclipse are always evil. On the contrary, the eclipse which is to occur on November 12, 1547, at 10.06 by the common clock at Rome, will, with the aid of the planet Jupiter, direct the hearts of princes to the supreme good, and with the aid of Saturn convert some of the Jews and

[60] *L'androgyn né a Paris le 21 Iullet 1570.* Illustré des vers latins de J. Dorat . . . avec la traduction d'iceux en . . . François etc. M. Jove, Lyon, 1570, 8vo.

[61] *Prognostication de Jean Brochier pour l'an mil cinq cens LXX avec les vers latins de J. d'A. sur ladicte prognostication,* 1569, 4to.

reform the church, also conciliate orientals to Christianity, and ultimately bring profound peace. Thanks to Mars, however, there will first be wars, popular tumults, and deaths of tyrants. Affaytatus asserts that the stars act not merely on external surfaces but the entire body, and that an eclipse exerts influence on inferiors not by depriving them of light, since the virtue—though not the presence—of light can be transmitted through solid bodies, but by the combined influence of sun and moon acting along the same straight line.

Such astrological ruminations lead on not unnaturally to a discussion of the stay of the infant in the womb and the varied fortune of twins. Affaytatus would reckon the time taken for the formation of the foetus not in solar months but in periods of twenty-eight days, two hours and fifteen minutes each. The diverse fortune of twins is normally not to be referred to birth at different times but to the fact that, while they share the same horoscope, they have different significators, just as do the different members of a single human body. However, sometimes twins may be born so far apart in time as to have different horoscopes.

Affaytatus's remaining topic is whether souls may naturally return to dead bodies. In this case he addresses cardinal Baptista Belaus rather than the pope. A celebrated axiom of Aristotle was that from privation to previous status there was no regress. On the other hand, some persons venture to suggest that Christ and Apollonius of Tyana resuscitated the dead by identical methods. Sometimes a spark of life is left in the heart which may rekindle the whole and bring back the soul. Or sometimes the soul, unimpeded by action of the senses, has access alone to the brain and thinks itself in heaven or hell, or foresees the future. Affaytatus, however, will not deny that some souls by divine providence have actually visited heaven and hell, and then returned to their own bodies. This type of resuscitation is more sudden and not gradual like the other. But there are many examples of both, notably in Pliny's *Natural History*, book 7, chapter 5. Affaytatus fails to say that in the fifty-sixth chapter of the same book Pliny denies any existence of the soul apart from the body and calls the belief in personal immortality "puer-

ile raving." A third kind of resurrection, when no power of the soul is left in the body but only the matter of the corpse, is denied by almost all natural philosophers. But Affaytatus thinks that the soul may be recalled to the body by suffumigations with juices of herbs, unguents from animals, and powdered gems which are especially adapted to the dead individual, with proper astrological observances. He speaks somewhat obscurely of "this human agent" as confined in an extraneous place by celestial natural light and like configuration of the stars. Christ by word alone restored to the body the same soul which had previously inhabited it. Apollonius by the other means just mentioned restored some soul that seemed the same as the original occupant. And, it may be added in conclusion, it would seem that the soul of Pomponazzi still drove the pen of Affaytatus.

Simon Portius or Simone Porzio of Naples addressed to Paul III a disputation of some sixteen pages concerning a German girl who had lived about two years without food or drink. It seems not to have been printed until after the pope's death at Florence in 1551,[62] where about the same time were printed other opuscula of Portius on such topics as colors, pain and the human mind. A work on the same topic of the fasting girl had been published at Paris in 1542 by Gerard Bucoldianus.[63] Lectures of 1540 and 1542 by Portius on *De anima* and the *Physics*, with a question concerning intelligible species are preserved in a manuscript now at Milan which is perhaps his autograph.[64] His two books on the natural principles of things, printed at Naples in 1553 and at Marburg in 1598,[65] deal with the topics of matter, form, nature, cause, fate and chance in much the usual way. It is granted that the celestial bodies are cause of all

[62] *Simonis Portii Neapolitani De puella Germanica quae fere biennium vixerat sine cibo potuque. Ad Paulum III pontificem maximum Simonis Portii disputatio.* Florentiae apud Laurentium Torrentinum, 1551.

[63] Gerardus Bucoldianus, *De puella quae sine cibo et potu vitam transigit brevis enarratio,* Paris, Stephanus, 1542.

[64] Milan Ambros. A 153 inf., 320 fols. It was presented to the Ambrosiana in 1673 by Jo. Bapt. Capponius of Bologna, doctor of arts and medicine at Pavia.

[65] Simon Portius, *De rerum naturalium principiis libri duo,* Marpurgi, 1598, 237 small pages. An earlier edition at Naples, 1561, is also listed. That of 1553, printer M. Cancer, is a small quarto of 80 leaves.

inferior natural virtue, but Portius will not accept an astrological cause for the accidental digging up of hidden treasure, contending that the stars are a universal cause but not a particular cause to produce that effect. To this an astrologer might retort that, while the stars are a universal cause, their particular position at that moment is a particular cause. Portius in his writings cites such medieval authorities as Peter of Abano. Portius taught at Pisa before 1525 and after 1545 and died in Naples on August 27, 1554.[66]

That not all of Paul III's associates were equally devoted to astrology may be seen from the work of an Adam ab Invidia. He tells us that when he became tired of writing in the papal curia and went out to get some fresh air by walking through the city, he met a certain doctor with whom he engaged in argument whether the human will was free or whether it was moved and not merely inclined by the stars. The doctor defended the latter position, while Adam upheld the freedom of the will. He took down rough notes at the time of their disputation, but inasmuch as he did not develop these into a formal treatise until 1572, when he dedicated the same to Horatius Arrigonius, a Roman noble and jurist,[67] further consideration thereof may be postponed until a later chapter.[68]

That interest in astrology at the papal court did not cease with the death of Paul III is shown by a nativity of Julius de Rovere, cardinal of Urbino, in a Vatican manuscript.[69] The nativity is dated from Ferrara, April 1, 1555, and signed Gieronimo Mario, with perhaps an additional third name that looks like Co Lugo or Cozugo written beneath. The text of the nativity is in Italian. It gives the date of the cardinal's birth as April 15, 1533, which indicates that Eubel is in error in saying that Julius de Rovere was made cardinal at the age of sixteen on July 27, 1547. According to this nativity he would have been not quite four months over fourteen when made a cardinal.

[66] N. Cortese, "L'età spagnuola," in *Storia della Università di Napoli,* Napoli, 1924, p. 326. Fabroni, *Hist. Acad. Pisanae,* 1791, I, 393. I have not seen G. Amenduni, *Di alcuni particolari della vita letteraria di Simone Porzio incerti o ignoti finora,* Napoli, 1890.

[67] MS BN 6689, fols. 3r-49r.

[68] See Chapter XXXV on Adversaries of Astrology.

[69] Vatic. 7180, fols. 360r-361r.

CHAPTER XIV

ASTRONOMY AND ASTROLOGY AT PARIS

Par ainsi donc, ô monde lunatique!
Ayes pour tous cestuy seul prognostique
C'est que, pour vray, tous les prognostiqueurs
Sont et seront ou mocqués ou mocquers
—BONAVENTURE DES PÉRIERS

The Spaniard, Pedro Cirvelo of Daroca, born in 1470, after ten years at the university of Salamanca, spent the next decade from 1492 to 1502 at Paris studying theology.[1] He then taught at Siguenza from 1502 to 1505 and later at Alcalà. During the years at Paris he supported himself by "the profession of mathematical arts." For while that university was strong in the arts of the trivium, and in both philosophy and theology, almost all persons at Paris were unskilled in mathematics, so that Cirvelo found himself as welcome there as rain on thirsty soil. In 1495 he edited the *Speculative Arithmetic and Geometry* of Thomas Bradwardine; in 1498, the *Sphere* of Sacrobosco with comments of his own including an allusion to the first voyage of Columbus. He abstained, however, from astrological judgments at that time, because in 1494 in connection with the affair of Simon de Phares the faculty of theology had condemned a number of astrological books.[2] He nevertheless questioned whether theologians without

[1] Concerning the life of Cirvelo see primarily J. M. Lorente y Pérez, *Biografia y análesis de las obras de matematica pura de P. Sánchez Ciruelo, Publicaciones del laboratorio y seminario matemático,* tom. 3, mem. 5a, 1921.

Julio Rey Pastor has briefly mentioned Cirvelo in his *Discurso Inaugural, Los matemáticos españoles del siglo XVI,* Oviedo, 1913, and more fully in *Los matemáticos españoles del siglo XVI, Biblioteca Scientia,* Num. 2, 1926, pp. 44, 54-61.

[2] In the Epistola proemialis of his *Apotelesmata astrologiae,* Alcalà, 1521, he says: "Verum de iudiciis astrologicis tunc temporis nihil egimus Parisii eo quod vulgaribus theologis essent invisa atque ludibrio exposita. Nam tota eorum facultas plures iudiciorum astronomicorum libros anno christi domini 1494 examinans quosdam illorum manifeste erroneos in fide et moribus, alios valde suspectos aut dubios damnavit scilicet doctrinaliter, alios denique plectos suspensione quadam reliquit."

training in astronomy were qualified to pass upon such books, but was told in reply that theologians could distinguish the true from the false in any other science, even if they did not understand its fundamentals, because they could tell what doctrines were contrary to the Catholic faith.

Cirvelo's own opinion was that while this indirect and negative judgment of theologians in the domain of another faculty was perhaps sufficient to instruct the simple faithful to avoid perils adverse to holy religion, on the other hand learned men and doctors of the church ought to judge directly and *per se* the truth or falsity of other sciences by arguing from the principles proper to each science. Writing in 1521, Cirvelo regards himself as having the essential combined knowledge of both theology and astrology to judge aright and ventures to publish certain definitions, sound in his opinion, as to astrological judgments and to act as an impartial judge and arbiter between theologians and astronomers who have long struggled over this matter. Vulgar astrologers too often mix tares with the wheat, and many persons, both men and women, laity and clergy, are prone to illicit astrology and thereby excite the theologians to condemn entirely the noblest of the liberal arts. Cirvelo alludes to the statutory oath required of all masters of the Parisian faculty of arts that in lectures and disputations they shall always solve any question of philosophy in favor of the faith and overthrow the contrary arguments of the philosophers. He always faithfully observed this oath when lecturing publicly at Paris, as he often did, on the books of Ptolemy and other astrologers. Now, returned to his native land "as to a safe haven," he writes and prints at the university of Alcalà in 1521 and dedicates to his old associates, the university body of Salamanca, a handbook of judicial astrology entirely purged of all vain divination.

Cirvelo's volume is in three parts: first, *Apotelesmata* of Christian astrology on weather prediction and human genitures, rejecting entirely the interrogations and vain elections of false astrologers; second, a *Centiloquium;* third, *Responses* to the attack on astrology by Pico della Mirandola.[3] Cirvelo does not

reject all election of favorable times, but only those for works which are not natural but purely voluntary or spiritual. He admits the use of elections in agriculture, medicine, and the *modus vivendi* of any man wishing to follow his nature. He condemns selection of a favorable time to make war or to lay a corner stone, if this last is done with the object of making the residents of the building richer or happier or healthier rather than merely to insure a firm and durable edifice. From one's nativity he would predict one's natural span of life, physical and mental traits and ability, profession or calling in life, infirmities and honors, but not with regard to one's parents, brothers, children, servants, friends and enemies, riches and journeys. To give a more specific instance of what he deems licit astrology, he states that a person whose horoscope is the same as that of the great conjunction of Saturn and Jupiter which preceded his birth, will be an honorable man according to his status in life, since he will be magnanimous, generous and high spirited by natural inclination and will seek to dominate others.

As the passage just cited shows, Cirvelo accepts the doctrine of conjunctions in large measure, but he disapproves of Albumasar's work on great conjunctions as well as his *Flores*. Cirvelo does not seem to be acquainted with John of Eschenden and other writers in the fourteenth and fifteenth centuries upon conjunctions and weather prediction. He professes to prefer Aquinas to other authorities on astrology, but he also uses Gerson not a little. He prefers Ptolemy to Albumasar, although he often cites the latter and grants that he "wrote many true and natural things which serve our purpose." Cirvelo regards both

[3] *Apotelesmata astrologiae Christianae nuper edita a magistro Petro Ciruelo Darocensi super duabus tantum iudiciorum partibus hoc est de mutationibus temporum et de genituris hominum reiectis omnino interrogationibus et vanis electionibus falsorum astrologorum. Petri Cirueli Darocen. Centilogium resolutorium totius sue artis iudicarie. Responsiones.* [Colophon]: Astrologie ergo christiane opus iudiciarium quadripartitum s. et centilogium a magistro Petro Cirvelo Darocensi editum expletum est atque impressum in alma Complutensi achademia opera et impensis Arnaldi guillelmi Brocarii calcographi artificiosissimi anno christiane salutis 1521 die 12 mensis Octobris. The *Centilogium* begins with new signatures at the bottom of the pages as if a distinct volume.

the *Quadripartitum* and *Centiloquium* as generally acceptable, although there is some vain divination in them. His preference for Ptolemy can scarcely be ascribed to classical prejudice against Arabic writings, since his own text contains numerous Arabic words, and since he rejects Julius Firmicus Maternus on nativities because he imposes necessity and fate on free will. Finally, however, he decides to select what is admissible in Firmicus rather than deprive his readers of it or allow them, by reading Firmicus themselves, to risk incurring his errors. Of medieval astrological writers he discards Haly Abenragel, Abraham ibn Ezra on nativities, Guido Bonatti, and their followers. Also all who have published books on astrological seals and characters, since these are really magical, not astrological.

Pico della Mirandola is styled a rhetorician by Cirvelo, who evidently does not believe him properly qualified to have criticized astrology. He asserts that Pico erred in dating the change of the conjunction of Saturn and Jupiter to the aqueous triplicitas in 1365, whereas it was still occurring in the aerial signs as late as 1405 and did not enter the watery signs until 1425.

Whether Cirvelo expressed such favorable views towards astrology during his residence at Paris before 1502 may be doubted. At any rate he did not print them until 1521 in Spain, and one suspects that he felt somewhat freer to express himself on the subject there and surer of a sympathetic audience. He alludes to public classes and lectures on astrology at Salamanca and says that in his youth he often occupied the chair of astrology there.

Cirvelo was not absolutely the only exponent of mathematical studies at Paris in the closing decade of the fifteenth century. Jacques Lefèvre d'Etaples edited Jordanus Nemorarius in 1494 and taught arithmetic by means of playing cards. As has been shown in our fourth volume, his own book on natural magic, finished between 1492 and 1494, contained a great deal of astrology but was never printed, perhaps because of the attitude of the faculty of theology in 1494 referred to by Cirvelo. After Cirvelo had left Paris in 1502, Lefèvre continued to issue

occasional mathematical and astronomical texts: the *Sphere* of Sacrobosco in 1507, Euclid in the Latin translations of Adelard of Bath and of Zamberti in 1516. But he seems to have published nothing distinctly astrological, and his main interest in the sixteenth century came to be commenting upon and translating the Bible.

In view of the unfavorable attitude towards astrology of the Parisian faculty of theology at the close of the fifteenth century, we are surprised to hear that Luca Gaurico, the famous Italian astrologer, in 1512 was thinking of leaving Italy for the university of Paris on the ground that the Ultramontanes, while less cultured than the Italians, were greater believers in astrology.[4] However, he did not go, possibly because he learned that conditions were less favorable there than he had anticipated.

Albert Pigghe at least, writing late in 1518 and printing his work at Paris in 1519, recognized that there was considerable theological opposition there to astrology and few persons interested in astronomy or astrology.[5] Yet he was not only a student of philosophy and mathematics but a bachelor of theology. His preface to Nifo opens by grieving at the disrepute into which astrology had fallen of late, being rejected as profane, infamous and superstitious by the learned, "and especially by our theologians who deem ignorance religion, considering it a great sin, if anyone works at mathematical disciplines, so that nowadays no one dares to admit that he is an astrologer but, if he pursues such studies, is forced to dissimulate this." The astrologers are at fault as well as the theologians, however. Many are rather abusers of astrology, a most unlearned tribe who pour forth a flood of absurd annual predictions and refer all their lies, sortilege and superstition to astrology. Such charlatans are rewarded by kings and princes, and are popularly regarded as the leading or only astrologers. Thus despite incurring theological censure,

[4] Erasmo Pèrcopo, "Luca Gàurico, ultimo degli astrologi," *Società reale di Napoli, Atti della r. accad. di archeologia, lettere e belle arti,* 17 (1893-1896), ii, 19.

[5] *Alberti Pighii Campensis . . . Adversus prognosticatorum vulgus qui annuas predictiones edunt et se astrologos mentiuntur Astrologiae defensio,* Parisiis Ex officina Henrici Stephani 1518 (1519 by our reckoning of the beginning of the year).

astrology even of the worse sort enjoyed royal favor and popular esteem.

Among past astrological writers whom Pigghe severely criticized was, as we have seen elsewhere, a distinguished alumnus of the university of Paris, cardinal Pierre d'Ailly. Present conditions at that university even more excite Pigghe's spleen. He goes out of his way to assail its scholastic theology and what he calls the sophistry prevalent at Paris. He may have felt that in taking this attitude he was conforming to the popular trend of the time and attracting radical readers. Or he may have been hitting back at the faculty of theology for its opposition to astrology. At Paris, he says, despite the throngs of students, there are scarcely two or three intent on astronomy and astrology. The others are all occupied with sophisms and cavils. Even the theologians teach little else. Would that a royal edict might banish both sophisms and their professors in perpetual exile to Scotland or wherever else they came from! Then good disciplines and true theologians and doctors of every kind would flourish at Paris once more. Finally we must note that in one place Pigghe represents his opponents as physicians, not theologians, and says he fears their poisons more than their disputations.[6]

The wish was father to the thought in Pigghe's prediction for the year 1519. Among happy events from the eclipse of 1518 he predicts an improvement in divine worship and ritual—a religious matter which his scruples do not prevent his inferring from the stars—and peace for princes and subjects in Gaul, Germany and Britain to the end of April, 1519. At the same time Mars will bring hot infirmities, pustules, tubercula, pests; while Saturn with Mercury will produce prolonged sicknesses, consumption, quartan fever, colic, coughs, catarrhs. For sixteen or seventeen months these diseases will grow worse, and other ills and discords will multiply. "Wherefore let the sophists of Paris beware, since this eclipse bodes them no good!" Once Paris was famed for its studies, especially theology, but now mere sophistry has

[6] *Astrologiae defensio*, fol. 4r, "plus venena eorum (sunt enim medici fere omnes) quam disputationes formidarem."

taken their place. The theologians of Paris should abandon such verbal disputes and study the holy evangels and sacred letters. In philosophy professors and students should attend to Aristotle and to mathematical disciplines. Expressing the hope that this eclipse may mark the end of such sophistry, Pigghe goes on to predict the oppression of ecclesiastical liberty and the plundering of ecclesiastical revenues both by secular powers and by the prelates.

The resemblances and divergences in attitude between Pigghe and Cirvelo are alike instructive.[7] Both had studied theology and recognized the opposition of theologians to astrology, especially at Paris. Cirvelo hoped to soften it; Pigghe would overthrow it. Both also criticized the vulgar astrologers of their day. Both would reform the art, Cirvelo by dropping interrogations and much of elections, Pigghe by less stress on conjunctions and revolutions. But neither would accept the attack on astrology of Pico della Mirandola. Both preferred Ptolemy to Albumasar, but Pigghe carried the classical reaction from Arabic astrology further than Cirvelo did. Both represented astronomy and astrology as neglected at Paris or at least at the university. Indeed, it may shrewdly be suspected that had there been more interest in mathematics in general and astronomy in particular at Paris, there would also have been more interest shown in astrology and less likelihood of theologians and others objecting to vulgar and illicit astrology there. That Cirvelo was much more favorable to annual prediction from revolutions and conjunctions than Pigghe has been shown in our chapter on the conjunction of 1524 from his prognostication for that year.

Pigghe, who was apparently inclined to make a great deal of fuss concerning relatively small matters, also about 1520 published a treatise on the equinoxes and solstices and celebration of Easter and restitution of the ecclesiastical calendar.[8] He

[7] In this comparison I include the views of Pighius set forth in our chapter on The Conjunction of 1524.

[8] Albertus Pighius Campensis, *De aequinoctiorum solsticiorumque inventione. De ratione Paschalis celebrationis deque restitutione ecclesiastici Kalendarii*, Conrad Resch, Paris, 1520? 4to. Copy used: BM C.54.f.22.

admits that Johann Essler of Mainz back in 1508 had written a tract in which he held that the vernal equinox preceded the beginning of Aries in the astronomical tables by four and a half degrees. Pigghe will show that it does so by more than five degrees, which he does with a great deal of bluster and overemphasis. All that his criticism seems to amount to is that the tables refer the movements of the stars to the ecliptic of the *primum mobile* instead of to the true (as he holds) ecliptic of the eighth sphere and that thereby all astrological predictions are thrown out of gear. It seems probable that anyone who knew how to use the *Alfonsine Tables* would be perfectly well aware of what they referred the positions of the planets to. This is the treatise by Pigghe which aroused the ire of Marcus Beneventanus, as has been noted in our chapter on the conjunction of 1524. Nunes, the Portuguese mathematician, in his treatise on the art of navigation pointed out a mistake of Pighius in geometry and another concerning the declination of the fixed ecliptic. Indeed, he excoriated Pigghe for some nine pages which he opened with the statement that the writings of Marcus Beneventanus had not come to his hands but that he had read the book of Pigghe on equinoxes and solstices and his *Apology* and that he was not so often right as he thought he was.[9]

Despite Pigghe's criticism in 1518 of scholastic theology, he later became known as a Catholic theologian. He and Eck died in 1543 within the space of a month, and were coupled by the historian Surius as "most invincible exponents of Catholic doctrine."[10] Andreas says that he was summoned to Rome by Adrian VI, whom he had accompanied from Belgium to Spain, and that he later enjoyed the favor of Clement VII and Paul III.[11] That he did not, however, renounce his astrology at Rome is indicated by his observing there the nativity of an illegitimate child of Aleander on March 31, 1524. He judged that the boy would be in great danger of his life until his seventh year but, if he sur-

[9] Pedro Nunes, *De arte atque ratione navigandi*, 1573, II, 4, pp. 31-39.

[10] Laurentius Surius, *Commentarius brevis rerum in orbe gestarum 1500-1568*, Cologne, 1568.

[11] Valerius Andreas, *Bibliotheca Belgica*, 1643, pp. 38-39.

vived then, would be long-lived and fortunate. Actually the child died young.[12]

In 1521, the same year in which was published his work in judicial astrology, Cirvelo had printed at Alcalà a treatise in Latin concerning magic superstition.[13] It has no connection with either Paris or Pigghe but well illustrates how an adherent to astrology might at the same time flatter himself that he was free from and a foe of every superstition. It is an edifying Christian book which distinguishes between natural medicines, the Christian sacraments, and superstitions, and which contains much about demons. It also distinguishes between true and false astrology, and between different types of dreams. It is unqualifiedly opposed to nigromancy, various forms of divination and such occult arts as the notory art. Magic once flourished at Toledo and Salamanca but was expelled by Christianity. Cirvelo further censures superstitious remedies, cures by use of words, vain observance of days and hours, vulgar exorcists, conjurers of the clouds in time of storms, and other quacks, and some forms of prayer to God, the Virgin, and the saints. This work, although no different from others of its class, enjoyed considerable popularity in Spain, being revised or reprinted at Salamanca in Spanish under the title, *Reprovacion de las supersticiones y hechizerias,* in 1539, 1541, 1547 or 1548, and subsequently.

Among the annual predictions to which Pigghe took exception was perhaps that of Germain Alegnos, "grant astrologue et docteur en medicine," for the year 1519 which seems to have been printed at Paris.[14]

[12] Henri Omont, "Journal autobiographique du Cardinal Jérôme Aleander (1480-1530)," *Notices et Extraits,* 35 (1897), 43, where Aleander further records that Moses Laton reckoned the date of conception as Saturday, July 11, 1523 at 10.04 P.M.

[13] *Opus de magica superstitione,* Compluti, 1521. This edition is listed by Hansen, *Quellen und Untersuchungen zur Geschichte des Hexenwahns und der Hexenverfolgung im Mittelalter,* Bonn, 1901, p. 323, but he used the Spanish edition of 1547, while I have used that of 1539. I am therefore no more certain than was Hansen whether the Latin edition of 1521 differs from the Spanish *Reprovacion* or is essentially the same work, but in any case it presumably reflects a like attitude to magic and other occult arts.

[14] *La grant prenostication nouuelle pour ceste presente annee Mil.CCCCC. xix,* 4to, 4 fols. Not noted by Hellmann (1924). L'Art Ancien, Catalogue 22, item 36.

In 1520 there appeared at Paris the *Secret of Secrets* and the work on weather signs ascribed to Aristotle and translated into Latin in the thirteenth century by Philip of Tripoli and Bartholomew of Messina respectively. Both contain astrological matter.

In 1521 there was issued by the Parisian printer Colinaeus the treatise of Augustinus Ricius of Lucca on the motion of the eighth sphere with a foreword by Oronce Finé. He said that while he was recently explaining the work of Pigghe on equinoxes and solstices to certain persons—presumably students—he also showed them this work of Ricius and was urged by them to publish it. The two most noticeable features of the book are its scholastic method of presentation and its citation of Jewish authorities. It also cites Pico della Mirandola against astrologers. It maintains that there are only eight spheres and rejects the movement of access and recess. Ptolemy, Averroes and the *Alfonsine Tables* are alike accused of error. On the whole, the position of Ricius seems reactionary and untenable.[15] Jobst states that Ricius flourished at the university of Coimbra under Julius III and Henry II.[16] He had earlier been Paul III's physician, as we have seen.

The same printer, Simon Colinaeus, who issued this work of Ricius, in 1526 published the two books of Franciscus Sarzosus Cellanus of Aragon on the *Equator of the Planets,* with such supplementary matter as Abraham ibn Ezra on the mansions of the moon, and Fernel's *Monalosphaerium,* of which the second part dealt with movable feasts and critical days, the third with the *primum mobile,* and the fourth with geometry. In 1527 Colinaeus published Fernel's *Cosmotheoria* and in 1528 his two books on proportions.[17] In the latter year another printer issued a Theory of the planets in French by Oronce Finé[18]

[15] *Augustini Ricii de motu octavae sphaerae . . .*, Imprimebat Lutetiae Simon Colinaeus, 1521, small 8vo, 51 fols. Copy used: BM 1395.f.2.

[16] Jobst (1556), pp. 169-70.

[17] These works were bound together in the reverse order of that which I have listed them in the copy used: BM 533.i.3.(1-4).

[18] Oronce Finé, *La théorique des ciels mouvemens et termes practiques des sept planetes . . . rédigée en français.* Imprime a Paris par maistre Simon du bois imprimeur demourant audit lieu

Oronce Finé or Orontius Finaeus was born at Briançon on December 20, 1494.[19] His father, Francis, was a student of medicine and philosophy who had devised an astronomical instrument, as his son tells us. Oronce studied grammar and philosophy at Paris in the colleges of Montaigu and Navarre. In 1516 he taught mathematics in private lessons in the college of Navarre and afterwards publicly in the college of Master Gervase. He had studied the subject, to quote his own words, "with mute masters," that is from books by himself, there presumably being no lecture courses at the university in that field. In a preface of 1531 to Francis I he corroborates the previous testimony of Cirvelo and Pigghe as to the low estate of mathematics at the university of Paris, declaring that the subject had lain half-buried there.

In October, 1524, the German Nation of the university supported the request of Oronce, who had been in prison for some time, that the faculty of arts send letters to the queen mother for his release. Judging from a letter of Henri Corneille Agrippa of November 3, 1526 (Ep. IV, 62), this imprisonment was connected with Finé's astrological predictions. Agrippa alludes to "Orontius, the noted mathematician and astrologer of Paris who, while he predicted as truly as he could, was long vexed by a most iniquitous captivity." The petition for his release appears to have been successful, since in 1525 he edited at Paris Peurbach's *New Theories of the Planets*, and in 1526 dated the preface to his *Aequatorii planetarum* at the royal college of Navarre. He also soon came into or regained the royal favor, since on March 27, 1530-1531, he was made royal professor of mathematics at a salary of 150 crowns.[20] In his preface of that year to Francis I he inveighs like Pigghe against contemporary dialectic

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en la rue Iudas pour Jehan Pierre de Tours marchant demourant a Paris au cloistre sainct Benoist Lan de grace mil cinq cens vingt huyt le dernier iour du mois Daoust. In fol. 45 fols. Copy used: BN Rés. V.207.

[19] His nativity is found on one of the fly-leaves of BN 7147.

[20] For the foregoing details of Finé's biography see L. Gallois, *De Orontio Finaeo gallico geographo*, 1890, pp. 3-8. More recently Gallois has an article, "La grande carte de France d'Oronce Finé," *Annales de géographie*, (1935), pp. 337-48.

and scholastic theology.[21] Finé was interested in geography as well as mathematics and astrology. A treatise by him on the burning glass is preserved in manuscript.[22]

Jean Thibault seems to have been more of a charlatan and vagabond and less of a man of learning than those exponents of astrology at Paris who have been thus far mentioned. He first appears as a printer at Antwerp in 1519. In 1529 he published a history of his own composition, *Le triomphe de la paix célébrée en Cambray*. He also composed medical and astrological works including a prognostication for 1526 in Flemish printed at Antwerp, one for 1531 in German at Leyden, and two for 1530 and 1533, of which we seem to have only English translations. Gaspar Laet, although himself an astrologer, wrote against Thibault. As a physician Thibault was an empiric, if not a quack, and Agrippa was ill-advised to write in 1530 an invective on his behalf against the physicians of Antwerp. However, we fear that Agrippa was much the same sort of person. Some years later, in 1536, Thibault got into trouble at Paris, where he was practicing medicine as a "doctor empiricus" and publishing collections of recipes, almanachs and astrological predictions. The university had him imprisoned, brought before the prévôt of Paris, and forbidden to practice medicine further until approved by the faculty of medicine. He appealed to the Parlement of Paris, submitting documentary proof that he was one of the royal physicians. His opponents, however, showed that he had received no pay from the king, and so Parlement rejected his appeal and approved the previous judgment. Thibault also seems to have written on dreams: *La phisionomie des songes*.[23]

Astrological predictions like Thibault's were satirized in *La Prognostication des prognostications* not only "for this present year 1537, but also others to come as well as all those that are past," which Bonaventure des Périers, valet de chambre of the

[21] Gallois (1890), p. 13.

[22] BN 16650, 16th century, Orontii Finaei de speculo ustorio: fols. 2r-3r, preface; fols. 3v-4r, poem of Anthonius Mizaldus on Oronce; fols. 4v-11, text.

[23] On Thibault see Hellmann (1924), pp. 31-32; Aug. Prost, *Corneille Agrippa*, II (1882), 241-44, 248-50: Du Boulay, *Historia Universitatis Parisiensis*, VI, 264 *et seq.*

queen of Navarre, published under the name of "Sarcomoros, native of Tartary and secretary of the very illustrious and very powerful king of Cathay."[24] This poem also ridicules the contemporary craving for news ("Nouuelles fresches" . . . "O glouton de Nouuelles"). It does not merely satirize astrology but also advances the pious religious argument against the art, taking the reader to the skies, showing him Christ sitting at the right hand of God, urging that He should be his hope and only horoscope, that he need not fear the twelve houses if he pleases the Master, that he should take no thought for the morrow, and that prognosticators of the future profane the secrets of God. The poem appears in the same volume with those of Clément Marot's supporters against François Sagon, one of which is by Bonaventure, and was probably issued by the same Parisian printer, Jehan Morin,[25] who was imprisoned for printing in the same year the *Cymbalum mundi* of des Périers. The *Cymbalum* was immediately suppressed by the Sorbonne and the Parlement of Paris, yet was published at Lyons without apparent penalty. Various conjectures have been made as to the purpose and real meaning of this obscure and cryptic work and why it was suppressed.[26] It has been interpreted as encouraging scepticism by a thinly veiled attack on Christianity and revealed religion. Its Rethulus, Tryocan and Du Clénier seem obvious anagrams for Luther, croyant and incrédule. But on the surface it is certainly professedly directed against astrology and alchemy.

[24] *La Prognostication des prognostications non seulement de ceste présente année MDXXXVII mais aussi des aultres à venir voire de toutes celles qui sont passées composée par Maistre Sarcomoros, natif de Tartaire et secrétaire du très illustre et très puissant roy de Cathai, serf des vertus.* (s.l.) 1537. In 8vo. 12 pp. Copy used: BN Rés. Ye.1585.

At fol. a ii r is the sub title, "Prognostication des prognostications pour tous temps à iamais sur toutes aultres veritable laquelle descoeuure l'impudence des Prognostiqueurs."

[25] Brunet, IV, 901, represents it as printed at "Paris, en la rue Sainct Jacques, en la boutique de Jehan Morin, 1537." Alfred Cartier, *Le libraire Jean Morin et le Cymbalum Mundi,* Paris, 1889, 16 pp.

[26] See A. Chenevière, *Bonaventure des Périers,* Paris, 1886; Henri Busson, *Les sources et le développement du rationalisme dans la littérature de la Renaissance (1532–1601),* 1922, p. 193; Preserved Smith, *Age of the Reformation,* 1920, p. 629; Ernst Walser, *Gesammelte Studien zur Geistesgeschichte der Renaissance,* Basel, 1932, p. 151 *et seq.*

Another ill-fated wanderer, Servetus, also came to Paris. In 1531 and 1532, when he had barely attained his majority, he had published two works on the Trinity,[27] a theme usually essayed only by those who had spent many years of study in obtaining the degree of doctor of theology. Servetus was only a master of arts. These books aroused such a storm of indignation in Germany that he fled and changed his name to Villanovanus after his birthplace. He worked on the edition of Ptolemy's *Geography* which was published at Lyons in 1535,[28] then came to Paris. His friend Pierre Paulmier, youthful archbishop of Vienne, induced him to offer lectures at Paris on geography, mathematics and astronomy. Hardly had the course begun, when the dean of the faculty of medicine, which presumably either had not been consulted as to the new course or had not understood that astrology would be included in it, entered the lecture hall and accused Servetus of teaching in his lectures and public disputations judicial astrology, which the dean held was forbidden by the doctors of Paris. Spurred on by Paulmier and by the dubious court physician, Jehan Thibault, who as we have just seen had his own private grudge against the medical faculty, Servetus then composed a short *Apology* or defense. This the dean forbade him to print, and he again intruded upon Servetus and his pupils after Servetus and a surgeon had dissected a human body.[29]

The circumstance that Servetus had not yet obtained a medical degree probably whetted the opposition to him of the dean

[27] I examined both these rare volumes in the Stadtbibliothek of Berne.

[28] On the contribution of Servetus to geography see Eloy Bullón y Fernández, *Miguel Servet y la geografía del renacimiento, Segunda edición*, Madrid, 1929.

Iunctinus in his *Commentary on the Sphere* of 1577 referred favorably to the work of Michael Villanovanus on Ptolemy without identifying him with Servetus: p. 221, "Sebastianus Munsterus in Ptolemaei Geographia qui versionem Bilibaldi Pircheymheri amplexatus est et vulgares interpretationes Michaelis Villanovani non respuit."

[29] For these facts I follow Henri Tollin's account in the introduction (pp. 12-14) to the reprint (Berlin, 1880) of Servetus's *Apologetica disceptatio pro astrologia*, first printed at Paris, 1538. The work of Henricus ab Allwoerden, *Historia Michaelis Serveti*, Helmstadt, 1727, 238 pp., was quite scholarly for its time but chiefly concerned with the trial and execution of Servetus.

of the medical faculty. Despite this fact that he was not a full-fledged member of the medical profession, Servetus had already in November, 1536, published an *Apology* against Leonard Fuchs[30] censuring him as a Lutheran, dilating on the theological question of faith and works, defending Symphorien Champier, whose disciple Servetus professed to be, against Fuchs' criticisms, and accusing Fuchs of plagiarism. The further charge that Fuchs in disputing resorted to calumnies rather than erudition would seem not wholly inapplicable to Servetus himself. Then in 1537 Servetus published "A General Theory of Syrups, carefully elaborated in criticism of Galen, to which after a full discussion of concoction, is prefixed a correct method of purging, with an exposition of the aphorism (of Hippocrates) 'Concocta medicari.' "[31] It does not seem that either of these publications would endear Michael of Villanova to the medical faculty. The work on Syrups was, however, reprinted at Venice in 1545 and was listed in the *Nomenclator insignium scriptorum* which Robertus Constantinus published at Paris in 1555,[32] while Wolfgang Jobst in his *Chronology of Illustrious Physicians* speaks of Michael Villanovanus as "a most learned interpreter of Galen and excellent physician."[33] Tiraqueau and Gesner also both mentioned the work on Syrups, and Gesner further noted that the same Michael Villanovanus had emended and explained Ptolemy.

Servetus not only lectured or tried to lecture at Paris on astrology but also, according to his own statement, made various astrological predictions. In the *Apologetica disceptatio* he boasts of several recent successful forecasts. On February 12, 1538, when Mars was eclipsed by the moon near the star called Rex or Cor leonis, he prognosticated that the hearts of lions, i.e. the

[30] *In Leonardum Fuchsium Apologia autore Michaele Villanovano,* 1536: reprint of 1909, BM 7679.c.63.

[31] *Syruporum universa ratio ad Galeni censuram diligenter expolita cui post integram de concoctione disceptationem praescripta est vera purgandi methodus cum expositione aphorismi (Hippocratis) Concocta medicari, Michaele Villanovano authore,* Parisiis, 1537, 8vo, 70 pp.: copy used BM 778.c.41.

[32] *Op. cit.,* p. 158.

[33] Guolph. Justus, *Chronologia . . . omnium illustrium medicorum tam veterum quam recentiorum,* Francoph., 1556, pp. 158-59.

minds of princes, would be avidly excited to arms this year with much devastation by fire and sword, suffering of the church, death of princes, and pestilence. When others were predicting rain, he said that winds would dispel the clouds. When others, using merely the almanach, forecast a cold winter, he often said publicly that there would be no cold. And of all astrological judgments those as to the weather are riskiest. He further warns the Parisians and Christian princes to make peace or at least truces this year.

As for "our adversary and his preceptor," Servetus asserts that "to their shame" they dared deny that Galen favored astrology, a fact which even Pico della Mirandola had admitted, foe of the art as he was. Later a certain ape of theirs, in an investigation of syphilis ("the Neapolitan disease"), refused to attribute it to the sky. Yet Aristotle taught that all miracles and novelties come from the heavens, since the production of a new form cannot be from any other source. Indeed, according to Aristotle the elements cannot be moved to form a given compound unless they are peculiarly so directed by the stars. The adversary of Servetus further advanced against astrology the two not very formidable arguments that it is not an art, because the predictions of astrologers are often false, and because the sky would have to stand still while being observed with an astrolabe.

When Servetus went on to print this *Apology* despite the prohibition of the dean of the medical faculty, the latter sought support from the other faculties of the university, from the inquisition, and from Parlement. The inquisition acquitted Servetus of heresy, but on March 18, 1538-1539, the Parlement of Paris decreed that he should recall all copies of his book from circulation and destroy them within the space of eight days.[34]

That this action was aimed rather more against Servetus than against astrology is suggested by the fact that in the same year Oronce Finé published rules for the use of almanachs and a brief introduction to judicial astrology, which not only seems

[34] Tollin, *op. cit.*, pp. 14-15.

to have incurred no censure but was published again in French translation five years later.[35] It may be that Finé's privileged position as a royal professor shielded him from the condemnation that a person of dubious academic status like Servetus was more likely to incur. But in 1539 we have printed also at Paris with scholia by Philippus Iollianus Blereius the fourteenth century work of Firminus de Bellavalle on astrological weather prediction which had been one of the eleven books selected in 1494 by the faculty of theology from the library of Simon de Phares to be burned. In 1542 appeared the first of numerous editions of a French translation of the German *Peasant's Almanach* under the title, *La grande prognostication des laboreurs durant à tout jamais.* Thus astrology was being popularized even in the rural districts. Also in 1542 Finé published the work of Roger Bacon on the marvelous power of art and nature and the nullity of magic, together with a fifteenth century work by Claudius Coelestinus on marvels which was drawn from the fourteenth century *Quodlibeta* of Nicolas Oresme, except that Coelestinus was much more favorable to astrology.[36] In the preface to another publication of 1542, however, Finé expressed the hope to be finally freed from monsters whose perversity had vexed him for a decade with irreparable losses personally and professionally.[37]

The astrological work of Arcandam began to appear in print in 1542.[38] More scientific in character was an edition of the *Alfonsine Tables* at Paris in 1545 which Pasquier Duhamel strove to make critical.[39]

The *Rules for the Use of Almanachs and Brief Introduction to Astrology* by Oronce Finé, which first appeared in 1538 and then in French translation in 1543, I have seen in a later French

[35] Hellmann (1924), p. 46.

[36] Lynn Thorndike, "Coelestinus's Summary of Nicolas Oresme on Marvels," *Osiris*, I (1936), 629-35.

[37] *De mundi sphaera sive cosmographia*, Paris, S. Colinaeus, 1542, in fol. Dedication to Guillaume Poyet, chancellor of France. Copy used: BN Rés. V.122.

[38] T I, 716, n. 1.

[39] *Alphonsus rex Hispaniae, Astronomicae tabulae in propriam integritatem restitutae. . . . Qua in re P. Hamellius sedulam operam suam praestitit.* Paris, Chr. Wechel, 1545, 4to maiori.

edition of Paris, 1556,[40] together with a work of Alcabitius on conjunctions and a dedication in verse to André Blondet, royal councillor and treasurer general, dated at Paris in September, 1551.[41] In it Finé alludes to almanachs which he had addressed in years past to Blondet's predecessor, Du Val. In his text Finé devotes eighteen chapters or canons to the use of almanachs or ephemerides. Of these only the seventeenth is astrological: on the twelve houses of the sky and their accidental nature. Then, without beginning a new numbering, canons or chapters 19 to 30 comprise the brief introduction to astrology.[42] These chapters treat of the properties of the signs, planets, aspects, mansions of the moon, rules for weather prediction, and election of favorable times for bleeding, taking medicine, and in agriculture.

Finé was sharply criticized as a mathematician by the Portuguese, Pedro Nunes of Alcasar de Sal, professor of mathematics at Coimbra. In a work of 1546 on the errors of Finé[43] Nunes said that they were few, because they occurred only when he ventured into the field of mathematical demonstrations, and there he usually slavishly followed Theon and Campanus. The former never erred, but Oronce had followed Campanus in some bad mistakes. Thirteen years ago Nunes had thought of calling attention to them but had decided that this correction might more fittingly come from one of Finé's Parisian colleagues. But now that Finé has perpetrated a new set of errors, Nunes can restrain himself no longer. Finé has erred in finding the means in a proportion, he has not squared the circle correctly, he has "erred greatly in investigation of the longitude of places because

[40] O. Finé, *Les canons et documens très amples touchant l'usage et pratique des communs Almanachz que lon nomme Ephemerides. Briefve . . . introduction . . . sur la iudiciaire astrologie. . . . Avec un traité d'Alcabice . . . touchant les conionctions des planetes* etc. Paris, 1556, 8vo: copy used: BM 432.a.28.(1.).

[41] L. Gallois, *Oronce Finé*, 1890, lists only a 1551 edition and not the above of 1556.

[42] After chapter 18 we read: "Fin de la declaration et usage des Ephemerides. Sensuit une briefve et Isagogique introduction sur la judiciaire astrologie pour sçavoir prognostiquer des choses advenir par le moyen des Ephemerides."

[43] Petrus Nonius, *De erratis Orontii Finaei:* I have consulted the work in a later collected edition of Nunes' *Opera*.

of his ignorance of the first rudiments of astrology," he has misplaced a star in Ursa Minor.[44]

Incidentally we may further note that Nunes speaks unfavorably of judicial astrology in another work. In a letter of October 18, 1541, to king John III of Portugal which is prefixed to his *De crepusculis,* he states that the king's brother, the Infante Henry, delights in astronomical theorems but not in that well nigh exploded doctrine of judgments pertaining to life and fortune.[45]

Finé was further criticized in a work by John Buteo on the errors of the translators of Euclid: Campanus, Zambertus, Oronce Finé, Peletarius and Jean Pena. Buteo recognized that Campanus surpassed all previous translators, that his errors were chiefly due to his translating from the Arabic instead of directly from the Greek, and while more numerous than those of subsequent translators were far less inept and absurd. Zambertus made a literal translation from the Greek but occasionally erred through ignorance of the subject. The studious accept him but without rejecting Campanus. Oronce mixed everything up and in the demonstrations was far inferior to Zambertus. Peletarius, in his translation of less than ten months before Buteo wrote, took even greater liberties with the text of Euclid, following now Campanus, now Zambertus, omitting anything he didn't like, and interpolating passages of his own.[46] Pena's errors were as translator of the *Catoptric* and *Optics* of Euclid.[47]

Returning to Paris and to opposition to astrology there, we may note a work published in 1540 by Giovanni Ferrerio of Piedmont on the true significance of the comet against the vanity of all astrologers. The comet referred to, however, was not contemporary but that of 1531, when the work had originally been

[44] For these errors see caps. 3, 10, 11, 15, 18.

[45] *Petri Nonii Salaciensis de Crepusculis Liber unus nunc recens et natus et editus. . . .* Ludovicus Rodericus excudebat Olyssippone Anno MDxlii mense Ianuario. According to Rodolphe Guimarães, *Sur la vie et l'œuvre de Pedro Nunes,* 1915, his name should not be spelled Nuñez—as it is in the catalogue of the British Museum.

[46] *Io. Buteonis Annotationum liber in errores Campani Zamberti Orontii Peletarii Io. Penae interpretum Euclidis,* 1559, pp. 207-9.

[47] *Ibid.,* pp. 268, 278-83.

composed at Perth in Scotland, with a preface to James V urging him to abandon the predictions of vain astrologers and trust only in Jesus, and with an epigram on the marriage of James with Mary of Guise or Lorraine, daughter of Charles, duke of Guise. The work was directed against those who saw in the comet an ill omen for the reign of James and his queen, and against astrology in general. It was now first printed at Paris in 1540.[48] In the preface to this edition addressed to David Betoun, primate of Scotland, Ferrerio points out that nine years after the comet James V is still alive, and that "no one now doubts that the suspicions of such judgments concerning the future are most false and far to be removed from a Christian."

Accepting the Aristotelian explanation of the origin of comets in earthly exhalations, Ferrerio contends that a comet as a work of nature has only natural significations and not the terrible effects imagined by superstitious persons. He denies any natural connection between comets and kings and even doubts if they have effects upon men at large. Indeed, since plants were created before the stars, he argues that they cannot be produced by them and under their rule. Henry VII of England once demonstrated the unreliability of astrological predictions. He summoned to his presence an astrologer who had predicted the king's death before Christmas and asked him where the stars showed that he would be then. When the astrologer responded that he would be safe at home, the king imprisoned him in the Tower until after Christmas. Another story told by Ferrerio is connected with the fear of a flood from the conjunction of 1524. The populace of one town changed the course of a neighboring stream so that it might not inundate them. Then a fire broke out and they had no water at hand with which to quench it. Ferrerio quotes Paul of Middelburg to Clement VII against the flood predictions without noting that Paul made many annual astrological prognostications. Ferrerio censures the astrologers for placing the birth of Christ under the stars and is not satisfied

[48] Io. Ferrerius Pedemontanus, *De vera cometae significatione contra astrologorum omnium vanitatem,* Parisiis, Ex officina Michaelis Vascosani, 1540.

with the Ptolemaic dictum that the wise man rules the stars. Rather God rules both, and if kings sometimes die when a comet appears, this should be ascribed to divine providence. Finally our author, unlike Cirvelo and Pigghe, mentions favorably Pico della Mirandola's exhaustive argumentation against astrology.

Nor does Ferrerio echo the pessimism of the mathematicians as to the state of studies at Paris. Prefixed to an academic dissertation by him published at Paris in 1539,[49] arguing that the sense of hearing is superior to that of sight, contrary to the commonly received opinion of Aristotle, is a preface addressed to Robert Reid, a Cistercian abbot in Scotland, in which he paints a glowing picture of a remarkable renaissance of learning at the university of Paris. Now that letters which long lay hid have been restored, it is fair to believe that gradually everything will return to a better state. Already skill in sacred scripture has flowered again beyond all men's expectations. The Old and New Testament are everywhere accessible and are daily expounded in the public classes of theology with great fruit of true piety. Now too are esteemed the best of the Fathers: Jerome, Basil, Chrysostom, Ambrose, Augustine, Gregory and others. Jurisprudence is so restored that the jurisconsults of old might well envy the men of this age. Never was there greater skill and fluency in the languages than at Paris in our time thanks to the liberality of Francis I. Hebrew is taught in many classes. The restored medicine of Hippocrates and Galen is read everywhere. Philosophy never flourished in greater purity at Athens itself. In mathematics we have ceased to envy the ancients, for now we have Euclid complete and the *Almagest* and *Geography* of Ptolemy. A further token of progress is that academic freedom prevails, and that commentators depart from the letter of their authorities as they did not venture to do a few years ago when all things were held oppressed by ignorance. Whereas Pigghe had expressed the hope that the sophists of Paris might be banished to their native heath in Scotland, Ferrerio lists a number of Scots learned in various fields, five of

[49] *Auditum visu praestare contra vulgatum Aristotelis placitum . . . academica dissertatio*, Paris, 1539, 21 fols.

whom he again mentions in the preface of another tract on Cicero as a poet addressed to William Stewart, bishop of Aberdeen and royal treasurer, on November 28, 1534.[50]

In 1543 there was printed at Paris a work in two books on astronomical observation of time and on astrological elections, medicine, weather prediction and the like.[51] The author was John Guido, originally of Villars in Piedmont or Provence but now a physician at Paris. From an allusion in the second book to 1540 as "the present year in which we write this,"[52] it would seem that the treatise was composed at that earlier date. Guido affirms the power of the moon over inferior bodies, that the nature of every man is influenced by the stars, that the occult virtues of things come from celestial virtue, that priests ought to be of blameless life, and that knowledge of the stars is necessary for priests. He cites freely such ancient astrological writers as Manilius and Firmicus, and will by no means agree with Pico della Mirandola that the other stars than sun and moon exert no influence on inferiors. Yet he attacks extreme judicial astrology in the following passage: "No one indeed knows how to predict those things certainly, but by fallacious conjectures they assert some of the things which sometimes happen. For that reason judicial astronomy is by no means to be believed, from whose bosom have flowed the vanities of all superstitions."[53] He goes on to say that astrology is cultivated as a shield for their iniquity by practitioners of various superstitious arts: necromancers,

[50] *Cicero poeta etiam elegans nedum ineptus fuisse contra vulgatam grammatistarum opinionem asseritur . . .*, Paris, 1540, 21 fols.

[51] *Ioannis Guidonis Villariensis medici Parisini De temporis astrorum annique partium integra atque absoluta animadversione libri duo. Primus temporis investigationem atque electionem item astrorum in haec inferiora vires et influxum describit. Secundus anni observationes pro variis temporum distinctionibus variisque solis ac lunae cursibus habendas esse ostendit.* Cum privilegio Parisiis prostant apud Iacobum Bogardum sub insigni divi Christophori e regione gymnasii Cameracensis, 1543. 44 small leaves. Copy used: BM 530.d.2.(4.).

Sudhoff (1902), pp. 53-54, in a very brief notice of the work gives this title in an abbreviated form.

The volume opens with a five page dedication to Nicolaus a Nova Villa, royal secretary of the fisc, in which the author assures him that he is the most perfect man in all France and Christendom.

[52] *Op. cit.*, fol. 22v.

[53] *Op. cit.*, fol. 14r.

chiromancers, pyromancers, hydromancers, aruspices, harioli, genethliaci, diviners and sorcerers.

After Guido's two books comes matter that seems to constitute a sort of appendix. First are given twenty-one signs of rain and storms from Virgil; then "Praise of Earth" and "Virtues and uses of Waters"; last, a discussion of the perfection and power of the monad and the number four. In addition to the more familiar and usual groups of four there are listed the four chief members of the body—heart, liver, brain and testicles; four questions commonly asked, namely, if it is, what it is, its cause, and its end; four requisites in the choice of a husband and wife respectively; four things that bring felicity; four things to be observed in uroscopy. Four kinds of men who receive benefits unwillingly are the debtor when he is freed of debt, the boy who is beaten for wrongdoing, the lethargic person roused from sleep, and the madman who is bound. Two years after the printing of the book which we have been describing Guido published at Paris a pest tract in French.[54]

It is remarkable that all the persons thus far considered in this chapter, whether advocates or opponents of astrology, were not natives of Paris but came there from such distant points as Piedmont and Briançon, Spain, Holland and Scotland. Interest in astronomy and astrology was hardly a native plant or product of Paris during the first half of the sixteenth century. Nor is the next name that we have to consider that of a Parisian by birth. Melanchthon wrote in 1549 to Johann Petreius that mathematics was studied less in France than in Germany, and that some of his students supported themselves in France by teaching mathematics.[55] Perhaps one of those whom Melanchthon had in mind was Gervasius Marstallerus of Breisgau, who constantly speaks of himself as a German and frequently quotes such authors as

[54] Jehan Guido, *Traicte et remedes contre la peste utiles et salutaires a gens de tous estatz*, Paris, 1545: copy at the Surgeon General's Library, Washington.

[55] "In Gallia non tanta sunt studia Mathematum, imo aliqui ex nostris auditoribus, in Gallia docentes Mathemata, hoc labore se sustentarunt": quoted by J. G. Doppelmayr, *Historische Nachricht von den Nürnbergischen Mathematicis und Künstlern*, Nürnberg, 1730, Vorrede, note m.

Melanchthon, Johann Virdung von Hassfurt, Jacob Curio and Jakob Milich. But he writes from the college of Beauvais and addresses Oronce Finé of Dauphiné, royal professor of mathematics at Paris and his friend and teacher. The work of Mastallerus was printed at Paris in 1549 and entitled, *Praises and Defenses of the Divining Art which they call Judicial Astrology*.[56] Melchior Adam says that Marstallerus was educated at Heidelberg and Wittenberg, became a friend of David Chytraeus, practiced medicine in Saxony for about thirty years, finally becoming physician to the duke of Brunswick and dying in 1578.[57]

Marstallerus reverts to the plaint of Cirvelo, Pigghe and Oronce Finé that astrology now has few followers, nor does he confine his lament to Paris but extends it to France, Italy and "our Germany." He gives three explanations of the present decline and disrepute of astrology. The reasons for its rules are less evident than in other arts and sciences. The barbarisms of the Arabic astrologers deter men of talents. Third, it suffers from the ignorance and illicit methods of many of its professors and practitioners, past and present, some of whom resort to necromancy, diabolical magic, geomancy and other forbidden arts. Therefore in addition to expounding the other branches of mathematics at the college of Beauvais, Marstallerus considers it his duty to teach astrology which is the crowning department of mathematics. For of what advantage is it to know the movements and positions of the stars without their effects? Yet he sees some shudder at the very mention of astrology and deny that it is either an art or worthy of a Christian. As for the difficulty of accounting for the rules of astrological technique, Marstallerus suggests that God may have purposely kept to Himself the causes, letting us know only the effects. He also quotes Duns Scotus that the reason for singular forms is not to be sought, but that it is enough to say, "Quia talis est res" (That's the way it is.) Marstallerus cannot see why one should deny to the stars

[56] Gervasius Marstallerus, *Artis divinatricis quam astrologiam seu iudiciariam vocant encomia et patrocinia*, Christianus Wechelus, Parisiis, 1549.

[57] *Vitae Germanorum medicorum.*

the occult virtue which one grants to lesser things like the magnet and basilisk. Countless past instances of the influence of the stars and of successful prediction by astrologers are enough to warrant faith in the art. A recent eclipse brought pest and inflamed men's minds to seditions and wars, as we at Paris and those at Saintes and the Gascons can abundantly testify. The present turbulent and wretched condition of "our Germany" was repeatedly forecast from the stars.

The bulk of the volume published by Marstallerus was not of his own composition but consisted of a reprinting of various justifications and expositions of astrological doctrine by previous distinguished authors such as Melanchthon, Milich, Schöner, Heller, Eberhard Schleusinger, Petrus Pitatus, Ptolemy, George of Trebizond and Pontano. If this volume was well received, Marstallerus promised to publish another on the method of preparing figures or schemes of the sky for making particular judgments and predictions.

Marstallerus referred to another friend of Oronce Finé who was interested in astrology, Antonius Misaldus, to whom he had been introduced by the head of the college of Beauvais, William Mustela, a theologian, for which introduction he will always be grateful. Misaldus, whose name seems to have been more often spelled with a z as Mizaldus or Mizauld, was also not a native of Paris but came from Montluçon in the Bourbonnais. But almost all of his works were printed at Paris, beginning in 1546 with a Latin treatise on weather prediction entitled, *Phaenomena sive aeriae Ephemerides,*[58] and in French in 1547 with *Le mirouer du temps autrement dict, Ephemerides. . .* In 1549 he published a work on comets, those "hairy stars which the world never sees with impunity."[59] This, like Marstallerus's book of

[58] For this and later editions and French translations see Hellmann (1924), pp. 46-49.

[59] *Antonii Mizaldi Monsluciani Cometographia: crinitarum stellarum quas mundus numquam impune vidit aliorumque ignitorum aeris phaenomenon naturam et portenta duobus libris philosophice iuxta ac astronomice expediens et de variis praeteritorum saeculorum observationibus gentiumque ac regnorum historiis accurate demonstrans et confirmans. Habes insuper catalogum visorum cometarum et ignitorum aeris spectrorum usque ad annum 1540 cum portentis et eventis quae secuta sunt. Ad reverendiss. cardinalem a Castellione.* Cum privilegio

the same year, was composed at the college of Beauvais. The four pages of dedication to cardinal à Castellione, who was also archbishop of Toulouse and count of Beauvais, are a combination of classical names and injunctions to keep the secrets of the sky and of nature from the vulgar. Then follows a poem by Marstallerus to Mizauld referring to various works of the latter which marginal notes explain as the two Latin works already mentioned and further a meteorology, a treatise on tides, a lunar medicine, a harmony of microcosm and macrocosm, a marriage of Aesculapius and Urania, an *Astrophania,* and aphorisms and decrees of eclipses. It is doubtful whether these writings, with the exception of the *Ephemerides aeriae* and the *Cometographia,* had yet been printed, since three of the titles[60] appear in a list of the year 1574 of works by Mizaldus which yet remained to be published.[61] Sudhoff dated the publication of the *Marriage of Aesculapius and Urania* in 1550 at Lyons but had not seen it.[62] He mentioned a Paris, 1555, edition of the *Harmony of Microcosm and Macrocosm* but himself used an edition of 1577.[63] There is a copy of a *Harmony of Celestial and Human Bodies,* printed at Paris in 1555, at the British Museum, but it appears to be a different work from that of 1577 described by Sudhoff. In its dialogues Aesculapius and Urania appear as interlocutors.[64] Mizauld did not die until 1578,[65] and during the remain-

regis. Parisiis excudebat Christianus Wechelus sub Pegaso in vico Bellovacensi anno salutis humanae MDXLIX.

[60] Namely, *Lunae et oceani concordia, Seleniatricon,* and *Astrophania.*

[61] To Mizaldus, *Opusculum de sena planta,* Paris, 1574, is appended a catalogue of his published and forthcoming works. In the latter the titles, *Astrophania* and *Seleniatricon,* appear more fully as, "Astrophania illustriorum stellarum inerrantium exortus et occasus statis mensium anni diebus ad Gallicarum clima et vicinarum regionum . . ." and "Seleniatricum, hoc est, medicum de luna opusculum."

[62] *Aesculapii et Uraniae Medicum simul et Astronomicum ex colloquio conjugium,* Lugduni, 1550: Sudhoff (1902), p. 59.

[63] *Idem: Harmonia superioris naturae mundi et inferioris . . .* etc.

[64] BM 721.d.1: *Harmonia coelestium corporum et humanorum dialogis undecim astronomice et medice elaborata et demonstrata.* Apud Iacobum Kerver via Iacobea sub duobus gallis, Paris, 1555.

[65] At least one volume from his library is preserved: see BN 18504, 14th century, containing astronomical tables and the Canons of Jean de Murs on the Alfonsine tables and of Arzachel on the tables of Toledo. Across fol. 104, the present first parchment leaf, is written, "Sum Antonii Mizaldi Monluciani medici et mathematici Lutetiae degentis."

der of his life, works of similar character to those already mentioned continued to pour almost annually from his pen. When in 1553 the work of Luca Gaurico on the miraculous eclipse at the time of the crucifixion was reprinted at Paris, verses by Mizaldus complimenting Gaurico were prefixed to it.

The contents of Mizauld's *Harmony of Celestial and Human Bodies,* as printed in 1555, may be noted a little further. The third dialogue is on the conciliation of the rays of the sun and the spirits of the same with the spirits of the human body. Mizauld, like Fernel, thinks of the spirits in the human body as ethereal. Urania says in the dialogue that the solar rays and spirits are not borne from one and the same place in the sky and horizon for vegetation, life, and change on earth. Rather they have a triple source: in Aries and Libra which are equinoctial, in Cancer which is solstitial, and in Capricorn which is bromous. Aesculapius replies that similarly the human spirits do not arise from one and the same place in the body, but the vital spirits in the heart, the animal spirits in the brain, and the natural spirits in the liver. The fifth dialogue collates the faculty of the rays of the planets with the faculties of the human body. The eighth dialogue relates the nature of the stars in the sky with the humors of the human body. The ninth dialogue associates various stars and parts of the body. The tenth dialogue compares the course of sun and moon with the curriculum of human life. The eleventh and last dialogue draws parallels between the celestial orbs and the orbs and eyes of man, for example, between the seven planetary spheres and the seven tunics of the eye. The *Harmony* is thus less astrological medicine in the strict sense than astrological physiology which provides a basis for the other.

Another work which appeared at Paris in 1555 was that of Thomas Bodier of Rouen on critical days.[66] It was dedicated to

[66] *De ratione et usu dierum criticorum opus recens natum in quo mens tum ipsius Ptolemaei tum aliorum astrologorum hac in parte dilucidatur, authore Thoma Boderio Rhotomagensis dioecesis. Cui accessit Hermes Trismegistus De decubitu infirmorum numquam antea in lucem editus.* Parisiis in officina Audoeni Parvi ad Lilii insigne via Iacobaea. Anno Salutis MDLV. At fol. 56v, at the close of Hermes, *De decubitu,* "Parisiis, Excudebat Andreas Wechelus sub Pegaso in vico Bellovaco, Anno Salutis 1555."

Oronce Finé at Paris on November 21, 1554.[67] Sudhoff[68] has already described the work as consisting of a briefer first part, devoted chiefly to exposition of the sixtieth *Verbum* of the *Centiloquium* and the influence of the moon according to the figure of sixteen angles, and of a second part giving a series of cases of sickness of recent date between 1549 and 1554, with accompanying astrological observations and figures.[69] A number of these were reproduced by Magini in 1607,[70] although he found it necessary to recalculate them more exactly and to correct printer's errors. The exact date and time of day when the patient fell ill is stated and whether he recovered or died. Of the 55 cases detailed and grouped under 14 "observationes" several are identified by name,[71] others by rank or occupation, such as a noble, priest, Augustinian, judge of Caudebec, anchorite, peasant, shepherd, mercenary soldier, upholsterer, merchant, scribe, schoolboy, smith, fisherman, stone-cutter, miller, midwife, wives of a groom, pilot, graindealer, weaver and hosier respectively, the son of a sailor, servants of a miller and of a criminal magistrate, and a housemaid. The whole is a splendid example of carefully recorded observation and measurement and application of the case method in an occult science, such as one would hardly find paralleled at that time in any of the now accepted natural and mathematical sciences, carried out to the complete satisfaction of the experimenter[72] concerned but with no contribution whatever towards the advance of modern science. For it is unlikely that the book would have the wholesome negative effect of exciting doubt as to astrology in the minds of its readers. Perhaps, however, we may take a more cheerful and hopeful view than this. Bodier realized that no hasty conclusions should be drawn concerning critical days, and that

[67] "Lutetiae undecimo calendas Decembris 1554."

[68] Sudhoff (1902), pp. 58-59.

[69] This second part covers fols. 16v-51v.

[70] In his *De astrologica ratione ac usu dierum criticorum,* Venice, 1607. Copy used: Col 156.4 M 272.

[71] Guillelmus Gronetus, Petrus Binetus, Petrus Natalis, Petrus Denguetus, Allanus Legerus, Nicolaus de Campis, Allanus Colemondus, Gaspar Rousselus.

[72] Boderius, *De ratione et usu dierum criticorum,* 1555, fol. 51r: ". . . solum (ita me deus amet) id quod experimentis mihi exploratum est memoravi."

further investigation was needed. He has merely broken the ice and, were he not already advanced in age, would devote more years to collecting cases.[73] When zeal for experimental verification could so animate an astrologer, it was high time for it to kindle the minds of sixteenth century physicists and naturalists. Here again, at the late date of 1555, we see magic pointing out the experimental path to science. Perhaps Bodier really opened a window to others, as he wished, and broke the ice.[74]

Printed with Bodier's work was a tract on astrological medicine attributed to Hermes Trismegistus under the title, *De decubitu infirmorum,* and said to be now published for the first time. It appeared again with a different title, *Iatromathematica,* as translated by Johann Stadius,[75] together with his *New Ephemerides* for the years 1554-1570.[76] Stadius was born in Brabant on January or May first, 1527,[77] taught mathematics for a while at Louvain (1565-1569), and later came to Paris.[78] There, de Thou says, he debated with Maurice Bresse of Grenoble, who wrote on trigonometry. There too he made astrological predictions for the French court. De Thou says that he discredited himself by them, while Tomasini, who was a bit of an astrologer himself, asserts that he drew up many horoscopes of princes successfully, although the only astrological work published by

[73] *Ibid.*, fols. 17r, 51r.

[74] *Ibid.*, fol. 51r, "Sed volui aliis fenestram aperire et (ut veteri proverbio dicitur) glaciem scindere."

[75] The incipit of the version published by Stadius, "Radii ex septem planetis emissi . . ." agrees with that of MS BN 13008, 1489 A.D., fols. 2r-18r, Medicinae cum mathematica coniunctio, so that Stadius perhaps merely printed an old manuscript translation rather than executed a new translation of his own. It differs from that of Bodier's publication, "In deiectione seminis humani ex 7 stellis radii implicantur. . . ."

[76] Printed at Cologne, 1556, and dedicated to Philip II.

[77] For the life of Stadius I have used Valerius Andreas, *Bibl. Belgica,* 1643, p. 565; Tomasini, *Elogia illustrium virorum,* edition of 1630; Thuanus, *Hist. sui temporis,* lib. 68; Melchior Adam, *Vitae Germanorum philosophorum,* and Zedler. There are considerable discrepancies between them. De Thou makes Antwerp the birthplace of Stadius; Adam and Zedler give Loenhut. Adam gives 1526 as the date of his birth; Andreas puts it on May 1, 1527.

Jos. A. U. Ernalsteen, *Joannes Stadius Leonnouthesius, 1527-1579,* Brecht, 1927, puts his birth at Leonhut on May 1.

[78] Ernalsteen dates his call to Paris in 1576.

him was *Prognostics of the Fixed Stars*. In his *Tabulae Bergenses* of 1560 Stadius calls himself both royal mathematician (i.e. of Philip II of Spain) and mathematician to the duke of Savoy. Of this work and his *New Ephemerides* we shall have more to say in the chapter on Post-Copernican Astronomy. Stadius died at Paris in 1579, according to Tomasini in the house of the Maréchal de Retz. Tycho Brahe, writing to Magini on January 3, 1600, gave in retrospect an unfavorable estimate of Stadius as having been "more facile than accurate" in his astronomical calculations.[79] Scaliger, on the other hand, in sending a copy of his edition of Manilius to Stadius shortly before the latter's death, had addressed a long and complimentary letter to him.

Jean Pena of Provence became royal professor of mathematics at Paris but died in 1558 when only about thirty. No astrological composition by him appears to be extant, but in the year before his death he edited the Greek text of the *Optica* and *Catoptrica* of Euclid with a Latin translation and preface by himself.[80] In the dedication he lauded Charles, cardinal of Lorraine, for having restored the mathematical sciences which lay prostrate and almost despaired of, and for having designated himself as royal mathematician and incited "many thousands of talented persons" to study mathematics. What Pena goes on to say concerning the heavens in this preface may more appropriately be noted in a later chapter on Post-Copernican Astronomy. But it may not be too much of a digression to repeat here what he has to say on the translation of Euclid and the study of perspective.

Pena says that he made this new translation because the existing one, as Maurolycus had already indicated, while made

[79] *Opera*, ed. Dreyer, VIII (1925), 229: ". . . uti erat vir ille in dicendo facilior quam verior. Utinam in calculo astronomico . . . idem non commisisset. Qua in re non immerito a te redarguitur."

[80] *Euclidis Optica et catoptrica numquam antehac Graece edita. Eadem latine reddita per Ioannem Penam regium mathematicum. His praeposita est eiusdem Ioannis Penae de usu optices praefatio ad illustrissimum principem Carolum Lotharingum cardinalem*, Paris, 1557. Copy used: BM 716. e.1. Two prefaces to the cardinal precede the Latin translation.

by a person who was not ignorant of Greek, suffered from his unfamiliarity with the principles of perspective. Also some theorems and many scholia were lacking, and the demonstrations were not always attached to the proper theorems. As edited by Pena, there are 61 theorems in the *Optics* and 31 in the *Catoptrics*. Pena in his turn, as we have noted above, was to be charged with errors in his translation by Buteo two years later.[81]

Pena complained that the physicists of his day accepted the dicta of Witelo and Peckham in perspective too unquestioningly. This continued trust in medieval Latin authorities in an age of classical reaction may surprise us, but was perhaps due to the fact that there were no classical writers to substitute for them. Even Pena did not underestimate Witelo's importance and called him "not inferior to Euclid in learning and erudition." But he held that Witelo's statements should be examined critically and accepted only when they could be experimentally demonstrated, since he had the common human failing in all ages of making assumptions and offering these for demonstrations. Pena particularly objected to Witelo's essentially correct theory of vision by the reception of rays in the eye rather than their emission from the eye as taught by Euclid. Pena further objected that Witelo had read authors who taught that the intersection of the optic nerves before they reached the eye was the reason why an object was seen as single and not double, and that, imbued with this view, he had pronounced that a union of forms took place in the intersection of the nerves. Against this view Pena argued that, if one eye was pressed with a finger, the object would appear double, yet the optic nerves were not disturbed. He preferred Galen's explanation, that the pyramids of rays emitted from both eyes had the same base in the object, while pressing the eyeball with a finger disturbed and doubled that base.[82] On the other hand, Pena repeated approvingly at considerable length Witelo's explanation of most apparitions,

[81] *J. Buteonis de quadratura circuli libri duo. Eiusdem annotationum opuscula in errores Campani, Zamberti, Orontii, Peletarii, Io. Penae interpretum Euclidis*, 1559, 8vo, pp. 268, 278-83.

[82] *Euclidis Optica* etc., fols. bb ii verso-bb iii recto.

specters and ghosts as optical illusions.[83] Pena criticized the author of the *Perspectiva communis,* that is, John Peckham, for embracing the opinion that the Milky Way was an effect produced by reflection of the light of the sun and stars in the purest region of fire. Many physicists accepted this proposition[84] as an oracle, but the fact that the Milky Way had no parallax but always appeared under the same stars showed that it was beyond the moon.[85]

[83] *Ibid.,* fols. bb iii recto-(b v) recto.

[84] It is the closing proposition of the *Perspectiva communis,* which had been printed in 1504 and subsequently. In the edition by Luca Gaurico (Venice, Sessa, 1504) the text of Peckham is as follows: "Lucem solarem et sideralem in perspicuo puro efficere galaxiam. Quidam in hoc philosopho contradicere non verentur qui dicunt galaxiam non generari in ignis purissima regione, quasi impressio fieri non possit in corpore transparente, quum contra videamus solarem radium in domo sub obscura per aerem transeuntem quamvis in aere non sit sensibilis densitas abscondere tamen se non potest vehementissima radiatio ipsius lucis. Multitudo ergo radiorum stellarum concurrentium in suprema parte ignis eadem ratione ibidem sensibilis potest apparere." The passage seems to approach the conception of the camera obscura.

[85] *Euclidis Optica* etc., fol. bb iii recto.

CHAPTER XV

ASTROLOGY ELSEWHERE

Ita natura res distinxit ut haec coelo isto illa altero gaudeant nam coelum est quod parit.

—BRASAVOLA

Except at Paris where, as we have seen, there was considerable theological opposition to astrology, the practice of that art seldom seems to have involved a learned man in difficulties with the law during the first half of the sixteenth century. After the affair of Simon de Phares, which began at Lyons in the closing decade of the fifteenth century, the next case appears to have been that of Pierre Turrel at Dijon more than a quarter of a century later.[1] Turrel was a native of Autun where in 1517 on the feast of St. Lazarus he had made a favorable sensation by a mythological poem in Sapphic verse. A contemporary jurist, Chasseneuz, praised Turrel as a prodigy of universal learning: a second Ptolemy in geography, another Alcabitius in astrology, a Cicero for eloquence, a Bias in philosophy, and a Livy as a historian. If these comparisons savor too much of the insipid compliments exchanged by fellow humanists, we may take as an antidote the characterization of Turrel by Theodore de Bèze as one of the chief diviners of the time. Henry Cornelius Agrippa appears to have been acquainted with him, since a correspondent requested Agrippa, while in Lyons, to give Turrell his regards.[2] Garnier believes that Turrel's influence may be detected in the long passages on the stars governing Autun in the preamble to the later redaction of customary law of the duchy of Burgundy, since among its commentators were numbered some of his pupils.

[1] For this affair I mainly follow Joseph Garnier and Ernest Champeaux, *Chartes de communes . . . en Bourgogne,* 1918, pp. 698-702, who give a fully documented account of Turrel's stay at Dijon; and Dr. Louis Marie Guyton, *Recherches historiques sur les médecins et la médecine à Autun,* 1874, pp. 39-47, 69-74.

[2] Agrippa, *Epistolae,* IV, 18.

At some earlier date, probably in 1520, Turrel had published at Lyons the introductory work of Alcabitius on judicial astrology in the twelfth century Latin translation of John of Seville, with the fourteenth century commentary of John of Saxony and minor additions of his own in text or margin. With this edition was printed a brief tract by Turrel on astrological medicine which is described on the title page as being as indispensable to a physician as an oar is to a seaman and as enabling the doctor to diagnose a case without inspecting the patient's urine.[3] The discussion includes signs indicative of death, signs of an evil ascendent, signs of ill from the moon and from the sixth house which is that of sickness, a treatment of the place of fortune, and of good signs.

A *Computus novus* by Turrel was printed twice at Paris in 1525[4] (1526?), but the dedication to Renatus a Brechia, an

[3] *Alkabitius astronomie iudiciarie principia tractans cum Joannis Saxonii commentario ordine textus nuperrime distincto. Additis annotationibus et in margine et in textu atque glossa per magistrum Petrum Turrellum astrophilum Divionensis gymnasii rectorem: cum tractatulo de cognoscendis infirmitatibus apprime medicis necessario e multis authoribus per eundem extracto, sine quo revera sepius quam nauta sine remo medicus hebet omnis quo habito urinam videre non opus est.* Text and commentary occupy fols. 2r-76v; the tract by Turrel, fols. 77r-79r. At fol. 79v the colophon reads: "Tractatus Alkabitii cum apparatu Ioannis Saxonii finem sortitus est in inclyta urbe Lugd. opera M. Guilhelmi Huyon calcographi Impensis vero honesti viri Bartholomei Trot bibliopole." Copy used: BM 718.g.7.

In 1934 the British Museum catalogue gave the date of printing as "(1506?)", but Houzeau et Lancaster, I, 3847, give it as 1525, while in the volume itself at fol. lxi verso a marginal note mentions 1520 as the current year. L. M. Guyton, *Recherches historiques sur les médecins et la médecine à Autun*, 1874, pp. 43-44, described a copy in his possession, in which the final medical tract was missing and the volume was manuscript from fol. 74 on.

[4] *Computus novus pedestri oratione contextus dies festos ab operosis uno digito disterminans omnibus maxime ecclesiasticis viris perquam necessarius, nuperrime a Magistro Petro Turrello Augustudunensi astrophilo Divionensis gymnasii moderatore primario aeditus et nuper ab eodem recognitus. Vaeneunt in aedibus Petri Gaudoul in clauso brunello commorantis.* On the last leaf d ii verso, "Parrhisiis apud Petrum Gaudoul." No date of printing is given.

That Turrell composed the *Computus* in 1525 is indicated by the statement at fol. a iii r-v, "Ab hoc anno millesimo quingentesimo vigesimo quinto. . . ." Copies used: BN Rés. V. 1272 bis; BM 8563.aaa.7.(2.).

For the other Paris edition, Gromon, 1525, which I have not seen, see C. Oursel, *Notes sur le libraire et imprimeur dijonnais Pierre-I. Grangier à propos d'une édition inconnue du*

abbot of Dijon, is dated from Dijon on January 30, 1525, and one edition was offered for sale at Dijon by Pierre Grangier. Although it deals primarily with the ecclesiastical calendar, the work contains some astrology. The members of the human body are associated with the planets. Peter of Abano and Albumasar in Sadan are cited. For such details of astrological technique as triplicitates, termini and facies the reader is referred to Alcabitius, Abraham Avenezra, Guido Bonatti, and Regiomontanus. Alluding to the twenty-eight mansions of the sun, "which once users of the astrolabe scrutinized quite superstitiously," Turrel adds, "But of those superstitions, if superstitions they were, the solar circle remains to us." At the close of the work is an astrological figure of the positions of the planets at the creation of the world. Two mottoes which occur before and after the text assert on the one hand that the sky is the tablet of fate, and on the other that the just shall live by faith.

Turrel had edited almanachs for the years 1523[5] and 1525,

Computus novus de Pierre Turrel, Extrait des Mémoires de la Société éduenne, 34 (1906).

Another edition of Lyons, 1539, apud Petrum Principem ("On les vend à Lyon par Pierre de Saincte Lucie dict le Prince demourant près Nostre-Dame de Confort") is described in Guyton's *Recherches historiques,* 1874, pp. 40 and 69. So far as I can make out, these editions gave the same text and were dedicated to the same person, René de Breche (although Guyton describes him for 1530 as bishop of Constance) on the same day of the month, exactly the same wording "III Calendas Februarii" being used in both cases, so that one suspects that the MCCCCCXXX in the second case is a misprint for MCCCCCXXV. This suspicion is supported by the fact that Renatus de Bresche became bishop of Coutances (not Constance) on July 28, 1525, and died on November 19, 1529, so that a dedication to him in 1530 is impossible. On the other hand, the dedication to him as abbot of Dijon on January 30, 1525, before he became bishop of Coutances, would be correct. Moreover these slips as to Constance and 1530 make one wonder if the date for the printing of the edition, 1539, may not also be at fault. Garnier (1918), p. 703, lists an edition at Dijon in 1530, another at Paris by Claude Nourry in 1536, and one at Lyons in 1553.

[5] BN Rés. p. V. 166 preserves the first leaf only of this annual prediction. "La grant Pronostication Avec lamanach bien au long calculee pour Lan Mil CCCCC et xxiii. Commencent le x iour de Mars et finissant Lan revolu a icelluy iour. A lorizon et hemisphere de la tresrenommee et bonne ville de Dijon et compose par maistre Pierre Turrel recteur des escoles de lad' ville. On les vend a Diion deuant nostre Dame en la maison de Pierre grangier Libraire." On the verso a dedication, "A tresmagnifique et puissante dame Madame de la Trimoille," opens, "Madame le prince des philosophes secretaire de nature Aristote Iadis directeur

and was said to have predicted the defeat of Francis I at Pavia. In 1528 there was printed at Lyons his prediction as to the influence of the stars upon Burgundy, which he called the region of Jupiter, for 1529 and several years following. The opening words of the title, "Fatal Prevision by the Stars," might well have aroused some objection as suggestive of fatal necessity.[6] Two years later Turrel translated into French in the house of a noble to whom he dedicated his translation[7] an astrological work which he says was composed in Latin in the monastery "des trois Valées,"[8] and which was entitled, "The Period, that is to say, the End of the World, containing the disposition of terrestrial things by the virtue and influence of the celestial bodies."[9] This work has been represented as printed at Lyons in 1531, but actually is without date or place of printing, while the fact that the author is spoken of as the "late Monsieur Pierre Turrel" indicates that it is posthumous publication.[10] Besides

de Alexandre le grand dit en son second livre intitule de celo et mundo. . . ." After this dedication, which occupies the upper half of the page, the text opens with citation of numerous astrological authorities, but the first line is partly obliterated.

[6] *Fatale prévision par les astres et disposition d'icelles sur la région de Jupiter, maintenant appelée Bourgogne, pour l'an 1529 et pour plusieurs années subséquentes,* Lyon, 1528. I have not seen this work nor any adequate description of it.

[7] ". . . à très hault noble et puissant seigneur messire Girard de Vienne, chevalier de l'ordre et chevalier d'honneur de la Roigne, seigneur de Ruffey et de Commarain, baron Dantigni et de Sainct-Aulbin."

[8] "Escript et composé en latin au monastère des trois Valées et translaté en françois en la très noble maison de Commarien, la plus illustre et magnifique que soit en la région de Mandubie. Faict et terminé le second jour de septembre, mil cinq cens trante ung."

[9] *Le Période c'est-à-dire la fin du monde contenant la disposition des chouses terrestres par la vertu et influence des corps célestes composé par feu M. Pierre Turrel, philosophe et astrologue, recteur des escoles de Dijon.* s.l.n.d. Petit in 8°. xxxi fols.

I have not seen this work but follow a full account of it given in an anonymous note in Guyton's *Recherches historiques,* 1874, pp. 70-74. Guyton himself knew only the title.

There exists in MS by Turrel in Latin a Fatal Prognostication Revealing Marvelous Future Events regarding the Duration of the World and its Last Days, which may be the Latin original from which *Le Période* was translated into French.

[10] The anonymous note in Guyton therefore puts the printing of the work after 1539, when Turrel's *Computus novus* was printed at Lyons. But this does not follow, since Turrel had composed the *Computus* much earlier and dedicated it on January 30, 1525. He may have died shortly after completing the French translation of *Le Période*

maintaining the utility of astrology against the attack of "Plutonic dogs," Turrel considers the duration and end of the world from four different modes of reckoning. One is the completion of the movement of trepidation or access and recess of the eighth sphere in seven thousand years with four stations at the end of each quarter or 1750 years marked by the flood, exodus, destruction of Jerusalem, and end of the world.[11] Others are by the planets each ruling in succession for 357 years and four months, by the change of triplicitas every 240 years, and by the completion of ten revolutions of Saturn every 300 years. Turrel therefore dates the future revolution or annihilation of the world about 270 years from the time of writing. In another passage he puts the fourth and last station of the eighth sphere and the coming of antichrist about twenty-five years after a marvelous conjunction which astrologers predict for the year 1789. In the more immediate future he is fearful of the year 1537 and of the approaching conjunction of Jupiter and Saturn in the venomous sign of the Scorpion in 1544. Turrell affirms his orthodoxy in more than one passage.[12]

Turrel had been called to Dijon late in 1517 as principal of its municipal school. Among his pupils was Pierre Duchastel who later was to become a bishop and royal almoner to Francis I. The king said that he was the only person whose fund of learning he had not exhausted within two years. Turrel investigated the lad's nativity and from his horoscope predicted future greatness but failure to reach old age. After six years as a student Duchastel became a teacher in Turrel's school. Turrel seems

on September 2, 1531. It was the opinion of Garnier and Champeaux, *op. cit.*, p. 703, that the municipal council dismissed Turrel in 1530 or 1531, and that there was no instruction given at Dijon until July 4, 1533. But his death may be the explanation. In November, 1529, he was still refusing to resign, and Chas. Muteau, *Les écoles et collèges en province,* Dijon, 1882, pp. 160-66, dates his rectorship from 1517 to 1530.

[11] This method had been employed by John of Bruges in his *De veritate astronomiae,* written in 1444 and printed later in the fifteenth century, especially in cap. x, De renovatione mundi. Copy used: BN Rés. p.V.186. Turrel also resembles John by concluding with an exhortation to princes.

[12] Guyton, *Recherches historiques,* 1874, p. 69: "l'auteur ne manque pas d'affirmer son orthodoxie en maints passages."

to have received very little as principal and to have eked out a subsistence by practicing astrology. On February 3, 1526/1527 the town council reprimanded him for neglecting his school and on June 12, 1528, charged that he was committing abuses and errors under color of the art of astrology, and that his practice thereof was arousing scandal and complaints. It was perhaps on this occasion that Duchastel came to his defense, asserting that Turrel professed only human, not diabolical, astrology. Galland in his life of Duchastel states that when Turrel was accused of impiety and violation of canon and civil law by his prediction of human fate from the stars, Duchastel defended him brilliantly in court, distinguishing between licit and illicit astrology. He held that it was permissible to cast nativities, provided allowance was made for divine power and human free will. He further argued that, although the causes might remain obscure, long experience had shown the effects of the constellations, and he made the usual point that most men follow natural inclination and exercise neither reason nor volition.[13]

If before the Catholic reformation astrologers did not often have to fear such serious attacks, they were, as we have already seen from the works of Thomas More and des Périers, occasionally the butt of ridicule and parody. In 1526 Pietro Aretino published his *Judicio over pronostico de maestro Pasquino quinto evangelista de anno 1527,* which is believed to have reflected upon Luca Gaurico. But it should be kept in mind that such burlesque and caricature of the current prophesies and annual predictions attest the general popularity rather than unpopularity of prophets and astrologers. They do not even necessarily indicate scepticism on the part of the author of the take-off, although this certainly became the case later with the ridicule of Bayle and Voltaire. If Aretino's intention was to lessen the general faith in such predictions, he chose his time poorly, for the tragic sack of Rome in the year in question must have con-

[13] Petrus Gallandius, *Petri Castellani magni Franciae eleemosynarii vita.* Stephanus Baluzius . . . nunc primum edidit et notis illustravit. Accedunt Petri Castellani orationes duae . . ., Paris, 1674.

vinced many that the contemporary predictions of disaster were no laughing matter, and that it was just as well not to trifle with fate or divine providence. Piero Valeriano tells that after the sack of Rome Angelus Cassius who was dying of fever with all his funds exhausted finally died of fright when Spanish soldiers threatened him with drawn swords and tortures in an effort to extract money from him. He then recalled how a *mathematicus* had once inspected his palm and nativity and predicted that he would die in great want and despair, which he had not credited at the time.[14]

A Rabelais was not to be abashed for long, however, and in 1532-1533 appeared his *Pantagrueline prognostication* by master Alcofribas.[15] It chiefly predicted things that always happen every year. According to Schmidt, Rabelais also published for the city of Lyons several almanachs containing astrological predictions and continued such publications at Metz where he was made municipal physician in 1545.[16] If this be true, his parody of Fries would seem to have been due more to his love of fun than to real opposition to astrology on his part. But in the bibliography of Houzeau and Lancaster only a single prognostication for the years 1533-1550 is listed as by Rabelais and it is represented as satirical.[17] Incidentally it may be noted that the

[14] *Ioannis Pierii Valeriani Bellunensis de Litteratorum infelicitate libri duo,* first printed at Venice, 1620. I have used the reprint from this edition with further notes and additions by Sir Egerton Brydges, Geneva, 1821, p. 108.

[15] The full title, as given in the Amsterdam, 1741 edition of the works of Rabelais, II, 311, is, "Pantagrueline prognostication certaine veritable et infallible pour l'an perpétuel nouvellement composée au prouſit et advisement des gens estourdis et musaris de nature. Par maistre Alcofribas architriclin dudict Pantagruel."

Leduchet, the editor, mentions an edition of 1535 by François Juste at Lyons in duodecimo, while an earlier edition of 1533 is listed by Charles Abel, *Rabelais médecin stipendié de la cité de Metz,* Metz, 1870, BN Lk[7]. 15387.

A recent facsimile reprint is, Gargantua, *Deux publications Lyonnaises de 1532,* 1925.

It was translated into English about 1660 as *Pantagruel's Prognostication,* with a mock introduction to the astrologer, Lilly. Copy seen: BM Huth 146.

Rabelais' two first books are signed, "Alcofribas Nasier."

[16] C. G. A. Schmidt, *Laurent Fries de Colmar médecin astrologue géographe,* Nancy, 1888, p. 45.

[17] Hellmann (1924), p. 33, also lists only it.

name, master Alcofribas, resembles that of a master Alofresant of Rhodes which also figures in the predictions of that time.[18]

Federicus Chrisogonus Iadertinus showed himself an aggressive advocate of astrological medicine in a volume which he published at Venice in 1528 upon fevers, human felicity and the tides.[19] On the title page of this work he is described as a most subtle doctor of arts and medicine and most excellent astrologer. In the dedication to Andrea Griteus, doge of Venice, he calls himself further a professor of "astronomy." Chrisogonus holds that Avicenna and his crowds of followers are mistaken in making the condition of the air the efficient cause of fevers, since there is no distinct science concerning the state of the air without considering the celestial bodies which are the adequate causes of all passions of health and sickness.[20] Coming in the second part of his work to discussion of critical days, he maintains that Hippocrates, Galen and Avicenna did not take astrological con-

[18] *Kaiserliche Practica und Prognostication auss allen alten Weissagungen von 300 jaren her zusamen geschrieben von Carolo V. Auch werden hierinn vil Wundergeschichten in der Welt zukünfftig durch den hochgelehrten Maister Alofresant zu Rhodis practiciert,* etc.: fifteenth tract in the volume, BM 8610.bbb.8.

In another volume, BM 1315.c.4. (11.), *Alle alten Prophecien von keyserlichen Maiestat . . . Alofresant zu Rhodes practiciert,* etc., 1530, an address "Zum Leser," says: "Die erste weissagung ist M. Alofresant von den vier erben Hertzog Hansen (Hausen?) von Burgund un der welchen er diss K. M. Carolum den fünfften am höchsten mit seinem gewalt und manlichen thaten herfür zuecht."

Other items under the name, Alofresant of Rhodes, from the new printed catalogue of the British Museum library are:

Ain wunderliche Prophecey oder Weyssagung gemacht . . . durch . . . mayster Alofresant: shelfmark, 8610. bb.48.(2.). See further L'Art Ancien, Catalogue 25 (1940), item 43.

III Pronosticon . . . ab anno MCCCCXXV (sic) *usque ad MDXL,* P. Gengenbach, Basileae, 1519, 4to: shelfmark, 8610.aaa.19.

Keyserliche Practica und Prognostication, 4to: shelfmark, 1395.h.29.

[19] *Federici Chrisogoni Nobilis Iadertini Artium et Medicine doctoris subtilissimi et Astrologi excellentissimi de modo Collegiandi Pronosticandi et Curandi Febres: Necnon de humana Felicitate ac denique de Fluxu et Refluxu Maris Lucubrationes nuperrime in Lucem edite.* MDXXVIII. At fol. 27v: "Explicit Aureum Opus de modo Collegiandi pronosticandi et curandi Febres atque de humana Felicitate neque non de Fluxu maris et Refluxu. Editum ab Eximio Doctore Federico Chrysogono nobili Iadertino. Et Venetiis impressum a Ioan. Anto. de Sabbio et fratribus Anno a partu Virgineo MDXXVIII. kal' Aprilis." Copy used: BN Rés. Td[60].25. The word Iadertinus probably indicates that the author is from Zara in Dalmatia.

[20] *Ibid.,* I, 3, fol. 2v.

siderations sufficiently into account in this matter. He then, without mentioning any names, attacks yet more vigorously what he regards as the erroneous opinions of "more recent" and "other modern" writers on the subject, arguing that while the ancients are to be excused because the science of astronomy had not advanced far enough in their time, moderns have no excuse since astrology had now attained a high degree of perfection. He is very incensed at one writer for asserting that practicing physicians found no difference between the new moon and other lunar aspects in efficacy or perilousness of bleeding and pharmacy. He censures another, presumably with Nifo in mind, for following the error of Ptolemy in the sixtieth *Verbum* of the *Centiloquium* and adopting an astrological figure of sixteen sides. His own method he characterizes as not set forth before "but scientific." It involves taking into account both the hour of the patient's nativity and the time when the sickness began. The physician should collate the astrological diagrams for both. Chrisogonus illustrates his point by a *figura cocli* for "Socrates" who began to have fever on October 9, 1527, at 21.43 o'clock. This was reproduced by Magini in 1607. After similarly illustrating the aspects of the course of the moon in the entire revolution of the medicinal month, and the days when the moon is not visible, Chrisogonus gives rules for telling what constellations of the planets cause death, how to determine the essence of the disease from the astrological diagram of the time when it began, how to know which humors are ailing in any case of fever, and so on, including the power and magnitude of fixed stars of the first and second magnitude. "The occult cause" of the tides is likewise the influence of the heavenly bodies.

Chrisogonus was less favorable to alchemy than to astrology. After remarking that the sun hated Saturn and that there was the same natural enmity between the minerals subject to those planets, gold suffering manifest alteration from lead, and after adding that many wonderful things might be said concerning the substance of quicksilver, he disappointed any expectation of a favoring attitude towards the transmutation of metals

which these statements might have aroused by declaring that alchemists were led by vain hope into the belief that the form of gold and silver could be multiplied, since they did not even know the substantial forms or how metals were composed naturally underground.[21]

On the other hand, Chrisogonus approved of some of the specific remedies of old wives and empirics, "which we have reduced to laudable canons and scientific modes of operation." An example was the practice of wet-nurses of carrying in the bosom the plant saxifragia maior or hircina to increase the amount of milk. So rapidly did it work in this respect, at least according to Chrisogonus, that after six hours they had to remove it, "not being able to bear further solution of the veins."[22] He also had faith in bezoartic remedies which act against poisons by their entire form, and had tested a bezoar stone at Rome and seen it expel the poison by provoking a violent perspiration.[23]

Despite his confidence in such remedies and in astrology, in his discussion of felicity and human perfection Chrisogonus denied that natural philosophy could make its devotees blessed although it offered us greater perfection than other disciplines he had mentioned.[24] Nor could pursuit of the cabala render us blest, which end could be attained only through orthodox theology, queen of all the sciences.[25]

Georg Tannstetter, whose geographical interest was shown by his editing Albertus Magnus, *De natura locorum* in 1514, whose astronomical activity was evidenced by his editing Peurbach's *Tables of Eclipses* in the same year, and whose annual astrological predictions have been noticed in connection with the conjunction of 1524, also lectured at Vienna on astrological medicine. In 1531 a volume in this field was published under his name at Strasburg by Otto Brunfels.[26] In a preface addressed

[21] *Ibid.*, I, 7, fol. 9v.
[22] *Ibid.*, fol. 17v, col. 2.
[23] *Ibid.*, fol. 20v, col. 2.
[24] *Ibid.*, fol. 22v, col. 1.
[25] *Ibid.*, fol. 23v, col. 2.
[26] *Artificium de applicatione astrologie ad medicinam deque conveni-entia earundem Georgii Collimitii Tansteteri Canones aliquot et quaedam alia quorum Catalogum reperies in proxima pagella.* Argentorati (Georgius Ulricherus) Anno MDXXXI Mense Martio. Copy used: BM 718.b.2.

to Michael Herus or Herr, a physician of Strasburg, Brunfels states that Michael had given him to print a manuscript, presumably in the form of lecture notes, taken down "from the mouth of that very learned man who in our time is among mathematicians first, among medical men supreme." Brunfels contends that astrology is a part of medicine and censures those physicians who oppose it in their books and published letters. Oddly enough he identifies these adversaries of astrology with the adherents of Arabic medicine, expressing the hope that this volume may come into the hands of students, especially those who have abandoned Avicenna and Rasis for ancient medicine, and declaring that he prefers one practitioner of astrological medicine to ten followers of Avicenna, arrayed in purple and unskilled in astrology.

This antithesis between astrology and Arabicism is neither true in general nor at all borne out by Tannstetter's book in particular, which Brunfels appears to have printed without troubling either to read it or to obtain its author's consent. For Tannstetter often cites both Avicenna and Rasis. And after the volume opens with his *Artificium* and discussion of critical days, it continues with a compendium from Alcabitius, Firmicus and Haly on the natures and properties of the planets. Then, after some intervening items, it closes with a Judgment of Albohazen Haly, son of Abenragel, concerning the medical man who is untrained in astrology. Tannstetter also cites such medieval Latins as Jacobus de Partibus the physician and Leopold, "the Austrian astrologer." Pico della Mirandola is said to have pruned astrology of many superstitions especially in the works of Ptolemy but also to have shown in many places his admiration for Ptolemy. Agostino Nifo is also twice cited.

It thus appears that Brunfels belonged to that genus, too common in all periods of history, of persons who do a deal of talking and a minimum of reading and thinking, and who repeat a number of contemporary catch-words and current ideas without the slightest sense or concern how these may fit together. He died not long after this at Berne on December 23, 1534. Although

he published other medical works, he is of course best known for his *Herbarum vivae icones*. *Prognostics from Divine Letters Against Astrology* are ascribed to him in sixteenth century bibliographies[27] but seem no longer extant. It is said that he was converted to a belief in astrology by his friend, John ab Indagine.[28] Almanachs by him are extant, and his discussion of astrological definitions and terms was printed with the 1533 and 1551 editions of the *Mathesis* of Julius Firmicus Maternus.[29]

Antonio of Cartagena was professor of medicine at the university of Alcalà and doctor to the dauphin and his brother. His discussion of fascination will come up in another chapter. We are here concerned with a treatment of critical days which he published in 1529 or 1530 as a supplement to his work on the pest.[30] It is not easy to determine exactly where Antonio himself stands. He presents first one view and then another, or remarks that he has said these things for exercise and therefore does not wish either to confirm the arguments adduced or to disprove them.[31] He repeats at considerable length the arguments of Pico della Mirandola against the astrological explanation of critical days but adds that he does not agree with them, for it is difficult to deny the influence of the planets other than sun and moon, or that of the fixed stars, or to reject such branches of astrology as nativities, revolutions and conjunctions.[32] He also maintains against Pico that there is reason for the division of the zodiac into twelve parts, distinguished *a posteriori* from

[27] Robertus Constantinus, *Nomenclator insignium scriptorum*, Paris, 1555, p. 86. Also in the 1583 edition of Gesner's *Bibliotheca*.

[28] Sudhoff (1902), p. 47.

[29] I quote from the 1551 edition: "Othonis Brunfelsii de diffinitionibus et terminis astrologiae libellus isagogicus." Hellmann (1924), p. 26, lists an annual prediction for 1582 in German by an Otto Brunfels, presumably some later bearer of that name.

[30] *Antonii Cartaginensis doctoris eximii in complutensi gymnasio medicine professoris nunc vero Caroli Caesaris iussu Galliarum Delphini eiusque fratris ducis Urliensis medici liber de peste, de signis febrium et de diebus criticis*. Compluti, 1530, folio. Copy used: BM c.63.m.15. The date on the title page is 1530, but in the colophon at fol. 120r we read, "Compluti in aedibus Michaelis de Eguia idibus Novembris anno domini millesimo quingentesimo vigesimo nono."

[31] *Ibid.*, fol. 110v, col. 2.

[32] *Ibid.*, fol. 110v, col. 1-2 (Secundus liber, Tractatus III, end).

their effects, and for the astrological aspects of the planets.[33] But he comes to the conclusion that it cannot be demonstrated that the moon by its aspects is the cause of critical days, which occur according to some natural order that escapes us.[34] Yet he proceeds in the next section to state that *dies iudiciarii* are those in which the moon is in quadrate aspect or opposite angles, if the tradition of the astronomers is true, or are those which happen by sevens.[35] So the main inference to be drawn from his discussion seems to be that it shows that the attack of Pico della Mirandola on astrology continued to receive attention and to arouse opposition as far away as the Spanish peninsula, and that the problem of critical days and their relation to the moon and to astrological influence was much disputed and in doubt there as elsewhere.

John ab Indagine wrote in 1530 some retrospective astrological reflections (*Rationes astronomicae*) on the imperial election of 1519 which have recently been reproduced from the original manuscript.[36]

Gemma Frisius (1508-1555) has recently been presented as an early friend of the Copernican theory and as further contributing to the advance of science by his method of determining differences of longitude by transporting timepieces and his treatise on triangulation.[37] In our chapter on anatomy we shall see him associated with Vesalius in the clandestine collection of anatomical material. He was also not unfavorable to astrology. In his manual of 1530 on the principles of astronomy and cosmography he discussed such matters of importance to astrologers as the ascendent sign, the houses, and directions.[38]

[33] *Ibid.*, fols. 112r-v, 114r, col. 1.

[34] *Ibid.*, fols. 114v, col. 1, 116v, col. 1.

[35] *Ibid.*, fol. 117r, col. 1 (Tractatus quintus).

[36] By Fritz Hermann, "Der Astrolog Johannes Indagine, Pfarrer zu Steinheim a. M. und die Frankfurter Kaiserwahl des Jahres 1519," *Archiv für hess. Gesch. u. Altertumskunde*, XVIII (1934), 274-91.

[37] By Grant McColley in *Isis*, 26 (1937), 322-25, and by A. Pogo, *ibid.*, 22(1935), 469-85. The new method of finding longitude was not first mentioned by A. Quetelet in 1864, whom Pogo cites, but at least as early as 1819 by J. B. J. Delambre, *Histoire de l'astronomie du moyen âge*, pp. 432-33.

[38] *Gemma Phrysius De principiis astronomiae et cosmographiae Deque usu globi ab eodem editi. Item de*

A judgment from the comet of 1531 by Nicolaus de Schadeck was composed at Cracow.[39] We shall have occasion to notice others by Paracelsus, Perlach and Schöner in subsequent chapters.

John Robyns who was elected a fellow of All Souls college, Oxford, in 1520 and later became chaplain to Henry VIII and canon of Christchurch and Windsor,[40] has left a number of astronomical and astrological works in manuscript, some of which are preserved in his own handwriting. They include a treatise on the fixed stars,[41] astrological observations made about 1530,[42] further astrological notes,[43] an epitome of Ptolemy's *Quadripartitum*,[44] and works addressed to Henry VIII on comets as portents[45] and on future events.[46] Of these the latter also contains observations on the comet which appeared in 1532. The former was the outcome of discussions concerning the natures and effects of comets with Henry VIII at Woodstock and Buckingham, in which Robyns was duly impressed by the king's mathe-

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orbis divisione et insulis rebusque nuper inventis. Antwerp, Jo. Grapheus, October, 1530, II, caps. 22 and 23. The preface is dated September 15, 1530. The name of Grapheus does not appear on the title page of the 1530 edition as reproduced by Pogo, nor in the copy at Columbia (910.G28) which I have used and which is dated on the binding, Lovanii 1532. In both cases there is instead the legend: "Vaeneunt cum globis Louanii apud Seruatium Zassenum et Antwerpiae apud Gregorium Bontium sub scuto Basiliensi."

Delambre, *op. cit.*, p. 445, said in another connection, "les directions sont parfaitement inutiles en Astronomie."

[39] Vienna 4756, fols. 147r-150r.

[40] R. T. Gunther, *Early Science at Oxford*, 1921-1939, 13 vols., II, 68.

[41] BL Digby 143, 16th-17th century, fols. 1-59.

[42] BM Sloane 1743, autograph, imperfect.

[43] BM Sloane, 1773, autograph, fols. 1-55v.

[44] *Ibid.*, fols. 57-117v, imperfect, opening, "Duo praecipua sunt et necessaria carissime. . . ."

[45] *De portentosis cometis*, CU Trinity 1035 (O.I.11), 16th century, 24 fols. BM Royal 12.B.XV, 16th century, fols. 11-52v, opening, "Ad invictissimum principem Henricum eiusdem nominis Octavum Serenissimum Anglorum regem De cometis Commentaria Ioannis Robyns sui Alumni et socii Collegii omnium Animarum Oxoniae Prohemium. Quanquam omnes philosophiae partes. . . ." I have used this MS in the account of the work given above. The preface was printed by Halliwell, *Rara mathematica*, 1841, p. 48.

[46] BL Ashmole 186, 16th century, fols. 5-14, 4^{b}-1, "Ad invictissimum principem Henricum eiusdem nominis octavum serenissimum Anglorum regem et fidei defensorem Joannis Robyns sui collegii in Oxonia canonici libellus de accidentibus futuris."

matical attainments. The work is in eight chapters. Robyns' treatment of the spheres of the four elements remains unaffected by the recent voyages of discovery with respect to the extent to which the earth's surface is covered by water. He denies that comets themselves produce the great effects which follow them and states that the majority of astrologers ascribe the generation of comets to eclipses and revolutions of years of the world. Furthermore no comet is generated without the influence of hot and dry planets, namely, the sun, Mars and Saturn. Since two out of three of these are unfortunate, comets are likely to forecast ills, but they may share the nature of favorable stars like Jupiter and Venus and portend good fortune, at least to some extent. They may not, however, presage rainy years, since they are generated themselves by hot and dry planets. The events they portend, as long observation and experience have shown, do not occur simultaneously with their appearance but sometimes two or three years, sometimes six or seven years later. Robyns is hard put to it to decide whether such events occur in those regions which are subject to the sign of the zodiac in which the comet appeared, as Ptolemy held, or in those provinces where the comet is visible, as Lincolniensis contended. There is, in his opinion, nothing to prevent a comet from appearing in a new and unusual form and shape such as has never been seen before.

In the dedicatory preface from Mainz on February 12, 1532 of his Seven *Books of Marvels*[47] to Lorenzo and Tommaso Campeggio, the one, cardinal legate to Germany, and the other, bishop of Feltre, Frederick Nausea attacked quite violently the vain prognostications of contemporary astrologers who derogate from God and human free will and have a bad effect upon the people. They incline one to believe that astrology is the root of all evil. But those who contend that recent signs in the sky have no significance go to the other extreme. Pontiffs and kings should rid their realms of all magicians, necromancers, insane

[47] Fredericus Nausea Blancicampianus, *Libri mirabilium septem*, Coloniae apud Petrum Quentell, 1532. 76 fols. I discuss the work further in the chapter on Divination.

chiromancers and deceiving astrologers, but not take action against true astronomers. Later in the course of the text of the work he holds forth concerning macrocosm and microcosm, and devotes seventeen chapters to the comet of 1531 and a certain other comet. Some theologians would regard them as new divine creations from nothing, supernatural and prodigious, but Nausea holds that they are natural phenomena.

Johann Vögelin, professor of mathematics at Vienna, who had made an annual prediction for the year 1531,[48] also published there in 1533 a tract on the significance of the comet of the previous year.[49] Tycho Brahe later wished to see it, because Vögelin had ascribed an enormous parallax to this comet.[50]

Nicolaus Pruckner or Prugner, who had contributed a complimentary poem to the *Herbarum vivae icones* of Otto Brunfels, in 1533 issued another edition of the *Mathesis* of Julius Firmicus Maternus. In the dedication thereof to Brunfels he censured those physicians who neglected astrology and held that the theological arguments against astrology could be turned against theology itself. He illustrated the former point by giving the constellations in a case where the patient had died under a surgeon's hands. The heavens indicated danger from the planet Mars on account of the physician. The British Museum also has a tract on the comet of 1532 by Pruckner and a *Practica* or annual prediction for 1543. Hellmann notes another for 1548.[51] The Bibliothèque Nationale has yet another based on the solar eclipse of 1540.[52] All four are in German. Pruckner's edition of Firmicus was reprinted in 1551 with another preface defending astrology addressed to Edward VI of England. Pruckner holds that the complaints made against astrologers are not the fault of the art but result from the fact that many would-be astrologers do not understand astronomy. He affirms the influence

[48] Hellmann (1924), p. 30.

[49] J. Vogelin, *Significatio cometae qui anno 1532 apparuit,* Viennae, 1533.

[50] *Opera,* VII, 212.

[51] Hellmann (1924), p. 29.

[52] *Der Grossen und grausamen Fynsternüssz der Sonnen auff das MDXL Jar Prognosticon; . . . durch Nicolaum Prucknerum . . . beschriben. . . .* Strasszburg, H. Schott (s.d.), 4to. Copy used: BN Rés. V. 1170.

of the stars, gives instances of true predictions from them in the past, asserts that he might cite many of his own, and adduces the biblical incident of the magi and the star of Bethlehem as attesting the validity of astrology. He would associate young Edward's growth with "the renaissance of religion in this realm," but dates his preface from Strasburg, January 28, 1551. Pruckner is said to have assisted in repairing the astronomical clock in the cathedral of Strasburg.[53]

At Strasburg in 1537 Jacob Cammerlander printed two collections of astrological medicine which Jacob Scholl of that city had put together from past authors, "feathers from various birds."[54] Cammerlander who was born at Mainz addressed this publication to an M.D. of that city, Antonius Junior, whom he had known from childhood and with whom he had been educated at Mainz by the same teachers: Andrea Suevus, Adam Weiss, Nicolaus Carbachius and Adam Helsinger. Of Scholl's two compositions the former and shorter was definitely entitled, *A Brief Application of Astrology to Medicine,* and in its nine chapters considered the signs and planets, elements, complexions and humors, weather changes, and astrological houses and aspects. The second and longer *Fasciculus of All Medicine,* which Scholl is said to have "recently restored to astronomical integrity," is also largely astrological, including a Regimen of the Twelve Months from Hippocrates, and citing Tannstetter, Johann Virdung von Hassfurt, and Arnald of Villanova ("Arnoldus Neocomensis") on bleeding. It is a different work than the *Fasciculus medicinae* of John de Ketham, printed in the previous century. Nothing more seems to be known about Scholl. Sudhoff was of the opinion that he lived at the beginning of the century, and

[53] See the article on Nicolaus Prugner in *Allgemeine Deutsche Biographie.*

[54] *Astrologiae ad medicinam adplicatio brevis deque convenientia earundem canones aliquot ex probatissimis quibusque et astrologiae et medicinae authoribus vigilantissime collecti restaurati et nunc primum in lucem aediti. Post hos fasciculus totius medicinae sequitur theses aliquot rei medice et maxime simplicioris brevissime complectens opera et diligentia M. Iacobi Scholl Argentini nuper integritati astronomicae restitutus.* Argentorati excudebat Iacobus Cammerlander Moguntinus Anno MDXXXVII. Copy used: BM 1141.c.3.

that our text was of earlier date than the year of its printing by Cammerlander.[55] This may be true of the *Brief Application of Astrology to Medicine* although its *collectanea* from past authors are said to be "now published for the first time lest they become food for worms."[56] But the *Fasciculus medicinae* must have been finished recently, since the works of Tannstetter and Hassfurt which it cites were printed only in 1531 and 1532.

Another example of close connection between medicine and astrology at this time is provided by Jacob Rueff, a surgeon of Zurich, who, Gesner tells us, composed a catalogue of physicians and astrologers with figures. It was printed in tabular form so that it could be hung on the wall.[57]

Charles de Dançay (c.1509-1589), French ambassador to Denmark who laid the corner-stone of Tycho Brahe's observatory at Uraniburg, in a letter of November 17, 1576, expressing his interest in astronomy, commended Tycho for employing astrology in moderation.[58] Dançay himself neither condemned it nor regarded it so highly as many did. He had been frightened away from it by Calvin when they were together in Strasburg. Calvin was there from 1537 to 1541. At that time Dançay had such confidence in the art that he boasted he could tell from the stars whether women were guilty of adultery—and his predictions rarely were false. But Calvin scolded him so, and he had such high esteem for Calvin, that he gave up such predictions, in which he implies that Sturm, the educational reformer, had also been involved.[59]

Petrus Maynardus, a physician of Verona who taught at Padua in the first half of the sixteenth century, in his tract on syphilis[60]

[55] Sudhoff (1902), p. 51.

[56] "Ad lectorem," at end of the volume: ". . . haec collectanea M. Iacobi Scholl Argentini quae ita ex propolarum foro typographica diligentia ne omnino tineas pascerent placuit tibi communicari. . . ."

[57] Gesner (1545), fol. 361v.

[58] Carolus Danzaeus ad Tychonem 17 Nov. 1576, *Opera*, ed. Dreyer, VII (1924), 41.

[59] *Idem*, "mecumque Sturmius plurimum illis tribueret."

[60] The copy in the Bibliothèque Nationale is undated, while the British Museum catalogue lists later reprints. Hirsch, *Biog. Aerzte*, gives 1527 as the date of printing, using J. K. Proksch, *Die Schrift des Petrus Maynardus*, Wien, 1875.

In Vatic. lat. 3187 a *Tractatus de Cabbala* ascribed to Petrus de May-

held that only men born under the sign Scorpio were susceptible to the disease, and that it would disappear with the conjunction of 1584. Otherwise his tract had merit and he is said to have introduced washing of the genitals as a prophylaxis.

Magini states that Matthaeus Curtius of Pavia was so erudite that in all the universities of Italy he ranked first in interpreting and disputing. He refuted the arguments of Pico della Mirandola as to critical days, explained the opinion of Galen, and attributed crises to the course and aspects of the moon.[61] He died at Pavia at the age of seventy in 1544, having previously taught at Padua, Bologna, Florence, and Pisa, while Clement VII had frequently summoned him to Rome.[62] He was among those present when Widmanstad explained the Copernican theory to Clement VII in 1533 in the Vatican gardens.[63] His name appears at Pavia in 1497 and 1499 as teacher of logic, and in 1512 as a promoter to a degree.[64] In 1515 he was at Pisa.[65] From 1524 to 1532 he taught the theory of medicine at Padua[66] and from 1538 to 1541 at Bologna.[67] He was again at Pisa in 1543,[68] and, according to Lami, a manuscript of a lecture by him on the *Parva naturalia* of Aristotle is dated there on November 2, 1545.[69] This would not leave him much time to return to Pavia

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nardis is really the *Opusculum de auditu kabbalistico* on the Lullian art which was printed several times in the sixteenth and seventeenth centuries. The handwriting of the MS, however, appears to be of the fifteenth century, so that if Petrus de Maynardis is the writer, he is probably some earlier bearer of that name.

[61] Jo. Ant. Magini, *De astrologica ratione ac usu dierum criticorum*, Venice, 1607, fol. (b 3).

[62] Jöcher, *Allgemeines Gelehrten Lexicon.*

[63] Tiraboschi, *Storia della letteratura italiana*, Milan, 1824, VII, 706, citing via Marini, *Degli archiatri pontifici*, II, 351, the statement by Widmanstad on the title page of his manuscript copy of Alexander of Aphrodisias, *De sensu et sensato*, presented to him by the pope on this occasion. The MS is now CGM 151.

[64] *Memorie e documenti per la storia dell' università di Pavia e degli illustri uomini più che v'insegnarono*, Pavia, 1878, p. 167. The rolls are lacking for the years 1499-1536.

[65] A. Fabroni, *Historia academiae Pisanae*, Pisa, 1791-1795, I, 399.

[66] N. C. Papadopoli, *Historia gymnasii patavini*, 1726, I, 12, n. 9; 316, n. 65. Ant. Riccoboni, *De gymnasio Patavino*, 1598, fol. 21r.

[67] U. Dallari, *I rotuli*, II, 87, 90, 93.

[68] Fabroni, *op. cit.*, I, 399.

[69] Giovanni Lami, *Catalogus codicum manuscriptorum qui in bibliotheca Riccardiana Florentiae adservantur*, Leghorn, 1756, p. 280: MS FR L.II.XV, paper in folio, Matthaeus a Curte Papiensis professor Pisanus, Lectura in librum parvorum naturalium die 2 Novembris MDXLV Pisis.

to die in 1544, even if we assume that the date, 1545, is given according to the *calculus Pisanus* and corresponds to our 1544. Of his treatise on birth in the seventh month, which was presumably astrological, I have found no earlier edition than that of Venice, 1562, with other medical works by him.[70] Tracts in connection with the controversy as to bleeding in cases of pleurisy were about all that he seems to have published during his lifetime.[71]

Another professor at Pisa, Giuliano Ristori or Julianus Ristorus we have earlier mentioned as the author of a treatise on chiromancy and physiognomy. With these arts he combined astrology. An annual prediction by him for the year 1528 made a great impression.[72] Junctinus, writing in 1573,[73] and Goclenius in 1618[74] still recalled how it had astounded Siena, Rome, and practically all Italy, as well as the armies of both Spain and France, and had been translated under the name of Johann Stoeffler, the noted German astrologer. There is extant by Ristorus in manuscript another prognostication, based upon the geniture of duke Cosimo de' Medici and drawn up on June 28, 1537, in which he speaks of himself as Iuliano Ristoro, a Carmelite of Prato and professor of theology.[75] Junctinus attended his lectures at Pisa in 1548 and reproduces some of his notes on them.[76] In a discussion why Albumasar in the second chapter of his *Magnum Introductorium* accepts only twelve out of forty-eight constellations as affecting sublunar things, we are told of

[70] *Tractationes medicinales tyronibus medicis per quam utiles quarum tituli ac authorum nomina sunt: Matthaeus Curtius, de dosibus; eiusdem consilium de septimestri partu; eiusdem etiam de febribus . . .* , Venice, 1562. Copies in the Surgeon General's library and BN Te[4].1.

[71] *Questio de phlebotomia in pleurisi,* Venice, Jo. Patavinus et Venturinus de Ruffinellis, 1534. *Cum neotericis medicis de venae in pleuritide sectione disceptatio,* printed with L. Fuchs, *Apologia . . . contra H. Thriverum,* 1534: BM 543.b.20.(4.). *De venae sectione quum in aliis affectibus tum vel maxime in pleuritide liber,* Lyons, 1538: BM 783.d.2.

[72] It is not, however, noted by Hellmann (1924).

[73] Franciscus Junctinus, *Speculum astrologiae,* Lugduni, Phil. Tinghi, 1573, fol. 2r.

[74] Rodolphus Goclenius, *Acroteleuticon astrologicum,* Marburg, 1618, p. 49, quoting Junctinus but changing the mention of Siena to Florence.

[75] FL Plut. 89 sup., cod. 34, pp. 119-76.

[76] *F. Junctini Commentarium in sphaeram Joannis de Sacro Bosco,* 1577, I, 416-26.

a ring, engraved while the moon was in Cancer in mid-sky, which Julian prescribed with success for ailing feet and shins, and of another, engraved while Saturn was in an unfavorable position, which Niccolò Orlandini, a religious of Florence, used against mosquitoes. Iunctinus adds that Mizauld also wrote on such astrological images, but that in his own judgment they are idle and contrary to the truth. He has repeated them only because he heard them from his preceptor at the university of Pisa and jotted them down. Although some miracles can be effected by magnetic virtue, these engraved rings are mere curious vanity and of the same stripe as the walking and talking statues of Simon Magus, which true Christian piety repels and condemns. We have already encountered other cases of friars and theologians defending astrology. But Ristorus presents a rather extreme case of a man who was at once friar and theologian—not to mention a university professor—who cultivated chiromancy and even images in addition to astrology, and who went farther with respect to images than even an astrologer like Junctinus was willing to follow.

Andreas Aurifaber of Danzig, for a time physician of the prince of Prussia and author of a work on amber (*De succini historia*) contained in the fourth volume of the *Consilia* and medical letters of Johann Crato,[77] also composed an astrological prognostication for the next ten years in 1541 in German.[78]

Federigo Delfino succeeded Thomas Philologus or Rangoni as professor of mathematics at Padua, where he taught from 1521 until his death in 1547. Previously he had practiced medicine at Venice for fifteen years and had almost been jailed as a magician, if we believe Papadopoli,[79] because of his marvelous cures and sure prognostications. He therefore retired to devote himself to astronomy and astrology. Annotations on the *Alfonsine Tables* are ascribed to him, but the only publication of his which I have seen was posthumous and dealt with the tides and the

[77] Cited by De Boodt, *Gemmarum et lapidum historia*, 1609.

[78] Hellmann (1924), p. 26.

[79] *Nicolai Comneni Papadopoli Historia gymnasii Patavini*, Venice, 1726, I, 305-6.

[80] Fredericus Delphinus, M. D., *De fluxu et refluxu maris et Disputatio*

movement of the eighth sphere.[80]

At the request of Andreas Perlach, whom we met thirty years before as Tannstetter's assistant but who was now professor of mathematics at Vienna himself, Johann Schröter of Weimar composed a manual with tables on the prediction of disease from the stars. Weather prediction also was involved. Nifo was cited and use was made of the materials of Johann Vögelin, now of Heilbronn. The work was printed at Vienna in 1551.[81] Schröter's name appears in the proceedings of the faculty of medicine at Vienna from September 27, 1549, to October 13, 1554. He was admitted in 1551 to examination for the baccalaureate and the licentiate, and ultimately became doctor of arts and medicine. On January 5, 1552, he became a member of the medical faculty and on October 13, 1553, was elected dean.[82] Sudhoff states that he also studied at Wittenberg and Padua. His later years were spent at Jena. He was physician both at the imperial and the Saxon court. He also wrote mathematical treatises[83] and published a work on humors in 1582.[84]

Astrological medicine was manifest in a *Paraphrasis* by Claude Fabre, a physician of Seurre on the Sâone, which accompanies the edition of Galen's *De decubitu infirmorum* in the translation of Joseph Struthius as printed at Lyon in 1550.[85] Fabre's preface is dated March 30, 1549.[86] Cardan's book on genitures is already cited by him.[87]

The Low Countries witnessed a small controversy as to the worth of astrology in the middle of the sixteenth century. Francis Rapard, a physician of Bruges, published at Antwerp in 1551

eiusdem de motu octavae sphaerae, Venice, 1559.

[81] Sudhoff (1902), pp. 57-58.

[82] *Acta facultatis medicae universitatis Vindobonensis,* ed. K. Schrauf, III(1904), 242, 254-55, 260, 264, 266. R. Kink, *Gesch. d. Univ. zu Wien,* 1854, I, ii, 165.

[83] DES (1917), p. 139, who specifies *De arte numerandi.*

[84] *De omnibus in universum totius corporis humani humoribus liber,* Patavii, 1582, 4to: BM 549.e.4(1.).

[85] *Claudii Galeni Pergameni Mathematices Scientiae Prognostica de Decubitu infirmorum Iosepho Struthio interprete cum Paraphrasi Claudii Fabri medici Surregiensis novissime iuncta.* Lugduni, Apud Theobaldum Paganum, MDL.

[86] "Vale Surregii supra Sagonam tertio Calendas Aprilis Anno 1549."

[87] *Ibid.,* p. 54; see also p. 67, "Unde Hieronymus Cardanus medicus Mediolanensis Aphorism. 87 ait." Publications by Cardan on genitures had appeared at Nürnberg in 1543 and 1547, and perhaps earlier in Italy.

A Great and Perpetual Almanach[88] in which he declared that times for bleeding, bathing and purging were not to be determined by astrology. He further condemned vulgar almanachs for containing things like the Indiction, golden number, and feast days which women and children know from their calendars, or such matters as the dates of fairs, tides and signs for sowing which are found in the booklet giving the value of moneys and are better known to merchants, sailors and gardeners than to medical men. Or the vulgar almanachs predict weather changes, wars and political events which "are nonsense of the Gentiles and Egyptians." For weather prediction for fixed future dates is mere divination and sheer conjecture and unworthy of physicians. Or they contain announcements of coming eclipses and conjunctions and phases of the moon which are astronomical but which any schoolboy can learn how to reckon from astronomical tables.

To this criticism Peter Haschard or Haschaert, a physician of Brussels, replied under the title: "An Astrological Shield Against the Scourge of Francis Rapard in which (no less than in the shield of Achilles all arts and trades) are detected the errors and follies of the same Rapard with a declaration and approbation of the usefulness of astrology and a confutation of his arguments."[89] This reply was printed at Louvain in 1552. Haschard gave both ancient and recent examples of the effects produced by comets and eclipses, but especially defended astrological medicine. Alluding to the marvelous remedies of Paracelsus, which we thus see had already spread to the Low Countries, Haschard noted that he said that the physician must know astrology. On the other hand, Haschard referred slightingly to Pico della Mirandola's attack upon astrology, averring that he was

[88] *Magnum et perpetuum Almanach . . . de Phlebotomia de Balneis de Purgationibus certiora precepta continens ut merito dici posset vulgarium prognosticorum medicorum empiricorum medicastrorum flagellum,* Antwerp, 1551. Copy used: BM 783.b.-30.(1.).

[89] Petrus Haschardus, *Clypeus astrologicus adversus Flagellum Francisci Rapardi Brugensis medici in quo (non minus quam in Achillaeo clypeo omnes artes et economiae) deteguntur errores et nugae ipsius Rapardi cum declaratione et approbatione utilitatis astrologiae et confutatione argumentorum eius.* Louvain, 1552. In the same volume as Rapard's work. Andreas, *Bibl. Belgica,* 1643, p. 745, says that Haschard was of Armentières and at first called himself of Lille.

never consistent in his attitudes, that his work was not original with him but excerpted from older authors, and that, like Rapard, he offered only trifling cavils by way of argument. Haschard complained, however, that the simple and unthinking populace always esteemed innovators and those who attacked old usage and regarded such ostentatious impostors as demi-gods.

Haschard wrote on the comet of 1556 and issued annual astrological predictions in French and Flemish, the last extant being for the year 1567.[90]

An Introduction to *Judicial Astrology* is promised with the work of Jacob Koebel on the astrolabe in the titles of the editions of Paris, 1545, 1551 and 1552.[91] In the two latter cases at least it does not materialize in the text.[92] In the treatise on the astrolabe the old method of dividing the zodiac into twelve houses is abandoned in favor of the more recent method of Peurbach and Regiomontanus, thus laying the foundation at least for astrological prediction.[93] If this Jacob Koebel, who wrote on other mathematical subjects in both German and Latin, was the same as the printer of that name of whose publications Roth drew up a bibliography,[94] he would seem to have observed the

[90] Hellmann (1924), p. 31. His commentary on Eobanus Hessus, *Praecepta bonae valetudinis . . .*, was printed in 1568: Andreas, *op. cit.*, p. 745. He may perhaps further be identified with a Hassard who practiced medicine at Antwerp and whose translation of the pest tract of Paracelsus, made in 1570, was discussed by Léon Bertrand, "La peste dans les Flandres," *Deuxième Congrès International d'Histoire de la Médecine*, 1922, p. 44.

[91] *Astrolabii declaratio . . . accessit Isagogicon in astrologiam iudiciariam*, Paris, 1551 and 1552. Copies used: BM T.962.(4.) and 531.e.3.(2.).

[92] I have not seen the 1545 edition but it has the same number of printed leaves as that of 1552. The *Introduction to Judicial Astrology* is not mentioned in the titles of the editions of Mainz, 1535 and of 1585. I have somewhere seen listed an edition of 1517 with the words, "Accessit Isagogicon in astrologiam iudiciariam." But since the author was given as Johannes rather than Jacobus, the date may have been wrong too. Gesner (1545), fol. 357r, speaks of the *Astrolabii declaratio* as printed "Franckfordiae apud Egenolfum, 1536 in 4" before it was translated into Latin and so printed at the same place. But the Latin edition at Mainz in 1535 belies this statement: *Astrolabii declaratio eiusdemque usus mire iucundus non modo astrologis medicis geographis ceterisque literarum cultoribus multum utilis verum etiam mechanicis quibusdam opificibus non parum commodus a Iacobo Koebelio nuper aucta longeque evidentior aedita.* Moguntiae Petrus Iordan excudebat mense Iulii anno MDXXXV. This title suggests, however, that Koebel was revamping some previous work, probably not his own.

[93] *Ibid.*, cap. 25.

[94] F. W. E. Roth, *Die Buchdruckerei des J. Köbel . . . 1503-1572. Central-*

rule of not printing his own compositions. Hellmann describes our author as "Stadtschreiber in Oppenheim" and lists an annual prediction in German by him for the year 1523.[95]

Sebastian Münster (1489-1552) may be mentioned here as continuing the tradition of Stoeffler, under whom he had studied at Tübingen, where in 1515 he entered the Franciscan convent. In 1529 he went to Basel where he turned Protestant and became professor of Hebrew.[96] His interest in astronomy and astrology continued, however. In 1533 he published an annual prediction in German[97] and in 1534 a brief astronomical textbook.[98] In the latter he illustrates the tendency to make things easier or more elementary for the student. He says that he knows various such works have been left us by our ancestors but that a person unskilled in mathematics could often make nothing of them. He therefore prepares a text which the reader can understand if he only knows addition and subtraction.[99] In 1550 he further published a *Cosmography* in which he has been accused of using without acknowledgement materials of Stoeffler which had been consumed in a fire of 1534 and of which Münster had the only surviving copies.[100] Münster remained true to astrology to the end, dying of the pest in his climacteric year, as Thuanus pointed out in his *History*. Münster has acquired a niche in the history of geography by his scheme for a cooperative map of Germany in which he was to cover the Palatinate; Lorenz Fries, Alsace; Aventinus, Bavaria; Schöner, Franconia; Peutinger, Swabia; Glareanus, Switzerland; Tannstetter, Austria; and so on.[101]

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blatt für Bibliothekswesen, Beiheft 4, 1889.

[95] Hellmann (1924), p. 28.

[96] J. C. Albert Moll, *Johannes Stöffler von Justingen,* Lindau, 1877, pp. 46-47; *Iac. Aug. Thuani Historiarum sui temporis,* Bk. XI.

[97] Hellmann (1924), p. 28.

[98] *Canones super novum instrumentum luminarium,* Basileae apud And. Cratandrum mense Martio anno MDXXXIIII. Copy used: BM 531.h.-1.(1.). Small 4to, 51 pp. I do not know just what relation it bears to his *Erklerung des newen Instruments der Sunnen,* Oppenheim, 1528, which I have not seen.

[99] *Ibid.,* pp. 2-3.

[100] Moll, *op. cit.,* p. 47.

[101] Printed together with his *Erklerung des newen Instruments der Sunnen, . . . Item eyn Vermanung an alle Liebhaber der Künstenn im hilff zu thun zu warer und rechter Beschreybung Teutscher Nation,* Oppenheim, Jac. Köbel, 1528, 4to, 16 fols.

Concerning it see further L. Gallois, *Les géographes allemands de la renaissance,* Paris, 1890, pp. 205-12 and Appendix VIII, where he translates a portion.

CHAPTER XVI

THE AFTERMATH OF REGIOMONTANUS

Regius alter erat cui mons cognominis usum
Et natale solum primaque tecta dedit . . .
* * * *
Alter ab hoc vixit Schonerus laudibus artis
Non tamen inferior quam fuit ille suae.
—MELANCHTHON

In the course of the sixteenth century it became a commonplace remark of German writers on mathematics or astronomy to refer to Peurbach and Regiomontanus as the restorers of these subjects after many centuries of medieval neglect. The activity in these fields of John of Gmunden earlier in the fifteenth century, not to mention John of Saxony and others in the fourteenth, was forgotten, and a mathematical renaissance comparable to the revival of classical belles-lettres by the Italian humanists was accredited to Peurbach and Regiomontanus. We read, for example, in the 1514 edition of various *Tables* of these two men by Tannstetter, the mathematician of Vienna: "These two most celebrated men magnificently restored the most noble discipline of astronomy which had almost been obliterated from human memory."[1] Yet Tannstetter nine years later in his *Libellus consolatorius,* as we have seen in a previous chapter, used data as to past planetary conjunctions compiled by his assistant, Andreas Perlach, from the *Viennese Tables* of John of Gmunden. Another illustration is provided by a preface of 1540 to an edition of the *Sphere* of Sacrobosco, itself a work of the thirteenth century. Yet the preface asserts that "this doctrine, after it had lain unhonored for centuries, recently flowered again in Germany, restored by two very great men, Peurbach and Regiomontanus."[2]

[1] Georgius Purbachius, *Tabulae eclypsium. Tabula primi mobilis Joannis de Monte regio.* Viennae, 1514, fol. a a 5.

[2] Although the preface is dated as of 1540, it is prefixed to the edition

The composition of such encomia was not confined to fellow Germans of the two astronomers, as the utterance of an Italian will presently show. William Gilbert, the celebrated English scientist of the later sixteenth century wrote the following sentence, which, while less eulogistic, illustrates the misapprehensions then prevalent even in the minds of distinguished men of science as to the history of their subject. "Eleven hundred and forty years after Ptolemy, king Alfonso in 1300 A.D., then George Peurbach and John Regiomontanus discovered . . . a third motion which they called that of access and recess."[3] Actually this movement had been suggested by Thebit ben Corat in the ninth century, to say nothing of Gilbert's inaccurate dating of the *Alfonsine Tables.*

When and how did this misestimate of the relation of Peurbach and Regiomontanus to the science of previous centuries begin? According to Zinner, the sole extant allusion to the death of Regiomontanus in 1476 by a contemporary appears to be by Hartmann Schedel.[4] Only with the last decade of the century do complimentary allusions to him by others begin. Most of these are moderate in tone and do not couple his name with that of Peurbach, or indulge in unwarranted aspersions upon all medieval astronomy and mathematics. Conrad Celtes composed an epitaph calling him ". . . astrorum dux decus et patriae." John of Glogau described him as "a most learned astronomer and very keen reformer of quadrivial studies." Pico della Mirandola, while accusing him of having taken his method of dividing the zodiac into houses from Abraham Avenezra without acknowl-

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of 1564. It is unsigned but is preceded by a dedication of 1550 by Elias Vinetus to Ioannes Tacitus. The passage which I have translated occurs at fol. 4v.

[3] Gilbert, *De mundo nostro sublunari philosophia nova, Opus posthumum,* Amsterdam, 1651, p. 149. "Post Ptolemaeum annis MCXL Alphonsus rex anno domini MCCC, Georgius inde Purbachius et Iohannes Regiomontanus invenerunt praeter dictos motus tertium motum quem accessus et recessus dixerunt." On the very next page "Tebith" is mentioned as having added a tenth sphere. Usually the hypothesis of a ninth sphere is said to have originated only with the *Alfonsine Tables.*

[4] Zinner (1938), pp. 178-79. He fails to note, however, the allusion to the death of Regiomontanus by Moravus in 1492 to which we shall presently refer.

edgement, called him "the most learned mathematician of our time." Simon de Phares discriminatingly characterized him as the most profound astronomer in the theory of the planets that there had been for a hundred years.[5] On the other hand, he was not mentioned by Schonheintz in his *Defense of Astrology* printed at Nürnberg in 1502, nor by Wimpheling in his *Epitome of Germans and Their Works* published at Strasburg in 1505, nor by Scheurl in his *Book of Praises of Germany and Concerning the Dukes of Saxony,* Bologna, 1506,[6] while Luca Gaurico merely named him in his Oration of 1507 in praise of astronomy. Stoeffler in 1510 was content to call him the restorer of astronomy and its outstanding defender.[7]

Nevertheless the exaggerated estimate of the importance of Peurbach and Regiomontanus with reference to their medieval background may be traced back into the fifteenth century, when it possibly began in an interchange of letters between the astrologer, Augustinus Moravus of Olmütz, who writes from the university of Padua, and Johannes Lucilius Santritter of Heilbronn, prefixed, oddly enough, to the edition of the *Alfonsine Tables* in 1492. Despite this example of astronomical activity in the thirteenth century and the fact that his very letter is entitled an *Exhortation to Print the Astronomical Tables of Alfonso the king,* Moravus glories in living in the present age, when studies are being revived after long neglect and almost total loss of the best disciplines. He praises above others the Germans, Peurbach and Regiomontanus, for their contribution in this. But he has begun to be consoled for the most calamitous and untimely death of Regiomontanus on learning that Santritter is to print the *Alfonsine Tables.* Santritter replies in the same vein. He agrees that in the present times all the good arts are not only reviving but flowering and bearing sweetest fruit, so that soon we shall vie with the golden age of Rome. He alludes, however, to whisperers against the reputation of Regiomontanus, but asserts

[5] These estimates have all been noted by Zinner (1938), pp. 200, 206-7, 256.

[6] *Ibid.,* p. 208.

[7] *Elucidatio fabricae ususque astrolabii,* Paris, 1585, fol. 132r. Copy used: BM 531.f.14.(1.).

that they know nothing of mathematics. Or perhaps they do not hate this one German alone but the whole German people. But look at Albertus Magnus who also was a German—Santritter seems to forget that he lived in the benighted medieval past—look at gunpowder and printing, both German inventions! All we Germans lack now, continues Santritter, is eloquence, and that defect will soon be remedied.

The shallowness and inconsistency of the conception by Moravus and Santritter of a renaissance and revival of learning towards the end of the fifteenth century scarcely needs remark. They themselves mention gunpowder, Albertus Magnus and the *Alfonsine Tables*, all of the thirteenth century, as against printing, Peurbach and Regiomontanus in the fifteenth, yet they repeat the senseless general assertion that the arts and sciences are now reviving after centuries of decline and neglect. They seem to think that printing the *Alfonsine Tables* is a greater contribution than drawing them up. Perhaps they intended nothing more than a printer's blurb and display advertisement. Unfortunately their piffle was to be repeated by many subsequent writers and to find a place for a time in standard histories.

Santritter remarked further that he was toiling at an edition of the *Epitome of the Almagest* by Regiomontanus.[8] When the *Epitome* was printed four years later, there was prefixed to it a three page letter by Johannes Baptista Abiosus of Bagnoli in the kingdom of Naples "to the speculators of true sciences," in which he said that great thanks were due to the German race for reviving astrology "in our times" and for the invention of printing.[9]

[8] Ioan. Lucilius Santritter. *Tabule astronomice Alfonsi regis*, Venetiis, 1492. Copy used: BM IA.23354. At fol. A 2 recto. "Exhortatoria in impressionem tabularum astronomicarum Alfonsi regis. Augustinus Moravus Olomucensis Iohanni Lucilio Santritter Heilbronnensi S.P.D." On fol. A 2 verso it closes, "Vale. Ex gymnasio Patavino xvi kl's Iulii Anno Salutis 1492." Santritter's reply on fol. A 3 r-v, is dated at the close, "1492 pridie Calen. Novembr. Venetiis."

Concerning astrological predictions by Augustinus Moravus see T IV, 463.

[9] "Sic quoque ingentes gratie germanice genti referantur que astrologiam nostris temporibus erexit librorumque impressionem comperit." From Abiosus, *Epistola verarum scientiarum speculatoribus*, prefixed to the Venice, 1496 edition of the *Epitome*.

All this was in accord with the general tendency of the period of the classical reaction to ignore and belittle medieval activity and accomplishment. The same attitude may be duplicated in other fields of learning, not even excepting logic to which the schoolmen had devoted so much attention. For instance, Ugolino Pacino da Montescutolo, in an oration in praise of jurisprudence printed at Bologna in 1574, boasted of having studied logic under Claudio Betti, who taught that subject from 1545 to 1589. Pacino declared that Betti alone by his singular learning and admirable genius had restored the doctrine of Aristotle, after it had lain in darkness so many years, and had adorned it as well.[10] Similarly in a previous chapter we have heard Leo X hail as the reviver of astrology an obscure person by whom no work is extant. Or we might note how Melchior Guilandinus, keeper of the botanical garden at Padua, with perhaps pardonable exaggeration in a eulogy of his dead friend, the anatomist Falloppia, declared that while Falloppia lived learning flourished not in Italy alone but in all Europe, but that with his death Europe "fell into the densest shroud of obscurity and those darknesses of old."[11]

Regiomontanus had shared the enthusiasms for Greek authors of his patron, cardinal Bessarion, and for the classics generally which he found prevalent in Italy. He had sharply criticized certain medieval writings and methods such as the *Cremonensia deliramenta* or the way that Campanus and Gazulus divided the zodiac into astrological houses. But he had been equally severe with the efforts of contemporaries and humanists, as in his exposé of Nicholas of Cusa's attempt to square the circle, the translation of Ptolemy's *Geography* by Jacobus Angelus of Florence, or George of Trebizond's faulty translation of the *Almagest*. On the other hand, although he too at times spoke of astronomy as now dimmed and disfigured and as requiring reno-

[10] Tiraboschi, VII, 2, Milan, 1824, p. 651.

[11] Guilandinus says that he had inscribed this eulogy under the picture or bust of Falloppia in his museum: *In C. Plinii maioris capita aliquot commentarius . . . authore Melchiore Guilandino,* Lausanne, 1578, p. 75.

vation,[12] he did not ignore—as some of his eulogists have—the very considerable mathematical, astronomical and astrological literature of the preceding medieval centuries. He had read widely in it, he treasured many manuscripts of it, much of it he proposed to publish on a par with the science of antiquity. Thus he would remedy the defect which he recognized when he said, "We neglect almost all authors except Gerard of Cremona and Sacrobosco."[13] Although, like Copernicus later, he was inclined to put greater trust in the recorded astronomical observations of the ancients, and to question medieval observations which were not in agreement with these, he was nonetheless continuing, and improving upon, many medieval lines of activity. The same was true of those who followed him, despite the apparent implication to the contrary of their eulogies of him and Peurbach.

Another claim made for Regiomontanus, or rather for Nürnberg, is that from his literary remains a whole younger school of Nürnberg mathematicians and geographers drew directly or indirectly the material for numerous works.[14] As examples Petz mentions Johann Werner (1468-1528) who was born and died in Nürnberg but was only eight years old when Regiomontanus passed away and only seven when he left Nürnberg, Konrad Heinfogel (died in 1517), Johann Schöner (1477-1547) and Andreas Schoner who was not born until 1528, Willibald Pirckheimer (1470-1530), Joachim Camerarius (1500-1574), Georg Hartmann (1489-1564), Joachim Heller (c.1518-c.1590), and Thomas Venatorius (1504-1551).[15] Since none of these men except Heinfogel[16] was more than a child when Regiomontanus died, while most of them were as yet unborn, and some saw the light

[12] In the dedication of his *Tabula primi mobilis* to Matthias Corvinus, quoted by Zinner (1938), pp. 111-12.

[13] From the preface to *Contra Cremonensia . . . deliramenta.*

[14] H. Petz, "Urkundliche Nachrichten über den literarischen Nachlass Regiomontans und B. Walters, 1478-1522," *Mitteilungen des Vereins f. Gesch. d. Stadt Nürnberg,* VII (1888), 237-62.

[15] Concerning most of these men see E. Zinner, *Die fränkische Sternkunde,* 1934.

[16] He took holy orders in 1480, his parents had died in 1468 and 1463, and it is barely possible that he may be the Conrad Heinfogel who matriculated at Erfurt in 1441. See Karl Schottenloher, "Konrad Heinfogel," *Schlecht Festschrift,* 1917, pp. 300-310.

only after 1500, it becomes evident that the influence of Regiomontanus upon them was in time at least remote, and that a consideration of what we may call the aftermath or afterglow of Regiomontanus belongs properly to the sixteenth century. As Zinner has well remarked, "So slight was the belief of the Nürnbergers in the value of the writings of Regiomontanus that thirty-nine years elapsed after his death before another work by him appeared at Nürnberg."[17]

Subsequent local historians like Doppelmayr[18] and Will[19] have enlarged upon the achievements of the mathematicians of Nürnberg. But it is well to remember that while such men could find employment there in connection with the printing press and the making of timepieces and geographical and other instruments, on the other hand the attempt in 1526 to found a humanist university in this wealthy trading city and home of artists was a failure, although Melanchthon and Schöner are said to have selected a favorable astrological moment for its foundation. Camerarius was called from Wittenberg at a salary of 150 florins to teach Greek, Rotting to teach rhetoric and dialectic, and Schöner to give instruction in mathematics. From Erfurt was drawn Eobanus Hessus to lecture on poesy at a salary of 150 florins, while Rotting and Schöner received 100 florins each. Instruction was free, but there were no scholars. To provide such, scholarships for twelve boys were established in 1529, but even this bait failed to attract. In 1533 Eobanus left his position, and the other high-salaried man, Camerarius, quit two years later.[20] The instruction in mathematics, however, continued, and Ramus, writing later in the century, tells us that Nürnberg not only employed a salaried professor of mathematics to address the learned but another to train artisans and instrument-makers who knew no Latin or Greek.[21]

[17] Zinner (1938), p. 138.

[18] Johann Gabriel Doppelmayr, *Historische Nachricht von den Nürnbergischen Mathematicis und Künstlern*, Nürnberg, 1730.

[19] Georg Andreas Will, *Nürnbergisches Gelehrten-Lexicon*, 4 vols., 1755-1758.

[20] Friedrich Paulsen, *Geschichte des gelehrten Unterrichts*, 3rd ed., I(1919), 278.

[21] *Schol. math.*, p. 65: cited by Doppelmayr, *op. cit.*, Vorrede, note t.

After spending from the fall of 1471 to the summer of 1475 in Nürnberg, where he made some astronomical observations and printed some books, Regiomontanus seems to have been called to Rome with regard to the calendar and to have died there in 1476. He left most of his manuscripts and scientific instruments at Nürnberg, where they were purchased after his death by a rich citizen, Bernhard Walther. Regiomontanus also left behind him a list of writings,[22] chiefly mathematical, astronomical and astrological, by himself and others, which he planned to publish. Walther, however, while he continued the astronomical observations which Regiomontanus had instituted, and improved upon his method for reckoning the length of the day at Nürnberg,[23] did little or nothing to further his plans for publication. Indeed, Werner later complained that Walther would not even allow others to look at the literary remains of Regiomontanus.[24] He appears, however, to have enriched the library by new acquisitions of his own. When he died in 1504, he left directions that the library be sold as a whole, but the city of Nürnberg did not finally acquire it until 1522. Meanwhile Stabius, an astronomer and astrologer who was also historiographer to the emperor Maximilian, charged the executors of Walther's will with keeping the books hid in hopes of obtaining a great price for them, while at the same time they sold instruments which the renowned master had made with his own hands for only so much as they would bring as scrap copper. Some of the volumes, however, were sent to Cracow and Italy, possibly because they had been borrowed

[22] In the form of a single printed sheet or broadside, issued at Nürnberg, probably in 1474: Hain 13807; reproduced by C. G. Schwarz, *Primaria quaedam documenta de origine typographiae,* Altdorf, 1740, III, 55-60, and in his *Opuscula quaedam academica,* Nürnberg, 1783, pp. 393-97; more recently by Konrad Burger, *Buchhändleranzeigen d. XV. Jahrhundert* (1907), Pl. XV.

Two folded but well preserved copies of the original are used in binding a manuscript of the *Geographia* of Ptolemy said to be in Regiomontanus's handwriting and with the notation, "Emi Norimberga a Pyrchamero ex libris Io. de Monte Regio" (I bought this at Nürnberg from Pirckheimer from the books of John Regiomontanus): Basel O.IV.32. Zinner (1938), p. 225, notes the MS but not the printed broadsides.

[23] Noted by Conrad Heinfogel for 1499 in his copy of Stoeffler's *Ephemerides:* Zinner (1934), p. 40.

[24] Petz, *op. cit.,* p. 238.

by Regiomontanus or Walther from those places, while in 1519 the trustees turned over 150 Gulden from the sale of books, but Pirckheimer is the only person known to have purchased any. There is extant an inventory, made in 1522, of those books and manuscripts which still remained then of the library of Bernhard Walther.[25]

It is to be kept clearly in mind that this is not an inventory of Regiomontanus's library or literary remains. It includes books printed since his death—such as the Venice, 1482, edition of Euclid's *Elements*—or which had been composed long after that event, like the *Defense of Astrology* against Pico della Mirandola written by Jacob Schonheintz and printed at Nürnberg in 1502. Similarly it is to be noted that the list of proposed publications left by Regiomontanus is not precisely a list of his literary remains. His library may have been more extensive: on the other hand, he did not necessarily possess at the moment a manuscript of every work that he thought of publishing.[26] But if a work which Regiomontanus proposed to publish is found listed still in manuscript in the inventory of 1522 and was first printed at Nürnberg after 1522, we are fairly safe in regarding it as a literary remain or posthumous publication of Regiomontanus, and its preservation and printing as made possible in part at least by him.

Certain works by Regiomontanus already appeared in frequent editions during the last quarter of the fifteenth century and the first quarter of the sixteenth. But these will be found to be either works which he himself had already printed before his death, like his *Calendar* and his *Ephemerides*, or which he had at least completed and which circulated in manuscript form, like the *Tabulae directionum*, first printed in 1490, and the *Disputationes contra Cremonensia deliramenta*.[27] The *Epitome of the Almagest*

[25] *Inventarium librorum Bernhardi Waltheri adhuc prae manibus die 1 Octobris anno 1522:* reproduced by Petz, *op. cit.*, pp. 247-62.

[26] The extant MSS of Regiomontanus have been carefully traced and described by Zinner (1938).

[27] The *Tabulae directionum* appear as a work yet to be published in the list Regiomontanus left, though an edition about 1475 at Nürnberg is sometimes listed (Hain 13799). The *Disputationes contra Cremonensia deliramenta* (Hain *13805) do not appear in the list of proposed publications at all, while of the *Calendar* and *Ephemerides*

which Peurbach had begun and Regiomontanus had completed was first printed in 1496. In some copies there is printed with it a letter by John Baptista Abiosus, a doctor of arts and medicine and professor of astrology of the kingdom of Naples, who asserts that he had discovered the work, copied it with his own hands, and revised or restored the text.[28] He does not mention Bernhard Walther and probably used some manuscript which he found in Italy and not that from which Regiomontanus had expected to print the work at Nürnberg. The further assertion by Abiosus that he prefers the *Epitome* to the original seems not to have met with widespread approval. The only other editions of the *Epitome* were in 1543 at Basel and in 1550 at Nürnberg. Prowe and Birkenmajer, however, have shown that it was used by Copernicus.

The last named edition was the work of Erasmus Flock, who was born in Nürnberg in 1514 and studied with Schöner there. After continuing his studies with Rheticus at Wittenberg and taking the M.D. degree at Leipzig in 1545, he had returned to Nürnberg to practice medicine but retained his interest in astronomy and astrology. He published an account of the comet

which head the list of Regiomontanus's own works (Propria), it is said, "Hec duo opera iam prope completa sunt," just as it is remarked, "Haec duo explicita sunt," of the two which head the list of works by others (Aliena), namely, Peurbach's *New Theory of the Planets* and the *Astronomica* of Manilius.

For a list of the various editions of Regiomontanus's works see Ernst Zinner, "Johannes Müller von Königsberg (Regiomontanus)," *Philobiblon, eine Zeitschrift für Bücherfreunde,* IX (1936), 89-97. Editions of the *Calendar* fill items 4-31; of the *Ephemerides,* items 32-44; of *Tabulae directionum,* 45-59; *Disputationes contra Cremonensia deliramenta,* 60-76. There are 121 items in all.

Zinner merely cites Hain for the reputed first editions of the *Tabulae directionum* and *Disputationes contra Cremonensia deliramenta* and does not attempt to date them. In the case of the latter work, however, the words quoted by Hain *13805, "Postquam emisimus indicem operum que librariis . . ." suggest that it was printed by Regiomontanus at Nürnberg after his list of proposed publications. This is the view finally adopted by Zinner (1938), p. 136.

[28] *Epistola verarum scientiarum speculatoribus.* For a full description of the edition see *Catalogue of Books printed in the XVth century now in the British Museum,* V, 427. I examined the work in a copy at the Biblioteca Nazionale, Florence. Zinner (1938), pp. 59-62, notes what Peurbach and Regiomontanus omitted and altered. In view of what Abiosus says, and the fact that Hamman printed the volume, it is hard to see what became of Santritter's professed toiling at an edition of the *Epitome* back in 1492.

of 1556 and its significance in 1557 in German and in 1558 in the same language a review of comets which had appeared between 1531 and 1558. In 1559 he dedicated to the bishop of Würzburg a *Vaticinium de ultimis temporibus ab Academia Parisiensi ante multos annos hexametris versis conscriptum, nunc denuo repertum et in lucem editum.* Flock died on July 21, 1568.[29]

The work of Regiomontanus's defunct press was to a considerable extent taken over by Erhard Ratdolt who in 1476 began his activity as a printer at Venice with the *Calendar* of Regiomontanus, in 1481 printed the *Ephemerides,* in 1482 the *Disputationes contra Cremonensia deliramenta,* and in 1490 at Augsburg issued the first edition of the *Tabulae directionum.*[30] These works were to have a great influence.[31] Ratdolt also published several works of other authors which had been on Regiomontanus's list. Zinner rejects as unauthentic an astrological treatise published under Regiomontanus's name at Lyons about 1485-1490 and dedicated to Duke Wilhelm III of Saxony (died 1482).[32]

Many of the works by other past authors which Regiomontanus had proposed to print were published by others before the sixteenth century. Since in most of these cases we know that there were—and are—plenty of other manuscripts in existence than such as Regiomontanus may have possessed, there is no need to suppose that their editors and translators made use of his materials. The new translation of the *Cosmographia* of Ptolemy to replace that of Jacobus Angelus which Regiomontanus had proposed, to be executed with the assistance of Theodore Gaza and Toscanelli, was actually achieved by Nicolaus Germanus (de) Donis, presented to duke Borso d'Este on March 15, 1466, and printed in 1482.[33] Pontano translated the *Centilo-*

[29] Doppelmayr (1730), p. 64. Zinner (1934), pp. 88-89.

[30] Zinner (1938), pp. 152-53. *Ibid.,* p. 214 *et seq.* for Ratdolt's further printings of the *Ephemerides* etc.

[31] Zinner (1938), pp. 248-49, for ten subsequent editions of the *Tabulae directionum* by other printers.

[32] Zinner (1938), pp. 175-76. Reichling 1619 suggests Lyon, Trechsel, 1495, as the place, date and printer.

[33] Copy used: BM IC.9303. Joseph Fischer, S. J., *Claudii Ptolemaei Geographiae codex Urbinas Graecus* 82, I (1932), 346-47.

quium anew. Firmicus was printed in 1497 by Ratdolt and again in 1499 by Aldus. The *Perspectiva communis* of John Peckham was printed in 1482.[34] The *Arithmetic* of Jordanus was published at Paris in 1494 by Jacques Lefèvre d'Etaples. Nicolaus Leonicenus translated the *Mechanical Problems* ascribed to Aristotle. Hyginus was printed several times before 1500. Euclid's *Elements* were issued with the commentary of Campanus by Erhard Ratdolt at Venice in 1482 and by other printers at Vicenza in 1491.[35] Werner, however, preferred to cite the new translation by Zamberti which appeared in 1505.[36] According to Doppelmayr the astronomical *Sufformationes* or *Hypotyposis* of Proclus was translated by both George Valla and George of Trebizond, the former translation being printed at Venice in 1498 and the latter at Basel in 1541.[37] But Hain and Klebs give no edition of 1498, while the edition of Basel, 1541, is George Valla's translation. The earliest editions noted in the catalogue of printed books of the British Museum are of the Greek text by Simon Grynaeus at Basel in 1540[38] and Valla's translation in the year following.[39] Valla's translation must of course have been made during the fifteenth century. And astronomical works by Proclus which Regiomontanus had not mentioned, namely, the *Sphere* in Linacre's translation and the treatise on the *Astrolabe*, had been published by others before the end of the fifteenth century.

In 1499 Hartmann Schedel wrote from Nürnberg to Georg Napurg at the monastery of Reichenbach asking for a torquetum,[40] a familiar form of astronomical instrument, and for a catalogue of stars which was subsequently incorporated in Albrecht Dürer's map of the heavens of 1515.[41] This confirms the

[34] Klebs 738.1.

[35] Hain *6693, *6694.

[36] Björnbo in *Abhandlungen z. Gesch. d. math. Wiss.*, 24(1907), 157.

[37] Doppelmayr (1730), 14,n.hh.

[38] *Procli Diadochi Hypotyposis Astronomicarum Positionum*, Basileae, 1540, 4to: BM 51.e.25.

[39] It is contained in the edition of Ptolemy of that year: BM 569.g.1.(2.).

[40] CLM 27, fol. 78 insert. I owe this and the following reference to Dr. Dana B. Durand.

[41] E. Weiss, "Albrecht Dürers geographische, astronomische und astrologische Tafeln," *Jahrbuch d. Kunstsammlungen d. allerh. Kaiserh.*, VII (1888), 207. According to Zinner, *Die fränkische Sternkunde*, 1934, Schedel obtained the list of stars in the first

complaints of Werner and Stabius that the manuscripts and instruments left at Nürnberg by Regiomontanus were not available until long after the opening of the sixteenth century. It further suggests, as Dana B. Durand writes,[42] "the surprising fact that in the renowned city of Nürnberg neither instruments nor tables were then available which could be compared with those of the monastic observatories. It also forces us to consider whether the scientific fame of Nürnberg and other south German cities was not, to a considerable extent, based upon achievements" of "an older generation."

If the candid and impartial reader will turn to the passages on astronomical instruments, tables and observations listed in the indexes of our third and fourth volumes[43] and of *A Catalogue of Incipits of Mediaeval Scientific Writings in Latin,* he will probably agree that no startling innovation or progress in any of these respects was marked by the activities either of Regiomontanus himself or those who continued his work at Nürnberg. We know of predecessors of whom they were not aware, and there must have been as many more whose work died with them and may never be unearthed.

The German who perhaps came closest to continuing the work of Regiomontanus and to realizing his program of publication during the closing years of the fifteenth and the early years of the sixteenth century was Johann Engel, who neither lived at

instance for Konrad Heinfogel.

The Dürer house at Nürnberg had been occupied earlier by Walther, who set up an astronomical observatory, opening up two windows, one with a balcony for instruments, in the south gable: Zinner (1938), 169.

[42] In a forthcoming treatment of cartography in the fifteenth century which I have been privileged to examine in manuscript.

[43] And to such subsequent articles as "Astronomy at Paris around 1485 and 1360," *Humanisme et Renaissance,* III, ii, 165-68, April-June, 1936; "Introduction and Canon by Dalmatius to Tables of Barcelona for the Years 1361-1433 A.D.," *Isis,* 26 (1937), 310-20; "Milan Manuscripts of Giovanni de' Dondi's Astronomical Clock. . . ," *Archeion,* 18 (1936), 308-17.

Of the *torquetum* of Nicholas of Cusa J. Hartmann writes in "Die astronomischen Instrumente des Kardinals Nikolaus Cusanus," *Göttingen Abhandlungen,* Math. Phys. Kl. X, vi(1919), p. 25: "Gerade in diesem sorgfältig geteilten exzentrischen Tageskreise erblicke ich einen beachtenswerten Vorzug des Cusanischen Torquetums vor den späteren Instrumenten des Regiomontanus und Apianus." I owe the reference to Dana B. Durand.

Nürnberg nor seems to have had direct personal relation to him; although one of his teachers had had instruction from Regiomontanus, while he himself had talked at Würzburg with a favorite pupil of Regiomontanus.[44] Engel was born at Aicha or Aichach in Upper Bavaria at an unknown date, matriculated at Ingolstadt on August 29, 1472, in the year of that university's foundation, and became a master of arts in 1474. According to Kobolt[45] he was on its faculty in 1479 but never taught publicly either there or at Vienna. Wickersheimer, however, has shown that he was teaching the *Physics* of Aristotle at Ingolstadt in 1476, and mathematics and poetry from 1492 to 1497.[46]

Meanwhile he had issued almanachs for 1484, 1488, 1489 and 1490 in German[47] and astrological predictions for the years 1487 and 1488,[48] and in the latter year had issued at Augsburg from the press of Erhart Ratdolt his *Astrolabium planum,*[49] a work reprinted at Venice in 1494 and 1502. It was far more astrological than the short form of its title indicates, comprising tables of the sign and degree of the ascendent for each hour and minute, equations of the astrological houses, images of the twelve signs with their properties, a table of the formation or stay of the child in the womb, extracts from the as yet unpublished work of Firmicus, significations of the hours of the planets, and nearly four hundred illustrations showing the occupations and types of men and women which various horoscopes would produce. It was one of the volumes in Simon de Phares' library which the faculty of theology of the university of Paris condemned in part in its report to the Parlement of Paris.[50] Later Tycho Brahe

[44] Zinner (1938), 170-71.

[45] Anton Maria Kobolt, *Baierisches Gelehrten-Lexicon,* Landshut, 1795, pp. 44-46.

[46] Ernest Wickersheimer, "Note sur Johannes Engel (Angeli) d'Aichach, astrologue et médecin, mort à Vienne en 1512," *Festschrift f. Max Neuburger, Internationale Beiträge z. Gesch. d. Medizin,* Wien, 1928.

[47] GW 1892-1899.

[48] Hellmann (1917), p. 213.

[49] Johannes Angelus, *Astrolabium planum in tabulis ascendens continens qualibet hora atque minuto. Equationes domorum celi. Moram nati in utero matris cum quodam tractatu nativitatum utili et ornato. Necnon horas inequales pro quolibet climati mundi.* Aug. Vind., 1488. GW 1900. Copy used: BN Rés. m.V.90.

[50] Du Plessis d'Argentré, *Collectio judiciorum de novis erroribus,* 1755, I, ii, 327-28.

was to censure its astrology severely, saying that there was scarcely one line of truth in it.[50a]

Kobolt represented Engel as editing the *Alfonsine Tables* at Venice in 1488 and 1492, but, although *Tabulae coelestium motuum,* Augsburg, 1483, have also been attributed to him, he seems to have had no connection with the two known editions of the *Alfonsine Tables* printed by Ratdolt in 1483 (Venice) and by Hamman at Venice, 1492.[51] According to Wickersheimer it was from 1489 to 1491 that he worked for Ratdolt at Augsburg as proof-reader. It was during these years that Albumasar on great conjunctions, Pierre d'Ailly's *Concord of Astronomy with Theology,* Regiomontanus's *Tables of Directions,* and Guido Bonatti's *Ten Tractates of Astronomy* or astrology were printed at Augsburg by Ratdolt. Kobolt represented Engel as editing them, while Mittarelli made him the proof-reader of the astronomical and mathematical works which were published by Ratdolt and Santritter.[52] Annual predictions by him for the years 1496 and 1497 are extant,[53] but *Ephemerides* for the years 1494-1500, said to have been printed at Vienna in 1494, cannot be found.[54] Engel began to study medicine at Ingolstadt in 1497, then went to Vienna and practised medicine at Krems, whence he wrote to Celtes in 1498. Henceforth he seems to have published little, except that Kobolt ascribes a new and corrected *Almanac* for 1512 to him.[55] His death at Vienna on September 29, 1512,[56] is said to have prevented his completing an edition of Peurbach's *Tables of Equations of the Movements of the Planets.*[57] It was published two years later by

[50a] *Opera,* ed. Dreyer III, 164.

[51] GW 1257, 1258. Klebs (1938), 50.1 and 2.

[52] Giovanni Benedetto Mittarelli, *Bibliotheca codicum manuscriptorum monasterii S. Michaelis Venetiarum prope Murianum,* Venice, 1779, II, 400: "Johannes Angelus erat corrector librorum astronomicorum et mathematicorum qui prodibant ex officina Erhardi Ratdolt et Jo. Lucilii Santritter."

[53] Hellmann (1917), p. 213.

[54] GW II, 267: Johannes Angelus, *Ephemerides coelestium motuum usque ad annum 1500,* Vienna (Joh. Winterburg), 1494, "nicht nachweisbar." Not in Klebs (1938).

[55] *Almanach novum ac correctum pro anno MDXII,* Viennae, 1512, 4to.

[56] Not on December 27, 1513, as I believe that Melchior Adam states.

[57] Gesner (1545), fols. 382v-383r.

Tannstetter with a life of Engel. His pest tract was likewise printed posthumously at Augsburg in 1518 and at Worms in 1530.

Rheticus, addressing Ferdinand, king of the Romans, in 1557, spoke of Peurbach and Regiomontanus as the first to rescue astronomy from the barbarism of the Saracens and represented Stabius and Stiborius (Stöberl) as their successors.[58] We have already heard Stabius express his concern at the fact that the library left by Regiomontanus and Walther was not more available. For the opening year of the sixteenth century this same Joannes Stabius had issued from the city of Ingolstadt a *Practica* or annual prediction in German. Next year he was appointed imperial historian and cosmographer and was made a member of Maximilian's college of poets, showing that humanism and astrology might coexist harmoniously. His annual predictions, moreover, continued to 1504. He was also author of numerous astronomical and cosmographical treatises, some of which further suggest astrology. In 1504 he edited Messahala on the science of the movement of the orb, but Messahala was better known for his astrological works. The titles themselves carry an evident astrological implication in the case of a *Horoscopion* fitted generally for every climate, printed at Nürnberg in 1512 as a woodcut by Hans Springinklee with explanatory text by Stabius, and a *Constitution* of a cosmographic table showing the degree of the sign and the planet to whose lordship any habitation is subject.[59] The association of Stabius with the Nürnberg mathematician and astronomer, Werner, is illustrated by a manuscript containing astronomical writings of the latter, where a figure of an instrument or organum is accompanied by the rubric,

[58] *Ioannis Verneri mathematici norimbergensis De triangulis sphoericis libri quatuor, De meteoroscopiis libri sex, Nunc primum studio et diligentia Georgii Ioachimi Rhetici in lucem editi,* Cracoviae, Lazarus Andreae excudebat, Anno MDLVII. It consists only of the Prooemium to Ferdinand. Reprinted in facsimile by A. A. Björnbo, *Abhandlungen z. Gesch d Math. Wiss.,* 24(1907).

[59] For the works of Stabius see Heinrich Pantaleon, *Prosopographia heroum atque illustrium virorum totius Germaniae ad . . . 1566,* 1565-1566, 3 vols., or the longer list in Tannstetter's edition of George Peurbach, *Tabulae eclypsium,* 1514.

"Johann Werner thought out this organum on October 30, 1513, at the urging of Johann Stabius."[60] It was likewise Stabius who induced Werner to publish a volume of his works in 1514 and procured the imperial privilege therefor.[61] Stiborius seems not to have published much, though we shall soon note a short work of which he was co-author.[62]

Erhard Etzlaub, a citizen of Nürnberg from 1484 until his death there in 1532, famous for his map of the environs of that city, printed in 1492, for one of Germany in 1501, and as a maker of scientific instruments, included astrological weather prediction in various calendars for years from 1500 to 1532.[63] These forecasts were put to the test by Killian Leib, prior of Rebdorf, in his observations on the weather from 1513 to 1531 and were found to be right three times out of five.[64]

The *Ephemerides* of Regiomontanus, which ran through eleven editions in the last two decades of the fifteenth century but extended only to the year 1506, were continued by Johann Stoeffler who, with Jakob Pflaum, issued at Ulm in 1499 Ephemerides for the years 1499-1532.[65] In a work of 1510 Stoeffler distinguished the method of dividing the zodiac into houses advocated by Peurbach and Regiomontanus from the older method of Nicephorus, Messahala, and Iohannes Eligerus.[66]

In Austria at Vienna the Regiomontanian tradition was continued by Georg Collimitius Tannstetter (1482-1535) who in 1514 edited tables of eclipses by Peurbach and other tables by

[60] BL Digby 132, fol. 61v: described by Björnbo, *Abhandl. z. Gesch. d. Math. Wiss,* 24 (1907), 142

[61] Björnbo, *Abhandlungen* 24 (1907), 152.

[62] Zinner (1938), 53, notes a treatise in MS by him "über die Himmelsscheibe": CLM 19689, fol. 294r. Gesner (1545), 411r-v, lists various works by him.

[63] Zinner, *Die fränkische Sternkunde,* 1934, p. 88.

[64] *Ibid.,* pp. 75-76, 93; more fully, Karl Schottenloher, "Der Rebdorfer Prior Killian Leib und sein Wettertagebuch von 1513 bis 1531," *Riezler Festschrift,* Gotha, 1913, pp. 81-114, 444-46. On Leib's astrology see Joseph Deutsch, *Killian Leib, Prior von Rebdorf,* 1910, pp. 26-28.

[65] Zinner (1938), pp. 142, 149.

[66] Ioannes Stoflerinus Iustingensis, *Elucidatio fabricae ususque astrolabii,* Paris, 1585, but preface dated from Tübingen, 1510, fols. 132r, 135r. Copy used: BM 531.f.14.(1.). There were earlier editions at Oppenheim, 1512, 1524; Paris, 1564.

Concerning Iohannes Eligerus de Gondersleven see Trithemius (1494), fol. 88v.

Regiomontanus.[67] He stated in its preface that they had left behind them learned men who excelled in astronomy: Henricus Seldner, Eberhard Schleisinger (or, Schleussinger), John of Phortzn, John of Kepfersperg, and John Dorn, a skilful instrument-maker who afterwards entered the Dominican order and lived in their convent until his death in 1509. In 1511 an appendix by Tannstetter on the rising and setting of the stars had been added to a reprint at Vienna of Linacre's Latin translation of the *Sphere* of Proclus.[68] In 1515 was printed a brief *Consilium* on calendar reform which Tannstetter and his colleague Stiborius had drawn up at the suggestion of the emperor Maximilian.[69] In 1518 the pupil and assistant of Tannstetter, Andreas Perlach, published a work on the use of the almanach or ephemerides drawn from the commentaries of his master.[70] Finally, in 1535, the year of Tannstetter's death, there was printed at Nürnberg the first edition of the thirteenth century work on optics of Witelo as edited by himself and Peter Apian.[71] Other astrological compositions of Tannstetter have already been mentioned in previous chapters.

If the relation of Stabius to Regiomontanus seems rather tenuous, that of Johann Werner was somewhat closer.[72] He was born and died in Nürnberg, to which he returned as a priest after

[67] Georgius Peurbachius, *Tabulae eclipsium*, etc., Vienna, 1514, fol. Copy used: BM 533.i.1.(1.2).

[68] *Appendicula G. T. Collimitii de ortu et occasu siderum. . . .* Per Hier. Victorem et Ioannem Singrenium, Viennae Pannoniae, 1511, 4to. Copy: BM 8561.b.6.

[69] Andr. Stiborius et G. Tannstetter, *De Romani calendarii correctione consilium in florentissimo studio Viennensi Austriae conscriptum et aeditum.* Vindobonae, Jo. Singrenius, 4to. 10 fols.

[70] Andreas Perlach, *Usus almanach seu ephemeridum ex commentariis Georgii Tannstetter . . . decerpti et in quinquaginta propositiones per Magistrum A. Perlachium Stirum redacti,* Vienna, Hier. Victor, 1518, 4to. Copy used: BM 1296.c.1,2.

[71] Vitello, περι 'οπτικη, *id est de natura ratione et proiectione radiorum visus luminum colorum atque formarum quam vulgo perspectivam vocant libri X. Nunc primum opera Georgii Tannstetter et Petri Apiani in lucem aedita* (*sic*). Nürnberg, Jo, Petreius, 1535, fol. 4, 297 fols. Witelo of course did not write in Greek, as the first words of the title might seem to imply.

[72] On Werner see Zinner (1934), 111-13; Siegmund Günther, *Johann Werner von Nürnberg und seine Verdienste um math.-physikalische Geographie,* Halle, 1878; Karl Schottenloher, "Der Mathematiker und Astronom Johann Werner," in *Festgabe an H. Grauert,* 1910, pp. 147-55.

visiting various universities of Germany and spending five years in Italy. He probably brought back manuscripts with him and several times in his writings affirms that he had learned a great deal from Italian scholars.[73] He was an independent student, so far as his church duties gave him leisure, of mathematics, geography and astronomy rather than a mere editor or continuer of the work of Regiomontanus. But he is said to have felt himself to be the spiritual heir or successor of Regiomontanus,[74] and Björnbo held that his work on spherical triangles owed more to that of Regiomontanus, which was not printed until after Werner's death, than he admitted or wished.[75] Since Werner's work was never really finished and was not printed until the twentieth century, although announced for publication by Rheticus in 1557, and since only a single manuscript of it appears to be extant, its influence either as an independent piece of work or as a reflection of Regiomontanus might seem relatively slight. In some respects, however, it was the best treatment of the subject thus far.[76] It influenced Rheticus's more celebrated book. Jakob Christmann (1554-1630) into whose possession the extant manuscript passed after the death of Rheticus and his collaborator, Otho, accused "some transcribers," whom Björnbo identified with Tycho Brahe and Wittich, of having appropriated its *inventio prosthaphaeresium* as their own.[77]

On March 19, 1507, Lorenz Beheim wrote to Pirckheimer slightingly concerning Werner who, he said, ever made a great fuss about his secrets but had thus far won little honor from them, and who lied most when he tried to predict truly.[78] Despite these depreciatory remarks, Werner was later to draw up horoscopes for Pirckheimer.

Werners' earliest datable works appears to be astrological and to have little or no connection with Regiomontanus. In 1498 he

[73] Björnbo in *Abhandlungen,* 24 (1907), 151.

[74] *Ibid.,* p. 173, "der sich als geistiger Erbe des Regiomontan fühlte."

[75] *Ibid.,* pp. 173-75.

[76] *Ibid.,* pp. 163-64.

[77] *Ibid.,* p. 165 *et seq.*

[78] E. Reicke, "Der Bamberger Kanonikus Lorenz Beheim, Pirckheimers Freund," *Forschungen zur Geschichte Bayerns,* 14 (1906), 21.

drew up a judgment on the nativity of Erasmus Doppler, born in 1462, a doctor of laws and pastor of the church of St. Peter and St. Sebaldus in Nürnberg,[79] and presently he addressed another *Judgment* concerning the comet of the year 1500 to Sebaldus Clamosus Schreyer,[80] another citizen of Nürnberg.

After a lapse of some years the next datable work by Werner that I have run across is a computation of the nativity of Wilibald Pirckheimer and those of other members of his family which Werner wrote in part, at least, late in August, 1513.[81] There are figures for the true conjunction of sun and moon on November 22, 1470, shortly before the famous patrician's birth, and for the latter event on December fourth of the same year. Other astrological calculations and tables follow, then a list of directions in the astrological sense of the word for the years 1478 to 1540. Usually the position of the stars is given without any accompanying prediction, but for 1529 Pirckheimer is warned that this year threatens a serious and almost fatal illness. Next are given daily tables of the progress of the horoscope during the current year from December, 1512, to December 3, 1513.

The remainder of the manuscript, which is an unprepossessing paper notebook slovenly written, consists of miscellaneous astrological notes and of horoscopes of other members of the Pirckheimer family: Felicitas (1497), Katherine (1498), Crescentia (1499), Barbara (1501), Charitas (1503), John (1496), Sebastian (1498), Loris (1500). A note beneath the nativity of Katherine announces her entry into a nunnery on May 19, 1513, and apparently gives the positions of the stars for this event too. The horoscopes then go back to an earlier generation, perhaps

[79] Vienna 10650, ff. 81r-87r: BN 7417, fols. 160r-168v, with four figures covering the conception and birth of Doppler in 1462. I have seen the latter MS.

[80] Vienna 4756, ff. 143r-146v, opening, "Superioribus his diebus. . . ."

[81] CLM 27083. The MS was noted by Björnbo, *Abhandlungen*, 24 (1907), 142. At fol. 8v, at the end of Pirckheimer's own horoscope is written, "Anno domini 1513 die ultima Augusti Computum hunc Ioannes Werner explevit." Another copy of Werner's discussion of Pirckheimer's nativity is preserved in Vienna 5002, fols. 104r-109r, followed at fols. 109v-111v by a nativity of another native of Nürnberg, also by Werner, by whom there is a third geniture in the same MS at fol. 180v.

Wilibald's brothers and sisters: Charitas[82] (1467), Geuderus (1479), Katherina (1479), Clara (1481), Sabina (1482), and Euphemia (1486). Two names with the dates 1469 and 1471 are difficult to read because they have been crossed out and transposed. Last come a few horoscopes of persons who were probably not members of the Pirckheimer family: Hans von Hoff, Ieronimus Ebner (1477), and others difficult to make out.

Other nativities drawn up by Werner are preserved in manuscripts at Vienna but apparently without stating when he composed them. One is for an Ursula Gundelfinger born in 1483, another for Schewrlein.[83]

In 1514 Werner printed at Nürnberg a new translation of the first book of Ptolemy's *Cosmography,* in which he completed a work already begun by Regiomontanus.[84] To it he added some other geographical works and the letter of Regiomontanus to cardinal Bessarion on the composition and use of the instrument called *Meteoroscopium.* In the annotations which accompanied the translation of the first book of Ptolemy, Werner displayed an acquaintance with Dominicus Maria Novara's measurement of the obliquity of the ecliptic and theory of its decrease, suggesting that he was the intellectual follower of others besides Regiomontanus.[85] Some, however, may hold that Dominicus was a

[82] Pirckheimer's sister of that name is mentioned in Schöner's geographical work of 1515: Karl Schottenloher, ZB 24 (1907), 146. See further F. Binder, *Charitas Pirkheimer Aebtissen v. St. Klara zu Nürnberg,* 2 Aufl., Freiburg, 1878; E. Münch, *Charitas Pirkheimer, ihre Schwestern und Nichten,* Nürnberg, 1826.

[83] Vienna 10650, fol. 43v, and fols. 44r-45r. There follow "Revolutiones quarundam nativitatum" at fols. 47r-63v. In Vienna 5002, at fols. 104r-111v are "Duo nativitatis iudicia." I have not seen the MSS but follow the descriptions of them in the catalogue. For further MSS of works by Werner see Zinner. *Die fränkische Sternkunde,* 1934, p. 113.

[84] Björnbo, *Abhandlungen,* 24 (1907), 172, quotes from its prefatory letter: ". . . semiplenas mutilasque reliquit praesertim geographiae Cl. Ptole. novam interpretationem atque eiusdem geographiae primi libri commentationem quam ego ex integro componens, uti praefatus fueram, complevi edidique."

[85] In a manuscript at Nürnberg these geographical works of Werner and the letter (there anonymous) to Bessarion are followed by a geographical introduction by Petrus Apianus to Werner's *Annotations.* Nürnberg Math. fol. 652, Introductio geographica Petri Apiani in doctissimas Verneri annotationes continens plenum intellectum et iudicium omnis operationis quae per sinus et chordas in Geographia confici potest adiuncto radio astronomico cum quad-

pupil of Regiomontanus. Werner's discussion was presumably the same as that prefixed to Apian's new edition in 1533 of Werner's geographical works.

In 1522 Werner published at Nürnberg several mathematical works which all seem to have been of his own composition and not relics of Regiomontanus.[86] They comprised "the first original work on conics to appear in the sixteenth century,"[87] and a discussion of the motion of the eighth sphere which inspired unfavorable comment in 1524 by Copernicus[88] who critized Werner for misdating one of Ptolemy's observations, for holding that these were not always strictly accurate, and for not recognizing that the fixed stars moved much more slowly before Ptolemy than thereafter.[89] Werner died in 1528, and his rules and observations concerning change in the weather were published posthumously by Johann Schöner only in 1546.[90] They include observations of the weather from 1513 to 1520.[91] Doppelmayr listed half a dozen other mathematical works by Werner which were still in manuscript.[92] The two on spherical triangles and *De meteoroscopiis* had been rescued by Georg Hartmann after

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rante novo Meteoroscopio loco longe utilissimo. Described by Siegmund Günther, "Johann Werner aus Nürnberg und seine Beziehungen zur mathematischen und physischen Erdkunde," in *Studien z. Gesch. math. und physikalischen Geographie*, Heft 5 (1878), 277-332, at p. 280.

[86] Joannes Werner, *In hoc opere continentur libellus super vigintiduobus elementis conicis, Commentarius in undecim modos conficiendi eius problematis quod cubi duplicatio dicitur, Commentatio in Dionysidori problemata quo data sphaera plano sub data secatur ratione, Alius modus idem problema conficiendi ab eodem Vernero novissime compertus demonstratatusque, De motu octavae sphaerae . . .*, Nuremberg, Peypus, 1522.

Doppelmayr, *op. cit.*, pp. 34-35, states that they were printed by Lucas Alantsee, Vienna, 1522.

[87] D. E. Smith, *History of Mathematics*, I, 331.

[88] Vienna 9737, 16th century, 9 fols.: Epistola de Ioh. Werneri opusculo De motu octavae sphaerae edito Norimbergae apud Fridericum Peypus a. 1522. See also Siegmund Günther, "Der Wapowski-Brief des Coppernicus und Werner's Traktat über die Präzession," *Coppernicus-Verein zu Thorn, Mitteil.*, II, 3-11. See below Chapter XVIII, note 22.

[89] Prowe, *Coppernicus*, II, 173, 175, 177, 180.

[90] *Canones sicut brevissimi ita etiam doctissimi complectentes praecepta et observationes de mutatione aurae*, Norimbergae, 1546.

[91] Hellmann (1924), 41. Extracts were published in Hellmann's *Neudrucke*, 13 (1901).

[92] Doppelmayr (1730), pp. 33-34. See also Zinner (1934), p. 113.

Werner's death and the dispersal of his papers and given to Rheticus in 1542. Rheticus issued a title page and Prohemium to them at Cracow in 1557, but appears to have altered his intention of printing their text, perhaps because he found it in such bad condition, perhaps because he preferred to postpone consideration of the subject till the perfection of his own *Opus palatinum de triangulis*. They were finally edited from a Vatican manuscript, which seems to have been the very one that Rheticus thought of printing, by Björnbo in 1907,[93] with a list of other works still in manuscript.[94]

Those compositions of his own which Regiomontanus had left at his death in an unpublished and often unfinished state were held, as we have seen, as it were in escrow until 1522, after which those that had survived[95] were gradually edited. Such publication was in large part the work of Johann Schoner or Schöner (1477-1547), a poor priest, book-binder and maker of globes who in 1526 became professor of mathematics in the newly founded university of Nürnberg.[96] We have seen Lorenz Beheim address an astrological tract on *Directions* to him at Bamberg in 1506. Schöner himself noted the prevalence of the pest in 1507 in Nürnberg, Bamberg, Karlstadt and all Germany as a result of the constellations.[97] On February 12, 1515, Schöner had addressed from Bamberg to a deacon of Nürnberg, Daniel Schmidt, whom he called his preceptor and with whom he had studied at Erfurt, a tract on a cylindrical sundial which further devoted some attention to astrological elections.[98] In the same year his first publication, on geography, appeared at Nürnberg,[99] followed in 1517 by canons on the sphere[100] and in 1522 by other astro-

[93] *Abhandlungen*, 24 (1907).

[94] *Ibid.*, p. 141 *et seq.* The *Opus palatinum de triangulis* of Rheticus was completed and published in 1596 twenty years after his death by L. Valentinus Otho. In 1551 Rheticus had printed a brief *Canon doctrinae triangulorum:* Lipsiae ex officina Wolphgangi Gunteri.

[95] For lost works of Regiomontanus see Zinner (1938), pp. 87, 94, 113, 138, 188, etc.

[96] For bibliography on Schöner see Zinner (1934), 99-103.

[97] Zinner (1934), 75.

[98] *Horarii cylindri canones*, printed in his *Opera*, 1551, II, 168r-172r. Schöner had matriculated at Erfurt in 1494 but took no degree there: ZB 24 (1907), 146.

[99] *Luculentissima quaedam terrae totius descriptio*, 4to, Joh. Stuchssen, 1515.

[100] *Solidi ac sphaerici corporis seu*

nomical canons.[101] Meanwhile he had printed in his own house at Bamberg in 1521 an *Aequatorium astronomicum,* to which in 1524 at Ehrenbach he added astronomical tables.[102] In 1523 he had published a letter on the Spanish and Portuguese discoveries and at Cologne a treatise on the Molucca islands.[103]

Unless we accept the dating by Moritz Steinschneider of Schöner's edition of the *Twenty-nine Problems with the Saphea* by Regiomontanus in 1524,[104] there seems to be no evidence of Schöner's publishing any work of Regiomontanus until some years after he had become professor of mathematics at Nürnberg. These problems of the *Saphea* had not been specified in Regiomontanus's list of proposed publications: in fact Schöner first received them in 1526 from Hartmann,[105] which proves that

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globi astronomici canones, 1517. Panzer, VII, 458.

[101] *Aequatorii astronomici omnium fere uranicorum theorematum explanatorum canones,* in folio, 1522.

[102] For these editions see Karl Schottenloher, "Johann Schöner und seine Hausdruckerei," ZB 24 (1907), 145-55.

[103] *Ibid.,* pp. 149-50. Schöner's interest in geography is further attested by his manuscript notes in a copy of the Ulm, 1482 edition of Ptolemy's *Cosmography* (Vienna 3292, fols. 2r-134r) and by his copying with his own hand (*Ibid.,* fols. 135v-183r) a treatise opening, "Quoniam ut ait Augustinus . . ." which is here entitled, "Tractatus de tribus orbis partibus ac variis naturis hominum portentorum . . ." etc. but which in another MS of the fifteenth century (Chicago Art Institute 15.334) is called "De locis ac mirabilibus mundi."

[104] The title page, which Steinschneider (*Etudes sur Zarkali,* BB XVII (1884), 785), assures us he had before his eyes in a copy of the work in the royal library at Berlin, and which he reproduces (*Ibid.,* p. 786), bears the date, "Anno M. D. XXIIII," and a poetical address to the reader by Eobanus Hessus.

But Schottenloher, ZB 24(1907), 145-55, and Zinner (1934), pp. 101-102, items 10, 10a, 23, list only a 1534 edition of the *Problemata XXXIX Saphaeae,* although they give a 1525 as well as 1534 edition of the *Saphaeae recentiores doctrinae,* of which Steinschneider mentioned only the 1534 edition, contained in the same volume at Berlin as the *Problemata.*

Since, however, Steinschneider states that Schöner's dedication of the *Saphaeae recentiores doctrinae* to "Joannes Gulielmus a Loubenbourg" is only two days later than the dedication to the same man of the *Problemata,* since Schöner himself tells this Johann Wilhelm that he wished to publish the two works together, and since Eobanus Hessus came from Erfurt to Nürnberg in 1526 and stayed there until 1533, it would seem more likely that the "MDXXIIII" of the one title page is a misprint on someone's part for "MDXXXIIII" than that the "MDXXXIIII" and "1534" of the other should be a double error for "MDXXIIII" and "1524."

[105] Zinner (1938), p. 259, item 173, citing Schöner's letter of April 11, 1526, to Pirckheimer.

he did not print them in 1524. Presumably, however, Schöner should be trusted as to their genuineness. In any case their author displays the characteristically narrow outlook of the classical humanist when, in ignorance of the Arabic origin of the word *Saphea,* he attempts to derive it from the Greek.[106]

Since Schöner did not edit the *Problems* in 1524, others preceded him in the publication of Regiomontanus's works. For his *Annotations* on the errors committed by Jacobus Angelus in his translation of the *Geography* of Ptolemy had been printed at Strasburg with the new translation of that work, of which the first book appeared under Pirckheimer's name in 1525.[107] Also at Strasburg in 1528 there appeared in German an astronomical work attributed to Regiomontanus.[108] The *Spherica* of Theodosius which Regiomontanus had proposed to publish was printed by Johann Vögelin at Vienna in 1529.[109]

Meanwhile Schöner was composing and publishing works in the field of medicine, although he had no M.D. degree. In 1529 there was printed under his name at Nürnberg a popular medical treatise in German which contained considerable astrology.[110] For the same year he composed a *Prognosticon* in Latin and German.[111] In 1530 he reprinted the manual of astrological medicine by Hieronymus Manfredi,[112] together with the commentary of Pontano on two items of the *Centiloquium* ascribed to Ptolemy, and an astrological composition of his own on the mansions of the moon.[113]

Schöner's publication of the literary remains of Regiomontanus began in 1531 with the *Problems* concerning the magni-

[106] See the text as quoted in BB 17(1884), 786.

[107] The printer, Johann Grieninger, had many difficulties with Pirckheimer over the putting of this book through the press.

[108] Zinner (1936), items 85-93, for this and subsequent editions.

[109] Zinner (1938), p. 239. Jean Pena published another edition of it at Padua, 1557.

[110] Karl Sudhoff, *Iatromathematiker,* 1902, p. 49.

[111] Zinner (1934), No. 13, p. 101.

[112] See T IV, 460.

[113] Copy used: BN 8° Te[130] .2: "De medicis et infirmis collectanea in ordinem centiloquii congesta Authore Hieronymo Manfredo clarissimo philosopho Medico Astrologo Insuper in vigintiocto mansiones lunae deque impedimentis eiusdem generalibus Ioannis Schöneri Mathematici collectanea. Impressum Nurembergae Sumptu Georgii Vuachter Anno MDXXX Mense Martis."

tude, longitude and true place of a comet.[114] Two years later he printed the five books of Regiomontanus on triangles,[115] important in the history of trigonometry, but which Werner had stated in 1514 were left at his death in a very disorderly and imperfect state.[116] Pirckheimer had purchased them from Walther. To the volume Schöner appended the tract of Regiomontanus against Nicholas of Cusa on the squaring of the circle.[117]

Between these first editions of works of Regiomontanus were sandwiched further works composed by Schöner himself: a brief *Coniectur* in German on the comet of 1531,[118] an *Ephemeris* for the year 1532, and in 1533 an *Opusculum geographicum* and a *Globi stelliferi seu sphaerae stellarum fixarum usus et explicationes*.[119] In the preface of the last to John Frederick, duke of

[114] Johannes de Monteregio, *De cometae magnitudine longitudine ac de loco eius vero problemata XVI*, ed. Joh. Schoner, Nürnberg, Frid. Peypus, 1531. Also at Nürnberg: Zinner (1934), p. 101, item 15.

[115] Ioannes de Regio Monte, *De triangulis omnimodis libri quinque*, J. Petreius, Nürnberg, 1533. There was another edition at Basel, 1561: *De triangulis planis et sphaericis libri quinque una cum tabulis sinuum.*

[116] "Denique libros quinque de sphaericis omnimodisque triangulis a se tumultarie nulloque recto ordine servato, velut in prima rerum inventione fieri solet, perscriptos constat morte praeventum imperfectos reliquisse": quoted by Björnbo, *Abhandlungen*, 24(1907), 172.

[117] "Accesserunt in calce pleraque D. Nicolai Cusani de quadratura circuli deque recti ac curvi commensuratione, itemque Joh. de Monte Regio eadem de re . . . hactenus a nemine publicata."

[118] Io. Schoner, *Coniectur odder abnehmliche Auslegung über den Cometen so in Augstmonat 1531 . . .*, Leipzig, 1531, 4to, 6 fols.

[119] I have examined the two last-named treatises in the 1551 edition of Schöner's *Opera* and give the titles as they occur there. I have also seen *Globi stelliferi* in the first edition of Nürnberg, 1533, where the form of title is the same except for its date. Doppelmayr (1730), 48, gives somewhat differing forms, presumably paraphrasing the wording somewhat.

Opera, II (1551), fol. 127r: *Ioanni Schoneri Carolostadii opusculum geographicum ex diversis libris ac cartis summa cura et diligentia collectum accomodatum ad recenter elaboratum ab eodem Globum descriptionis terrenae.* The dedication to John Frederick, duke of Saxony, is dated from Nürnberg on the Ides of November, 1532.

Ibid., fol. 87r (misnumbered xci): *Globi stelliferi sive sphaerae stellarum fixarum usus et explicationes quibus quicquid de primo mobili demonstrari solet id universum prope continetur Directionum autem ipsarum quas vocant ratio accuratissima est exposita.* Autore Ioanne Schonero Carolostadio atque haec omnia multo quam ante emendatiora et copiosiora singulari cura ac studio in lucem aedita fuere Anno Christi MDLI. It was printed again at Paris in 1556 with Gemma Phrysius, *De principiis astronomiae et cosmographiae.*

The full title of the 1551 edition of Schöner's works is: *Opera mathematica Ioannis Schoneri Carolostadii in unum*

Saxony, dated from Nürnberg on the nones of June, it is stated that Schöner has in it improved upon all his previous starry globes. The geographical opuscule, in addition to a description of the earth's surface which takes into account the voyages of discovery and new maps, includes a disputation attributed to Regiomontanus[120] whether the earth moves or is at rest. It is noted that by supposing the earth to revolve from west to east and the eighth sphere to stand still all appearances can be saved, but the hypothesis is rejected on the ground that in this case it would be harder to go west than east on the earth's surface, and on the ground that the conjunctions and oppositions of the planets and the diversity of their movements cannot be saved thereby. In the *Globi stelliferi* also Schöner makes use of the writings of Regiomontanus, borrowing at least two chapters (56 and 60) from his *Tabulae directionum*. To the *Globi stelliferi* were appended five tracts on as many astronomical instruments. They were rather closely related to similar works by Regiomontanus.

In 1532 Camerarius printed with a Latin translation of his own a Greek astrological manuscript, consisting in part of extracts from Hephaestion of Thebes,[121] which he had found "among the remains of the books of John Regiomontanus," and which he says was written almost entirely in Regiomontanus's own hand. This information is given in a preface written from Nürnberg on Camerarius's birthday, the twelfth of April, to Andreas Perlach, professor of mathematics at Vienna, whom Camerarius says he has long known through his writings and

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volumen congesta et publicae utilitati studiosorum omnium ac celebri famae Norici nominis dicata. Impressa Norimbergae in officina Ioannis Montani et Ulrici Neuberi Anno Domini MDLI. Really there are three volumes in one, with new title pages and paginations. Copy used: BN Inv. Rés. V.216. In 1650 it belonged to the Dominican convent of Sanctissima Maria Annunciata in the "via nova S. Honorati," Paris.

[120] Zinner (1938), 45-46, suggests that Regiomontanus may have merely copied it from some other MS. On the other hand, Zinner makes much of a brief statement that the earth moves a little, a statement reported once to have existed on a scrap of paper now lost but said to have been torn from a letter by Regiomontanus.

[121] Joachim Camerarius, *Astrologica,* Norimbergae apud Io. Petreium, 1532. Copy used: BM 1305.g.16. The MS, Erlangen 1227, is described by Zinner (1938), 240-41, and F. Boll in *Catalogus Codicum Astrologorum Graecorum,* VII (1908), 73-74, 231-46.

through Schöner, "professor of mathematics with us." Camerarius further deplores that the signs of the zodiac are no longer where they were in the time of Ptolemy. "Now scarcely one foot of the Twins is in its place."

In 1534 Schöner edited the *Twenty-Nine Problems* by Regiomontanus, concerning the noble astronomical instrument, the *Saphea*.[122] To it he added other treatments of the *saphea* such as that by Arzachel.[123] In the same year Schöner published the *Algorithmus demonstratus* of Gernardus, a work which has sometimes been incorrectly ascribed to Regiomontanus,[124] although Doppelmayr stated two centuries ago that it was the composition of an unknown (medieval) author which Regiomontanus had copied with his own hand from a manuscript in Vienna.[125] In 1535 Schöner himself printed on two large sheets an astrological "Horoscopion generale omni regioni accomod(at)um," dedicated to Georg Volckamer, a patrician of Nürnberg.[126]

The year 1535 appears to have passed without publication of any new treatise by either Regiomontanus or Schöner, but saw an edition of Peurbach's *Theory of the Planets* by Milich at Wittenberg with an introduction by Melanchthon. The next year Melanchthon contributed another preface and Milich a supporting letter to Schöner's astronomical tables or *Tabulae resolutae*, with which was printed Regiomontanus's discussion of the twelve astrological houses against Campanus and John Gazulus.[127]

[122] *Problemata xxix Saphaeae nobilis instrumenti astronomici ab Ioanne de Monteregio mathematicorum omnium facile principe conscripta*, 4to, Nürnberg, 1534. Copy used: BM T.962.(3.).

[123] *Sapheae recentiores doctrinae patris Abrufabk Azarchelis summi Astronomi a Io. Schonero innumeris in locis emendatae*, Nürnberg, 1534, 4to: listed by Will, III, 561. Jacob Ziegler in 1504 had prepared a version of the *Saphea* of Arzachel, but it remained in MS (Vienna 5280): see Karl Schottenloher, *Jakob Ziegler*, 1910, p. 12 *et seq.*; G. Eneström, "Le commentaire de Jakob Ziegler sur la 'Saphea de Zarkali,'" *Bibl. Math.*, X(1896), 53 ff.

[124] Antonio Favaro, "Intorno alla vita ed alle opere di Prosdocimo de' Beldomandi," *Bullettino di Bibliografia e di Storia delle Scienze matematiche e fisiche*, XII (1879), 130, 133.

[125] Doppelmayr (1730), 48.

[126] Described more fully by Karl Schottenloher, ZB 24(1907), 154-55.

[127] *Tabulae astronomicae quas vulgo quia omni difficultate et obscuritate carent resolutas vocant ex quibus cum erraticorum tum etiam fixorum siderum motus . . . facillime calculari possunt per J. Schonerum correctae et locupletatae. Ratio . . . duodecim domorum coeli authore Joanne de Monte regio.*

Schöner took umbrage at Gaurico's criticism of the *Tabulae directionum* of Regiomontanus and his apparent desire to restore the method of division into houses favored by Campanus and Gazulus. Maurolico also was to prefer the method of Campanus to that of Regiomontanus.[128] In the same connection Schöner lauded Regiomontanus and listed some of his writings. The *Tabulae resolutae* were sufficiently in demand to be reprinted in 1551 in the collected edition of Schöner's works and again separately in 1587-1588.[129] Melanchthon in his prefatory letter to Schöner noted the flourishing of mathematical studies at Nürnberg in the past and how much today was owed to Schöner, who not only inspired his own students there but supplied books useful for schools and students elsewhere. He called the *Tabulae resolutae* an outstanding work. "Let others admire wooden doves and other automata. These tables are much more worthy of admiration which show the positions of all the stars and not for one year only but many centuries."

Melanchthon contributed yet another foreword to Schöner's edition of astronomical writings of Alfraganus and Albategni in 1537. These Arabic authors, of whom Albategni was to be much cited by Copernicus, had not appeared in Regiomontanus's list of proposed publications, but the inventory of Walther's library in 1522 had contained manuscripts of them which were presumably utilized by Schöner in his edition. He added geometrical demonstrations and additions of Regiomontanus and the latter's introductory oration on the mathematical sciences at Padua when opening a course of lectures on Alfraganus. Also his "most useful introduction to the elements of Euclid."[130]

Praefatio D. P. Melanchthonis in easdem Astronomiae commendatoria, Johann Petreius, Norimbergae, 1536. Copy used: BM 532.d.5.(2.) and editions of 1551 and 1587-1588 at the Bibliothèque Nationale, Paris. The dedication to the senate of Nürnberg is dated Aug. 25, 1536. Milich's letter is omitted in the edition of 1551.

[128] BB IX(1876), 37.

[129] In the edition of 1587-1588 the preface by Iohannes Hagius of Wittenberg in 1587 states: "Desideratae sunt hactenus per annos quinquaginta a studiosis artium mathematicarum Tabulae astronomicae Resolutae Iohannis Schoneri quibus in Academiis praecipue opus est."

[130] *Rudimenta Astronomica Alfragani. Item Albategnius astronomus peritissimus de motu stellarum ex observationibus tum propriis tum Ptolemaei,*

Last in his announcement of proposed publications Regiomontanus had listed "De ponderibus et aqueductibus" and "De speculis ustoriis." Doppelmayr says that the former was published with other minor works of Regiomontanus at Marburg in 1537,[131] but no such edition seems to be extant.

For the year 1538 Schöner composed in German a *Practica . . . auff das Jar Christi MCCCCCXXXVIII . . . auss der lere Ptolomei gezogen,* that is to say, based on Ptolemaic methods. This is only one example of his annual predictions, of which Hellmann found seven in Latin or German for years between 1534 and 1547.[132] This reckoning does not include the *Ephemeris* for 1532 or the *Coniectur* on the comet of 1531 which have been already mentioned.

In 1539 was printed at Nürnberg Schöner's *Opusculum astrologicum.*[133] It was dedicated to two nephews of Wilibald Pirckheimer, Johann and Christofer Geuder, and pointed to their uncle and Melanchthon as supporters of astrology. The book is described as "collected from various works with the greatest care for the utility of students." Its first four parts were Schöner's own work and consisted of instructions as to the use of *Ephemerides* and *Tables,* with a brief instruction as to weather prediction, an introduction to judicial astrology, and sections on elections and nativities respectively. No prejudice was displayed against medieval and Arabic astrology, such terms as *Almuten, Animodar* and *Hyleg* being freely employed. Haly Abenragel,

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omnia cum demonstrationibus Geometricis et Additionibus Joannis de Regiomonte. Item Oratio introductoria in omnes scientias Mathematicas Joannis de Regiomonte, Patavii habita cum Alfraganum publice praelegeret. Eiusdem utilissima introductio in elementa Euclidis, Joh. Petreius, Nürnberg, 1537. Listed by Zinner (1936), item 108.

[131] Doppelmayr, p. 20; Zinner (1938), p. 258, items 168, 169.

[132] Hellmann (1924), 29.

[133] *Ioannis Schoneri Carolostadii Opusculum astrologicum ex diversorum libris summa cura pro studiosorum utilitate collectum subnotata continens: Instructio intelligendae Ephemeridos, Isagoge astrologiae iudiciariae, De electionibus communibus, Canones succincti nativitatum, Tractatus integer electionum M. Laurentii Bonincontrii Miniatensis, Assertio contra calumniatores astrologiae D. Eberhardi Schleussingeri claris. philosophi atque medici.* Norimbergae apud Iohan. Petreium . . ., 1539. I have consulted copies of the work at Munich and Paris, the latter numbered BN V.8780-8781. Another copy in London is BM 1395.g.18.

John of Seville, and Antonius de Montulmo were quoted as authorities as well as Ptolemy and Regiomontanus, who for his part had not disdained to make additions to the work of Antonius de Montulmo on nativities. In the discussion of astrological elections Schöner denied that there was any favorable moment for attempting the transmutation of metals, since it was not naturally possible and no one had ever been enriched thereby, whereas many had wasted their wealth upon alchemical experiments. With this astrological primer, as we may regard it, of his own Schöner reprinted the treatise on elections of Lorenzo Boninincontri of San Miniato, composed at Rome for a cardinal in 1489,[134] Schöner also published, apparently for the first time, a brief but somewhat original defense of astrology by Eberhard Schleussinger already mentioned by Schöner in his geographical work of 1515.[135] While this defense was written in the fifteenth century, we may give some account of it as published in 1539.

The *Assertion against the Calumniators of Astrology* by Eberhard Schleussinger,[136] "illustrious philosopher and physician," is devoted primarily to a defense of the practice of elections or

[134] See T IV, 409.

[135] Karl Schottenloher, ZB 24(1907), 145. Under the year 1472 Jobst (1556), p. 122, lists "Everhardus Schleussingerus Francus Orientalis medicus Tigurinus in Helvetia eximius." Schöner mentions Schleussinger only under Bamberg, not Zurich: "Ibi nostra aetate Doctor Eberhardus Schleussinger in mathematica excelluit," *Luculentissima quaedam terrae totius descriptio,* Impressum Noribergae in excusoria officina Ioannis Stuchssen anno domini 1515, fol. 30r, col. 1. Copy used: BM 1295.f.12.

[136] Zinner (1938), 157-58; (1934), p. 98, ascribes to Schleussinger the work on comets of 1472 of the "physician of Zurich" which T IV, 359-60, attributes to Conrad Heingarter.

Gesner (1545), fol. 218r, also seems to attribute this work to Eberhard Schleussinger of Gastmansdorf in Franconia, doctor of arts and medicine, and a physician of Zurich, who, Gesner says, wrote on comets and judgments from them and especially on the comet which appeared at Zurich in 1472. But Gesner does not state definitely that this work on comets was printed, as he does of another introductory treatise to astrology, especially medical elections, which he says Schleussinger had printed in Latin and German. Christopher Clauser, Gesner adds, possesses fragments of these tracts. Presumably the latter work would be the *Assertio contra calumniatores astrologiae,* but Gesner does not give that title or date its printing in 1539. On the other hand, Gesner says that Conrad Heingarter wrote a defense of astronomy of which he had seen a manuscript, also in Christopher Clauser's possession.

choice of favorable hours. Different categories of human actions or undertakings are first distinguished. Some are voluntary in their inception but once started are completed by nature. Such are sowing, planting, eating, drinking, taking medicine, and procreating. Others are entirely voluntary such as virtuous, vicious and scientific operations. Others are voluntary but require extrinsic instruments, like building and clothing. Others involve the will of other persons, as do marriage, friendship, partnership, ruling, speaking to princes, and standing in judgment. In others the result is fortuitous and a matter of chance, such as games of chance, hunting, pursuit of fugitives, buying and selling, investment for profit, and in such matters the stars have more influence. Schleussinger insists that many errors are ascribed to astrologers which their true principles deny.

In any undertaking those particular things are to be chosen which are essential to its success. First one should invoke divine aid and commit the matter to God's providence, so that no diabolical suggestion or pact may be involved. One should not attempt the unnatural or impossible. God has set a time for all things. Not that the time chosen itself produces the result, but that at such a time conditions are favorable to the undertaking. Schleussinger also points out that other factors besides selection of a favorable time are essential for success. In buying and selling, for example, demand for the article, salesmanship, and scrutiny of the article by the intending buyer for possible defects are all influential. To have healthy children a choice of favorable stars is not alone enough. The rules of medicine also must be observed, and the mother should have abstained from imaginations likely to be injurious to the offspring. Nevertheless the science of the stars is especially essential in medicine. Such is the gist of Schleussinger's brief discussion of less than a dozen pages.

In 1540 the treatise on judgments of nativities by the late fourteenth century author, Antonius de Montulmo, with the additions of Regiomontanus, was printed at Nürnberg by Johann Petreius together with the work of Gaurico on the same subject, and is sometimes found bound together with Schöner's *Opus-*

culum astrologicum.[137] Also sometimes found bound with Schöner's *Opus astrologicum* is an edition in 1540 by the same printer of the work on nativities of the Arabic astrologer, Albubater.[138] In 1541 Schöner published Regiomontanus's *Tables of Sines.*[139] There seems to have been no other considerable publication by Schöner or edition of unpublished treatises of Regiomontanus until 1544.

Meanwhile other works of ancient or medieval authors which Regiomontanus had proposed to print were published. In editing the commentary of Theon of Alexandria on the *Almagest* at Basel in 1538, Joachim Camerarius utilized a manuscript once in the possession of Regiomontanus.[140] He seems to have made use of the same manuscript in his edition of Ptolemy's *Tetrabiblos* in 1535. Zinner suggests that Grynaeus may have utilized in his Basel, 1538 edition of the *Almagest,* a Greek manuscript of it listed among the remains of Regiomontanus in 1512 but missing from the inventory of 1522.[141] The Latin translation of Apollonius of Perga by Johannes Baptista Memmius, published at Venice in 1537,[142] and the Italian translation of Hero's *Pneumatics* by Giovanni Battista Aleotti, printed at Bologna in 1543,[143] seem to have borne no relation to the remains of Regiomontanus. Independent likewise seem the later editions of Theodosius *De habitationibus* by Joseph Auria at Rome in 1587, *De diebus* at Strasburg in 1572 by Dasypodius, and in 1591 at Rome by Auria, or of the *Musica* of Ptolemy in the translation of Gogava at Venice in 1562.[144] Georg Hartmann, in his 1542 edition

[137] See T III, 603,n.7.

[138] *Albubatris astrologi diligentissimi liber genethliacus sive de nativitatibus non solum ingenti rerum scitu dignarum copia verum etiam iucundissimo illarum ordine conspicuus.* Norimbergae apud Ioh. Petreium Anno MDXL. Copy used: BN V.8780-8781.

The address to the reader is by the printer, and probably the edition is merely a reprint of those at Venice in 1492 and 1501.

[139] Zinner (1938), p. 251. Apian also printed them in his *Instrumentum sinuum,* Nürnberg, 1541: Zinner (1936), item 103.

[140] Doppelmayr (1730), 13; Petz (1888), 248. It is now Nürnberg Cent V app 8, described by Zinner (1938), pp. 237-38.

[141] Zinner (1938), p. 241.

[142] Doppelmayr (1730), 17; Petz (1888), 248.

[143] Doppelmayr (1730), 17; Petz (1888), 258.

[144] Doppelmayr (1730), 15-16; Petz (1888), 257.

of the *Perspectiva communis* of John Peckham,[145] said that he also had a fragment of the *Optics* of Ptolemy but in too corrupt a text to publish. The work was not printed until 1885 by Govi and is extant only in the twelfth century Latin translation without the first of the five books. Yet at least sixteen manuscripts are known,[146] so that Hartmann's excuse sounds flimsy. Hartmann was born at Eggolsheim near Forchheim, studied at Cologne, travelled in Italy, returned in 1518 and became an expert instrument-maker (*magister horologiorum*) and vicar of Sebaldus-Kirche at Nürnberg. In 1554 he was to publish an astrological *Directorium*.[147]

When Schöner in 1544 published for the first time tracts by Regiomontanus on certain astronomical instruments such as the torquetum and armillary astrolabe,[148] nearly seventy years had elapsed since the death of Regiomontanus and his own birth a year later in 1477. He spoke of himself as "in this my extreme old age"[149] and printed the treatises lest they perchance perish "after my death," since they had so long lain neglected and were difficult to read and might fall into the hands of unqualified per-

[145] "Pisanus," repeated by Zinner (1938), pp. 257-58, is incorrect. The work of Peckham had been printed long before Hartmann's edition in 1482 by Facio Cardan and in 1504 by Luca Gaurico.

[146] T I, 107-9.

[147] Will, II, 40-41; Doppelmayr (1730), 56-58. On Hartmann's instruments and writings left in MSS see Zinner (1934), 56-58, 89-90, who also corrects Will as to Hartmann's birthplace. His letter in German to duke Albrecht of Prussia on the inclination of the magnetic needle was first printed in the nineteenth century, in 1831, 1838, 1841 and finally, with a facsimile of the MS, in Hellmann's *Neudrucke*, 1898, No. 10.

[148] *Scripta clarissimi mathematici M. Ioannis Regiomontani De Torqueto, Astrolabio armillari, Regula magna Ptolemaica Baculoque astronomico et Observationibus Cometarum aucta necessariis Ioannis Schoneri Carolostadii additionibus; item Observationes motuum solis ac stellarum tam fixarum quam erraticarum; item Libellus M. Georgii Purbachii de Quadrato Geometrico. Ioachimus Heller Leucopetraeus ad Lectorem.* Norimbergae, Joh. Montanus et Ulrich Neuberus, 1544, 4to Minori 89 fols. Copy used: BM 531.g.3.(2.)

Heller's contribution is limited to four lines of verse. The *De cometae magnitudine longitudineque ac de loco eius vero problemata xvi*, at fols. 79r-88r, had been printed before in 1531, and the *Canones pro compositione et usu gnomonis geometrici pro reverendissimo domino Ioanne archiepiscopo Strigonensi a preclarissimo mathematico Georgio Burbachio*, at fols. 61r-78v, had been printed in 1516.

[149] There is a picture of him with a white beard "anno aetatis suae LXIX" in the 1551 edition of his works.

sons. At the same time he could speak of "this our most learned age" and praise Peurbach and Regiomontanus for having so revived in Germany "these studies of celestial phenomena," which for centuries before had lain utterly abolished and buried without honor, that now they flourished more in Germany than elsewhere.[150] Schöner also published the observations of the sun by Regiomontanus and Bernard Walther, those of eclipses, comets, the planets and fixed stars by Peurbach, Regiomontanus and Walther, and the further observations made by Walther at Nürnberg. The observations of the sun by Regiomontanus do not occupy much space, being limited to observations made at Rome in 1462 and at Nürnberg in the years 1472, 1473 and 1475, but those of Walther for the years 1475-1479 and 1487-1504 are more extensive. So are the observations of eclipses, comets, planets and fixed stars by Peurbach and Regiomontanus which begin at Melk with a lunar eclipse in 1457 and continue not quite every year[151] at Vienna, Rome, Viterbo, etc. Again, however, the observations of Walther are more voluminous. They are fairly full for the years 1475-1489, fall off a great deal from 1490 to 1502, but become very detailed for 1503 and 1504. Zinner reckons that Walther made 746 observations of the sun's altitude and 615 observations of the positions of planets, stars, comets and eclipses. His observations were surprisingly accurate and were utilized subsequently by Tycho Brahe, Kepler, Wurzelbaur and M. Viljeff. Unfortunately Schöner's edition was marred by misprints and other faults.[152]

One outcome of Walther's observations was that he rediscovered the phenomenon of refraction by which a star appears above the horizon when it is really below it. This was familiar centuries before to Alhazen and Witelo, as Walther discovered when he came to read them. Tycho Brahe also observed the phenomenon before he had read either Walther or the authors on perspective, as Kepler and Snellius were subsequently at pains to

[150] See his preface to the senators of Nürnberg, fol. a iii r-v.

[151] 1460, 1461, 1462, 1464, 1465, 1468, 1471 and 1474 are the other years in which observations fall.

[152] E. Zinner, *Die fränkische Sternkunde*, 1934, pp. 13-15, for further details.

point out.[153] The incidents suggest that sometimes it may be as well to read the past authorities before proceeding to observation, experiment and independent but superfluous discovery.

Having thus paid, so to speak, his last respects to the memory of Regiomontanus and Walther, and brought to completion his publication of the former's literary remains, Schöner in 1545 printed another work of his own of considerable length, namely, three books on the judgments of nativities,[154] with another preface by Melanchthon.[155] Schöner had been one of those who encouraged Copernicus to publish his magnum opus. Now in the present work, although preferring the method of Ptolemy in astrological judgments to those of subsequent astrologers, Schöner maintained that the Copernican system was not unfavorable to astrology. He illustrated the method of finding the ascendent at birth by arguing back from the subsequent accidents befalling the person in question by his own geniture, thereby giving some autobiographical information. He was born on January 16, 1477, at 11 P.M. in a latitude of fifty degrees. At the age of forty years and 192 days (i.e. in 1517) he was very "scabby, ulcerous and afflicted with apostumes and various melancholy disturbances," which showed the influence of Saturn. When fifty-eight on New Year's day (presumably in 1535) he had a bad fall from a height, of which "the cause was Saturn retrograde in Leo in the tenth house of my geniture."[156] In another passage he stated that the presence of three other planets with Mercury in the aerial triplicitas produces preeminent genius and sublimity of science. Proof of this was the geniture of the most learned Regiomontanus who had Mercury, Mars, sun and moon together in Gem-

[153] Willebrodus Snellius, *Observationes Hassiacae*, Lugduni Batavorum, 1618, fols. 51v-52r.

[154] Johannes Schoner, *De judiciis nativitatum libri tres*, Norimbergae, J. Montanus et U. Neuber, 1545, 8 and 152 fols. In the first volume of the *Opera*, 1551, this text covers fols. 55r-218r.

[155] For a summary of it see the following chapter on The Circle of Melanchthon.

[156] *Opera*, 1551, I, fol. 57r-v. At the close of the third volume there is an astrological diagram or *Figura coeli* of Schöner's nativity. Melchior Adam, *Vitae Germanorum philosophorum*, gave the time of Schöner's birth more precisely as "minutiis septem ante undecimam horam noctis."

ini.[157] Although it contained such personal observations, Schöner's work on nativities was professedly largely compilation from past authorities. In the preface to its third book he says that he "has gathered most diligently into this book whatever I have found worth stating concerning this part of the subject."[158] Schöner cast other horoscopes than his own. In a manuscript at Paris is a nativity of Nicolaus Gugler, who was born on April 7, 1502, drawn up by Schöner, apparently in 1535 and given by him to Gugler on January 13, 1539.[159]

Schöner had yet to pay his respects to the memory of Werner and in 1546, the last year before his own death in 1547, the old man edited Werner's unpublished work on weather prediction.[160] In a letter of February 18, 1551, to the senate of Nürnberg Andreas Schöner said that his father had not been a lover of ease. When his friends had concluded their visits and the day's stint of teaching was over, he would engage in writing astrological judgments or making computations or observing the stars or constructing instruments. By his labors he had rescued the arts of mathematics and astrology, which were almost dead before his age, and had collected and edited the works of Regiomontanus which were in danger of perishing.[161] Thus he had resusciated both the resuscitator of mathematical science and what the latter had resuscitated. Mathematics at this period would appear to have required frequent and repeated applications of first aid.

A brief oration on the life of Regiomontanus by Johann Schöner was printed in Melanchthon's volumes of selected declamations by himself and others,[162] where it is followed by another oration on Regiomontanus by Erasmus Reinhold. Schöner's

[157] *Opera,* 1551, I, fol. 124r.

[158] *Ibid.,* fol. 155v.

[159] BN 7417, fols. 144r-156r, in a firmer neater hand than Gugler's own scrawl in the same MS. Beneath the nativity is written the date, 1535. Then follows at fol. 156v, "Rectificatio gradus ascendentis nativitatis D. Nic. Guglerum per modum Ioh. Schoneri." *De nativitatibus* by Schöner in BL Canon. Misc. 109, fols. 96-110, is perhaps merely a part of his works of 1539 or 1545 on the subject.

[160] *Canones . . . de mutatione aurae,* Nürnberg, 1546. I have been unable to find a copy of this work.

[161] *Opera,* 1551, III, first pages.

[162] *Oratio de vita Ioh. Regiomontani:* Melanchthon, *Selectae Declamationes,* III, 503.

three books on nativities were published in Italian translation at Venice in 1554.[163] His son, Andreas, published in 1557 at Neuburg on the Danube *Fundamenta operationum* of Regiomontanus, supplementary to his *Tables of the Primum Mobile*.[164] He also published two volumes on astronomical and other instruments with a long title at Nürnberg in 1562,[165] which were reprinted at Görlitz in 1572. They may owe something to Regiomontanus.[166]

In the same year, 1544, that Schöner published the observations of Regiomontanus and Walther, Thomas Venatorius (Gechauff) who was born at Nürnberg about 1490, after 1504 became a pupil of Schöner, and was also a friend of Pirckheimer, fulfilled the intention of Regiomontanus to publish various works of Archimedes together with the commentaries of Eutocius of Ascalon upon them.[167] He obtained the Greek text for this from the library of Pirckheimer and the Latin translation from the version of James of Cremona included among the literary re-

[163] *I tre Libri delle Natività di Giovanni Schonero . . .* Tradotti di Latino in Italiano per M. Gio. Battista Carello, Venice, 1554.

[164] Zinner (1938), p. 236, for the full title.

[165] Andreas Schonerus Noribergensis, *Gnomice, hoc est: De Descriptionibus Horologiorum Sciotericorum omnis Generis, Proiectionibus Circulorum Sphaericorum ad Superficies cum planas tum convexas concavasque sphaericas cylindricas ac conicas. Item de Delineationibus quadrantum annulorum, etc. Libri III. His addita sunt eiusdem Autoris: Gnomonices Mechanices seu de designandis per Instrumenta Horologiis Libellus. De Inventione Lineae Meridianae ac Instrumenti ad hoc necessarii Compositione. De Compositione Astrolabii plani et columnaris. Directorii Astrolocici plani.* Noribergae, apud Joa. Montanum et Ulr. Neuberum, 1562.

[166] Zinner (1938), p. 260, item 177.

[167] *Archimedis opera quae quidem extant omnia nunc primum et grece et latine in lucem edita. Adiecta quoque sunt Eutocii Ascalonitae in eosdem Archimedis libros commentaria item grece et latine numquam antea excusa.* Basileae, 1544, folio.

This may be compared with the corresponding item in the list of proposed publications by Regiomontanus: "Archimedis geometri acutissimi opera de spero (sphaera) et cylindro, de arculi (circuli) dimensione, de conalibus et speralibus, de lineis spiralibus. De equiponderantibus. De quadratura parabole. De hareno (arenae) numero. Cum commentario Eutocii ascalonite in tria opera ex predictis scilicet de spera et cylindro, de dymensione circuli, de equiponderantibus. Traductio est Iacobi Cremonensis sed nonnusquam emendata."

I have used a manuscript list of Regiomontanus's proposed publications in Vatic. Palat. 1375, fol. 176v, but it seems roughly identical with that reproduced by Schwarz.

mains of Regiomontanus,[168] whose manuscript had passed after 1522 into the possession of Venatorius.[169]

In 1548 Jacob Ziegler published as by Regiomontanus a *Libellus de cometa* which differed from the *Problems* printed by Schöner in 1531.[170] But Zinner has shown that Ziegler's publication was practically identical with the middle part of *Thurecensis phisiti Tractatus de Cometis,* already twice printed in 1473(?) and 1474. Ziegler had presumably found a copy of it among the books and manuscripts of Regiomontanus.[171] Ziegler gave another evidence of his interest in the literary remains of Regiomontanus by incorporating an extract from the latter's work on the *Torquetum* (printed in full by Schöner in 1544) in a work of his own on the fixed stars which he composed at Ferrara in 1527 but which has remained in manuscript.[172] Ziegler further manifested his interest in astronomical instruments in his commentary on the second book of Pliny's *Natural History,* printed at Basel in 1531. But he only occasionally passed through Nürnberg, spending most of his life and composing his works at other centers, and having closer relations with other men of science like Calcagnini than with the Diadochi of Regiomontanus.[173]

The Nicolaus Gugler whose horoscope was read by Schöner should be mentioned a little further in connection with the aftermath of Regiomontanus. In another manuscript, which once belonged to him and had been copied either by him or under his direction, he is called a doctor of both laws, a physician and mathematician, a judge at Nürnberg, an advocate of the imperial

[168] Will, IV, 86; Doppelmayr (1730), 51-52.

[169] Nürnberg Cent V 15, described by Zinner (1938), pp. 232-33.

[170] Karl Schottenloher, *Jakob Ziegler aus Landau an der Isar,* Münster, 1910, pp. 337, 361, 387.

[171] Zinner (1938), pp. 156-58.

[172] Karl Schottenloher, *Jakob Ziegler aus Landau an der Isar,* Münster, 1910, pp. 359, 362, 389.

[173] On Ziegler's life and writings see J. G. Schelhorn, *Amoenitates historiae ecclesiasticae et literariae,* II (1738), 210-86, De vita et scriptis Jacobi Ziegleri; Siegmund Günther, *Jakob Ziegler, ein bayerischer Geograph und Mathematiker,* Ansbach, 1896, 54 pp.

G. Enestrom, "Le commentaire de Jakob Ziegler sur la Saphea de Zarkali," *Bibliotheca mathematica,* X (1896), 53, pointed out that Vienna 5280 preserved this work of Ziegler, unknown to Günther, under the Latin equivalent of his name, Lateranus.

court, and a counselor of the king of Denmark.[174] There seem, however, to have been two Nicolaus Guglers, presumably father and son, since the nativity drawn up by Schöner was for one born on April 7, 1502, while in the same manuscript with it are other figures for the conception of a Nicolaus Gugler on July 14, 1520, and his birth on April 15, 1521.[175] This manuscript further contains two works on astronomical instruments by Nicolaus Gugler, one of which is dated at the close 1538,[176] a *Prognosticon* by him composed on May 17, 1539,[177] a brief tract on comets,[178] and a *De orbibus*.[179] Houzeau and Lancaster ascribe to him an edition or paraphrase of the *Sphere of Sacrobosco*[180] and works on astronomical instruments, contained in manuscripts of the Bibliothèque Nationale whose numbers they fail to state.

The same manuscript of which we have been speaking includes treatises by Philip Imser, professor of astronomy at Tübingen, one on the theory of the planets, another on the composition of the astrolabe, and annotations on the *Tabulae resolutae* of Schöner, dated in the year 1539, and on *Tables of Directions*, presumably those by Regiomontanus.[181] Imser had succeeded Stoeffler as professor of astronomy at Tübingen and issued a posthumous edition of Stoeffler's *Ephemerides*, covering the twenty years from 1532 to 1551. Imser's dedication to Ferdi-

[174] BN 7443C, on the flyleaf, "Nicolaus Gügler N.V.I. (standing presumably for Norimbergensis Utriusque Iuris) Doctor Imperialis Camerae Advocatus serenissimi regis Danice consiliarius"; at fol. 335r, at the end of the text, "Nicolaus Gugler Norimpergensis authoritate Pont. et Ces. Iudex ordinarius utriusque juris doctor officialis ——— [a word I failed to make out] medicus et mathematicus omnia haec scripta curavit 1562."

[176] BN 7417, fols. 113v, 114r.

[177] BN 7417, fols. 2r-13v, "Compositiones instrumentorum astronomicorum una cum eorundem usu et utilitate"; fols. 27r-29r, "Structura instrumenti imaginatorii theoricae solis."

[178] BN 7417, fols. 112-143.

[179] BN 7417, fols. 172r-175r.

[180] BN 7417, fols. 71r-91r.

[180] "Sacrobosco Sphaera in compendium redacta." It is hard to imagine how the *Sphere* of Sacrobosco could be reduced to more of a compendium than it is.

[181] BN 7417, fols. 14r-27r, "Compositio theoricarum planetarum per Philippum Imser astronomiae professorem Tubingae"; fols. 64r-68r, "Astrolabii compositio. De proiectione sphere in planitiem ex qua tota fere planispherii sive astrolabii compositio dependet per Philippum Impser" (in 9 caps.); fol. 94r, "Annotata Philippi Imseri in Tabulas resolutas anno 1539"; fol. 102r, "In tabulas directionum annotata." Houzeau et Lancaster mention the first item.

nand, king of the Romans, is dated June 24, 1531, and the work was printed on September first of that year.[182] There also were subsequent editions in one of which Imser carried the *Ephemerides* on from 1551 to 1556.[183] In the last named year tables by Imser on Peurbach's *New Theories of the Planets* were printed with Erasmus Oswald Schreckenfuchs's commentary on that work.[184] Imser also made astronomical instruments and in 1554 went with Nicolaus Pruckner or Prugner to offer one to the count palatine.[185]

Further works or first drafts towards works by Imser are preserved in a manuscript at Basel.[186] First comes his commentary on the first book of Ptolemy's *Geography,* then his *Succinct Composition of a Geographic Globe,* dated in 1549. It begins with an index of 34 problems but only six of these seem to be treated in the text, after which we have nine chapters in the seventh of which is inserted a sixteen page table of the boundaries of provinces based on Ptolemy. After the ninth chapter follow ten propositions connected with the use of the geographic globe, and then a *Composition of the Meteoroscope of Ptolemy* according to the mind of Regiomontanus by Philip Imser, dated March 11, 1549. This last tract includes a full page colored representation of the meteoroscope. The manuscript then concludes with a *Description of the World* by degrees of longitude and latitude very useful for designation of the geographic globe, written by Peter Apian, enlarged and edited by Gemma Phrisius

[182] *Ephemeridum opus Ioannis Stoefleri Iustingensis . . .*, Tubingae per Huldenrichum Morhart Ann. XXXI Kal. Sept.

[183] K. Steiff, *Der erste Buchdruck in Tübingen* (1498-1534), Tübingen, 1881, p. 180 *et seq.*

[184] *Erasmi Oswaldi Schreckenfuchsii Commentaria in novas theoricas planetarum Georgii Peurbachii . . . His quoque accesserunt varia exempla . . . Philippi Imsseri in eiusdem Purbachii Theoricas tabulis utilissimis adiectis,* Basileae per Henrichum Petri, 1556. Copy used: BM 533.1.3.(5.). Imser's tables take the form of a chart which is folded into the volume after its last numbered page, 424.

[185] *Urkunden z. Gesch. d. Univ. Tübingen aus den Jahren 1476 bis 1550,* Tübingen, 1877, pp. 167-68.

[186] Basel O.IV.27, paper 16th century, fols. unnumbered: codex MS Musei Faeschii. See Haenel (1830), 658, but the *Geography* of Ptolemy in the hand of Regiomontanus is now a separate MS, Basel O.IV.32, and not accompanied by the commentary of Imser.

in 1553, and transcribed by Philip Imser at Strasburg on February 14, 1561.

How ready the age was to welcome predictions of disaster and even of the end of the world is seen in a preface and a poem which Gaspar Brusch wrote in 1553 to accompany an edition of the medieval work of Engelbert, abbot of Admont, *On the Rise and End of the Roman Empire*.[187] Brusch dated his preface on May 29, the centenary of the fall of Constantinople, and bewailed the old age and threatening ruin and dissolution of the world. He had been greatly stirred by finding in a monastery of Noricum four lines of doggerel in German which were supposed to have been written years ago by Regiomontanus predicting the end of the world in the year 1588.

> Tausent fünffhundert achtzigk acht
> Das ist das iar das ich betracht
> Ghet inn den die welt nicht unnder
> So gschicht doch sunst gross mercklich wunder.

In the Latin poem, entitled *Hodoeporicon Bavaricum,* which is appended to Engelbert's treatise, Brusch enlarges upon the prediction of Regiomontanus whom he calls a great astrologer, and holds that all things point to the end of the world being near. Thesbaeus Helias, following the Talmud, had reckoned the number of the stars and the years of the world as six thousand, of which two thousand were without law, two thousand under the law, and two thousand Christian. As there were six patriarchs before Enoch, so six marvelous emperors would follow one another: Sigismund, Albert II, Frederick III, Maximilian, Charles V, and a sixth who, Brusch thinks, will be a young Charles. Despite Brusch's fears for the future of the world, he added after his poem a fourteen page bibliography of his own previous writings.[188]

[187] *Engelberti abbatis Admontensis qui sub Rudolpho Habspurgio floruit de ortu et fine Romani imperii liber cum Gasparis Bruschii poetae laureati praefatione. Accessit eiusdem Bruschii Hodoeporicon Bavaricum in quo et Regiomontani vaticinium quoddam explicatur et varia de die extremo coniiciuntur.* Basileae, Per Ioannem Oporinum, 1553.

[188] *Ibid.*, pp. 152–165.

This prediction of the end of the world in 1588 continued to trouble men as that year drew nigh. From King's Lynn in Norfolk on December 16, 1587, John Harvey, a physician, issued *A Discoursive Probleme concerning Prophesies* which was printed at London in 1588.[189] In the first part he made a general attack upon the professed prophecies of the present century, but not such judgments "as are learnedly and skilfully grounded upon lawfull art or certainly and assuredly approved by actual experience." In the second part he especially examined the prophesy "of this famous yeare 1588." He stated that its attribution to Regiomontanus was questionable. After a long astrological discussion and citation of such authorities—Arabic and Latin—as Leowitz on the conjunction of 1583, Postel on the new star of 1572, who stated that the end of the seventh age was at hand, as did Helisaeus Reslyn (*sic*) in the 24th proposition of his meteorological theory, Harvey decides that there is no astrological basis for the end of the world in 1588.

De Thou, the French historian of the sixteenth century, writing after the event, thought that Brusch had misinterpreted the meaning of the four vernacular verses by Regiomontanus but shared the faith of Brusch in their authenticity and their reliability as a prognostication. For the many prodigious events which made the year 1588 terrible had been forecast "not by the raving voices of seers but by the sure predictions of mathematicians." Stoeffler and after him others had confirmed the predictions as to this year "of such and so great a man" as Regiomontanus. Incidentally de Thou vouchsafes the further information or misinformation that Regiomontanus traced the cause of an illness of Matthias Corvinus to an eclipse rather than to the humors of his body, and that the king of Hungary gave him an annual salary of two hundred ducats.[190]

[189] John Harvey, *A Discoursive Probleme concerning Prophesies . . .*, London, 1588, 4to minori. Copy used: BM 718.g.64.

[190] Thuanus, *Historia*, lib. 90, at the beginning. Ernst Zinner, *Leben und Wirken des Iohannes Müller von Königsberg genannt Regiomontanus*, München, 1938, pp. 154-55, has briefly noted the statements of de Thou and Brusch, but not that of Harvey. On the faith of a vague statement made about 1580 by Geo. Ursinus in his *Prognostica oder Weissagung: Von ge-*

Gaurico had continued the labors of Regiomontanus on behalf of astrology by a supplement to his *Tables of Directions*, an accompanying treatise on directions, and so forth. These were not printed until after Luca's death in 1560 at Rome.[191] In a manuscript of the accompanying treatise at Milan there is included in the text a table of fixed stars based upon the work of Tycho Brahe.[192] This manuscript is therefore even later than the edition, testifies to the continued influence of Gaurico's astrology after the age of the new astronomy had begun, and shows that posthumous addenda to a posthumous work continued to appeal to distant posterity.

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fehrlichen verenderungen, printed at Erfurt (Zinner cites no page), Zinner would trace the origin of the prophecy to Johann Hilten, whose Latin prediction for 1588 was translated into the four lines of German by Stoeffler. Hilten died in 1502. But Zinner makes no reference to any publication by Stoeffler in which the four lines appear. On the other hand, he notes that they were attributed to Regiomontanus by Leovitius, *Ephemeridum novum atque insigne opus,* Augusta Vind., 1556, ee 10, upon the authority of Schöner. If they had appeared in the *Ephemerides* of Stoeffler before 1531, it is strange that this should have escaped the notice not merely of Brusch but such adepts in astrological literature as Schöner and Leowitz. Moreover, the quatrain might have been added to the *Ephemerides* of Stoeffler after his death, since the edition of 1531 was printed posthumously, as it was in 1544 and again in 1552 and 1553 with the additions of Petrus Pitatus for the years 1552-1557. Even so, it is hard to see what place there would be for a prediction for 1588! The *New Ephemerides* of Iohannes Stadius for the years 1554-1600 would be a likelier place.

As a matter of fact we have more reliable evidence than that advanced by Zinner that the prediction made by Hilten could not have been the basis of the quatrain. Melanchthon writing on May 18, 1552 (twenty-eight years nearer to the source than Ursinus), to Iohannes Matthesius, says that Johann Hilten, a Franciscan of Eisenach, predicted that in 1516 the papal power would begin to decline, and that by about 1600 the Turks would rule in Italy and Germany, which of course would preclude the end of the world arriving in 1588, of which year Melanchthon says nothing in this connection: CR VII, 1006-7.

Later in the century appeared the following work on Hilten and his predictions: Andr. Angelus, *Gewisser Bericht von Joh. Hilten und seinen Weissagungen,* Frankfurt, 1597.

[191] For their full titles see Pèrcopo, p. 43. It should be noted, however, that in the manuscript listed in the following note, the title of the accompanying treatise, which Pèrcopo gives as "Directiones progressiones sive inambulationes ascensoria tempora horimea horarum constitutio obviationum apoche et tempora particularia perilegiorum directiones examinata et in singulis huiusmodi circuitibus apotelesmata," reads in place of the word perilegiorum "per hyleg vere(?)."

[192] Milan Ambros. N.123.sup., fols. 1r-56v. The table occurs at fol. 20v, "Stelle fixe desumpte de tabula Tychonis. . . ."

Moreover, the *Tables of Directions* of Regiomontanus themselves, although they had been dedicated to the archbishop of Gran so long ago as 1467 and were useful primarily for astrological purposes,[193] were still in sufficient demand after the promulgation of the Copernican system and the labors of Tycho Brahe to be put forth in a new edition at Wittenberg as late as 1606.[194] They were accompanied by his table of sines and said to be arranged in better order and "emended in many places," but the chief improvement was to add to them, from Erasmus Reinhold's canons of directions, tables of oblique ascensions north of sixty degrees for the astrological benefit of dwellers in boreal regions such as Livonia, Sweden and Norway.

Tycho Brahe often cited Regiomontanus but was far from regarding him as infallible. He suggested that if Maestlin called some comets elementary as well as others celestial, it was because he had reposed too much faith in the authority of Regiomontanus and Vogelinus, whose observations Tycho did not regard as certain.[195] In other passages Tycho remarks that the astronomical observations of Regiomontanus were seldom in mutual agreement.[196]

As late as 1576 Tycho and his correspondent, Brucaeus, were looking for unpublished works of Jordanus or Regiomontanus,[197]

[193] The title page of the 1606 edition states that they are useful and necessary not only for judicial astrology but for constructing many tables and instruments, but of course such tables and instruments were also largely used for astrological purposes.

[194] *Iohannis de Monte Regio mathematici clarissimi Tabulae directionum profectionumque totam rationem primi motus continentes et non tam astrologiae judiciariae quam tabulis instrumentisque innumeris fabricandis utiles ac necessariae. Denuo nunc editae et pulchriore ordine dispositae multisque in locis emendatae. Eiusdem Regiomontani tabula sinuum per singula minuta extensa universam sphaericorum triangulorum scientiam complectens. Accesserunt his Tabulae ascensionum obliquarum a 60 gradu elevationis poli usque ad finem quadrantis per Erasmum Reinholdum Salveldensem supputatae.* Witebergae. Imprimebantur in officina typographica Laurentii Seuberlichs impensis Samuelis Selfisch. Anno 1606.

The table of sines begins at p. 235. Reinhold's *Tables* occupy pp. 267-327.

[195] Tycho Brahe, *Opera,* edition of 1648, II, 132.

[196] Tycho Brahe, *Opera,* ed. Dreyer, V, 179; VI, 147; VII, 258.

[197] Tycho Brahe, *Opera,* ed. Dreyer, VII, 33: Brucaeus to Tycho, "Si quos habeas Iordani aut Regiomontani nondum editos Norimbergae a te emptos una tecum afferas."

but the mention of the thirteenth century mathematician in the same breath with the fifteenth century astronomer indicates that they did not share the notion that the latter had revived such studies after they had been neglected for many centuries.

Thomas Digges in 1573 spoke of Regiomontanus in high terms[198] but thought that he had relied too much on mere demonstration and had not accommodated his method sufficiently to the senses.[199]

If the Diadochi of Regiomontanus at Nürnberg and elsewhere mingled a good deal of astrology—which now seems to us superstitious and worthless—with mathematics and astronomy—which we call sound science—it must be remembered that their master himself had done the same,[200] that to neither him nor them did it seem superstitious or worthless but equally sound science with the rest, forming not an incongruous mixture but an organic union. If anything, the astrology was the warp, and the instruments, tables, calculations and observations only the woof in the web of their activity, in the seamless robe of queen Philosophy. Those historians of "modern science" who would pick out merely the threads that seem to them to deserve the name of science can neither trace a connected development which is true to life and thought then, nor paint a picture of the past with any claim to verisimilitude, nor even unravel the skein of particular problems. They merely tear to pieces a unified fabric, which the ravages of time may have already worn threadbare, and show no regard for how it was woven.

[198] Thomas Digges, *Alae seu Scalae mathematicae,* London, 1573, Preface to Wm. Cecil.

[199] *Ibid.,* Preface to the reader.

[200] Zinner (1938), has found a stray sentence or two in all the writings of Regiomontanus which he thinks show some doubt in his mind as to the validity of astrology. But no one then thought that astrologers were invariably right; many agreed that the art had its uncertainties and unsolved problems, and might be improved. It would take many times more bits of evidence than these to counterbalance the many astrological volumes in the possession of Regiomontanus, a number of them copied in his own hand, the works of past astrologers which he proposed to publish, his additions to the work of Antonius de Monteulmo on nativities, his interest in the time of geniture and other problems of judicial astrology, his *Tables of Directions,* and so on and so forth.

CHAPTER XVII

THE CIRCLE OF MELANCHTHON

To Philip and the school of Wittenberg for a long time by God's grace this praise was peculiar, that he both instructed the minds of the students in varied knowledge and especially formed the judgment of youth as to true opinions concerning things and eminently prepared them for public service. Hence it came about that all who were true disciples of Melanchthon employed a very similar style and form of oration in speaking and writing, moulded and turned out in imitation of their most erudite preceptor.[1]

The interest and activity displayed in natural science and occult arts, especially astrology, by Melanchthon and the circle of his pupils, colleagues, associates, friends and correspondents centred at Wittenberg but had ramifications elsewhere. Philip Melanchthon was an educator and a man of learning as well as a religious reformer, and the intellectual leader of Protestant Germany as well as a Lutheran theologian. He was intensely interested in various profane sciences and pseudo-sciences as well as in religious creeds and confessions. We shall find marked resemblances and relatively slight divergences between the learned circles of Paul III and of Melanchthon. There was no more reason for a Catholic and Protestant to disagree about herbs and gems, astrology and witchcraft, than there was for them to come to blows over Greek grammar and prosody. These were neutral or rather universal territories open to men of every creed and country, and had been so since the day of Albertus

[1] *Ferinarius . . . de vita J. Curei*, 1601, fol. C2v. "Philippi enim et scholae Witebergensis longo tempore Deo dante haec laus fuit peculiaris quod et ingenia discentium instruxit cognitione multiplici et inprimis iudicia iuventutis veris de rebus sententiis formavit et ad rem publicam praeparavit egregie. Inde et factum ut omnes qui . . . veri Melanthonis erant discipuli uterentur in dicendo et scribendo simili fere stilo et orationis forma ad imitationem eruditissimi praeceptoris conformata et expressa."

Magnus and Albumasar. Luca Gaurico, the Italian astrologer and Catholic bishop, had admirers at Wittenberg as well as at Rome. A favorable astrological moment, it may noted in this connection, had been selected for the foundation of the university of Wittenberg,[2] while its first rector, Martin Polich of Mellerstadt, was the author of numerous annual predictions.[3] The *New Almanach* of Pitatus of Verona continued the *Ephemerides* of Stoeffler at Tübingen and parts of it were dedicated to Paul III. Melanchthon, writing on December 14, 1553, to Stathmion, who was himself the author of annual astrological predictions, informed him that Pitatus had recently carried his *Ephemerides* on to the year 1562.[4]

Already in 1517 before he came to Wittenberg Melanchthon had dedicated his Oration on the liberal arts delivered at Tübingen[5] to Johann Stoeffler who was both a leading luminary of that university and author of the astrological *Ephemerides* whose passage on the conjunctions of 1524 was to precipitate a scare as to a second flood and an outpouring at least of astrological pamphlets and predictions as to the conjunctions. Evidently no conflict was felt to exist between astrology and the liberal arts, while Stoeffler enjoyed the esteem of Melanchthon as well as of the general public.[6] That Melanchthon's intellectual relations with Tübingen continued long after he came to Wittenberg is seen in his dedication of his first edition of the *Sphere* of Sacrobosco in 1531 to Simon Grynaeus of Tübingen.[7] In this preface Mel-

[2] Hans Hahne, "Die Wittenberger Horoskope," *Leopoldina,* V(1929), 102-9. The horoscope was preserved in the first volume of the university Matriculation book.

[3] T IV, 455, 457, 543, 607.

[4] *Corpus reformatorum,* VIII, 183.

[5] CR I, 15-16.

[6] Melanchthon referred to Stoeffler in complimentary terms at a later date in announcing to his students at Wittenberg that when he had finished lecturing on the *Problems* of Aristotle he would begin *De mundo* in Greek: "Memini virum optimum et excellenti doctrina preditum Ioannem Stoflerum cum Tubingae mathematicam profiteretur deplorandum ignaviam iuventutis . . ." *Intimationes orationes et epistolae:* Basel O.III.4, fol. 53v.

[7] CR II, 530-37. It opens, "Cum in omnibus artibus prosit initio. . . ." It was used without Melanchthon's name and with the date altered to 1540 as the preface to the Paris, 1572 edition of the *Sphere,* "Apud Hieronymum de Marnet et Gulielmum Cavellat sub Pelicano Monte D. Hilarii," accompanied by a notice concerning Sacrobosco and Scholia by Elias Vinetus and various other matter.

anchthon defends astronomy and astrology against "some Epicurean theologians" and Pico della Mirandola. To Grynaeus Melanchthon also addressed in 1535 a letter praising and defending astrology which was prefixed to Jacob Milich's edition of Peurbach's *Theory of the Planets*[8] and reprinted again in 1542 with Reinhold's edition of the same work, to which introductory poems by Melanchthon and Ioannes Stigelius were also affixed, while Reinhold in an introductory letter from Wittenberg to the margrave of Brandenburg did little but repeat ideas already expressed in Melanchthon's letter.

Later in the century Melanchthon's textbooks were tabooed at Tübingen. In 1586 Nicodemus Frischlin, in the dedicatory epistle to his work on astronomy and against astrology,[9] complained because Crusius had charged him with wishing to exclude the books of Philip Melanchthon from the schools. As if, said Frischlin, the Tübingians had not long since cast out both his grammars together with the *Rhetoric* and *Dialectic*. Or as if any student was found there with the *Initia Doctrinae Physicae atque Ethicae* in his possession. Or as if Melanchthon and all his teaching had not been condemned by them in public council. Even in this wholesale condemnation, however, it is possibly of some significance that no work on either astronomy or astrology by Melanchthon is specifically mentioned.

Among the declamations of Melanchthon is one of 1531 against medical empirics which there is some temptation to associate with Paracelsus, the printing of whose works had been forbidden the previous year by the city council of Nürnberg at the suggestion of the medical faculty of Leipzig. These empirics, Melanchthon says, are without education but have picked up in apothecary and barber shops a few remedies of which they

[8] Georgius Peurbachius, *Theoricae novae cum praefatione P. Melanthonis*, 1535. Copy used: BM 531.f.,4. About the only evidence of Milich's editorship is Melanchthon's allusion to it, "diligentia viri optimi . . . Ia. Milichii." There are neither notes nor commentary by him. Milich is also mentioned in the preface of 1531. Melanchthon's letter to Grynaeus opens: "Cum Graecia longo et civili bello . . ." and fills 13 small pages.

[9] N. Frischlin, *De astronomicae artis cum doctrina coelesti et naturali philosophia congruentia . . .*, Francofurti, 1586.

understand neither the causes nor forces nor application. They borrow, however, from rhetoric certain other arts, make extravagant promises, and detract from the reputation of regular physicians. They make predictions which they pretend are based on the stars or even resort to magic and pretend to divine from the urine not only the nature of the disease but the age and personality of the patient. They derive their remedies from magicians and Jews as well as from barbers and mid-wives. They are actors rather than physicians.[10]

Since this declamation against medical empirics has raised the question of Melanchthon's attitude towards Paracelsus, it may be noted now that a late but devoted pupil of Melanchthon, Joachim Cureus (1532-1573), tells that his master would sometimes speak very harshly of Paracelsus and his followers. Cureus himself compared Paracelsus to Manes and, while allowing a place in natural philosophy to true chemistry, censured "the impiety of those who, armed with alchemical or rather diabolical juggleries and monstrous sophisms, overthrow arts propagated in a continuous series from the first antiquity of the human race."[11]

In June, 1531, Melanchthon wrote to Camerarius acknowledging receipt of his disputation concerning the predictions of Johann Carion, who had earlier studied at Wittenberg. Since 1521 or 1522 he had been court astrologer of Joachim I of Brandenburg. Whether he was also professor of mathematics at Frankfurt seems dubious. Melanchthon went on to remark that many persons were not satisfied that Carion's predictions rested entirely on astrological grounds, although Carion insisted that they did. In Melanchthon's judgment the art of astrology could

[10] *Contra empiricos medicos, Corpus reformatorum,* XI (1843), 202-9. On Melanchthon's relations to medicine see Viktor Fossel, "Philipp Melanchthons Beziehungen zur Medizin," *Festschrift Hermann Baas,* 1908, pp. 33-40; E. Wickersheimer, "Les recettes de Philippe Melanchthon contre la peste," *Janus,* 27(1923), 1-7.

Some account of the medical men in the circle of Melanchthon is given by C. F. Heusinger, *Commentatio de Joachimo Cureo,* Marburg, 1853, cap. iv, "De medicina Germaniae in initio saeculi decimi sexti, Schola Wittebergensis," pp. 40a-40h.

[11] Joachim Cureus, *Libellus physicus,* 1572, Praefatio.

not pronounce in such detail as to particular events. But he believed the man sincere and was going to revise Carion's *Chronicle* as Carion had requested. Melanchthon found a great deal to revise in it and published it in German the following year.[12]

The charge that Carion predicted by other than natural and legitimate methods was made publicly in a work on the significance of the comet of 1531 by Andreas Perlach, disciple of Tannstetter, whom he succeeded as professor of astronomy at Vienna. Carion's employer, Joachim, also was accused of magic.[13]

Of Carion's prediction from the conjunctions of 1524 we have spoken in the chapter thereon. The work by him to which Melanchthon referred was a prognostication printed at Nürnberg in 1531 and covering the years until 1550. It was a revision and continuation of an earlier prediction of events from 1527 or 1528 to 1540, and was to be renewed with the passing years, for example, for the period from 1536 to 1550. Hellmann knew of nine predictions by Carion, all in German and falling between the years 1524 and 1537.[14] In one of these he is said to have predicted a day and hour when Luther would be burned at the stake as a heretic.[15] Carion seems to have died in the last named year, when Melanchthon wrote of his death to Jacob Milich, who was also a devotee of astrology. Carion, who was very fat and a great drinker, died in his cups at the age of only thirty-eight. An epitaph upon him began as follows:

[12] CR II, 105-6.

[13] Ioh. Adam Flessa, *Apologia pro Ioachimo I Brandenburgico magicarum artium insimulato, Fasciculum commentariorum varii argumenti . . .*, Altonae, 1744, p. 125. I borrow the citation from Georg Theodor Strobel, "Von Carions Leben und Schriften," *Miscellaneen literarischen Inhalts,* VI(1782), 141-206, page 142. Most of what I say concerning Carion is from Strobel's monograph.

[14] Hellmann (1924), p. 26.

[15] The statement is made by Strobel, usually a careful scholar, at pp. 144 and 159, but he had seen none of Carion's slighter *Practicae* or predictions for single years, while Hellmann does not advert to such a prediction by Carion. Luther wrote to Carion in 1535, congratulating him somewhat jocosely upon his recent attainment of the doctorate in medicine. But perhaps he found it advisable to keep on good terms with so potent a public predicter who wielded a power comparable to that of the modern press. Tycho Brahe criticized the astrological predictions of Cardan and Gaurico concerning Luther, since they had misdated his birth and he had lived twelve years longer than Gaurico had said. *Opera,* ed. Dreyer, III, 290-91.

Iohannes	Carion	doctor
Ingentium	craterarum	decoctor
Influxuum	coelestium	divinator[16]

After thirteen more similar lines, each composed of three words beginning with the same initials, I, C, and D, the epitaph terminated:

Inter	calices	demorienti

The year before his death he had attended the wedding of Melanchthon's daughter on November 6, 1536.

Carion's prediction of events to 1550, like his *Chronicle,* seems to have been very popular and continued to appear in posthumous editions. It was even reprinted, as Strobel noted, in the middle of the enlightened and sceptical eighteenth century, "in den Europäischen Staats-Wahrsager (Bremen, 1758, 8°)," i.e. during the Seven Years War. Strobel remarked that even in modern times under the disturbing influence of war men turned to predictions.

Hieronymus Wolf (1516-1580), the classical philologist, of whose astrological publications of 1558 and 1559 we treat elsewhere, had earlier in life had a brief connection with Wittenberg. According to Melchior Adam, after studying at Tübingen he came to Wittenberg, and Melanchthon in 1543 got him a teaching post at Mülhausen. Two years later he went to Nürnberg, then passed on to Augsburg and Paris.[17] According to Will, after studying a while at Nürnberg he followed Camerarius to Tübingen and later came to Wittenberg, perhaps with the same teacher.[18]

As for Joachim Camerarius himself, his work on portents was printed at Wittenberg in September, 1532,[19] and was accompanied by a letter of dedication by Melanchthon to the Italian astrologer, Luca Gaurico, dated in March of the same year.

[16] "Doctor John Carion, mixer of huge draughts, diviner of celestial influences . . . died in his cups."

[17] *Vitae Germanorum philosophorum.*

[18] Geo. Andr. Will, *Nürnbergisches Gelehrten-Lexicon,* IV(1758), 286.

[19] *Norica sive de ostentis libri duo, cum praef. Phil. Mel.* III Calend. Octob. Vitebergae apud Georg Rhau, 1532.

Melanchthon voiced his great admiration for Gaurico and especially for his prognostic poem on European events which had proved so true that it now seemed history rather than prediction.[20] The concern of Camerarius with astrology is shown by a nativity which he drew up in 1535 for Albrecht von Brandenburg, duke of Prussia.[21] Of a more general work on divination by Camerarius, which was not published until 1576, after his death, we shall treat in the chapter on Divination, together with that of Peucer on the same subject. Caspar Peucer studied at Wittenberg under Melanchthon and married his daughter. The work referred to was first printed at Wittenberg in 1553. Thus other arts of divination than astrology received attention from members of Melanchthon's circle. Peucer became a professor at Wittenberg. There in 1560 he and his son discussed the question whether astrology was necessary in medicine and answered it in the affirmative.[22] John Garcaeus, a pupil of Peucer at Wittenberg, became an astrologer, astronomer and meteorologist of some note.

On April 17, 1536, at Wittenberg Georg Joachim Rheticus, born at Feldkirch in 1514, discussed the question whether astrological predictions were condemned by law. He held that the provisions of the Code against *mathematici* were not intended to apply to forecasts based on natural causes and physical reasons, but only to such practices as divining from the moment of interrogation or revealing the perpetrators of thefts and murders. In this connection he made the statement that in the *Decretals* a priest was condemned who pretended to reveal thefts by means of the astrolabe.[23]

The favoring relation of Rheticus and Reinhold, both professors at Wittenberg, to the Copernican theory will come up in the chapter upon it. Osiander who put *De revolutionibus* through the press had studied at Wittenberg. On the other hand, the aforesaid Peucer, in an astronomical textbook first printed at

[20] CR II, 570-71.

[21] Leopold Prowe, *Nicolaus Copernicus*, I,ii,401.

[22] CR X (1842), 887-89.

[23] CR X, 712-15: "Quaestio, An leges damnent praedictiones astrologicas? recitata a Georgio Ioachimo Rhetico, die 17 Aprilis 1536."

Wittenberg in 1551, and reprinted there in 1553 and 1587, proceeded upon the fundamental assumption that the earth is motionless at the center of the universe.

Melanchton's own attitude towards the Copernican theory seems to have altered considerably. He supported Reinhold during the six years that he was preparing the *Prutenic Tables*. But in the first edition of Melanchthon's own *Initia doctrinae physicae* in 1549, although some use is made of Copernicus's *De revolutionibus,* not only is the theory of the heavens fundamentally Ptolemaic, but slighting allusion is made to the heliocentric hypothesis. As Wohlwill has shown, however, in the subsequent editions of 1550, 1555, 1562 and 1570 Melanchthon altered the tone of these references to the Copernican theory, omitting such phrases as had implied that it was a mere paradox advanced from love of novelty, an absurdity, and feat of intellectual legerdemain (*praestigia*).[24] In 1553, however, Melanchthon filled eleven leaves of manuscript with calculations of the "movement of the sun" rather than that of the earth.[25] As we show in our chapter on the Copernican theory, this was the normal attitude at this time of persons who were more specialized in astronomy than Melanchthon was.

Jacob Milich has already been mentioned in connection with Melanchthon's introductory letter to his edition in 1535 of Peurbach's *Theory of the Planets*. Milich, who lived from 1501 to 1559, was born and educated at Freiburg-im-Breisgau. His horoscope, Melchior Adam assures us, was that of a man of great genius and learning.[26] He then perhaps studied at Vienna and certainly taught philosophy or at least mathematics and astrology at Wittenberg, where in 1536 he received the M.D. degree and thereafter appears to have advanced to the teaching and prac-

[24] Emil Wohlwill, "Melanchthon und Copernicus," *Mitteilungen zur Geschichte der Medizin und der Naturwissenschaften,* III(1904), 260-67.

[25] These leaves are now bound in front of the Milan, 1482 edition of Peckham's *Perspectiva communis* (Hain 9425) in the possession of the Huntington library at San Marino, California: *Census of Medieval and Renaissance Manuscripts in the United States and Canada,* I (1935), 120.

[26] *Vitae Germanorum medicorum.*

tice of medicine.[27] Gesner in 1545, however, still spoke of him as professor of mathematics.[28] On the occasion of Milich's receiving the doctorate in medicine a Johann Reiffenstein, who seems to have been a student at that time at Wittenberg, pronounced a brief oration on the question whether astrology should be employed in medicine which he answered in the affirmative. In closing he said: "But I defer this question to that most learned man, versed also in astronomy, my preceptor, Herr Doktor Milich, and I ask that he will sometime expound this controversy fully to us and settle it."[29] The oration by Milich which immediately followed was, however, on another topic. In August of the same year 1536 Melanchthon addressed his preface to the geometry of Johann Vögelin to the aforesaid Reiffenstein.[30]

An *Oration on the Dignity of Astrology* by Milich was delivered at some time between the conjunction of 1524, upon which it looks back, and 1533, when it appears to have been printed in Melanchthon's *Orationes aliquot lectu dignissimae*.[31] It seems to have been reprinted in 1538,[32] 1546[33] and 1549[34] and thus to have enjoyed considerable popularity and influence. In this oration Milich argues that astrology should not be spurned because it does not foresee everything, since few things are certain in the other arts. If parents would only learn from the stars the natures of their children, they could mould their future "with singular art." Milich affirms that there were rains and floods for two years after the conjunction of 1524, and that during the summer in

[27] Gisbertus Voetius, *Exercitatio de prognosticis cometarum*, 1665, p. 58, published together with Andreas Libavius, *Declamatio de cometa anno 1604*, represents Milich as a physician and professor of astrology.

[28] Gesner (1545), fol. 359v.

[29] CR X(1842), 715-17.

[30] CR III(1836), 107-14.

[31] Haganoae, 1533, 8vo: BN Rès. X, 2474, Jacobus Milichius, *Oratio in promotione magistrorum*. I have not seen this edition but judge that it is the same as the "Oratio de dignitate astrologiae . . . in promotione magistrorum" which Gesner (1545), fol. 359v, says was added at the close of the 1538 edition of Milich's Commentary on the Second Book of Pliny's *Natural History*.

[32] See the preceding note.

[33] In the first volume of the *Declamationes* of Melanchthon, at p. 362: also CR XI(1843), 261-66.

[34] By Marstallerus in his collection of past treatises and prefaces favorable to astrology, *Artis divinatricis quam astrologiam seu iudiciariam vocant encomia et patrocinia*, Paris, 1549, pp. 68-77.

which he writes Jupiter in Pisces and Mars in Taurus have produced excessive precipitation and insalubrious weather variations. Another oration delivered at Wittenberg by Milich, but perhaps composed by Melanchthon himself, dealt with the life of Avicenna and was as erroneous as the biographies of Mesue and Arnald of Villanova by Symphorien Champier, since it made Avicenna a contemporary of Rasis who died before he was born and of Averroes who was born after he died.[35] Milich also spoke on the life of Galen.[36] Yet other medical pieces under Milich's name printed among the *Declamations* of Melanchthon are on the study of anatomy and the parts and movements of the heart.[37] Sudhoff knew of no work of astrological medicine by him unless it be his *Propositiones medicae,* printed in 1552.[38] Like Sudhoff, I do not know where a copy of this may be had.

Before receiving the doctorate in medicine Milich had published a commentary on the second book of Pliny's *Natural History.* He finished its composition in 1534 while professor of mathematics at Wittenberg[39] and it was printed at Hagenau in August, 1535,[40] then again at Schwäbisch Hall in 1538[41] and at Frankfurt in 1543.[42] If we believe Mylius, this work, although bearing Milich's name, was to a large extent written by Melanchthon.[43] It utilized the erudite *Commentary* on Pliny's second book which Jacob Ziegler had published in 1531.[44] The author

[35] *De vita Avicennae* (an. 1549?): *Declamationes,* III(1551), 378; CR XI, 826-32.

[36] Melanchthon, *Declamationes,* II (1546), 402.

[37] *Declamationes,* IV(1558), 266-79, 291-304.

[38] Sudhoff (1902), p. 61. Sudhoff does not refer to Reiffenstein's above-mentioned oration.

[39] The title page reads: "Commentarii in librum secundum Historiae Mundi C. Plinii conscripti a Jacobo Milichio professore mathematum in schola Vvittenbergensi. Anno domini 1534." But then below we read, "Haganoae ex officina Petri Brubacchii An. Do. XXXV."

[40] This date is given at the close of the book.

[41] Gesner (1545), fol. 359v: "Halae Suevorum apud Petrum Brubachium . . . anno 1538 in 4. chartis 54 et dimid."

[42] Strobel, VI (1782), 1-80, *Bibliotheca Melanchthoniana:* BM 975.c.2; two copies in BN.

[43] *Ibid.,* "quoad maximam partem labor Melanchthonis, iuxta Mylii chronol. script. Mel. ad a. 1537." The work by Martin Mylius (1542-1611) to which Strobel refers is *Chronologia scriptorum Philippi Melanchthonis,* Görlitz, 1582, 8vo, 71 pp.

[44] *In Plinii de nat. hist. Comment. quo difficultates Plinianae, praesertim*

regards the second book of Pliny's *Natural History* as an admirable brief compendium, comprising the elements of astronomy and meteorology, to prepare students for more advanced studies in physics and astronomy.[45] Moreover, Pliny lightened the subject with events from histories which made it more interesting to adolescents. His *Natural History* is further praised by Milich as not so much a book as an entire library, covering practically the entire domain of nature and unrivalled among even Greek authors. In this second book alone Pliny covered the ground of many of Aristotle's volumes as well as many essential astronomical matters not found in the works of Aristotle and perhaps not yet understood by the Greeks of that time. Thus we see no evidence in Milich's pages of any decline in Pliny's reputation as a result of the attack upon him by Leonicenus at the end of the previous century.

But the second book of the *Natural History* requires a commentary for three reasons. Pliny's brevity sometimes renders his text obscure; past misinterpretations of it need to be rectified; and sometimes Pliny himself requires correction. Although Milich may seem to show classical bias and humanistic revolt in turning away from medieval introductory manuals and using a classical text, he is unable to abandon the former entirely. When it becomes necessary to explain why the days grow longer and shorter, he patches up the text of Pliny with the *Sphere* of Sacrobosco. That the pre-Ptolemaic astronomy of Pliny was really woefully out-of-date for the sixteenth century, although perhaps offering a suggestion to Newton, is seen from its attributing the stationary positions and retrograde movements of the planets to the pull of the sun's rays. When Johannes Pratensis expressed wonderment at this, Tycho Brahe informed him that epicycles

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astronomicae omnes tolluntur. Item organum quo Catholica siderum ut apud Plinium est mira arte docetur. Item Georgii Collimitii et Joachimi Vadiani Scholia in eundem librum historiae Plinii, Basel, 1531.

[45] It seems to have been used so a good deal. Joannes Pratensis was lecturing on it at the University of Copenhagen at the time Tycho Brahe showed him the new star of 1572 in the sky: *Tychonis Brahe Opera,* ed. Dreyer, III (1916), 94.

were then not yet used to explain these phenomena.[46]

The same faith in astrology is displayed as in Milich's other utterances. He tells of the great services of Ptolemy to mankind, or how Thales saved his country by his astrological foresight, advising it not to side with Croesus against Cyrus. He also often cites Pontano as a very learned man.

Milich still regarded comets as fumes or earthly exhalations in the upper air, although he recognized that many men were already arguing that they were stars. Such persons held that comets had a double motion like stars, whereas, if they were exhalations in the air, they should move only up and down like other heavy and light elemental bodies. They further contended that comets were of the same shape and magnitude as stars and in the same place, and that probably they were wandering stars which never departed far from the sun. Milich replies that the upper air is affected by the motion of the *primum mobile,* that a comet is further moved by the course of the planet which has excited and influenced it, and that at first a comet is of smaller magnitude than a star. Comets cannot be planets because they are outside the zodiac. They cannot be fixed stars because they move about too much, their splendor and magnitude is not lasting, and they are not seen at stated and certain times, whereas the movements of the stars are regular and sure. Moreover, Aristotle says that comets vanish above the horizon without setting: hence their matter is different from that of the stars. Thus, while we shall see Rheticus going to learn a new astronomy at the feet of Copernicus, we find Milich holding fast to the outworn Aristotelian theory of comets as earthly exhalations.

Even less justifiable seems his denial of the existence of the Antipodes. He states that the greater part of the earth's surface is covered with water, so that it cannot be inhabited by men, and he discusses the dimensions of the habitable earth as if they were still the same as they were believed to be in Pliny's day and as if they had been adequately and accurately measured

[46] Tycho Brahe, *Opera,* ed. Dreyer, VII, 24, 29.

then. He says nothing of the voyages of discovery, although he cites the *De natura locorum* of Albertus Magnus as well as the classics.

One more interest of Milich remains to be mentioned. The theme of sympathy and antipathy was briefly discussed by him in an academic oration at Wittenberg in 1550 in which he said that he had begun a catalogue of things which were mutually sympathetic and repugnant.[47] This longer work seems not to have been published and perhaps was not even completed. Another medical oration on sympathy and antipathy was delivered at Wittenberg in 1557 by a Johann Hermann who, however, also used the theme as a text for reflections on man's relations to God and to his fellow men.[48]

Carolus Figulus may not have studied at Wittenberg but in a dialogue on method in botany which he published at Cologne in 1540 and addressed to the archbishop of Cologne he shows how great was the influence of Melanchthon in the educational world of Germany at that time. When one of the two speakers in this dialogue asks the other whether he has not read the dialectic of Philip Melanchthon, the other replies that he has diligently read and thumbed it over. In a later passage it is stated that Philip Melanchthon, a man beyond controversy most erudite, in his book *De anima* has so discussed tastes that to try to improve upon his treatment would be like trying to rewrite Homer's *Iliad*.[49]

Achilles Pirminius Gassar or Gasser (1505-1577) may be included as a member of Melanchthon's circle, since as a student at Wittenberg he attended three successive courses or seminars of Melanchthon on the orations of Gregory the theologian, the Apostolic canons, and historical biography ("Excerpta ex aliquot illust. virorum hist."),[50] and since it was to him, when a

[47] *De sympathia et antipathia, Declamationes,* IV (1558), 204-15; CR XI, 924-31.

[48] CR XII (1844), 221-25. Possibly he was the same as the Johann Hermann, physician to the duke of Saxony, at whose request Erastus refuted Paracelsus in 1572.

[49] Carolus Figulus, *Dialogus qui inscribitur Botano-methodus sive herbarum methodus,* Cologne, 1540, 4to minori, fols. c iii verso, E 3 recto.

[50] Beneszewicz, "Melanchthoniana," *Sitzb. Bayer. Akad., Philos.-Hist. Kl.*

physician in Feldkirch, that Melanchthon dedicated an edition of the additions of Rheticus to the *Sphere* and the ecclesiastical *computus* of Sacrobosco in 1538.[51] In the dedicatory letter Melanchthon spoke of Rheticus's debt to Gassar.[52] Gassar was active in the fields of history, medicine and astrology. He wrote annals of the city of Augsburg,[53] where he served as municipal physician, an epitome of universal history,[54] and a catalogue of Christian kings of Europe, which last was dedicated to Ulrich Fugger.[55] He was a friend of Gesner as well as of Melanchthon and sent to him to publish an old German translation of the Gospels by Ottfried, for which he had made a vocabulary.[56]

The son of a surgeon of the emperor Maximilian, Gassar studied medicine at Vienna and Montpellier but took his degree at Avignon or Auray according to Melchior Adam.[57] He then practiced medicine at Feldkirch[58] as well as at Augsburg and Lindau. In 1558 he published the thirteenth century work of Petrus Peregrinus on the magnet. Medical *Consilia* by him, addressed like his catalogue of kings to Ulrich Fugger, are preserved in a manuscript which was once in the library of the electors Palatine and is now at the Vatican.[59] A volume from Gassar's own library is now at the Academy of Medicine in

(1934), Heft 7, p. 13; at p. 14 further references for Gassar's life. Jobst, *Chronologia . . . illustrium medicorum*, 1556, p. 148, calls Gassar "mathematicus et medicus Velcuriae non procul a lacu Podamico clarus."

[51] Wilhelm Bernhardt, *Philip Melanchthon als Mathematiker und Physiker*, Wittenberg, 1865, pp. 22-23.

[52] CR III, 573. Gassar was to be responsible for the edition of the *Narratio prima* at Basel, 1541, which followed that by Rheticus himself at Danzig, 1540. Gassar's prefatory letter to Vogelinus is printed with the *Narratio* in Kepler's *Mysterium cosmographicum*, 1621, p. 94, and by Prowe, II, 288-89. On the relations between Gassar and Rheticus see further Adolf Müller, "Der Astronom und Mathematiker Georg Joachim Rheticus," *Vierteljahrsschrift. f. Gesch. u. Landeskunde Vorarlbergs*, II (1918), 18-28.

[53] Printed in Mencke, *Series rerum Germanicarum*, I (1728), 1315-1952.

[54] *Historiarum et chronicorum totius mundi epitome . . .*, Venice, per Io. Antonium et fratres de Sabio sumptu et requisitione D. Melchioris Sessae, 1533.

[55] *Catalogus regum omnium quorum sub christiana professione per Europam adhuc regna florent.* In gratiam domini Urrichi Fuggari Kyrchbergae et Weissenhorni comitis . . . anno salutis 1554 collectus et primum aeditus.

[56] Willy Ley, *Konrad Gesner*, 1929, p. 32.

[57] *Vitae Germanorum medicorum.*

[58] Hellmann (1924), p. 27.

[59] Vatic. Palat. lat. 1892, fol. 138r.

New York. It is a copy of the *Anatomia* of John Dryander, printed at Marburg in 1537. On the title page is written, "I belong to Achilles P. Gasser. At Constance, June 3, 1540."[60] Of Gassar's censure of Paracelsan propositions advanced by a John de Suchten, physician to the king of Poland, we treat in another chapter.

Three astrological predictions by Gassar are extant and apply to the years between 1544 and 1547.[61] I have seen that for 1544, printed at Nürnberg with another by Luca Gaurico for the same year.[62] Gassar's prediction, which is much the longer of the two, deals first with the weather; then with such topics as crops, output of mines, disease and health, and rumors of war and peace; next with four eclipses and the great conjunction of 1544; finally with the fate of individuals according to the sign and planet under which they are born. Gassar states that the year 1544 would be a happy and opulent one but for the four eclipses and the unfavorable conjunction on February third.

Descriptions of recent eclipses, including the last one of 1540, by Melanchthon and others, were printed at Basel in that same year as an addition to the reprint of Gaurico's edition of the first three books of Bonincontri's poem on *Things Natural and Divine*.[63]

Among the many prefaces composed by Melanchthon for the works of others was one to an arithmetic by Michael Stifelius, published in 1543. This Stifelius, besides being a Lutheran clergyman and the author of other arithmetics, had engaged in astrological prediction. In fact, he had set the end of the world

[60] "Sum Achillis P. Gasseri. Constantie 3 Iunii anno domini 1540."

[61] Hellmann (1924), p. 27.

[62] Achilles P. Gassarus, *Prognosticum astrologicum ad annum Christi MDXLIIII. Adiecta sunt Iudicium D. Lucae Gaurici Neapolitani in eundem annum. Item ekphonesis in Prognostica anni 1544 Thomae G. Venatorii,* Impressum Norimbergae apud Iohan. Petreium.

[63] *L. Bonincontri rerum naturalium et divinarum sive de rebus coelestibus libri tres. . . . Ab L. Gaurico . . . recogniti inque lucem editi. Adiecimus . . . Eclipsium solis et lunae annis iam aliquot visarum usque ad postremam huius anni MDXXXX descriptiones per Philippum Melanchthonem et alios.* Basileae, 1540, 4to. Copy at London, BM 718.g.57.

Concerning the poem of Bonincontri see further T IV, 406.

to occur on October 3, 1533, at 8 A.M. and had been deprived of his ecclesiastical living because of popular indignation at the failure of his prognostication—not presumably that the people were disappointed that the world did not come to an end then, but that they were angry that he had induced them to think that it might. Melanchthon, however, had interceded in 1534 to procure him another parish.[64]

Melanchthon's relations with Johann Schöner and their co-operation in editing Alfraganus and Albategni in 1537 have already been discussed in our chapter on The Aftermath of Regiomontanus. We may further note that Erasmus Reinhold, in an oration on Regiomontanus, told of Schöner's showing Melanchthon a manuscript of the Greek New Testament, copied very beautifully in Regiomontanus's own hand at Rome.[65] Melanchthon and Schöner are further said to have selected a favorable astrological moment for the foundation of the university of Nürnberg, and their example to have been followed by the duke of Brunswick in the case of Helmstadt.[66]

In his preface to the work of Schöner on nativities printed in 1545 Melanchthon contended that astrological divination was physical and natural, referring temperaments and inclinations to celestial causes, and was not superstitious but a consideration of divine works which men learned by experience. He alluded rather contemptuously to the work of Pico della Mirandola against astrology as a farrago of criticisms taken from previous writers which Bellantius and others had sufficiently answered, or which consisted of jejune cavils that were not worth while to repeat or refute. Neither Pico nor anyone else could persuade Melanchthon that the stars have no effects on the elements and on the bodies of living beings. God and the devil, however, act as causes as well as the stars, and a moral monster like the emperor Nero should be attributed to the devil and not to the

[64] Bernhardt, *Philipp Melanchthon als Mathematiker und Physiker,* Wittenberg, 1865, and its citations: J. C. A. Grohmann, *Annalen der Wittenb. Universität,* 3 vols., Meissen, 1801-1802, I, 137; CR II, 791.

[65] Melanchthon, *Declamationes,* III, 506: cited by Doppelmayr (1730), 4.

[66] G. G. Zeltner, *Historia . . . Academiae . . . Altorfinae . . .*, p. 1166.

stars or natural causes.[67] This preface was reprinted as the preface to Schöner's collected works in 1551 and before that in the collection of Marstallerus in 1549,[68] where also appeared reprints of Melanchthon's prefaces to the *Sphere* of Sacrobosco and the *Tabulae resolutae* of Schöner. In these other prefaces Melanchthon argued that only the influence of the sky could account for the vast differences between individuals, regions and races, and that astrology was a part of physical science.

It is somewhat questionable whether Vitus Amerbach (1504-1557) should be included in the circle of Melanchthon. He studied at Wittenberg and followed Luther and Melanchthon for a while but then turned back to the Roman Catholic church and after 1543 became a professor at Ingolstadt.[69] At that place he published in 1549 six books on natural philosophy[70] along Aristotelian lines, although he sometimes expresses disagreement with other interpreters of Aristotle or even with the philosopher himself.[71] He duly treats of matter, form and privation; nature and the difference between a physician and a mathematician; cause, fortune, chance and necessity; motion, the infinite, place and time. Occult science hardly comes within his purview. He is pessimistic as to the present state of liberal studies and of true philosophy.

Joachim Heller of Weissenfels had studied at Wittenberg and was a friend of Melanchthon, who in 1543 had recommended him for the rectorship of the gymnasium at Nürnberg.[72] A poem by Heller was prefixed to Schöner's work on nativities in 1545. The following year he succeeded the aged Schöner as professor of mathematics in Nürnberg. In that same year an edition of the work on nativities of the Arabic astrologer, Albohali, for

[67] This thought was also found in one of the other prefaces about to be mentioned.

[68] *Artis divinatricis . . . encomia et patrocinia,* Paris, 1549.

[69] Anton Maria Kobolt, *Baierisches Gelehrten-Lexicon,* Landshut, 1795.

[70] Vitus Amerbach, *De philosophia naturali lib. VI,* 1549: copy used, BM 534.c.31. At the end of the dedicatory epistle, fol. (c 7 recto), we read, "Datum Ingolstadii 3 Non. August, Anno post natum servatorem nostrum 1549."

[71] *Ibid.,* fol. a 3 verso.

[72] Doppelmayr (1730), 54.

which the privilege had been conceded to Schöner,[73] carried a preface by Heller addressed to Philip Melanchthon, "his teacher," and dated April 1, 1546.[74] In it he explains the method of Albohali which "he has in common with the other Arabs, Indians and Persians," and criticizes those Neoterici who would measure the astrological houses on the equator rather than on the circle of the zodiac. He asks if the influences of the sky will be affected any, whether measured obliquely or in a straight line. In closing he indicates that Schöner and he have cooperated in the work by saying that if Melanchthon approves their gift in the present volume, they will undertake an edition of Albumasar next. Heller states that they publish the present work of Albohali for the first time from a manuscript which was once in the library of king Matthias of Hungary, but it is not mentioned either in Regiomontanus's proposed list of publications or in the inventory of Walther's library. Its issue seems to have filled a want, since another edition was published in 1549.

It appears evident that neither Heller nor Melanchthon had any prejudice against Arabic and medieval astrology, or against the casting of nativities, and that the reading public largely agreed. Although the proposed edition of Albumasar does not seem to have materialized, Heller edited the work of Messahala on the elements and the celestial orbs in 1549,[75] and in the meantime contributed a preface to the *editio princeps* of the *Epitome of All Astrology* by John of Seville, the twelfth century translator and author, which was printed at Nürnberg in 1548.[76]

[73] *Albohali Arabis astrologi antiquissimi ac clarissimi de iudiciis nativitatum liber unus antehac non editus. Cum privilegio D. Ioanni Schonero concesso.* Impressum Noribergae in officina Ioannis Montani et Ulrici Neuber Anno Domini MDXLVI, 4to. Copy used: BN V.1300.

[74] *Ibid.*, fol. a 2 recto, "Clarissimo ac doctissimo viro D. Philippo Melanchthoni Praeceptori suo summa observantia colendo Ioachimus Heller Leucopetreus S.P.D."

[75] Messahalla (s. Meseallach) Arabs, *De elementis et orbibus coelestibus liber. Cui adiectum est Scriptum cuiusdam Hebraei de Eris seu intervallis regnorum et de diversis gentium annis ac mensibus. Item iisdem de rebus: Scriptum cuiusdam Saraceni, continens praeterea praecepta ad usum tabularum astronomicarum utilissima.* Ed. Joachimus Hellerus, Nürnberg, Joh. Montanus und Ulrich Neuber, 1549.

[76] *Epitome totius astrologiae conscripta a Ioanne Hispalensi Hispano as-*

This preface was directed against the adversaries of astrology. It appears to have been written a few years earlier since, in listing recent eclipses, comets and conjunctions, it alludes to those of the years 1530, 1533, 1538, 1540 and 1542, but mentions the conjunction of 1544 as still in the future. It possesses little or no originality, repeating thoughts and past astrological examples which had already been expressed and listed in Melanchthon's letter of 1535 to Simon Grynaeus and copied by Erasmus Reinhold in his letter to the margrave of Brandenburg in 1542. Nothing is said of floods and rains in connection with the conjunction of 1524, which, with lunar eclipses of preceding years in the same sign, is said to have announced the Peasants' Revolt of 1525 and the captivity of Francis I. This last was further prefigured by a phenomenon in the sky seen by the king of Poland, six suns of which the westernmost was black.

Of annual predictions in German by Heller, Hellmann found some sixteen, the earliest for the year 1547 and the latest for 1580.[77] Because of religious and other difficulties he had to leave Nürnberg in 1563, and his latest annual predictions were printed at Leipzig, Schneeberg and Eisleben.[78]

Because he had long lived in places where there were veins of metals, Johann Matthesius discussed metals in an academic exercise of September 23, 1540 at Wittenberg.[79] He criticized the statement of Pliny that silver was only smelted from ore and not found in masses or nuggets and veins. Noting that metals each observed certain laws and had certain relations to one another, he took this as a proof that the world was not formed by chance. Further arguing that precious metals were much rarer in his time than in antiquity, he remarked that some interpreted this as an indication that the world was in its last stages, while

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trologo celeberrimo ante annos quadringentos ac nunc primum in lucem edita. Cum praefatione Ioachimi Helleri Leucopetraei contra astrologiae adversarios. Noribergae in officina Ioannis Montani et Ulrici Neuber, Anno Domini MDXLVIII.

Heller's preface was reprinted next year by Marstallerus, *op. cit.*, pp. 88-122, which is the text I have used.

[77] Hellmann (1924), p. 27.

[78] Will, II, 84-86.

[79] *Quaestio de rebus metallicis recitata a Mag. Iohanne Matthesio die 23 Sept. 1540:* CR X (1842), 729-32.

his own conclusion was that the earth had grown sterile because of human injustice. This Matthesius was or became a pastor in the mining region of St. Joachimsthal. In 1587 there was printed his *Bergpostilla oder Sarepta, darinn von allerley Bergwerck und Metallen.* Of the *De re metallica* of Christoph Entzelt or Encelius, whom Melanchthon recommended to the printer as offering new matter on that subject, we treat in the chapter on The Lore of Gems.

Of Erasmus Flock, who is occasionally mentioned in the letters of Melanchthon, who studied with Rheticus at Wittenberg and succeeded him there for a while after he went to Leipzig, but most of whose work was done at Nürnberg, we have already treated in the preceding chapter on the Aftermath of Regiomontanus.

Johannes Homelius or Hummel (1518-1562), after studying at Strasburg and Wittenberg, became professor of mathematics at Leipzig in 1551. Tycho Brahe and Praetorius mentioned his observation of the comet of 1556, and his writings on the sundial and gnomon are noticed in Tycho's letters.[80]

David Chytraeus (Kochhafe) was a pupil of Melanchthon who continued his master's combination of theology and astrology. He was the son of a Lutheran pastor at Ingelfingen near Schwäbisch Hall where he was born on January 26, 1530. He received the A.B. degree at Tübingen where he studied the humanities with Joachim Camerarius and theology with Erhard Schnepf, then came to Wittenberg and Melanchthon. During the Schmalkaldic war he turned to Heidelberg and Tübingen but returned to Wittenberg again in 1548, when the university reopened, and became a lecturer there. After a trip to Italy he was called in 1551 to Rostock as professor of history and theology and in 1553 began his commentaries on the Bible.[81] In his commentary on Deuteronomy he inserted some pages on the new star of 1572 and its significance in matters of church and

[80] *Opera,* ed. Dreyer, IV, 351, 509; VII, 33, 56.

[81] For his life see Otto Krabbe, *Die Universität Rostock im fünfzehnten und sechzehnten Jahrhundert,* Rostock, 1854, pp. 550-54.

state, and he composed a separate treatise on the comet of 1577.[82] Tycho Brahe adverted to these works and they interchanged letters.[83] Chytraeus died in June, 1600, although Thuanus placed his death in 1601.

In lectures on physical doctrine given at Wittenberg and first published there in 1549 Melanchthon discussed the influence of the stars at greater length than in those prefaces to other works which we have thus far noticed. The discussion occurs in those sections of the second book which are devoted to temperaments, the stars and fate.[84] Although human temperaments owe something to inheritance and environment, Melanchthon believed them to be governed and diversified by the stars. Moreover, apart from temperaments, there is a certain force of the stars in inciting inclinations. He further held that often temperaments and the positions of the stars were causes of fortuitous events *per se*. He admitted, however, that God might interfere to moderate the inclinations from the stars or to punish the wicked, and that many men who were not temperamentally inclined to crime by the stars committed evil acts of their own will or under diabolical impulse. He also thought that in time of pest many men might die, whose individual genitures and temperaments forecast no such death, which was due to the universal corruption of matter. These exceptions and tendency to compromise on Melanchthon's part do not impress one as very logical, consistent or far-sighted.

More particularly may be noted an example or two of Melanchthon's trust in nativities. The margrave John Albert,

[82] A German translation of his remarks both on the new star of 1572 and the comet of 1577 is contained in a collection in the Columbia University library, 523.6 Z 2, where it is tract 43.

[83] See Dreyer's edition of his works, III, 225 *et seq.* and other references given in the Index in vol. XV.

[84] I have used a later edition: *Initia doctrinae physicae dictata in academia Witebergensi,* Witebergae, 1585, pp. 244-81. According to Dreyer, *op. cit.,* VI(1919), 359, the first edition was at Basel, 1549, but BM 536.b.2 is Witebergae, 1549. A recent sales catalogue claims an edition of Frankfurt, Christ. Egenolff, 1550 as the first, and I have seen listed another edition of 1550, Ioh. Lufft, Wittenberg. BN R.43513 is "Lugduni apud J. Tornaesium et G. Gazeium, 1552." Such rapid reprinting testifies to the work's widespread acceptance and influence.

archbishop of Magdeburg, in his geniture had the moon in Aries in the sixth house, which signifies sickness. The moon was surrounded by two other planets, Mars which also was in Aries and Saturn which was in Taurus. In opposition were the sun and Mercury. "These are manifest signs of constant suffering from sickness." In the emperor Maximilian's horoscope Mars with the tail of the dragon in the twelfth house denoted imprisonment. Frederick III and Francis I were unlucky in war because in both their genitures Mars was in the fourth house.

Melanchthon argues that astrological prediction from natural causes is not forbidden by divine law and scripture, which only preclude divination and magic without natural causes such as augury, lot-casting, pythons, crystal-gazing, and incantations. But prediction from physical causes is simply consideration of the divine order in nature. Melanchthon answers the arguments of Basil against astrology and other objections, and contends that it is useful to predict or consider future possibilities.

Besides natural signs of the future such as the constellations, Melanchthon believed in others contrary to the natural order, such as a spring of blood in a field not far from Bokelnheim, or apparitions seen in the sky by honest men of Brunswick. These included a halo around the moon, a fiery lion, an eagle lacerating its breast, a likeness of John Frederick, duke of Saxony, God the Father dandling Adam and Eve on His knees, flaming cities surrounded by camels, and Christ on the cross encircled by the Apostles. Such aerial images might, Melanchthon thought, be either divine manifestations by good angels or the magic of demons. In either case they signified future events.[85] A Pomponazzi in Melanchthon's place would have attempted a natural explanation of such phenomena or reputed phenomena.

In his later years Melanchthon continued to publish astrological works and to write prefaces for them arguing in favor of prediction from the stars. In the dedication to the Fugger brothers of an edition of the *Tables of Directions* of Regio-

[85] CR VII (1840), 652-54: letter of Sept. 1550 to Io. Placotomus.

montanus in 1552, he affirmed that it was certain that many changes in the elements came from the stars, and that the celestial light had great force in inclining human bodies, natural dispositions, and even mores.[86] Melanchthon once more spoke in favor of astrology in the preface, addressed to Erasmus Ebner, a patrician of Nürnberg, and dated March, 1553, to his edition of that standard manual of astrology, the *Quadripartitum* of Ptolemy. Joachim Camerarius translated its first two books, and Melanchthon the last two. In the preface he asserted that there had been great humidity in 1524 because of the many conjunctions of the planets in Pisces, and great heat in 1540 because of a solar eclipse in Aries.[87]

September 1, 1554, is the date of the preface of Melanchthon to his edition of the paraphrase of Proclus on the *Quadripartitum* of Ptolemy.[88] In it he complains that when he points out the influence of the stars on nature and the need of observing them in medicine, certain wicked fools accuse him of encouraging forbidden divinations.[89] The allusion is presumably to the publication by his opponents at Weimar of a book against astrological predictions, to which he refers in letters of February 16, 1554, to Peter Vincent and Stathmion.[90] By this Christopher Stathmion Hellmann found twenty-four annual predictions extant for years between 1543 and 1585.[91] In the letter to him Melanchthon, writing on his fifty-eighth birthday, expresses fear as to the approaching conjunction of Saturn and Mars. Bretschneider suggests that the Weimar attack may have been instigated by an academic publication of October 23, 1553, by Peucer, or possibly Melanchthon himself, in which evil constellations for the ensuing year were noted, and seditions and confusion of dogmas were inferred from them.[92]

That the students at Wittenberg were sometimes less interested than their master in the astrology of Ptolemy is shown by

[86] CR VII (1840), 950-53.
[87] CR VIII (1841), 61-63.
[88] *Procli paraphrasis in quatuor Ptolemaei libros de siderum effectionibus*, Basel, Apud J. Oporinum, no date.
[89] CR VIII (1841), 337-41.
[90] *Ibid.*, pp. 225-27.
[91] Hellmann (1924), p. 30.
[92] CR VIII (1841), 229 note.

an unpublished address of Melanchthon to them.[93] He says that he has often explained before why he began to lecture on Ptolemy and that he has not yet repented of doing so. But he is deeply grieved that certain students have taken a dislike to so good an author, and urges them to resume attendance upon his lectures, and expresses his gratitude to those who have not deserted him. In the present lecture he will treat of the significance of eclipses and comets. It is undated. Incidentally it may be noted that in repeating the frequent prohibition to the students to swim in the Elbe, Melanchthon said that he heard that there were spirits in the river who attacked bathers.[94]

Hartfelder, in a paper on the superstition of Melanchthon,[95] has given various further illustrations of his belief in astrology from his Latin academic orations at Wittenberg, his historical compositions for the king of Denmark, and his private letters to friends. Melanchthon's father had had his son's horoscope drawn up by Johann Virdung von Hassfurt,[96] court astrologer of the Palatinate, and Melanchthon was careful to do the same for all his children. Shortly before his death he predicted from a conjunction of Saturn and Mars that there would be a time of scarcity and a rise of prices and persuaded the university to purchase foodstuffs. He further believed that the stars should be carefully observed in politics and affairs of state. Like most divines of his day he was a believer in the reality of diabolical witchcraft, and he was attentive to dreams and omens. In a brief *Quaestio de somniis* of 1525[97] he took the position that natural dreams were confused and could be the basis only of conjecture, not of sure prediction, but that divine dreams were

[93] Basel O.III.4, *Melanchthonis Intimationes orationes et epistolae*, fol. 64r-v. Dr. Gustav Binz, alt-Oberbibliothekar of the Basel Library, in a catalogue of the *Codices Faeschii* which he is preparing, gives a very full description of this codex, which he was so kind as to show me.

[94] Basel O.III.4, fol. 66v: "Nam audio etiam spectra conspici in Albi quae minantur natantibus."

[95] Karl Hartfelder, "Der Aberglaube Philipp Melanchthons," *Historisches Taschenbuch*, Leipzig, 1889, pp. 233-69. See also Bernhardt, *Philipp Melanchthon als Mathematiker und Physiker*, Wittenberg, 1865.

[96] Hartfelder, *op. cit.*, p. 245, does not seem to recognize that Hassfurt and Virdungus were one and the same.

[97] CR I, 778-79.

most certain revelations. The matter is more fully discussed in his commentary on *De anima.*[98] There was a later story that at the Diet of Ratisbon Melanchthon left his fellow theologians to inspect the stars as to the outcome of the Diet and wept when he found them unfavorable. Whereupon one of the other theologians reproved him for star-gazing instead of praying.

The influence of Melanchthon and his associates may be traced at the university of Heidelberg. Johannes Mercurius Morshemius or Morssheim of Worms had been a student under Erasmus Reinhold[99] at Wittenberg. In 1558 Morshemius is found giving extraordinary lectures at Heidelberg on the first part of Ptolemy's *Quadripartitum,* on arithmetic, and on the *Sphere.*[100] He dedicated to the elector Palatine and duke of Bavaria, who was also rector of the university, a justification of judicial astrology under a long form of title,[101] interspersed with Greek words, which is later more briefly given as *De praedictionibus astrologicis themata.* In its preface he recognizes that the subject has already been admirably presented by two other former teachers of his, namely, Philip Melanchthon in his *Phisica* and Caspar Peucer in his work on different varieties of divination.[102] But he has wished to repeat their substance in the form of Themata or numbered propositions for the benefit of his own and perhaps other students.

As a matter of fact, the division into 178 Themata and a conclusion seems of little significance and is of no help in following Morshemius' argument or wading through his wordy periods which, like his title, are interspersed with frequent bits

[98] On it see further Johannes Rump, *Melanchthons Psychologie (seine Schrift 'de anima') in ihrer Abhängigkeit von Aristoteles und Galenos,* Kiel, 1897, 188 pp. Jena diss.

[99] As he himself states at p. 15 of the work which we are about to consider: "ad exemplum praeceptoris mei piae memoriae viri venerandi Erasmi Rheinholdi olim in celebri Academia Vuitebergensi lectoris Mathematum publici."

[100] *Ibid.,* p. 12. He had received the A.B. there in 1539 and the doctorate in arts in 1547: Gustav Toepke, *Die Matrikel d. Univ. Heidelberg von 1386-1662,* I (1884), 561, 617; II (1886), 458.

[101] *Explicatio gravis . . . cuiusdam quaestionis . . . hoc est, De praesignificationibus atque iudiciis astrologicis. . . . Accessit . . . Ptolemaei vita: item juridica disputatio de rebus mathematicis,* etc., Basel, Oporinus, 1558.

[102] *Ibid.,* p. 16.

of Greek. His argument itself, on the other hand, is of some interest. It closely follows the biblical narrative and is especially noteworthy for the contention that but for the fall of man astrology would be a perfect and flawless science, and that it is imperfect and faulty only as a result of human sinfulness. In this form its transmission and development are traced from Adam and Seth through Abraham and Moses, Egyptians and Chaldeans, Daniel and the three Magi, in an effort to show it harmonious with God's word and sometimes used by Him. According to Morssheim, however, God may interfere in the course of nature at any moment, and the stars have no control over the inorganic actions of the soul in individual men. "Astrological predictions are not praetorian edicts." But astrology is the most certain of human arts, the oldest, and that most worthy of a Christian.

To this publication Morshemius added a life of Ptolemy. He notes that Cardan had questioned the authenticity of the *Centiloquium,* but that other learned men like Pontano and George of Trebizond had accepted it as authentic. In the same volume he included two disputations suggested by Melanchthon's *De anima* and held by himself at Heidelberg in 1555, and another anonymous disputation, presumably of considerably earlier date, which his teacher and colleague in medicine at Heidelberg, Jacobus Curio Hoffemianus, had come across while searching among his papers and manuscripts. This disputation returns to the subject of astrology which it contends is not prohibited by canon or civil law despite such edicts as those of the Theodosian Code. This appears to have been very similar to the above mentioned question of 1536 by Rheticus.

Joachim Cureus of Freistadt (1532-1573) was a late but very enthusiastic disciple of Melanchthon. He came to Wittenberg in his eighteenth year and saw Melanchthon for the first time after dinner on March 5, 1550, in the ethics lecture. In 1554 Cureus received the degree of master of philosophy at Wittenberg and in 1557 went to Italy to study medicine at Padua and Bologna, receiving the M.D. at the latter university

in 1558. On his return from Italy he practiced medicine at Glogau in Silesia and in Poland and Prussia.[103] He composed a *Libellus physicus* which I have read in the edition of 1572[104] but which seems first to have been printed in 1567.[105] In a long preface to Abraham Sbonsius, a Polish knight, Cureus says that he composed the first draft of the work six years ago and now has revised and published it partly to relieve his grief over the recent demise of his brother Adam, a pastor in Breslau.[106] This preface includes a brief survey of the history of learning from antiquity through the middle ages which is rather commendable for the time when it was written. At its close Cureus says that God has "set over our schools a doctor whom we may justly oppose to all antiquity, Philip Melanchthon, our preceptor, to be remembered with perpetual reverence." He adds that Melanchthon controlled studies in the greater part of Germany and "handed down with inimitable dexterity and sweetness the arts essential to religion and life, purged from the filth of the Latin schools." The text of the *Libellus physicus,* however, seems to reflect the views of Cureus's Italian teachers more than those of Melanchthon, and will be considered in another chapter, For and Against Aristotle.

Hermann Witekind (1524-1603), of whom we say more in the chapter on Post-Copernican Astronomy, had been a favorite pupil of Melanchthon at Wittenberg.[107]

[103] Ioannes Ferinarius, *Narratio historica de vita et morte . . . J. Curei . . . philosophi et medici,* Lignicii, 1601, 4to. Copy used: BM 12301.dd.7.(3.). Reprinted with some omissions by Carl F. Heusinger, *Commentatio de J. Cureo summo saec. XVI medico theologo philosopho historico,* Marburg, 1853. Copy used: BM 10707.h.42.(3.).

[104] Joachim Cureus, *Libellus physicus continens doctrinam de natura et differentiis colorum sonorum odorum saporum et qualitatum tangibilium et recitans rationem qua res eaedem a sensibus comprehenduntur et iudicantur,* Witebergae, Excudebat Iohan. Schwertal, small octavo. Copy used: BM 784.c.5.

[105] This is the earliest edition listed by Heusinger. An edition of 1557 was advertised in a recent sales catalogue, but it would seem that this date must have been a misprint. Cureus could not have composed the work that early, since it embodies the results of his studies in Italy from Sept. 1, 1557, to Sept. 10, 1558, while his preface indicates that the book was not published until six years after its composition.

[106] Ferinarius does not give the date of this event.

[107] Melchior Adam, *Vitae Germanorum philosophorum.*

Nicodemus Frischlin, in a work dedicated in 1586 to the elector Christian, duke of Saxony, referred in glowing terms to Wittenberg's past mathematicians. "For who was ever more forthstanding in this art than Johann Schöner? Who was more famous than Jacob Milich? Who was more illustrious than Caspar Peucer or than Vitus Winzemius [Amerbach?]?" At the same time Frischlin recognized that they and even Melanchthon himself had been devoted to astrological divination, which Frischlin in the present work intended to attack.[108]

[108] Nicodemus Frischlinus, *De astronomicae artis cum doctrina coelesti et naturali philosophia congruentia . . .*, Francofurti, 1586. Copy used: BN V.29248.

CHAPTER XVIII

THE COPERNICAN THEORY

Quid tum, si mihi terra movetur solque quiescit
Ac coelum? Constat calculus inde mihi.[1]

Copernicus had triumphantly concluded the brief *Commentariolus,* in which he set down the main positions of his theory a decade or more[2] before the *De revolutionibus* was printed, with this sentence: "So therefore altogether thirty-four circles are enough with which to explain the whole fabric of the world and all the choral dance of the stars."[3] He further contended that it was better to suppose "that Venus and Mercury travel round the sun" than "to let the mind be distracted by an almost endless multitude of circles which those are obliged to do who detain the earth in the center of the world."[4] Tycho Brahe also stated that Copernicus required fewer circles than Ptolemy.[5] But this appears to overlook the fact that Campanus of Novara, "whom almost all the moderns follow," already in the thirteenth century had reduced the number of movements of the celestial bodies to thirty-four, and that John Tolhopf in the fifteenth century had attempted to reduce them further to twenty-eight in number.[6] Tolhopf further says that Vincent of Beauvais in his

[1] Quoted by Melchior Adam, *Vitae Germanorum philosophorum,* article on Copernicus.

[2] A. Birkenmajer, "Le premier système héliocentrique imaginé par Nicolas Copernic," *La Pologne au Congrès International des Sci. Hist.,* I (1933), 91-97, would date the *Commentariolus* before 1515.

[3] Prowe, *Nicolaus Coppernicus,* Bd. II, Urkunden, 1884, p. 202. For an English translation of the *Commentariolus* by Edward Rosen see *Osiris* III (1937), 123-41, or *Three Copernican Treatises,* 1939, in *Records of Civilization,* Vol. XXX, where are further translated the Letter against Werner and the *Narratio prima.*

[4] Quoted by Dreyer, *History of Planetary Systems,* 1906, pp. 326-37.

[5] *Opera,* ed. Dreyer, VII, 80.

[6] John Tolhopf is a much better known person than T (1929), 298-301, indicates. He studied at Leipzig, taught at Ingolstadt from 1472, becoming dean of the *via antiqua* in 1475, became court astrologer to Matthias Corvinus of Hungary in 1480, and a doctor of

Speculum naturale of the thirteenth century held that Aristotle and Ptolemy had not fully comprehended such matters.[7]

The *Theory of the Planets* of Campanus was never printed.[8] Copernicus seems to have known only his translation of and commentary upon Euclid,[9] to which Nunes added his great *Computus*,[10] and Gesner, a tract on squaring the circle and "some compositions in astrology."[11] Campanus was mentioned only once by Tycho Brahe.[12] If anything, he was even less known to Tycho's editor, biographer and author of *A History of Planetary Systems*. Dreyer dated Campanus in 1150 (!) and

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decretals, borrowed a work from the Vatican library on January 18, 1485, visited Cologne, Rome and Vienna, became a canon at Regensburg, belonged to the Sodalitates of both Rhine and Danube, associated with Conrad Celtes, and died in 1503.

See H. Pantaleon, *Prosopographia heroum*, 1565, II, 468; G. Erler, *Matrikel d. Univ. Leipzig*, XVI (1895), 250, 292, XVII (1897), 203, 214, 224; H. Keussen, *Die Matrikel d. Univ. Köln*, II (1919), 481; Carl Prantl, *Gesch. d. Ludwig-Maximilians Univ. in Ingolstadt*, I, 35, 80, 91, II, 39, 72; Aschbach, *Gesch. d. Wiener Univ.*, II, 429-30; Karl Sudhoff, *Studien zur Gesch. d. Medizin*, 1909, pp. 40-41; E. Klüpfel, *De vita et scriptis C. Celtis*, 1827, pp. 107-8, 147-48, 157; B. Hartmann, *Konrad Celtis in Nürnberg*, 1889, pp. 31, 56, 66; A. Werminghoff, *Conrad Celtis*, 1921, p. 123; Müntz et Fabre, *La bibliothèque du Vatican au XVe siècle*, 1887, p. 294; E. Reicke, *Der Bamberger Kanonikus Lorenz Beheim*, 1906, p. 6; Zinner (1938), 150, 171, 180.

A *Stellarium* by Tolhopf, with a preface to Matthias Corvinus, is preserved in a MS at Wolfenbüttel, 84.1. Aug., 32 fols. The first leaf is reproduced by A. de Hevesy, *La bibliothèque du roi Matthias Corvin*, Paris, 1923, Plate XLVI.

[7] Vatic. lat. 3103, fol. 18r: "ut et Vincentius in speculo naturali testatur, numerum celestium mobilium tempore Aristotelis nondum fuisse inventum, Ptholemei tempore quoniam stellarum fixarum motus non fuit plene cognitus orbium numerus perfectus nequibat haberi." I have failed to find such a statement in the *Speculum naturale*.

[8] A critical edition from the MSS is in preparation by Mr. Francis S. Benjamin, Jr., a student of mine.

[9] Prowe, *op. cit.*, II, 207-8.

[10] *In theoricas planetarum Georgii Purbachii Annotationes per Petrum Nonium Salaciensem*, 1573, p. 182, col. 1: "Quod quidem eadem arte demonstrari poterit qua usus est Campanus ad ostendendum 31 quinti libri Euclidis."

In *De arte navigandi*, 1573, II, 4, p. 30, col. 1, Nunes states that Campanus disproved the opinion of Albategni as to the anticipation of the equinoxes in his great *Computus*, a work to which he again alludes at p. 31, col. 1.

[11] Gesner (1545), fol. 161r, ". . . nonnulla etiam in astrologia composuit. Raph. Volaterranus." Gesner states that the tract on squaring the circle was printed as an appendix to the *Margarita philosophica*.

[12] *Tychonis Brahe Opera omnia*, ed. J. L. E. Dreyer, 15 vols., 1913 *et seq.*, Copenhagen. Dreyer died in 1926, while the publication was still in process and some of the later volumes were edited by others. For the mention of Campanus see VIII, 217.

noted only his commentary upon Euclid.[13] Even Pierre Duhem's account of the *Theory of the Planets* is all too brief.[14]

This rather shocking ignorance which Dreyer displayed concerning so influential a figure in the past as Campanus makes us wonder if it may not invalidate his estimates of Copernicus and Tycho Brahe by considering them quite apart from their medieval background. It is true that they themselves also largely ignored it and under the influence of the then prevailing classical reaction did little more than try to improve upon Ptolemy. But their historian should take a broader view. The theories of Campanus may have been incorrect, but in their day they seem to have won a general acceptance by "moderns" much more rapidly than the hypotheses of Copernicus did in theirs.

Yet the scientific world of that time, if not public opinion generally, had been gradually prepared for the final publication of the full text of Copernicus's *De revolutionibus* in 1543, and may even be said—as a result of this previous propaganda and advertising—to have been looking forward eagerly to its appearance. Copernicus already had a great reputation as an astronomer. Even at the time of his stay in Italy at the turn of the century he was, if we believe Rheticus, less a student than an associate and co-worker in astronomy with Dominicus Maria Novara.[15] According to Caspar Peucer, who also states that Copernicus "heard and helped" Domenico Maria, Copernicus reached the height of his reputation about 1525.[16] Already in 1514 his opinion on calendar reform had been asked by Paul of Middelburg for the Lateran Council.[17] He had formulated a preliminary sketch of his system in the *Commentariolus*, which, if not written before 1515 as Birkenmajer contends, at

[13] *Ibid.*, VIII, 453.

[14] *Le système du monde*, III (1915), 322-25.

[15] Prowe, II, Urkunden, p. 297: "Cum D. Doctor praeceptor meus Bononiae non tam discipulus quam adiutor et testis observationum doctissimi Viri Dominici Mariae. . . ."

[16] Peucer, *Elementa doctrinae de circulis coelestibus et primo motu*, Wittebergae, 1551. In the "Series astrologorum," which is prefixed to this work, we find "Dominicus Maria Bononiensis quem et audivit et iuvit Copernicus," while of Copernicus himself, besides giving the dates of his birth and death it is said, "Inclaruit maxime circa annum Christi 1525."

[17] Prowe, I, ii, 66-72.

least was composed long enough before the final draft of *De revolutionibus* for his hypotheses to have altered considerably in detail in the interim.[18] The *Commentariolus* was not printed but probably circulated in manuscript to some extent.

Celio Calcagnini (1479-1539) had advocated the motion of the earth and ridiculed the movement of the sky in letters to Jacob Ziegler which were probably written between 1518 and 1524,[19] although not printed until 1544,[20] a year after *De revolutionibus* and five years after Calcagnini's own death.[21] He perhaps had got wind of the teaching of Copernicus on a trip to Poland in 1518. However, he does not ascribe such views to Copernicus, but to Nicholas of Cusa. Moreover, the arguments which he adduces for the earth's moving from the force of sympathy in nature or from the movements of man the microcosm are of a quite different order from the mathematical calculations and proofs of Copernicus. Whether or not Calcagnini received any suggestion, direct or indirect, consciously or unconsciously, from Copernicus, his letters show that the idea of a moving earth was spreading and that the way was being paved and men's minds were being prepared for the appearance of *De revolutionibus*. That Copernicus's own correspondence kept increasing his reputation as an astronomer we may infer from such a surviving letter as that of June 3, 1524, to Bernhard Vapovsky, secretary of the king of Poland, against Werner's tract on the motion of the eighth sphere.[22] In it, however,

[18] A. Birkenmajer, "Le premier système héliocentrique imaginé par Nicolas Copernic," *La Pologne au Congrès Internat. des Sci. Hist.*, I (1933), 91-97.

[19] They were reprinted by Franz Hipler, "Die Vorläufer des Nikolaus Coppernicus insbesondere Celio Calcagnini," *Mitteil. des Coppernicus Vereins . . . zu Thorn*, Heft IV, 1882, pp. 51-80 (3-32), with the text of the letters at pp. 69-78.

[20] Calcagnini, *Opera*, Basel, Froben, 1544, pp. 387-95.

[21] Calcagnini is possibly one of numerous famous personages depicted in Sebastian Fanti's *Triompho di Fortuna*, Venice, 1527, fol. 15v, "Calcagno."

A *Compendium of Magic* is ascribed to Coelius Calchagninus by Robertus Constantinus, *Nomenclator insignium scriptorum*, 1555, p. 94, but no such work by him is listed in the catalogues of the British Museum and Bibliothèque Nationale.

[22] *Epistola Coppernici contra Vernerum:* printed by Maximilian Curtze, *Inedita Coppernicana, Mitteil. des Coppernicus Vereins*, I, 1878, pp. 23-33, and again by Prowe, II, 172-83.

From the way that writers later in

Copernicus does not assert the motion of the earth. A historical work printed in 1559[23] tells us that the appearance of a comet in 1533 in the sign Gemini gave rise to a great controversy between Copernicus, Apian, Hieronimus Scala, Cardan and Gemma Frisius, but seems to be our sole source for this, no work on the comet by Copernicus having survived.[24] Nor would we know that John Albert Widmanstad explained the Copernican theory to pope Clement VII in the Vatican gardens in this same year 1533 in the presence of cardinals Orsini and Salviati, Iohannes Petrus, bishop of Viterbo, and Matthaeus Curtius, the well-known medical writer, but for a note to that effect by Widmanstad himself on the title page of a copy of Alexander of Aphrodisias, *De sensu et sensibili,* which volume Clement VII presented to him on that occasion.[25] Thus the theory was already becoming known, and pressure upon its author to publish it in full seems to have increased as the years went on. But for such pressure he might not have published it at all.

Gemma Frisius was one of those who were very anxious to see the work of Copernicus appear. A letter by him of July 30, 1541, from Louvain to John Dantiscus, bishop of Warmien or Ermland in Prussia,[26] indicates that he almost expected a new heaven and a new earth from it,[27] or at least a definite fixing of

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the century coupled the names of Werner and Copernicus concerning this problem it would seem that this tract must have had a fairly wide circulation in manuscript form.

[23] Gulielmus Zenocarus a Scauvuenburgo, *De republica vita moribus gestis . . . imperatoris . . . quinti Caroli . . . Libri septem,* Gandavi, Excudebat Gislenus Manilius Tipographus, 1559, pp. 193-94. See Prowe, I, ii, 268-72, who, however, omits Scheveninger's astrological comment on the comet that never was the mind of Charles V more inflamed to a Turkish war.

[24] However, Ph. Carl, *Repertorium der Cometen-Astronomie,* Munich. 1864, p. 49, says: "Der Comet wurde von Ende des Juni bis Anfang Septembers in Europa gesehen und von Apian (4mal), Gemma und Fracastor beobachtet." See also Prowe, I, ii, 271.

[25] MS CGM 151. Already noted by Tiraboschi, *Storia della letteratura italiana,* VII (1824), 706.

[26] First published from a MS in the library of the university of Upsala by Maximilian Curtze, "Fünf ungedruckte Briefe von Gemma Frisius," *Archiv d. Math. u. Physik,* 1874, pp. 313-25, especially 318-20.

Again by Fernand van Ortroy, *Bio-bibliographie de Gemma Frisius,* Académie royale de Belgique, Classe des lettres, Série II, Tom. XI, fasc. ii (1920), 408-10.

[27] Curtze (1874), p. 319; van Ortroy (1920), p. 409: ". . . novam nobis terram, novum Phoebum, nova astra, immo totum alium apportabunt orbem."

their bounds, and an end to the errors and uncertainties in which "our astrology" had been involved. At present Mars was often found far from the position assigned it in astronomical tables, as Gemma had often observed. The moon did not vary so much in apparent magnitude as very grave authorities stated. The length of the year never conformed exactly to the truth, to say nothing of the motion of the firmament and apogees and longitude and latitude of almost all the stars. If Copernicus, whom Gemma did not name in this connection but of whom he reminded the bishop that they had once talked, could set these matters right, as the prooemium which he had sent forth led one to anticipate, "would not that be giving us a new earth, a new heaven, and a new universe?" It did not much matter to Gemma whether the hypotheses of Copernicus were true or false, whether the earth revolved or stood still. What he wanted was to have the movements of the stars and the intervals of time exactly calculated. What irked him most was the delay. He therefore urged the bishop to spur on the publication of the work, which might otherwise be lost by the death of its author. Two years later in a letter of April 7, 1543, Gemma was still awaiting "with supreme desire that mathematical work of that great man, Nicolaus Copernicus," which he had recently heard had at last gone to press.[28]

All these fond expectations of Gemma were not to be immediately realized. The orbit of Mars was not satisfactorily worked out until Kepler determined it. The length of the year had really been more accurately measured by the *Alfonsine Tables* than it was to be by Copernicus and the *Prutenic Tables*.

The two persons whom Copernicus mentioned in his preface to pope Paul III as having done most to overcome his delay and reluctance to publish *De revolutionibus* were both Roman Catholic prelates, the one cardinal of Capua, the other bishop of Culm. On the Protestant side Rheticus[29] left a teaching posi-

[28] Curtze (1874), p. 322; van Ortroy (1920), p. 413.

[29] Adolf Müller, "Der Astronom und Mathematiker Georg Joachim Rheticus," *Vierteljahrsschrift f. Gesch. u. Landeskunde Vorarlbergs*, II (1918), 5-46. The library of the Boston Society of Natural History kindly sent this volume to New York for my use.

tion in mathematics at Lutheran Wittenberg to come in 1539 at the age of twenty-five to what Copernicus called his remote corner of the world[30] to imbibe the new astronomy directly from the master himself. He gave a preliminary sketch of the new hypotheses in the form of a long letter to another German astronomer, Johann Schöner of Nürnberg, which was published with the title, *Narratio prima,* first at Danzig in 1540, then at Basel in 1541. Half a century later Maestlin, himself no mean astronomer, gave among his reasons for reprinting the *Narratio prima* that it explained many obscure passages in *De revolutionibus,* and regretted that Rheticus had never completed a proposed *Narratio secunda.*[31]

In 1542 Erasmus Reinhold, another professor of mathematics and astronomy at Wittenberg, in the preface of his re-edition of the *New Theories of the Planets* of Peurbach, addressed to the margrave of Brandenburg, expressed his keen joy at the news that a certain very learned man as the result of long experience and many observations was about to emend the existing astronomical tables. Later in the general preface he alluded again to "a certain more recent and most outstanding artificer who had aroused great expectations concerning himself among all men of restoring astronomy," who was now engaged in putting the last touches to an edition of his labors, in which *inter alia* he would give a different explanation than Ptolemy's of the movement of the moon.

These preliminary announcements by Rheticus and Reinhold were likely to come to the notice of anyone interested in such matters and to increase the number of persons who were waiting impatiently for the appearance of Copernicus's magnum opus. No one seems to have raised any objections to its publication except Copernicus himself. Both religious parties, as has already been suggested, forwarded its publication. Although

[30] Preface to Paul III: ". . . in hoc remotissimo angulo terrae in quo ego ago." It seems a little inconsistent for Copernicus to use this expression when he well knew how many much more remote lands there were in the western and southern hemispheres.

[31] *M. Michael Maestlin Goeppingensis candido lectori Salutem,* dated at Tübingen, 1596; reprinted in Kepler's *Prodromus dissertationum cosmographicarum,* 1621, p. 93.

the work was printed in Protestant Nürnberg, the preface of Copernicus to Paul III was nevertheless retained.[32] The book, of which Rheticus had brought back with him one or more copies, was put through the press by the Lutheran preacher, Andreas Osiander, who took the further precaution to temper its novelties to the minds of readers of prefixing an anonymous statement to it that its theories were hypothetical, the true inner causes of nature being hidden from man's view.[33] That there was no opposition to the work's publication and rather a general eagerness to have the full Copernican argument available for study was not, of course, any assurance that everyone would agree with the work when it did appear in print, or that it would even satisfy all the expectations that had been aroused with reference to it. The truth of the matter may be that, great work as it was, men had been led to hope for even more, and that many astronomers and mathematicians hesitated to accept it, not so much because of its novel hypotheses, as because of its failure completely to establish its contentions and to work out a more regular and uniform system than the Ptolemaic, or perhaps because of certain imperfections of detail. All had to admire the man as an astronomer and his work as a mathematical feat: but there many stopped. Some may even have been disappointed

[32] But the Introduction to Book I by Copernicus was omitted.

[33] Dr. Edward Rosen, *Journal of the History of Ideas,* I (1940), 363-68, has correctly interpreted the passage, "epistola tua ni fallor Copernico praeposita," contained in a letter of Ramus to Rheticus, to apply to the anonymous statement to the reader found in the edition of 1543. This raises the question in my mind whether this notice was not by Rheticus rather than Osiander, or perhaps their joint work, since Rheticus in replying to Ramus did not deny the attribution to himself but agreed to "undertake the task . . . of freeing astronomy from hypotheses," as Ramus had urged. In this connection it is further noteworthy that Rheticus took no steps to alter the anonymous statement to the reader found in the edition of 1543, as the bishop of Ermland urged, and that the very tone of the bishop's letter somewhat suggests that he suspected Rheticus of engineering the 1543 edition, although he professes to blame the printer and tries to explain to Rheticus why Copernicus had not mentioned him in the original preface. Text of the bishop's letter in Prowe, II (1884), 419-21: see also Adolf Müller, "Der Astronom und Mathematiker Georg Joachim Rheticus," *Vierteljahrsschrift f. Gesch. u. Landeskunde Vorarlbergs,* II (1918), 5-46, especially 32-33. Kepler seems to be our earliest evidence for Osiander's authorship.

that the astrological doctrine with which the Copernican theory had been accompanied in the *Narratio prima* of Rheticus, instead of being developed further in *De revolutionibus,* was entirely omitted. For it should be kept in mind that what may strike us today as flaws in the Copernican theory as originally promulgated may have served rather to commend it to contemporaries, as well as vice versa.

It is a historic fact that the Copernican system was first publicly announced, if not precisely under astrological auspices at least to an astrological accompaniment and that such signifying the future was for long after associated with it in many men's minds. Those who wish in narrating the history of modern science to take as their model the medieval methods employed in composing the lives of the saints and to state only what is edifying and complimentary may close their eyes to this fact. But the historian of thought who would note continuing as well as new ideas and do justice to all sides of his subject cannot fail to note it. Indeed, this astrological accompaniment was somewhat of a new idea itself, since it represented the movement of the earth rather than the motion of the stars as influencing the course of human destiny.

The *Narratio prima* of Rheticus, besides a rhapsody upon the perfection of the number six,[34] contained a discussion of the dependence of earthly monarchies and their vicissitudes through the ages upon the movement of the earth in its eccentric orbit.[35] After thus ushering in the Copernican system with political prediction, Rheticus in 1542 published at Wittenberg the treatise of Copernicus or chapters from *De revolutionibus* on the sides and angles of triangles, plane and spherical.[36] When years later in 1557 after long delay Rheticus at last announced an edition of the posthumous works of Werner on spherical triangles and

[34] Copernicus, *De revolutionibus orbium coelestium,* Thorn, 1873, p. 467. Prowe, II (1884), 329.

[35] *De revolutionibus,* 1873, p. 453; Prowe II (1884), 305.

[36] *Nic. Copernici De lateribus et angulis triangulorum tum planorum rectilineorum tum sphaericorum libellus,* Wittenberg, 4to, dedicated to Georg Hartmann, a mathematician and instrument-maker of Nürnberg: Doppelmayr (1730), 56-57.

meteoroscopia,[37] his preface still showed traces of the four monarchies theory and still asserted that the stars govern these inferiors by order of nature. He believed that they now threatened the Turks with imminent ruin, since the watery trigonus was about to give way to the fiery, and the anomaly of the orb of the fixed stars was approaching its third term. As often as the term was reached, great changes in the world and in empires always resulted. Nicholas Copernicus, "the never sufficiently praised Hipparchus of our age," whom Rheticus cherished not merely as a preceptor but as a father, was the first to grasp this anomaly of the sphere of the fixed stars. As Rheticus was leaving Prussia after having spent three years more or less there, the aged Copernicus enjoined him to perfect those things which he himself, impeded by old age and his twist of fate, could not complete. The text of Ptolemy was incorrect concerning the fixed stars and did not provide a reliable basis for astrological prognostications, as the Viennese astronomers, Georgius Tannstetter and Andreas Perlach, agreed. In 1550 Rheticus published at Leipzig, where he was professor from 1542 to 1551, an *Ephemeris* on Copernican foundations for the year 1551.[38] He also printed at Leipzig in 1551 a few leaves of trigonometric tables.[39] He moved to Prag in that year and in 1557 moved on to Cracow.

The conjunction of Saturn and Jupiter on August 25, 1563, led friends of Rheticus to urge him to undertake a commentary upon the work of Copernicus. He wrote to Hagecius from Cracow on October 28 of the same year that he had the work in hand and that he hoped that Hagecius would render any assistance he could. This proposed commentary was never finished, but the astrological occasion for it is noteworthy. Nearly four years later on May 10, 1567, Rheticus again wrote to

[37] Rheticus' announcement was reprinted and the text of Werner printed for the first time by A. A. Björnbo, "Ioannis Verneri de triangulis sphaericis libri quatuor," in *Abhandlungen zur Gesch. d. math. Wiss.* 24 (1907).

[38] Rheticus, *Ephemeris ex fundamentis Copernici*, Lipsiae, 1550.

[39] *Canon doctrinae triangulorum*, Leipzig, Wolphgang Gunter, 1551, 4to, 12 fols. The Canon occupies 3 pp; the tables the rest.

Hagecius from Cracow, expressing the wish that he was a reader of Paracelsus and could supply the full text of the *Astronomia* of Paracelsus, of which he sent a fragment and of which he had heard that there was a complete text in the possession of George Fugger.[40] Whether Hagecius read Paracelsus or not, he and his son Simon were reported by Hoghelande to have displayed at the imperial court six ounces of pure gold manufactured from mercury with a powder from England.[41]

Late in life in the year 1568 Rheticus wrote to Ramus that it was his ambition to free astronomy from hypotheses and to be able to be content with observations alone—an ideal scarcely consonant with those of present science. He further asserted that he was even more critical of Ptolemy than Ramus was of Euclid, and that the Ptolemaic system was like a child's castle of sand compared to true and solid doctrine concerning the movements of the stars—which he suggested that the ancient Egyptians had had. He further hoped to construct a Germanic astronomy for his fellow Germans, to systematize astrology, and to inaugurate a new natural philosophy from contemplation of nature alone without regard to the writings of the ancients. The same should be done in medicine, but in another letter to an unknown correspondent he recognized that medicine cannot attain the same precision as geometry, and that the farther he advanced in it, the more conscious he became of ground uncovered. He believed, however, that the subject could be mastered, if we only had now such preceptors as Hippocrates. Fernel in his day had cured quartan fever by a single draught learned through the art of distillation, but now was dead. Paracelsus too had worked many miracles such as curing a patient whom other doctors had given only hours to live by administering three drops of some mysterious elixir. The remarks of Rheticus as to abandoning hypotheses in astronomy and yet reducing the literature of astrology to order on its most

[40] Both these letters of Rheticus to Hagecius were printed at the close of the latter's *Aphorismorum metoposcopicorum libellus* in the second edition of Frankfurt, 1584.

[41] Hoghelande, *Historiae aliquot transmutationis*, 1604, p. 28.

ancient foundations, or as to contemplation of nature alone without regard to writings of the ancients and yet yearning for such teachers as Hippocrates, are certainly none too consistent and suggest that he was repeating common catch-phrases rather than doing any deep thinking of his own. At least his radical tendencies are shown in his fleeing from Ptolemy on the one hand and flying to Paracelsus on the other. Yet he was a patient and industrious calculator of more exact mathematical tables. In the letter to Ramus he further stated that he had composed seven books on chemistry, an art in which he much delighted.[42] His interest in the Paracelsan revival is further attested by an announcement made in 1574 that the *Archidoxa* of Paracelsus would be issued in a Latin translation by Joachim Rheticus, M.D., which would be more correct than that of Dorn.[43] It seems, however, never to have appeared.[44] Rheticus died in 1576.

The interest of Rheticus in astrology was further shown in the dedicatory letter of his *Chorographia* to duke Albrecht of Prussia in which he stressed the service which his work would render to astrology.[45]

Erasmus Reinhold also combined an interest in the Copernican theory with astrology. In the same publication of 1542 in which he looked forward to the appearance of *De revolutionibus,* he showed his attachment to astrology by insisting upon the great importance of eclipses and conjunctions as harbingers of future change and speaking of a great impending alteration of all empires. He further inserted a treatise of his own on the illumination of the moon, in whose twelfth and last chapter he collected

[42] The letter of Rheticus to Ramus was first printed by Josias Simler in his *Epitome* of the *Bibliotheca universalis* of Conrad Gesner, Tiguri, 1583, and was reprinted in subsequent editions of the *Bibliotheca.* The other letter was published by Michael Neander (1525-1595) in his *Orbis terrae partium succincta explicatio,* 1583. Both letters are noted by Karl Sudhoff, "Rheticus und Paracelsus," *Verhandlungen der Naturforschenden Gesellschaft in Basel,* XVI, 353 *et seq.*

[43] Toxites et Fischart, *Onomastica II,* 1574, p. 430: cited by Sudhoff, *op. cit.,* XVI, 352.

[44] Sudhoff (1894), I, 261-62.

[45] Prowe, *Coppernicus,* 1883, I, ii, 400-1. The *Chorographia* was written in German and first edited by F. Hipler, *Zeitschrift f. Math. u. Physik.* 1876.

various passages from Ptolemy, Pliny and others on the effects of the moon. He also composed annual predictions.[46]

Iunctinus or Giuntini in 1577, in his *Commentary* on the *Sphere* of Sacrobosco, immediately after citing the *Prutenic Tables* for the determination by Copernicus of the apogee of the sun in 1515, related the course of empires to the eccentricity of the sun, since he did not accept the Copernican transfer of it to the earth's orbit.[47]

Bodin, in his work on the Republic, attributed this astrological doctrine of the influence of the earth's eccentric orbit to Copernicus himself, although it actually appears only in Rheticus's exposition of the Copernican theory and not in *De revolutionibus*. Bodin rejected it as involving two absurdities: first, that influence comes from the earth rather than the sky; second, that the earth moves.[48]

Similarly Zwinger (1533-1588) in his encyclopedic *Theatrum vitae humanae*[49] stated that Copernicus in *De revolutionibus*, then Reinhold and later Stadius (1527-1579) had taught by clear demonstrations that the apse of the sun was 31 semidiameters nearer the earth than in Ptolemy's time. Melanchthon connected this with decay in the nature of celestial and terrestrial bodies, but Julius Caesar Scaliger sharply censured such opinions. William Postel, however, inferred from this propinquity the approaching end of the world by fire.[50] It is true that Zwinger does not charge Copernicus directly with any astrological inference from the earth's approach nearer the sun, but it is equally clear that he makes his theory the starting point for all such prediction.

Alsted (1588-1638) was another who ascribed this doctrine

[46] One is preserved in BM 8610.bbb. 16.(7.). *Practica auff das MDLXIX Jhar durch Erasmum Reinholdum doctorem medicum. . . .* Gedruckt zu Erffordt durch Georgium Bawman, [1568], 4to, 10 fols.

[47] *F. Iunctini Comm. in Sphaeram J. de Sacro Bosco*, 1577, II, 285-86.

[48] Iehan Bodin, *Les six livres de la republique de I. Bodin Angeuin*, Paris, 1576, pp. 441-42 (IV, 2): "Quant à ce que dit Copernic que les changemens et les ruines des monarchies sont causées du mouement de Leccentrique . . ."

[49] The work was printed at Basel in 1571, again in 1586-1587, and a third time in 1604, which is the edition I have used.

[50] Zwinger, *Theatrum humanae vitae*, Basel, 1604, p. 1265.

to Copernicus himself. "Copernicus, easily the first of the astrologers (or, astronomers) of his age, as he has refurbished the old view of Eudoxus concerning the earth's motion, so also thinks that the shifting and end of states depends on an eccentric motion which he has attributed to the earth."[51]

It is not improbable that Copernicus agreed with the astrological interpretation of the earth's eccentric set forth by Rheticus. His interest in astrology is shown by his possession of the work of Albohazen Haly on that subject[52] and by his adding to his copy notes from the *Quadripartitum* of Ptolemy.[53] But the most noteworthy fact is that he kept this interest out of *De revolutionibus* and confined the latter exclusively to astronomical argument. Ptolemy, it is true, had set the example in this respect by devoting the *Almagest* to astronomy and considering astrology separately, though favorably, in the *Quadripartitum*. But Copernicus, who had slowly and reluctantly published *De revolutionibus* at the very close of his life, so far as we know published nothing in the field of astrology. This abstention may have been in part accidental, but it, as well as the new Copernican astronomical hypotheses, was not without significance for the future.

We have referred to the interest of Copernicus's interpreter, Rheticus, in medicine and may add a word as to the medical notions of the master himself. A *Regimen sanitatis* which is ascribed to Copernicus in two manuscripts of the seventeenth and eighteenth centuries is rejected by Prowe as apocryphal[54] but at least shows how late such a childish combination of medicine and divination persisted from the earlier medieval centuries.[55] Instructions as to drink, bathing, prophylaxis, drugs,

[51] J. H. Alsted, *Cursus philosophici encyclopedia*, first edition at Herborn, 1620 (I have used at different times other later editions with varying forms of title), 23, 12, or II (1649), 198: "Copernicus astrologorum suae aetatis facile princeps ut veterem Eudoxi opinionem de motu terrae renovavit, ita quoque rerumpublicarum conversiones et occasus ab eccentrici motu quem terrae tribuit pendere putat."

[52] *Liber completus in iudiciis astrorum*, Venetiis, Ratdolt, 1485.

[53] Prowe, I, ii, 414.

[54] Text printed by Prowe, *Nicolaus Coppernicus*, Bd. 2, Urkunden, Berlin, 1884, pp. 256-58.

[55] See T I, Chapter 29, "Latin Astrology and Divination: especially in the ninth, tenth, and eleventh cen-

bleeding and the like are grouped in brief paragraphs by the months of the year. Certain days of each month are enumerated upon which bleeding will prove fatal. The significance of thunder in each month is also usually stated. There are such occasional statements as that anyone born on February 3, 7, or 13 will enjoy good health, "as Bede the presbyter noted," or that a person who is wounded or receives a potion on April first will die straightway or soon. Turning to materials of undoubted authenticity, we find that entries made by Copernicus in medical manuscripts owned by him show that he continued the belief in the efficacy of compound medicines and recipes with such ingredients as pearls, the bone from the heart of a stag, the horn of a unicorn, and *terra sigillata*.[56] Osiander who put *De revolutionibus* through the press went yet farther in the direction of belief in occult virtue in medicine, since he is said by his contemporary, George Fabricius, to have worn a golden chain about his neck to prevent his becoming infected with leprosy.[57]

From the astrological doctrine which was interwoven with the Copernican system in the *Narratio prima* of Rheticus—and the medical notions of himself, Osiander and Copernicus—we turn to the purely astronomical and mathematical *De revolutionibus* of the master. If we have seemed to spend too much time in past chapters on astrological husks, it was because of the kernel of corn which they enclosed and which grew with them and could not have grown without them. *De revolutionibus* stands out all the more impressively as a work of science, when viewed against this background of the other interests, occult or erroneous, of its author and his contemporaries and century. This is not to say that it stood alone. That its publication in 1543 was not an isolated event in the history of science is shown not only by the *Narratio prima* of Rheticus and other works heralding it, and the printing in the same year, 1543, of

turies"; Chapter 31, on "Medicine in Manuscripts from the Ninth to the Twelfth Century."

[56] Prowe, *op. cit.*, I, ii, 312 *et seq.*; II, Urkunden, 245-56.

[57] *De metallicis rebus ac nominibus observationes variae et eruditae ex schedis Georgii Fabricii quibus ea potissimum explicantur quae Georgius Agricola praeteriit*, Tiguri, 1565, fol. 4r: "Osiander theologus auream cathenam collo gestavit ne lepra inficeretur."

such outstanding works in other fields as Vesalius *De humani corporis fabrica* and the attacks of Ramus against the dialectic of Aristotle,[58] but by other treatises in astronomy, mathematics and physics which closely preceded or followed it: in 1540 the sumptuous *Astronomicum Caesareum* of Petrus Apianus (1495-1552), professor of Ingolstadt and astronomer to the emperor, Charles V;[59] in 1542 the *De crepusculis* of Pedro Nunes (1502-1578) with the first edition of Alhazen on the same subject, containing his calculation of the height of the atmosphere, with repetition of the argument of Alhazen and Witelo, often repeated by Tycho Brahe, that air could not extend far above the earth's surface or the rays of the sun would continue to be refracted long after it had set;[60] in 1543 the *Cosmography* of Maurolycus; in 1544 the first Greek edition of the complete works of Archimedes; in 1545 the *Ars magna* of Cardan and a new edition of the Alfonsine tables.[61]

The rather excessive classicism of Copernicus was no doubt in accord with the predilections of his age and until recently has continued to characterize most modern historians of astronomy. He traced the germ of his idea of the motion of the earth to classical authors whom he had read, or rather had found cited in Cicero and Plutarch, not to those of the fourteenth century and since who had made similar suggestions at first hand. In *De revolutionibus,* besides ancient Greeks and Latins, he occasionally cited Arabic writers like Albategni and Arzachel or the Sabian, Thebit ben Corat, or the Jew, Profatius. But between the time of Martianus Capella and that of Peurbach and Regiomontanus he scarcely mentions a Latin author or even the *Alfonsine Tables,* although he was perfectly familiar with them. He ignores the medieval Latin literature much as Vesalius did in his work of the same year 1543. Except for the

[58] In his *Dialecticae partitiones ad academiam Parisiensem,* and *Aristotelicae animadversiones.*

[59] Other publications of Apianus were *Quadrans astronomicus,* 1532, a work in German of the same year on the recent comet, *Cosmographiae introductio* of 1533 at Venice, *Instrumentum primi mobilis,* Nürnberg, 1534, and a number of annual predictions in German.

[60] Rodolphe Guimarães, *Sur la vie et l'oeuvre de Pedro Nunes,* Coimbra, 1915.

[61] *Divi Alphonsi Astronomiae Tabulae,* Parisiis, 1545.

notion of the earth's movements, however, Copernicus does not go back of Ptolemy much. He does not attempt, like Fracastoro and others, to return to the homocentric spheres of Aristotle. Here again a parallel might be drawn between his attitude towards Ptolemy and that of Vesalius toward Galen. In some of his citation he seems to lack historical perspective and ability to estimate an individual's scientific calibre. He cites Vitruvius as an astronomical authority and credits Vespucci with the discovery of America.

In large measure what Copernicus did was to attempt to derive and justify his own new hypotheses from the Ptolemaic data, devices and method by working them over from his own standpoint. He accepted the Ptolemaic observations of the heavens without question as the basis, along with further observations of his own, for his tables and conclusions. Indeed, it vexed him not a little when anyone else called them into question. His astronomical method still moved for the most part in the accustomed Ptolemaic grooves of eccentric and epicycle. He took little account of the criticisms and emendations and supplements to the Ptolemaic theory which had been made in the closing medieval centuries. His system was therefore still in large part Ptolemaic. He did not try to overthrow the Ptolemaic system: he tried to modify and amend it. Sometimes in the sixteenth century he was even thought of as restoring Ptolemaic astronomy against the medieval Arabic and Alfonsine corruptions thereof. Thus we shall hear John Dee, as a supporter of the Copernican theory, called a keen champion of new hypotheses and of Ptolemaic doctrine.[62]

Nor were the Copernican hypotheses strictly heliocentric.[63] The sun was not represented as at the exact center of the earth's orbit, which had a marked eccentricity, nor at that of the orbit of any other planet. Nor had all these orbits any common

[62] Richard Forster, *Ephemerides meteorographicae,* 1575, last page (unnumbered).

[63] Copernicus himself put the matter in a nutshell when he said at the beginning of the fifth book of *De revolutionibus:* ". . . Orbes ipsi non circa terram sed magis circa solem centra sua haberent." That is to say, the various centers of the orbits of the planets are clustered about the sun rather than about the earth.

center.[64] This had also been true of the Ptolemaic system which had never been strictly geocentric. Both were eccentric systems, and the chief difference between them was rather that the earth was thought of as in motion in the Copernican, indeed as having three different motions. The Ptolemaic system was devised to represent things as they appear to an observer on the earth who supposes himself to be at rest. Indeed, as has been pointed out by others, no astronomical instrument can be constructed on any other basis and "all sixteenth- and seventeenth-century treatises on . . . astrolabes, cross-staffs or celestial globes assumed a geocentric system because they could not do otherwise."[65] Even today "the positions of the planets, though computed by the heliocentric theory, are reduced to their directions relative to the earth before being entered in the astronomical tables."[66] It might be more appropriate, therefore, to designate the Ptolemaic system as geostatic and the Copernican as geodynamic. Be that as it may, the tendency of Copernicus to utilize the *Almagest* to the utmost served to make the transition to his own innovations less abrupt and difficult. It also, however, made it easy for his contemporaries to accept some of his superior calculations without committing themselves to his more radical theories.

Copernicus had evidently expected that his new hypotheses would uphold "the principle of uniform circular motion"[67] better than the Ptolemaic had, and would present a simpler and less intricate pattern. He had argued on behalf of his theory that epicycles and eccentrics "seem averse to the simple regularity to be expected from one best exquisite divine nature."[68] But when he came to grapple with actual details, these pretentious generalizations went largely by the board. He dispensed, it is true, with equants and with such late medieval additions to

[64] Dreyer, *Planetary Systems,* 1906, p. 343, seems to hold that Copernicus assumed the center of all movements to be the center of the earth's orbit (where the sun was not), but *De revolutionibus,* V, 36, states that the orbits of the planets are not homocentric with that of the earth.

[65] Francis R. Johnson, *Astronomical Thought in Renaissance England,* Baltimore, 1937, pp. 117-18.

[66] *Ibid.,* p. 117.

[67] Dreyer, *Planetary Systems,* 1906, p. 335.

[68] Preface to Paul III.

Ptolemy as a ninth sphere—although Giannini in 1618 charged Copernicus with adding an eleventh sphere. He was able to explain away the stationary position and retrograde motion of the planets as only apparent, an illusion produced by the movement of the earth. But to account for the varying velocities of the planets in their orbits he had to resort to eccentrics and epicycles. He employed two epicycles for the moon. For the movements of Venus and Mercury his theory "is fully as complicated as that of Ptolemy,"[69] and once in the case of Mercury he deviates from circular motion without offering any explanation.[70] He even supposed two motions of the earth's axis at right angles to each other, "being obliged on this occasion to give up the usual principle of circular motion."[71] He frequently had to deal with "anomalies"[72] or discuss such a matter as "the third kind of latitude of Venus and Mercury which they call deviation."[73]

Copernicus not merely gives one the impression of not quite living up to his professions or own expectations in these respects but once strikes a note that seems more appropriate to lyrical, mystical or theosophical than scientific writing, when he rhapsodizes over the position of the sun, resident in the center of the universe like a lamp in a temple placed so as to illuminate all. He quotes Trismegistus and the *Electra* of Sophocles. Then, enlarging upon the admirable symmetry and sure harmony of his arrangement, he exclaims, "So great is this divine fabric of Almighty God (Optimus Maximus)."[74] The passage is not only not scientific and seems out of place in *De revolutionibus* but is shallow and fallacious, not to say a trifle insincere. For a sun which revolved through the heavens on the middle one of seven tracks would illuminate the others quite as well as a sun stationary inside all of the orbits, especially since their eccentric

[69] Dreyer, *Planetary Systems*, 1906, p. 340.

[70] *Ibid.*, pp. 337-38.

[71] *Ibid.*, p. 330.

[72] *De revolutionibus*, III, 6, "Cum ergo iam habeamus anomaliae circuitum praecessionis."; IV, 28, "Sed anomaliam solis"; IV, 14, "De locis anomaliae latitudinis lunae."

[73] *Ibid.*, VI, 8. Or see III, 20, "Instat iam maior difficultas circa absidis solaris inconstantiam."

[74] *De revolutionibus*, I, 10. For some further examples of animistic and teleological conceptions and of sympathetic influences in *De revolutionibus* see Edgar Zilsel, "Copernicus and Mechanics," *Journal of the History of Ideas*, I (January, 1940), 113-18.

orbits would keep them at the same varying distances from the sun in the one case as in the other.

As for assigning the sun a position of importance in the system of the universe, it should be remembered that Ptolemy had taken it up first after consideration of the *primum mobile*—and had been followed in this procedure by later writers like Campanus and Peurbach in their *Theories of the Planets*. The reason for this was, as Reinhold stated in his preface of 1542 to Peurbach's work, that we measure the movements of all the other planets by the solar year and cannot understand the disposition of the rest without knowing the motion of the sun, whom the rest revere as their prince, lord and norm. These last words seem a rhetorical relic of ancient sun-worship, and probably Copernicus's rhapsodical lapse should be excused on the same ground. His work is for the most part solidly mathematical both in tone and content.

The number of observations on which the Copernican hypotheses were based has seemed scanty to modern scientists. As Dreyer well expressed it, "Copernicus was not a persevering observer," and, "thought a few observed places of each planet sufficient for determining the elements of its orbit."[75] His normal procedure was to adduce three modern observations of his own to compare with those made by Ptolemy in the second century. Thus to the three lunar eclipses recorded by Ptolemy he added three observed by himself on October 6, 1511, September 5, 1522, and August 25, 1523.[76] Similarly he added three new observations of his own for Saturn,[77] Jupiter[78] and Mars.[79] But for Venus he mentioned only one observation of his own, and none for Mercury. He states, however, that "many observations teach" that the eccentricity of Venus has decreased about a sixth.[80] In the latter case he explained that amid the fogs of the

[75] Dreyer, *Planetary Systems*, 1906, p. 338.

[76] *De revolutionibus*, IV, 5. He had, however, observed other eclipses which illustrated other points: one of June, 1509 at Cracow (IV, 13); another at Rome in 1500 (IV, 14); etc.

[77] *Ibid.*, V, 6: in May, 1514; June, 1520; and October, 1527.

[78] *Ibid.*, V, 11.

[79] *Ibid.*, V, 16: in June, 1512; December, 1518; and February, 1523.

[80] *Ibid.*, V, 22. Curtze found a later observation of Venus of 1532 and fuller tables for finding the latitude of Venus and Mercury than those of the last

Vistula he was unable to observe Mercury as Ptolemy could in the clear air of Egypt. He therefore utilized an observation made by Bernhard Walther on September 9, 1491, and two by Schöner in 1504—all three at Nürnberg.[81] That he was not very eager to make observations is suggested by a passage in which he says that, since the estimate of the movement of Saturn handed down by Ptolemy "is not a little discrepant with our times, nor can it immediately be understood where the error lies, we are forced to adduce new observations."[82]

It should be remembered in this connection that Copernicus was occupied throughout his life with many other matters than astronomy, to which he was able to devote only a part of his time and which may even be said to have been a side issue and avocation with him. During his stay of ten years in Italy he was studying civil law at Bologna, canon law and medicine at Padua, and received the degree of doctor of canon law at Ferrara. His astronomical observations at Rome in 1500 and his astronomical studies with Dominicus Maria Novara at Bologna were subordinated to these other studies. During the rest of his life he was occupied by his ecclesiastical duties as canon, by diplomatic and political missions, and by the practice of medicine. He also gave some attention to economic problems, writing a treatise on the need of reform of the Prussian currency. There is no doubt that his new and fruitful ideas and peculiar genius lay in astronomy rather than in the other fields of knowledge, and that even during his lifetime his reputation was primarily as an astronomer. But he was not a specialist in the sense that Tycho Brahe was later, who came to devote himself almost completely to astronomical (and astrological) observation and writing.

It might be thought that the limited number of observations recorded by Copernicus would have disappointed some of his

chapter of the sixth book of *De revolutionibus*. See his "Zur Entstehungsgeschichte der Revolutiones des Copernicus," *Archiv d. Math. u. Physik*, LVI (1874), 325-26, where he also shows that Copernicus used the secant before Maurolycus or Rheticus.

[81] *De revolutionibus*, V, 30.

[82] *Ibid.*, V, 6: "Cum autem supputatio motus Saturni a Ptolemaeo tradita haut parum discrepet nostris temporibus neque statim potuerit intelligi in qua parte lateret error, coacti sumus novas observationes adhibere."

readers in view of the "many observations" which Reinhold attributed to him in 1542, and we shall hear Peucer and Tycho Brahe make criticisms of this sort. But most writers on astronomy of the time were more favorably impressed by and readier to avail themselves of his observations than they were of his hypotheses.

Copernicus insisted upon the erroneous view that the precession of the equinoxes had been slower in the centuries just preceding Ptolemy than in the period between Ptolemy and Albategni. He had maintained it against Werner and still affirmed it in 1543.[83] Yet it was not a point vital to his new hypotheses and introduced another and needless irregularity, when he was trying to represent the movements of the heavenly spheres and bodies as uniform and harmonious. It was chiefly utilized then, although Copernicus himself does not say so, to support an astrological theory of cycles in human history, of ups and downs in the course of empires and of civilizations. It was also to be made a ground by Maestlin for attacking the Gregorian calendar, which was based on an equal anticipation of the equinoxes, while he insisted on the anomaly.[84]

The Copernican doctrine introduced marked changes in the elementary world as well as in the revolutions of the celestial orbs. The voyages of discovery, which showed land protruding everywhere,[85] had convinced Copernicus like many of his contemporaries that the surfaces of land and water constituted a single sphere with an even circumference rather than that, according to Aristotelian theory, the earth was enclosed by a sphere of water of greater diameter which came between it and the sphere of air. He rejected the old ratios suggested as to the relative diameters or densities of the spheres of earth and water. In conformity with the belief that in transmutation of the elements one unit of the element earth could be resolved into ten of water, some Peripatetics, Copernicus assures us, had held that

[83] *De revolutionibus*, III, 2.

[84] Michael Maestlin, *Defensio alterius sui examinis*, 1588, p. 16.

[85] Copernicus appears to have accepted Vespucci rather than Columbus as the discoverer of America. *De revolutionibus*, I, 3: "et praesertim America ab inventore denominata. . . ."

the sphere of water was ten times as great as that of earth. But geometry shows that the water cannot be even as much as seven times larger. He further doubted if the spheres of earth and water had different centers of magnitude and gravity—eccentrics by which it had been customary to explain the emergence of a part of the earth beyond the surface of the water.[86] This conviction that there were no distinct spheres of earth and water, whether concentric or eccentric, but that earth and water together constituted a single sphere, emboldened him to go further both above and below the moon. He made a somewhat incongruous—though not at all novel—distinction between the upper and lower air, as if they were two different concentric spheres, the latter moving with the earth, the other not.[87] The reasons, however, for his taking these positions are clear. To meet the objections to his hypothesis of the earth's movement that objects on or somewhat above its surface would be disturbed or flung out into space, he made the lower air move with our globe. But if he still adhered to the Aristotelian doctrine that comets are earthly exhalations which rise into the upper air under the influence of the planets, whose courses they then follow, it was essential for him to leave the upper air free to participate in these celestial influences. Indeed, it was not uncommon in the sixteenth century to distinguish three regions of air: upper, lower and middle. The sphere of fire between those of air and the moon Copernicus seems to have ignored by a complete silence, and he very likely had ceased to believe in the existence of it or in fire as a fourth element.

As Copernicus chose to regard the terrestrial sphere as one of the planets moving through the heavens, so he in a sense reduced the moon to the position of an inferior elementary sphere, since it unlike the other planets still revolved about the center of the earth. This point, however, does not seem to have been made much of by opponents of the Copernican hypotheses then, nor, so far as I know, has it been remarked by modern his-

[86] *De revolutionibus*, I, 3: "Nec audiendi sunt Peripateticorum quidam. . . .," etc.

[87] *Ibid.*, I, 8 (p. 22 in ed. of 1873): "Nos ob magnam a terra distantiam eam aeris partem ab illo terrestri motu destitutam dicere possumus."

torians.[88] It is true that the moon further had a movement in two epicycles, a feature more suggestive, at least hitherto in the Ptolemaic system, of celestial than of elemental bodies. On the other hand, instead of being promoted like the sun to the center of the universe,[89] it had really been demoted from its place as one of the two great luminaries and as the last sphere and final medium for all the astrological influences of the other spheres. It is true that exponents of the Copernican system scarcely realized this. Maestlin, for example, after setting forth the theory of the sun "or rather, of the great orb of the earth," and then the theory of the moon "according to the Prutenic Tables, from the opinion of Nicolaus Copernicus," concluded, "So much about the luminaries of the sky, which God created to divide day and night and distinguish months and years."[90] Thus old phrases and categories persisted amidst new hypotheses. But there was the further consideration that the divergence between the moon's orbit and those of the other five planets in the new system hardly made for that uniformity, simplicity and perfection which was one of Copernicus's chief arguments for his system. It is not altogether surprising that Tycho Brahe should have thought his system, of having Venus and Mercury move about the sun as it moved about the earth, quite as good.

On the other hand, it is to be put to the credit of Copernicus that he suggested that the same considerations of gravity and of heavy and light applied to the other planets as spherical bodies as to the earth.[91]

[88] It was remarked by Alsted in his encyclopedia of the early seventeenth century. Speaking of Archimedes as a precursor of Copernicus, Alsted adds that it is uncertain whether, like Copernicus, he thought of the orbs of the moon as revolved with the elements themselves. "Cum incertum sit an Archimedes lunae orbes ut Copernicus cum elementis ipsis circumvolvi voluerit," Alsted (1630), 1923.

[89] According to the way of looking at things then, however, it was hardly a promotion, since it had been customary to place the earth at the center as the dregs, cold and slow and motionless, and lowest part of the universe, with hell at the earth's center and the empyrean heaven forming the outermost circumference.

[90] Kepler, *Prodromus dissertationum cosmographicarum*, 1621, p. 155.

[91] *De revolutionibus*, I, 9. In conclusion I may note an article which otherwise might not come to the attention of English-speaking readers: Quido Vetter, "Sur les destins du manuscrit pragois du Kopernik De revolutionibus orbium caelestium libri sex," *Mémoires de la société royale de Bohême*, Classe des Sciences, Année 1931, Prague, 1931.

CHAPTER XIX

GERMAN MEDICINE

Sed heus heus in dies atque in dies errores accrescunt
—FRIES

The classical reaction extended to medical activity in the first part of the sixteenth century. Many belittled Avicenna and other Arabic medical authorities and wished to re-establish medicine upon the ancient Greek writers with some admixture of Latin eloquence. Within the space of eight consecutive leaves in Gesner's *Universal Library* of 1545 are named three physicians to whom no works are ascribed except translations from the Greek. Martin Acakia of Catalonia, professor of medicine at the university of Paris, translated in "a pure and most elegant style" the two books of Galen to Glaucon *De ratione curandi,* printed at Paris in 1538, with the addition of some commentaries. Martin Gregorius had issued corrected translations of half a dozen treatises by Galen, all at Paris. Matthias Theodorus Melanelius, a physician of Antwerp, translated a Greek book on melancholy collected from the writings of Galen, Rufus and Aetius, together with "a most exquisite eye-wash" of Stephanus, printed at Antwerp in 1540.[1] In vernacular literature the classical trend was less strong, while interest in the occult had, if anything, a freer play. Let us turn to two medical writers in German of the first half of the sixteenth century, Lorenz Fries and the renowned Paracelsus.

Laurentius Frisius (Phrisius) or Lorenz Fries (Friese) was of Colmar and not of Frisia, although he may have been of Dutch descent.[2] He somewhat resembled Symphorien Champier

[1] Gesner (1545), fols. 500r, 501v, 507v.

[2] For this and other facts of Fries' life I chiefly follow an excellent monograph, "Laurent Fries de Colmar médecin astrologue géographe," Nancy, 1888(?), 54 pp., which bears no name of the author and is catalogued as

as a miscellaneous writer and popularizer of learning. His career and writings further had something in common with those of such intellectual vagabonds, devotees of occult science, and semi-charlatans as Henry Cornelius Agrippa and Paracelsus. He seems to have attended the universities of Vienna, Piacenza, Pavia and Montpellier. After practicing medicine a while in his native town of Colmar, he became dissatisfied with conditions there and migrated to Strasburg. This town soon became too strongly Protestant for his taste, and he moved on to Metz. Agrippa had departed from Metz in 1520, but through a priest there Fries corresponded with him in 1526. Fries was also acquainted with Paracelsus who, after his flight from Basel to Colmar, wrote from the latter town on February 28, 1528, to Boniface Amerbach, professor of law at Basel, that Fries of Colmar was in the best of health.[3] Schmidt has suggested that the attack in Fries' astrological prediction for the year 1531 upon doctors who pretend to teach a new art and scorn the ancients was meant for Paracelsus.[4] It is something of a coincidence that Melanchthon made like remarks in his declamation of the same year against medical empirics.

Fries' *Spiegel der Artznei*, first published at Strasburg in 1518, is said by Schmidt to be the oldest work on internal medicine in the German language. The author dedicates it "to the poor sick of the common people," but to this preface adds a prayer in Latin to the learned asking pardon for teaching the science of Apollo in the language of the people. He asserts that his only aim is to extirpate errors, and that the glory of true physicians will not suffer from his book. He warns the folk against charlatans and empirics, and states that the only doctors worthy of their confidence are rational physicians possessing academic degrees and a knowledge of grammar, logic, astronomy, arithmetic, geometry, music, cosmography, and especially

anonymous in the British Museum library. But an allusion at p. 7, note 2, to "notre Histoire littéraire de l'Alsace, Paris, 1879," makes it evident that C. G. A. Schmidt was its author.

Jöcher and the authorities whom he follows were mistaken in claiming Fries as a native of Frisia or the Netherlands.

[3] Karl Sudhoff, *Paracelsus, Sämtliche Werke*, I, VI, 34-35.

[4] *Op. cit.*, p. 29.

natural science. Among empirics Fries classed Hieronymus Brunschwig, who had considerably antedated him in writing in German, his book on the art of distillation having been first printed in 1500 and then in eleven successive editions to 1532. Fries alludes to him slightingly as the coarse peasant who lived near the fish market in Strasburg. One cannot help suspecting that it was largely the success of such a book as Brunschwig's and the prospect of making a little money that induced Fries to write his work in German. A brief treatise in that language on physiognomy had already been printed in 1511.[5]

The circulation of scientific and medical works in German was older, however, than the invention of printing and not a result thereof. Such works as that of Arnald of Villanova on wines,[6] the *Sphere* of Sacrobosco,[7] and the introduction to astrology by Alcabitius[8] are already found in the manuscripts in German translation in the early fifteenth century.

The therapeutic of the *Spiegel* has already been described by Schmidt as medieval in character with mysterious manipulations of mixtures suggesting sorcery. A use of animals which borders on the superstitious and fantastic is common in it. For rheumatism a fat old goose is plucked and cleaned and stuffed with a dressing made of a cat chopped to bits, lard, incense, wax, mutton fat, salt, and flour of rye and beans. The goose is to be roasted and the limbs of the patient are to be well rubbed with the drippings. Another unguent is made of the bones of all sorts of animals, especially asses, boiled for a long time in water. Or a young hare cooked to a powder is taken in half ounce doses morning and evening for the stone. This treatment caused one of Fries' patients to void over four hundred stones, large and small. Or an oil for leprosy is concocted from little green lizards. In view of such remedies, which can scarcely be called rational,

[5] *Von Complexio der Menschen zu erlernen leibliche und menschliche Natur, Geberden und Nayglichhayt zu erkennen,* Strasburg, Hupfuff, 1511, quarto minori.

[6] John F. Lewis collection, Free Library, Philadelphia, MS 169, 25 ff.

[7] Pierpont Morgan library, New York, MS 722, fols. 1-17.

[8] *Ibid.*, ff. 18-48, Alcabitius, Libellus isagogicus.

it is difficult to see how Fries himself could escape the charge of empiricism.

The *Spiegel der Artznei* was so popular that a second edition appeared the following year, 1519. Ten years later in the third edition Fries spoke less harshly of the empirics, who had complained of his attacks, and again defended writing in German for the laity against the opposition of the learned. This was in March. In August of the same year Otto Brunfels issued a fourth edition with the consent of Fries, but it contained so many typographical errors that Fries published yet a fifth edition in 1530. In it he once more defended writing in the vernacular. Very likely this success of the *Spiegel* encouraged Schöner, although he had no medical degree, to print his popular medical work in German in 1529 at Nürnberg. It contained a good deal of astrology.

It was apparently more common to issue astrological predictions in German than it was to publish medical treatises in that tongue. Various German astrologers had done so even before 1500. Hellmann noted four annual predictions by Fries, of which the earliest was for 1524 and the last for 1531.[9] But already in 1520 he had published a reply in German[10] to Luther, who in sermons of 1518 on the decalogue had called astrology idolatry, attributing to the soulless stars action upon men, drawing horoscopes and observing certain days. Friedrich, however, has shown that Luther was no consistent opponent of astrology.[11] Of the four annual predictions by Fries those for 1524, 1526 and 1531 were in German, while that for 1529 was published at Metz in French in 1528. In the preface to the prediction for 1531 Fries attacked abusers of astrology who went too far or employed necromancy, which he described as an uncertain art

[9] Hellmann (1924), II, 27, 38; Schmidt (1888), 12, 43-44. Hellmann speaks of the prognostication for 1526 in German as hitherto undescribed, but Schmidt had already mentioned it.

[10] According to Graesse the title of Fries' work was: *Ein kurtze Schirmred der Kunst Astrologie wider etliche unverstandene Vernichter auch etliche antwurt uff die reden und fragen Martin Luther Augustiners so er in seinen zehen geboten unformlich wider die Kunst gethon hat.* Strasburg, Grüninger, 1520, 4to.

[11] Friedrich (1864), p. 106 *et seq.*

known to very few men "in its purity." In 1521 Fries had called Thomas Murner a necromancer in a pamphlet directed against him. This *Dialogus Murnarus Leviathan* was listed in 1559 on the Index of Paul IV as of uncertain authorship.[12] In the prediction for 1531 Fries complained of opposition to astrology by the Dominicans. Of his controversy with Gengenbach we have spoken in another chapter.

That Fries drew up horoscopes of individuals as well as composed annual predictions is shown by one of his patron at Metz, Nicolas de Heu. It was drawn up on November 14, 1528, at 8:20 P.M., which had been the time of Nicolas's birth in 1494.[13]

Sudhoff[14] has noted that *The Exposition and Use of the Astrolabe* by Fries, printed at Strasburg in 1522, contains astrological medicine, including the common Ptolemaic or pseudo-Ptolemaic division of the course of the moon into a figure of sixteen sides and angles. But he has not noted, at least in the same connection, that in his *Epitome opusculi de curandis pusculis ulceribus et doloribus morbi Gallici mali Frantzoss appellati,* printed at Basel by Henricus Petrus, in August, 1532,[15] Fries attributes the outbreak of syphilis at the end of the fifteenth century to conjunctions of the planets on October 15 and November 1, 1483. He cites Haly Abenragel and the *Conciliator* of Peter of Abano for the influence of the stars. A certain doctor and most famous astrologer whose name would be familiar to the reader should Fries mention it predicted the epidemic years beforehand. In other writings Fries observed the stars in certain remedies for

[12] Reusch (1886), p. 184. On the astrology of Murner consult Moriz Sondheim, *Thomas Murner als Astrolog,* Strasburg, 1938, 208 pp. His *Practica* for the year 1498 is reprinted at pp. 51-61.

[13] Schmidt, *op. cit.,* p. 12, states that this horoscope is preserved in a MS of the Arsenal, Paris, but gives no shelfmark. Prost, *Corneille Agrippa,* I (1881), 382-83, supplies the number of the MS, Arsenal 5028. From the printed *Catalogue des MSS de la Bibliothèque de l'Arsenal,* V (1889), 10, I derive the following description: Arsenal 5028 (804 B.H.F.), 16th century, fols. 3-(20), on parchment, Horoscope, en latin, de "Nicolas de Heu, chevalier, seigneur d'Ennery et capitaine de Brie," fait par "Laurentius Frisius, nature philosophus." Incipit, "Anno salutifere incarnationis Christi 1494. . . ."

[14] *Studien* (1902), p. 43.

[15] Copy used: BM 541.b.15.(2.).

sharpening the memory, and affirmed that the virtues of mineral baths differ according to the celestial influences.[16]

The suspicion of salesmanship pandering to popular superstition which the *Spiegel* stirred in us is further accentuated by a tract on the memory which Fries published in German in 1523. He assures the reader that the mountains in whose depths the sciences once were hid now lie open to him, thanks to the divine invention of printing. Books that until now have been chained in the caverns of monasteries and churches have made the sciences accessible to you. But because of your feeble memory, Fries continues, what you read does you little good. Your reading is like bailing water with a sieve. Buy then my book. It is short because I know that our age no longer cares for great volumes of medical advice. But, reader, if you follow the instructions given in this book, "your memory will be that of a god rather than a man."[17]

It was probably because Fries was a bit of a charlatan that he was more than once ridiculed, first by Thomas Murner, then by the poet, Pamphilius Gengenbach, in the satiric comedy *Geuchmatt,* while in the opinion of Schmidt Rabelais parodied his annual prediction for 1529 in the *Pantagrueline prognostication* of master Alcofribas, first printed in 1533.[18] Gesner criticized him more seriously, asserting that his *Synonyma* of medical simples, a work in German with Latin, Greek and Arabic names of the simples, was stuffed with a thousand mistakes and unworthy of learned ears.[19]

In an age when many physicians tended to follow the humanistic current and to rely on ancient Greek medical authorities alone, rejecting Arabic and medieval Latin medical writings, Fries took an opposite position. Already in 1518 in the vernacular *Spiegel* he put Avicenna before Hippocrates and Galen and averred that, if he possessed one of Ibn Sina's bones, he would

[16] Schmidt (1888), pp. 37, 34.

[17] Schmidt (1888), p. 36.

[18] According to Charles Abel, *Rabelais médecin stipendié de la cité de Metz,* Metz, 1870, p. 73. A recent facsimile reprint seems to date it rather in 1532: Gargantua, *Deux publications Lyonnaises de 1532,* 1925.

[19] Gesner (1545), fol. 476v.

venerate it as he would the relics of the saints.[20] In 1530 he addressed to the physicians of Germany *A Defense of Avicenna Chief of Physicians* against certain recent physicians who calumniate Avicenna.[21] Fries seems to have been especially aroused by the attack of Symphorien Champier upon Avicenna, although he also refers to Leonicenus and to writers of medical letters. He complains that the youth of his time, although making great progress in some ways, are prone to put sweetness of words and of style before substance and solidity. Yet the medical art ought to heal rather than to please the ear. Fries wishes that a thousandth part of what his juniors publish were true and charges that almost all German physicians diagnose by inspection of urine alone. Errors multiply daily, and a worse barbarism is abroad than was ever perpetrated by any of the Arabs. Once while Fries was residing in Strasburg, there came from Italy a doctor of great name among modern Greeklings who lectured upon the works of Hippocrates and Galen. Yet he was so totally ignorant of the structure of the eye that he promised to cure cataract with an eye-wash, until finally he realized his error from observing Fries perform an operation for cataract.[22] Nevertheless these moderns venture to attack such medieval Latin medical

[20] Schmidt (1888), pp. 19-20.

[21] *Defensio medicorum principis Avicennae ad Germaniae medicos Laurentio Frisio authore,* MDXXX: copy used: BM 543.b.20.(1.).

[22] *Defensio medicorum principis Avicennae ad Germaniae medicos,* 1530, fol. b ii verso: "Cum olim in civitate Argentoraten. habitabam ex Italia illuc divertebat medicinae doctor magni inter recentes graeculos nominis Hippocratem atque Galenum graece multis praelegerat: oculorum autem constitutionem eousque ignorabat ita quod collirio condensatam oculi cataractam se curaturum polliceretur at tandem visa a nobis manuali operatione impossibilitatem confessus est nam inter corneam et vucam in profundo oculi videbat latere pelliculam quae nullo potuit apprehendi collirio."

Schmidt, who had not had access to the *Defensio* and so did not know of this passage, accused Fries of advising in the *Spiegel* a procedure somewhat like that of the aforesaid Italian and doubted if Fries had ever performed an operation for cataract: p. 24. "Cure de la cataracte, laquelle Fries assure avoir plusieurs fois prescrite avec un plein succès: pendant six jours le malade prend matin et soir un breuvage d'eau de fenouil d'euphraise et d'oxymel, il se purge ensuite avec des pilules laxatives et met un certain onguent dans les yeux: si cela ne sert à rien, il ne reste qu'à faire l'opération; celle-ci, Fries ne la décrit pas, il convient qu'il ne l'a jamais essayée et que cela regarde la chirurgie; est-il vraisemblable d'après cela qu'il se soit fait une réputation comme habile oculiste?"

authors as Gentile da Foligno, Jacobus de Partibus, Nicholas of Florence, Hugh of Siena, James of Forlì, Michael Savonarola, Guaineri and Bernard Gordon. Fries further maintains that the Greeks transmitted little which they had not borrowed from the Egyptians, Arabs and Hindus. He doubts whether the opponents of Avicenna have read more of Galen than a few recent translations of certain of his works, whereas many are still accessible only in the older medieval translations. He prefers Avicenna even in the medieval translation of Gerard of Cremona to the experiments of Pliny (perhaps referring to the *Medicina Plinii*) or the lies of Apuleius (probably meaning the *Herbarium* of Pseudo-Apuleius). Avicenna gives all that Hippocrates and Galen do but more briefly and clearly. The Arabic author still has many adherents, of whom Fries lists Wendalinus Coronobachius, who however was already deceased at the time Fries writes, Johann Fuchs the elder of Strasburg, Johann Widmann, Johann Wonneck, Johannes Adelphus, Heinrich Zittart of Cologne, and Johannes Nidepontanus. This last-named John of Pontigny or Niedbruck was co-author with Fries of a treatise on the English sweat which was written hastily (*praecipiti calamo conscripta*) at the request of the bishop of Strasburg and published there in 1529.

Fries was interested in the recent geographical voyages and discoveries as well as in anatomy, medicine and astrology. In 1522 he was put in charge of a new edition of the *Geography* of Ptolemy. He gave due credit for the accompanying maps to Waldseemüller (Hylacomylus), who by that time was dead. This credit the previous editors, Johann Essler and Georg Ubelin in 1513, and the latter alone in 1520, had failed to give.[23]

Taking everything into account, we may not dismiss Fries as a mere popularizer, empiric and superstitious devotee of occult science. He had his standards in medicine and at times showed a courageous independence in resisting current tendencies which he believed were not for the best. He appears to have had a sound education and to have read fairly widely in the fields

[23] Schmidt (1888), pp. 46-48.

with which he was concerned. If some of his remedies and predictions seem superstitious to us today, we must remember that he shared them with the learned as well as with the vulgar of his own time.

More original, richer in ideas, more revolutionary and far-reaching than the writings of Fries were those of Paracelsus. But while Paracelsus had a greater reputation than Fries as a practitioner, he published little during his lifetime. The popularity of Fries' books was contemporary and ephemeral. The works of Paracelsus were to have a much greater future vogue and influence, but were for the most part not printed until the second half of the century, when too they were translated into Latin. We therefore shall now speak chiefly of Paracelsus himself and devote a later chapter to the Paracelsan revival.

Paracelsus (1493-1541) who had gained the admiration of the Basel printer, Froben, and of the great Erasmus by his medical skill and success with them or persons of their acquaintance, obtained through their support an opportunity to lecture on medicine at the university of that town in 1527. This he did in German and in a popular and revolutionary manner, attacking the old authorities and present teaching of the subject, and professing to introduce a New Medicine. Gesner, writing less than twenty years later, states that he had seen a broadside printed at Basel in the year 1527 in which Paracelsus promised that he would teach all parts of medicine in a different way from what had been done by former physicians.[24] Gesner believed that he taught in German because of his unfamiliarity with Latin. He said nothing remarkable but was rather an impostor and frequently resorted to narcotics containing opium in his medical practice. In another place Gesner spoke of Paracelsus as an empiric.[25] Whether he burned the *Canon* of Avicenna and works of Galen before his students as Luther had burned the papal bull and corpus of canon law at Wittenberg is disputed.[26] It may be

[24] Gesner (1545), fol. 614v.

[25] *De balneis*, 1553, fol. 294r, col. 2: "Scripsit de his thermis Germanice libellum apud nos excusum Theophrastus Paracelsus empiricus. . . ."

[26] A. Burckhardt, *Geschichte der mediz. Fakultät zu Basel, 1460-1900*, 1917, p. 29, pronounces it a myth.

an unwarranted inference from an enigmatic passage in the *Paragranum* in which he states that he had thrown the *Summa* of the books into the fire of St. John, so that all the misfortune went up in smoke and the monarchy was purified and will be eaten by fire no more.[27] Whether he set out to ape Luther with a reformation of medicine or not, he was certainly compared to him later by his opponents and resented the charge. His teaching at Basel aroused opposition and he soon left the town in a huff, never to frequent academic halls again.

Like Agostino Nifo and other men of the sixteenth century, Bombast von Hohenheim, if that was his original name, bestowed upon himself, perhaps in lieu of the medical degree which it is doubtful if he ever attained, various fanciful appellations: Paracelsus to indicate his superiority to the ancient medical writer, Celsus; Theophrastus, in memory of Aristotle's great successor; and Aureolus by way of a golden alchemical halo. Gesner called him Theophrastus Bombast ex Hohenheim, a hermit and professor of both medicines,[28] who named himself Paracelsus.[29] He also applied such titles as *Paramirum* and *Paragranum* to his works. In the preface to a work published under his name[30] occurs this passage: "In this midcentury monarchy of all the arts pertains to me, Theophrastus Paracelsus, prince of philosophy and medicine. For to this am I chosen by God that I may extinguish all fantasies of all far-fetched, false and putative works and presumptuous words, be they of Aristotle, Galen, Avicenna, Mesue, or any of their adherents." Sudhoff doubts the authenticity of the passage,[31] but the boastful tone is not uncharacteristic.

In a letter of 1530 to a physician of Nürnberg Paracelsus described himself as a wanderer and a vagabond,[32] and such he was for the rest of his life. He would enter a town, pick up a few patients, address a minor medical or pest tract or an astro-

[27] *Opera,* VIII, 58, in Sudhoff's edition.

[28] That is, of both theory and practice.

[29] Gesner (1545), fol. 614v.

[30] *Libellus de tincturis physicorum.*

[31] Sudhoff (1894), I, 190.

[32] *Opera,* ed. Sudhoff, VIII (1924), pp. 29-30.

logical prediction to the local authorities, but ere long move on elsewhere. The Parthian shots in the form of vile, abusive letters which he more than once sent back from a safe distance after such withdrawals incline us to believe that the parting had not been voluntary on his part nor the wrong wholly on the other side. He appears to have been a more or less unlicensed as well as unorthodox medical practitioner. His itinerancy, however, probably aided the spread of his new medical gospel. Sometimes he left one place because invited elsewhere, as when in 1530 he was called away from Regensburg to attend a patient at Amberg.

Works by Paracelsus which were printed during his lifetime and are extant are few in number. Except for astrological predictions, of which a number appeared in German and in Latin,[33] his publications—for the rest in the vernacular—were limited to a tract on guaiacum wood in 1529 at Nürnberg, one on syphilis in 1530, on a particular bath in Oberschwyz in 1535, and the *Grosse Wundartzney* in 1536.[34] Everywhere he met with opposition to his efforts to procure publication of his writings. In 1530 the town council of Nürnberg, at the suggestion of the medical faculty of Leipzig, forbade further printing of his works.[35] He had failed to publish at Colmar in 1528. At Vienna he tried to print his *Labyrinthus* and *Defensiones,* but the other physicians prevented. In 1538 the Estates of Carinthia promised to print three works for him but failed to do so. All the time he was writing but rarely publishing. He completed the first and second parts of *Paramirum* at St. Gall in 1531 and left the third part, "De matrice," in an unfinished state.[36] Gesner knew of theological works which he had composed at the monastery of St. Gall and left unpublished, as well as seven books on degrees

[33] Hellmann (1924), p. 29, listing three in Latin for years between 1530 and 1536, should be corrected by Sudhoff who has noted a *Practica* of 1529 in German for the next 30 years, printed at Nürnberg and Augsburg, other astrological predictions in this and other years, a work of 1531 on the comet in German printed at Zurich, a work of 1534 on astrological signs and comets, in 1536 his first Latin *Prognostica* for 24 years, and further *Practicas* in German.

[34] I follow Sudhoff in this and most of the rest of this paragraph.

[35] Sudhoff, *Paracelsus, Opera,* VIII (1924), 14.

[36] *Ibid.,* IX (1925).

and composition of recipes in barbarous Latin addressed to Christopher Clauser and preserved by him in manuscript.[37]

The slogan attributed to Paracelsus, "The sick should be the doctor's books,"[38] sounds fairly well until we begin to reflect upon its implications and further upon the vast number of books that Paracelsus himself wrote. Carried to its logical extreme, this slogan means that there will be no schools of medicine, no medical literature, no science of healing, and no progress in medical knowledge. For each physician will have to learn his art from personal practice and so might as well begin to practice at once without any preparatory medical education. Furthermore, when he dies or ceases to practice, his fund of experience will perish with him, and he will leave behind no acquisition of knowledge. And while he is learning from the sick as books, they will die as patients. If Vesalius had limited his activity to dissection and had never written *De humani corporis fabrica,* the science of anatomy would have been the loser, not the gainer. Similarly it is all very well to say that science should proceed by the experimental or laboratory method, but if the results are not reduced to writing and the printed page, they will not be communicable and perpetuating. Moreover, for Paracelsus to make such a remark was not much more than a pose, since he would seem to have spent quite as much time at the writing table or dictating to amanuenses[39] as he did at sickbeds. Had he left no writings behind him, either there would have been no Paracelsan medicine or the name of someone else would have been attached to the movement. Somewhat similar was the case of Palissy who set up a practitioner who derived all his knowledge from observation against a theorist who aired ridiculous notions taken from Latin tomes. Yet some of the supposedly practical observations were copied by Palissy directly from the Latin

[37] Gesner (1545), fol. 614v.

[38] H. O. Taylor, *Thought and Expression in the Sixteenth Century,* II, 1920, p. 320. In the *Labyrinthus medicorum errantium,* Nürnberg, 1553, Paracelsus argued that "the light of nature" was preferable to books.

[39] Dorn, *Congeries Paracelsicae chemiae,* Frankfurt, 1581, in his preface to the count palatine states that the greater part of Paracelsus's works were dictated by him.

works of Cardan.[40] It is also well to remind ourselves that the sick had been the doctor's books during the fourteenth and fifteenth centuries, from which we have preserved many collections of *Consilia* or records by physicians of their cases. Finally, the melancholy reflection forces itself upon us that those with little book learning are apt to write the most guff.

Paracelsus on the one hand tried to write on almost everything. For example, he composed a commentary on the Psalms and addressed seven books on the Lord's Supper (*De coena domini*) to pope Clement VII. On the other hand, he tended to put a bit of everything he had ever experienced, read, heard of, or dreamed about into his works: astrology, alchemy, magic, arcana, mysteries, religious and spiritual conceptions, Aristotelian topics, clinical observations, new theories, or, more often, new and strange words for old ideas. His medicine and philosophy of nature were strongly affected and even perverted by occult science and superstition on the one hand, and on the other by supernatural and theological ideas which had no proper place in natural science. He wrote on things that he knew about at first hand and on which he may be regarded as a specialist: for instance, hysteria, Bergkrankheiten, and syphilis. Concerning the last Sudhoff credits him with showing the greatest clinical knowledge of anyone before 1850.[41] He also wrote about mysteries of nature or spiritual beings, of which he knew very little and that mainly at second or third hand. Unfortunately it seems to have been his works of this second sort that aroused most discussion, that seem to have had most influence—at least on the surface of thought and medicine—and that bulked largest in the Paracelsan revival of the later sixteenth century. It would have been better had his works been used for their particular clinical observations rather than for their somewhat wild and incongruous general theories.

A third and worst representative of German medicine was Walther Hermann Ryff who, especially in the fifth decade of the century, issued numerous publications in both Latin and German. He was in Strasburg in 1541-1542, at Frankfurt in

[40] Duhem I (1906), 247.

[41] Sudhoff (1894), I, vi.

1543-1544, and at Mainz in 1544-1545.[42] Gesner, writing in the last named year, openly pilloried Ryff as an absolutely unpardonable ignoramus and plagiarist who published a steady stream of books, especially in medicine, anatomy, pharmacy and surgery, of which he knew nothing, with commentaries that were worthless except what was copied from others, particularly Fuchs, Tragus, Manard, Barbaro, Vergil, Marcellus and Gesner himself.[43] In the eighteenth century Will reiterated this censure, calling Ryff a shameless plagiarist who did nothing but invent splendid titles and translate the works of Fuchs, Gesner and other famous physicians into German as his own compositions. Will suggested that he may have been better at mathematics than medicine but listed scarcely any mathematical writings by him.[44] Hellmann, however, mentions two astrological predictions in German for the years 1544 and 1545.[45]

It seems hardly worth while to give the long titles of Ryff's publications in German, which included a cookbook for invalids. In Latin he published in 1542 a work of astrological medicine[46] at Strasburg which Sudhoff has described as a patchwork without acknowledgement from the earlier works on that subject of Tannstetter, Jean Ganivet and Manfredi.[47] Ryff also edited Vitruvius and added scholia to Ruelle's Latin translation of Dioscorides. He further published works of Arnald of Villanova,[48] the five books on minerals of Albertus Magnus, and the alchemical *De secretis* attributed to Raymond Lull. Of his commentary on Pliny's account of magic we shall treat in another chapter.

Jason Pratensis or J. A. Pratis[49] of Zierikzee[50] in the second quarter of the century departed somewhat from the usual run

[42] F. W. E. Roth, "Hieronymus Brunschwyg und Walther Ryff, zwei deutsche Botaniker des XVI Jahrhunderts," *Zeitschrift für Naturwissenschaft*, 75 (1902), 102-23.

[43] Gesner (1545), fols. 284v-285r.

[44] Georg Andreas Will, *Nürnbergisches Gelehrten-Lexicon*, III (1757), 368-70. Will states that Ryff came to Nürnberg and became municipal physician there.

[45] Hellman (1924), p. 29.

[46] *Iatromathematicae . . . enchiridion* etc., Argentinae, 1542. Copy used: BM 1170.a.19.

[47] Sudhoff (1902), pp. 52-53.

[48] *Arnoldi Novicomensis Opera . . . recognita . . . per G. H. Ryff*, Argentinae, 1541.

[49] His name is so given in the British Museum catalogue.

[50] Gesner (1545), fol. 370v, calls him Zyriceus.

and topics of medical works in two treatises on preventing sterility and giving birth to children,[51] and on diseases of the brain[52] respectively. The former composition, written in an affected and digressive style, abounds in classical allusions and is as much moral as medical. At its close Jason repeats some aids to fertility from celebrated authors but will not attempt to explain their action. They include taking the tongue of a goose as an aphrodisiac for women, smelling the Ethiopian variety of the herb cummin during sexual intercourse in order to conceive more easily, and eating a thistle in order to generate males. The treatise on diseases of the brain is less specialized than one might infer from its title, since the author admits that most diseases may be so regarded. He considers demoniac possession very similar to mania and states that demons insinuate themselves into melancholy persons.[53] Again he gives many classical examples, for example, both of cases of mania and of their cure. He affirms that the influence of the stars and of the locality has a by no means small effect on both morals and diseases.[54]

[51] *De arcenda sterilitate et progignendis liberis,* Antwerp apud Mich. Hillenium, 1531. Copy used: BM 549.d. 2.(1.). There was another edition of Amsterdam, 1657.

[52] *De cerebri morbis,* Basel, 1549. Copy used: BM 1188.a.3.

[53] *Ibid.,* pp. 214, 262.

[54] *Ibid.,* p. 219.

CHAPTER XX

BRASAVOLA AND PHARMACY

Fabulosum est et quod nostris etiam temporibus fertur ex Dioscoride fortassis et antiquioribus sumptum

—BRASAVOLA

A vivacious and entertaining treatment of herbs and other medicinal simples was given by Antonius Musa Brasavola, writing in 1534 at the age of thirty-four.[1] The work is in the form of a dialogue between Brasavola, an old apothecary and a herbalist. It opens in the high mountains,[2] where they, like Simon de Phares in the previous century, have gone to collect herbs. The apothecary thinks that mountain herbs are better than others, and Brasavola adds that many of them cannot be transplanted.[3]

[1] *Examen omnium simplicium medicamentorum quorum in officinis usus est,* Impressum Romae impensis et laboribus A. Bladi de Asula, 1536, in folio, BN Te^{121}.65 pièces liminaires et 120 fols. My references are primarily to the Lyons, 1537, edition (BM 1168.e.1), at pp. 329-30 of which Brasavola gives his family tree and says that he was born on January 16, 1500, and is now 34 years old. Six years ago he married Cassandra, the daughter of Hieronymus de Robertis, by whom he has three living children—Renatus, Hercules and Margareta. "The others flew away to heaven."

In the dedication to Ercole II of Este and his wife, Renata of France, Brasavola says that he had been prevented from dedicating the work to Ercole's father, Alfonso I, who had encouraged him to investigate the medicaments in use in the apothecary shops of Ferrara, by the latter's death in 1534-1535. Presumably publication had been delayed from 1534 to 1536 in consequence.

The Lyons printer of 1537 says that he has followed a copy brought from Rome, which he owes to the kindness of Benedictus Curtius Symphorianus. Gesner (1545), fol. 62r, states that the work was printed at Rome in 1536 in folio with an index, then at Lyons in octavo. He adds that when he spent several days at Ferrara in 1543, Brasavola told him that he was preparing a much enlarged edition to be printed at Venice. Zedler lists an edition of Leyden, 1537, but probably means that of Lyons.

The folio *editio princeps* of Rome, 1536, which I was able to examine subsequently, has a fuller index than that of Lyons, 1537, with reference to over 500 numbers in the margins, so that it is easy to find any topic.

[2] *Examen,* Lyons (1537), p. 1: "per has Alpes inhospitas et inaccessas"; p. 2, "alta montium iuga."

[3] *Ibid.,* p. 12.

Brasavola had studied at Padua, Bologna and Paris, taking the doctorate in law and theology as well as medicine. He taught at Ferrara—first logic for eight years, then natural philosophy for nine, then the theory of medicine[4]—until he became physician to pope Paul III. The dedication of his *Examen omnium Loch* etc., printed at Venice in 1554, to Balduinus de Balduinis, bishop of Mariana in Corsica from 1550 to 1554, speaks of leaving Rome, perhaps to enter that bishop's service. Brasavola died in 1555. His practice of eating as much as he liked at both lunch and dinner, of which he boasts in one of his works,[5] stating that he felt upset if he did not do so, at least failed to procure him longevity, if it did not shorten his life. The story was told concerning him that, when news was brought to him while he was lecturing that his house was on fire, he finished his lecture nevertheless.[6] He would not have been teaching natural philosophy for more than a year or two when he composed his work on simples, so that botany and pharmacy must have been avocations for him while teaching logic. In the work on simples he cites several earlier compositions of his: a tract on wine for Alfonso d'Este, another on the wood guaiacum for cardinal Campeggio, a treatise on the times to collect herbs, some work in which he had discussed different kinds of violets, and a defense of Serapion and Mesue against recent criticism of them.[7]

Aloysius Mundella, a physician and philosopher of Brescia who later was put in charge of the botanical garden at Padua,[8] composed annotations upon the dialogue of Brasavola, which he addressed to him from Brescia on December 30, 1537, and which were printed with Mundella's *Medicinal Epistles* in 1538 and 1543.[9] These *Annotations* and also Mundella's *Epistles* we shall sometimes use to supplement Brasavola's picture of the

[4] So he says in the preface to his *Commentary on the Aphorisms of Hippocrates and Galen*, printed at Basel in 1542.

[5] *Examen omnium trochiscorum*, 1551, fol. 4r.

[6] Zedler, *Universal Lexicon*, IV (1773), 1095.

[7] *Examen omnium simplicium*, Lyons, 1537, pp. 14, 17, 327, 332, 354-55.

[8] See the article upon him in Zedler.

[9] *Epistolae medicinales*, Basel, 1538: copy used, BM 1165.b.1. Basel, 1543: copy used, BM 540.d.34.(1.).

pharmacy of his time, for which purpose we shall also allude to the *Castigationes* of Champier, printed in 1532.

Brasavola's discussion of medicinal simples is partially one of classical nomenclature, whether the present names of herbs may be identified with those in Dioscorides. In this respect he somewhat follows the lead given by Leonicenus in his criticism of Pliny but is less purely linguistic and more interested in descriptive botany. For example, the first herb discussed, called by the herbalist reuponticum, is shown by Brasavola not to correspond in odor, taste or fungosity to the rhaponticum of Dioscorides, with which apothecaries for centuries and the more recent Pandectarius have identified it. Others, including Leonicenus, identify the rhaponticum of Dioscorides with the present rhabarbarum but are also wrong.[10] At the shop in Venice with the sign of a bell, kept by an apothecary who spares no expense, Brasavola has seen an herb brought from the banks of the river Rha in Maeotis, which answers to Dioscorides' description. He cannot say if our rhubarb is found under another name in Dioscorides, but will say that the present reuponticum or rhaponticum closely resembles the centaurium maius of Dioscorides.[11] When the old apothecary is about to throw the herb in question away, Brasavola admits that it is useful in medicine and advises him to keep it.[12] Thus the sin of the medieval herbalists was linguistic rather than medical, and the implication is that healing herbs can be found outside the pages of Dioscorides.

That Brasavola was ready on occasion to swim with the tide of classical reaction in medicine is shown by his commentary and annotations on the *Aphorisms* of Hippocrates and Galen, pub-

[10] Mundella (1538), p. 509, held that rhubarb had the same properties as the Greek rhaponticum. Champier, *Castigationes*, 1532, fol. 36r, also stated that what the Greeks called rhaponticum, the Arabs call rheubarbarum or rhabarbarum, and that it is so known to present apothecaries and to medici iuniores.

[11] Symphorien Champier had already so identified it: *Castigationes*, 1532, fol. 35r.

[12] *Examen* (1537), pp. 4-11. On Dec. 3, 1514, Aleander spent one franc, nineteen sous for "aromas and four ounces of rheubarbarum" at Reims: Henri Omont, "Journal autobiographique du Cardinal Jérôme Aleander," *Notices et Extraits* 35 (1897).

lished at Basel in 1542. In it he discarded the previous medieval commentaries of James of Forlì, Hugh of Siena, Sermoneta and others as too scholastic, barbarous and sophistical, as of more hindrance than help in expressing the truth. He claimed to be the first Latin to approach the task from good authors and transcribed the greater part of the Greek commentator, Philotheus.[13] There are numerous traces of the same narrow classical attitude in his earlier dialogue on simples. Sometimes this prejudice in favor of classical writers is misplaced, as when Brasavola wonders that apothecaries today use only one kind of camomilla out of three species described by Macer, the other two being eranthemum and chrysanthemum, both medicinal.[14] In this passage he apparently thinks of Macer on herbs as the classical poet, whereas the true author was Odo of Meung or some other medieval writer. On the other hand, he was aware that the *Secrets* of Galen was a supposititious work.[15] He also had to admit that some of the assertions of antiquity were fabulous, like that attributed to Dioscorides that, if anyone blinded the eyes of young swallows without breaking the nerve, the parent birds would cure their young with the herb chelidonia, which many professed to have seen in their nests. As a boy Brasavola tested this belief. The next day he found the five young swallows indeed cured but no such herb in their nest.[16] He also stigmatized as fabulous some of the assertions of Solinus, Strabo and Posidonius as to the Dead Sea,[17] and lamented that the story of the beaver's castrating itself when hunted could not be eradicated from men's minds.[18]

Brasavola made a rather unusual criticism of Arabic pharmacy. Expressing surprise that so few flowers were in use by the apothecaries, when an infinite number were efficacious medically, he accused the Arabs of having curtailed materia medica.[19] It has been more usual to complain that they overloaded medicine with superstitious detail. On the other hand, he frequently ac-

[13] Gesner (1545), fol. 62r-v.
[14] *Examen* (1537), p. 14.
[15] *Ibid.*, p. 326.
[16] *Ibid.*, p. 87.
[17] *Ibid.*, p. 453.
[18] *Ibid.*, p. 506.
[19] *Ibid.*, p. 45.

knowledged, as even Champier had once or twice, that pharmacy was indebted to them for new simples, such as nux methel, nux Indica and nux vomica.[20] He also came to the defense of Mesue, marveling that a certain worthy man should censure Mesue's statement that lapis lazuli draws out melancholy, because this was not mentioned in Greek writers, as if nothing new could be found which had not previously been noted by the Greeks.[21] We have heard Champier similarly admit that new uses had been found for simples known to the Greeks. In another passage Brasavola asserted that the Arabs were not to be rashly censured, and that sometimes we must learn from them. None of the Greeks noted the odor of asphalt, while Avicenna did.[22] Camphor was unknown to Dioscorides, Pliny, Galen, and Paul of Aegina. It was first mentioned by the Arabs or possibly by Aetius.[23] The Greeks had no special name for gum Arabic.[24] Brasavola is certain that camphor is the gum of a tree, whereas Symphorien Champier had been able only to exclaim, "See how many difficulties and indeed inexplicable are encountered by the younger physicians who follow the teaching of the Arabs as to camphor."[25] On the other hand, Champier had identified the Tragacantha of Dioscorides with gum Arabic.[26]

Guillaume Dupuis, a physician from Blangy-sur-Ternoise who became a professor and citizen of Grenoble, was another who came to the defense of Mesue against Manard and Fuchs as to use of aloes and rhubarb.[27] He further asserted that a good part of recent physicians had overwhelmed medicine with innumerable errors, basing their judgment not on reason but witnesses, as if there were no art, no method handed down teaching physi-

[20] *Ibid.*, pp. 219, 231.
[21] *Ibid.*, p. 429.
[22] *Ibid.*, p. 457.
[23] *Ibid.*, p. 363.
[24] *Ibid.*, pp. 382-83.
[25] *Castigationes*, 1532, cap. 40, De Camphora. Champier recognized, however, that the ancient Greeks did not know camphor.
[26] *Ibid.*, cap. 55, fol. 74v.
[27] Guilhelmus Puteanus Blangiacus medicus civis Gratianopolis, *Defensio Ioannis Mesue medici aloen aperire ora venarum aliaque similia non pauca dicenda adversum Ioan. Manardum et Leonardum Fuchsium aliosque neotericos multos medicos ad simplicium medicamentorum facultates noscendas non parum utilis*, Lugduni apud Germanum Rose, 1537, 8vo: BM 778.a.1.(1.).

cians to know the qualities and properties of medicinal simples.[28] Dupuis followed this up by a work on medicaments printed at Lyons in 1552 and again in 1554 with a different title, *De occultis pharmacorum purgantium facultatibus,* and even a century later at Lyons in 1656.

Brasavola was, however, critical of past Latin translators from the Arabic. He complained that the translator of Serapion had rendered *zeg* as vitriolum, and been followed in this by Pandectarius and others, whereas *zeg* is clearly vitriolum romanum and the misy of Galen, while ordinary vitriolum is shoeblacking or the chalcanthum of the ancients. Brasavola further objected that chalcitis and chalcanthum had been confused, though Galen stated that chalcanthum became chalcitis after a long time.[29] On this Mundella commented that since chalcanthum and chalcitis had the same properties and qualities, he could not see that it made much difference if one was employed instead of the other.[30] Indeed, Brasavola himself went on to say that *zeg* in Arabic meant the same as atramentum or ink among recent writers, and that therefore the translator of Avicenna so rendered it. Brasavola then proceeds to distinguish between writing ink and printing ink.[31]

The name Pandectarius presumably refers to Brasavola's fellow Mantuan of the early fourteenth century, Matthaeus Silvaticus, author of a *Book of Pandects of Medicine* (*Liber pandectarum medicinae*) addressed to Robert, king of Sicily, It is less strange that Brasavola should occasionally criticize this medieval Latin work of two centuries ago than that it should have still been generally recognized as a standard pharmacopeia. There had been at least ten incunabula editions of it by different editors—Angelo Cato, Matthaeus Moretus and George de Ferrariis. There were further editions in 1511, 1512, 1526, 1534 and 1541, but its popularity seems to have waned after the appearance of Brasavola's *Examen.*

Brasavola was even more critical of Albertus Magnus. He

[28] Gesner (1545), 293v-294r.

[29] *Examen* (1537), pp. 466, 469.

[30] Mundella, *Annotationes,* Basel, 1538, p. 641. In this edition and that of 1543 they follow his *Epistolae medicinales.*

[31] *Examen* (1537), pp. 469-72.

accused him of ascribing fabulous powers to the magnet in love charms. Albert said that the stone borax was found in the heads of toads, and subsequent writers repeated this. But when Brasavola dissected a toad's head, he found only a blackish stone or rather bone. When the old apothecary remarked that approved physicians never employed snake fat, Brasavola replied that only the fat of the viper was esteemed by standard authors with the exception of Albertus Magnus, "whom, however, I would not dare nor do I wish to number among approved medical authors."[32] But Brasavola had seen pharmacists at Bologna who used indiscriminately any serpent except earthworms and worms in boys. Such criticisms of Albertus would be more convincing, if Brasavola did not seem to believe that nails are drawn out of ships by the magnet, although he denies that there are whole mountains of it, and if he did not accept Pliny's story of dragon's blood being the by-product of the death struggle between the dragon and the elephant, the serpent sucking out all the elephant's blood from its ear, so that it dies and falling crushes the dragon to death. The latter's blood mixed with earth is then collected and formed into pastilles.[33]

In our fourth volume we have heard Leonicenus and Collenucius dispute whether cinnabar was really the blood of the dragon. Champier in 1532 followed Leonicenus in denying this. Brasavola had more difficulty with the matter which he argued as follows. The dragon's blood or cinnabar now sold by apothecaries is neither the real blood of the dragon nor what Serapion called dragon's blood and which was identical with Dioscorides' fourth species of the herb sideritis, which rustics call millefolium. Rather it is an adulteration from pseudo bolum armenum and earth or the tear or gum of a tree, whose name Brasavola does not know and which he implies was unknown to the ancients. To either the tear or the gum he prefers the fourth species of sideritis. Those who use minium for cinnabar employ poison. Pliny identified cinnabar with dragon's blood but Dioscorides distinguished between them.[34] Returning to minium in

[32] *Ibid.*, pp. 442, 481, 503.
[33] *Ibid.*, pp. 442, 360, 432.
[34] *Ibid.*, pp. 361-62. Champier, *Castigationes*, cap. 31, pointed out that

a later passage,[35] Brasavola again refuses to identify it with the cinnabar of the ancients. He has seen it adulterated at Venice. Nor is cinaprium cinnabar, since it is made artificially at Venice from sulphur and quicksilver, whereas Pliny assures us that cinnabar is the blood of the dragon drawn from the elephant. Even in Pliny's time, however, some medical men identified minium with cinnabar. When the old apothecary complains that he still does not know what cinnabar was, Brasavola admits that authors who classify it as a metal speak of it as a thing unknown, and that he suspects that it is the drop or tear of a tree[36] which apothecaries sell as dragon's blood, which was first brought to Venice not long since, and which is used by painters as well as by physicians. "Pliny treats of the blood of the dragon in an uncertain manner, whereas this variety we know and have tested experimentally." This about-face from his previous acceptance of classical tradition to reliance on modern practice is a leading feature of Brasavola's book.

Brasavola did not limit his criticism to medieval writers but had occasion a number of times to disagree with his own teachers, Leonicenus[37] and Manard,[38] both extreme exponents of classicism, and to uphold Avicenna and Mesue, or his "own senses and the words of the ancients"[39] against them. But he agreed with Leonicenus against Politian in the matter of cisthon and cisson, and also cited a correction of Pliny by Leonicenus with approval.[40] Mundella sometimes defended Leonicenus against Brasavola,[41] or Manard against both Mesue and Brasavola,[42] but he sometimes took the opposite side[43] and

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Dioscorides had equally failed to identify either with his fourth variety of sideritis, although "almost all physicians in our age, following the error of Avicenna and Serapion" identify this with dragon's blood.

[35] *Ibid.*, pp. 431-32.

[36] Valerius Cordus, *Historia stirpium*, 1561, IV, 89, fol. 207r, declared outright that "Cinnabar or, as it is still called today, Dragon's Blood, is the tear of a tree native to Africa and by no means the gore of elephants and dragons falling in fabulous fight." Cordus lived from 1515 to 1544.

[37] *Examen* (1537), pp. 267, 342, 461.

[38] *Ibid.*, pp. 18, 24-25, 68, 307.

[39] *Examen* (1536), fol. 7r, item 33.

[40] *Examen* (1537), pp. 349, 472.

[41] Mundella (1538), p. 509.

[42] *Ibid.*, pp. 518, 528, 532.

[43] *Ibid.*, pp. 514, 527.

he was more inclined to question Pliny's statements than Brasavola was.[44]

As we have already seen, Brasavola acknowledged that there were simples in use today which were unknown to the ancients.[45] In part these were new flora revealed by the voyages of the Portuguese and Spaniards. The Greeks knew nothing of the spice, mace; Serapion, Isaac and Avicenna were better informed, while the Portuguese had found forests of it.[46] Those who identified sandal wood with the ancient aspalathus were much deceived. Sandal wood was first noted by the Arabs, while the Portuguese had found it in abundance at Calcutta.[47] The recent voyages had also disproved some fabulous assertions of the past, such as that of Pandectarius that no one had ever seen the habitat of lignum aloes, and that broken branches of it were washed down by rivers from the terrestrial paradise. The Portuguese had found forests of it in Sumatra, but the best variety was still shipped to oriental potentates exclusively.[48] On the other hand, Brasavola contended that there was no cinnamon to be had now such as Galen has described.[49] Similarly Champier, who apparently was not much impressed by the flora of the New World and the Far East, affirmed that as yet he had heard no one suggest that what the Portuguese fleet brought from India was true cinnamon.[50] Another much mooted point was whether cane-sugar had been known to the ancients. Brasavola admitted that it was unknown to Galen.[51]

Mundella was impressed by the attention given by Brasavola

[44] *Ibid.*, p. 619.

[45] *Examen* (1537), p. 170.

[46] *Ibid.*, pp. 319-22.

[47] *Ibid.*, pp. 325-26. No one seems to have known what aspalathus was. Champier, *Castigationes*, 1532, fol. 60v, notes that Nicolaus erred in substituting coral for it in theriac. Pièrre Belon, however, *Les observations de plusieurs singularitez*, 1553, fol. 163r, depicts a branch of aspalathus.

[48] *Ibid.*, pp. 323-24. Champier, *Castigationes*, 1532, cap. 37, held that lignum aloes "seldom reaches us," and that he had only once seen the genuine, in the pharmacy of Renatus Villaterius at Lyons.

[49] *Ibid.*, pp. 305-8.

[50] *Castigationes*, cap. 5, fol. 21v. For a like slighting reference to the acacia brought by the Portuguese fleet see cap. 30, fol. 46r.

[51] Champier, cap. 53, fol. 68r, maintained the thesis, "Saccharum antiquorum a sale Indo nihil differt, a zuccharo tamen nostro diversum est."

to herbs and other simples unknown to the ancients and expressed a desire to learn why he took such delight in more recent or only just discovered medicaments.[52] In a letter written from Brescia on August 1, 1538, Mundella recognized that the Arabs had discovered many medicaments unknown to Galen, for which we should be eternally grateful to them. But they would have done still better, had they not wandered in many respects away from the truth and the unimpeachable methods of Galen.[53] Like most men of his time, Mundella was further convinced that many things had been most diligently treated "by our ancestors," the ancients, of which the memory was now utterly lost.[54]

That parts of animals were not extensively employed in the sixteenth century is indicated by the statement that of the fox only the lung is used and of the beaver only the testicles.[55] Burnt deer horn should be in every apothecary shop, but at Venice instead of the bone from the heart of the stag they sell some bone from domestic cattle. Indeed, there is only a cartilage, not a bone, in the hearts of deer, as Brasavola had found on dissecting two.[56] When an executed criminal is dissected, some of his fat should be preserved for pharmaceutical purposes. For, although Benedetti and Euricius Cordus opposed the use of human parts in medicine, Brasavola argues in favor of it.[57] He would, in fact, seem to have been unfeeling towards animal suffering, since he recounts with relish how he killed a neighbor's dog which ate his chickens by feeding it a little scammony each day and so

[52] Mundella, *Annotationes,* 1538, p. 521; 1543, p. 188.

[53] Mundella, *Epistolae medicinales,* Basel, 1543, p. 27.

[54] *Ibid.,* p. 19.

[55] *Examen* (1537), p. 505.

[56] *Ibid.,* pp. 415-16. According to Champier, *Castigationes,* 1532, cap. 36, Platearius had long since described it as a cartilage, not a bone. Champier held that most of those sold by apothecaries came from the hearts of goats or cows rather than deer, "for more such cartilages are sold by a single pharmacy in Lyons in a month than deer die in all France."

Aleander on August 12, 1525, having a fever, "swallowed a powder of bone from the heart of a stag" and had an "intolerable stomach ache" in consequence with vomiting and sweat but thought the fever routed or at least mitigated. Two days later, however, he records, "fever with stomach ache." H. Omont, *Notices et Extraits,* 35 (1897), p. 47. A month later, Aleander became convinced that he had syphilis and drank a decoction of guaiacum from September 28 to November 29, when he changed to coriander water.

[57] *Examen* (1537), p. 502.

causing it to die of dysentery.[58] Mundella, however, agreed with Leonhard Fuchs that it was better to use bitumen or petroleum in prescriptions than to employ "abominable and detestable mumia,"[59] which Brasavola had defined as the remains of an embalmed corpse.[60]

Brasavola still included gems in the pharmacopeia but inveighed against the ascription of magical powers to them. As we have seen, he chided Albertus Magnus for recommending the use of the magnet in love philters.[61] Regarding the eagle stone or aetites he exclaimed, "O how many superstitious and infinite vanities and almost childish ravings are made in the case of this stone!" It was supposed to detect thefts, predict the future, reveal adultery, and render one incapable of eating even the choicest dainties.[62] Yet he urged the old apothecary to buy whole pearls, since when pulverized they lost their potency and could easily be adulterated. But the distinction sometimes drawn between perforated and unperforated pearls he thought a recent invention to excite popular admiration which was unsanctioned by any Greek or Arabic author and without real significance.[63] Coral was most acceptable and deservedly ranked among gems. The red variety was to be preferred and employed as an amulet about boys' necks and hands to protect them from fascination, atrabile, epilepsy and apoplexy. It was now high-priced because women used it for ornament. Brasavola condemned the apothecaries for selling a scaly and stony variety which had no virtue. They should send for the right kind to Genoa, Sicily, Naples and the French Mediterranean coast rather than to Venice.[64] Brasavola branded as fabulous the belief in a stone congealed from the urine of lynxes. Count Niccolò Tasso owned two lynxes, but the earth on which they urinated never hardened. The apothecary is therefore advised not to handle the stone which is commonly sold as lyncurium and not to keep the urine of lynxes

[58] *Ibid.*, p. 358.
[59] *Annotationes*, 1538, p. 639.
[60] *Examen* (1537), pp. 453-55, 459. He had further identified it with bitumen iudaicum.
[61] *Examen* (1537), p. 442.
[62] *Ibid.*, p. 443.
[63] *Ibid.*, p. 436.
[64] *Ibid.*, pp. 436-38.

either, since it is useful for very few things.[65] Most of the sapphires and emeralds offered for sale by apothecaries are spurious. The old apothecary is advised to throw away the small black sapphires in his shop, since they are not genuine stones, and instead to purchase from jewelers at Venice fragments of true sapphires left over in cutting them. His emeralds are pronounced glass or marble. In some shops green jasper is sold as emerald. This does the sick little harm, since it has almost equal medical potency, especially the kind which is brought from India. Sardonyx, on the other hand, is rarely of use, and Brasavola thinks vain the properties universally attributed to it by authors.[66]

Mundella also discussed the medicinal properties of gems at some length but in his letters rather than the *Annotations* on the *Examen* of Brasavola. Indeed, the first of his medicinal epistles[67] opens with mention of the emerald, "noblest of gems." The ancients said nothing of its use to check fevers, but about eight years ago—Mundella's letter is dated in 1538—men began to praise it to the skies as a remedy for putrid fevers. Mundella sees no support for this belief in the gem's manifest qualities, which he takes to be cold, dry, earthy and hard. He refuses to accept an astrological explanation, since Galen to his knowledge never referred the cause of the action of medicines to the force of the stars, although he did admit occult virtue. But the green jasper of Galen should not be confused with the emerald. Mundella goes on to question the practice of reducing expensive gems like the emerald to a powder for pharmaceutical purposes. The way is thus opened to adulteration, while the stone, especially in so far as its occult virtue is concerned, is apt to exert a more beneficial effect if worn whole as an amulet about the neck or held in the mouth, as Avicenna suggests in the case of the gem hyacinth. Such external suspension will also, in Mundella's opinion, have a more permanent effect than if the gem is passed

[65] *Ibid.*, pp. 440-41.
[66] *Ibid.*, pp. 446-49.
[67] *Aloisii Mundellae . . . Epistolae medicinales,* Basileae apud Mich. Isingrinium, 1543, pp. 1-33. Mundella further discussed the emerald in a letter to Fracastoro: *ibid.*, pp. 40-46.

through the alimentary canal once or twice or thrice. He also doubts whether even the widespread custom of giving powdered pearls or flour of gold and silver to help the heart and spirits is efficacious. So far as the manifest qualities of silver and gold are concerned, those metals should rather produce sadness and lesion. He further wonders why Manard prefers pearls and coral as cordials to garnets, which are more easily prepared and less expensive. The arguments of Mundella, including a number which I have not detailed, such as that there is danger of poisoning from pulverizing the gems in a mortar with a pestle of copper, were all repeated by Johannes Baptista Silvaticus of Milan in a treatise printed at Bergamo in 1605 on the unicorn, bezoar stone, emerald and pearls, and their use or abuse in pestilential fevers.[68]

In another letter Mundella inquires why his correspondent made so bold as to prescribe three grains of the stone achates to a female patient. On what authorities or experiments did he rely? Mundella says that achates is not the same as aetites or gagates but is rather, as Ermolao held in his *Castigationes Plinii,* to be identified with sardonyx. He warns that, except in the case of certain medicaments which have been specified by the authorities, occult forces which come from the whole substance do not operate promiscuously and indifferently in every disease but are good, one for this particular disease, and another for another.[69]

Of salts, metals and other chemical ingredients of the pharmacopeia Brasavola has considerable to say. He names four varieties of alum found in apothecary shops: alumen rochae, alumen zucharinum, alumen plumae and alumen sciolae, found in gypsum mines. He states that alum comes from German mines and says nothing of the papal monopoly. Alumen catinae is used to purify glass and is made from an herb which the Arabs call *cali.* When this herb is dried and burned, the vapor yields sal alkali

[68] *De unicornu lapide bezaar smaragdo et margaritis eorumque in febribus pestilen. usu tractatio Io. Baptista Silvatico medico . . . authore,* Bergomi 1605 typis Comini Venturae cum superiorum auctoritate. Copy used: BM 546.i.12.

[69] Mundella (1543), Ep. 4, pp. 47-49.

and the ash hardens into alumen catinum. Alumen zucharinum is likewise an artificial preparation from liquid alum, rose water and white of egg. Women use it to whiten and purify their faces. These two varieties were not mentioned by the ancients, while alumen plumae was called by them scissile.[70]

Sal gemmae, so called because it shines like a gem, is rarely found in large masses. Sal armoniacus is not named armeniacus from Armenia, as Pandectarius says, but ammoniacus from the oracle of Ammon, where it is found under the sand. Sal nitrum or saltpeter is not the nitrum of the ancients, as Mundella agrees. Brasavola deplores its destructive use in gunpowder. Sal nephthicus the old apothecary does not have, and Brasavola assures him that he does not need it.[71]

Recent chemists have applied the name arsenic to three substances: auripigmentum, risigalum and what we commonly call arsenic. They call auripigmentum yellow arsenic; sandaracha, red arsenic; common arsenic, white arsenic. They are deceived in thinking that the last is not a mineral but manufactured from auripigment, whereas it is dug from mines. Brasavola also expresses astonishment that Agricola denies that sandaracha smells of sulphur, since when rubbed in one's hand it emits an unmistakable sulphuric odor.[72]

Star of Earth was a name applied to talc and also to the herb lunaria which opened at night and so reflected the moonbeams that it seemed a shining star. When the people of the locality saw it, they took to their heels, thinking that it was the devil. "With this they prepare sorcery, with this they provoke demons, with this the chemists render their quicksilver fixed and stable." Some persons, especially alchemists, search for a blue or green or yellow talc, and so, "seeking what cannot be found, they wear out their lifetime in false nonsense."[73]

Silver sublimate was unknown to the ancients. Albucasis tells how to make it of chalcanthum, quicksilver and vinegar, to which sal armoniacum is now added. The apothecary can buy it

[70] *Examen* (1537), pp. 459-62.
[71] *Ibid.*, pp. 486-89; Mundella (1538), 644-45.
[72] *Examen* (1537), pp. 390-91.
[73] *Ibid.*, p. 484.

at Venice or make it himself. But beware of the fumes, by which some have been killed, others mutilated, and others afflicted with apoplexy. Brasavola wishes that this poison had never come to light, since it has more disadvantages than benefits. No simple is so poisonous. It kills in less than a half hour, burning the vitals especially those about the heart like fire. Once he touched some with the tip of his tongue to identify its taste. His tongue swelled so that he had to resort to extreme refrigerants. Women employ it to whiten their skin but at great cost, since the teeth decay, the breath takes on a bad odor, the eyes cloud, the skin wrinkles, and they are seized by apoplexy and rush to a sudden death. It was formerly used for syphilis, but mercury ointment is now preferred. A decoction of silver sublimate in moderate quantity cures scab in three days, unless it is of the noxious variety.[74]

The medical use of gold was very rare among the ancients. Brasavola is surprised at physicians who prescribe for the sick capons cooked with gold coins. He would class gold as injurious like other metals, since it is nothing but condensed pure mercury receiving the purest part of sulphur. Mercury is used for syphilis, but whether it is hot or cold is still disputed. Rascally barbers try to cure everything with it but kill more than they can cure.[75]

We have seen that Brasavola, while retaining much of the pro-classical prejudice of his time and something of the tendency to disparage medieval writers, is inclined to break away from a primarily linguistic interest in nomenclature, from the attitude that everything worth while can be found in Dioscorides and Galen, from the extreme classical reactionaryism of Leonicenus and Manard. He recognizes that some herbs which have wrongly been given ancient names none the less have pharmaceutical value, that many new medicinal simples unknown to the ancients have been introduced by the Arabs and more recently by the Portuguese and Spaniards. He has not succeeded in shaking himself free from all the traditional lore and superstition of the

[74] *Ibid.*, pp. 430-31.

[75] *Ibid.*, pp. 416-22.

past, but he has made a brave and intelligent effort in that direction. He goes botanizing to observe the simples in their native habitats and he tests their reputed effects experimentally. His work was in sharp contrast with the usual pharmacopeia. That of Johann Kuefner, a physician of Salzburg, for instance, printed at Ingolstadt in 1542, was compiled from Platearius, the *Antidotarium Nicolai,* the *Grabadin* of Mesue, John of St. Amand, Copho, Jacobus de Partibus, Christopher de Honestis, and from more recent writers such as the authors of the *Luminarium,* Hieronymus Brunschwig, Manard, Leonardus Legius, Paul Suardus and Lorenz Fries.[76]

Experience was for Brasavola "mistress of all things,"[77] in which he put more trust than in the authority of either Greeks or Arabs. Manard had asserted that senna strengthened the stomach because it was bitter, but experience showed the contrary. There was no physician in Ferrara or elsewhere but had found six hundred times, "and I experience it daily," that not everything bitter strengthened the stomach. Manard too, however, had affirmed that experience supported his contention.

Symphorien Champier had already said that senna, a noble medicine celebrated among Arabic and recent writers, was unknown to the ancients.[78] Brasavola also declares it unknown to the ancients and mentioned among new medicines by Averroes, although Manard and others had tried to identify it with the empetron of Dioscorides and with other herbs. Brasavola in this connection goes on to assert that Dioscorides, Theophrastus and Pliny did not describe a hundredth part of the herbs in the whole world. We keep learning of new ones, and the medical art keeps growing. Brasavola has no sympathy with those who despise guaiacum because it is not recommended by ancient authorities. How could they recommend it, when the very island where it grows was undiscovered forty years ago?[79]

The impression made by Brasavola's *Examen* is attested not

[76] Ioannes Kuefnerus Trochoreus, *Pharmacopoliterion:* described by Gesner (1545), fol. 429v. A copy of it is BM 547.d.1.(1.). Legius was a physician of Pavia who published medical works in 1520, 1522 and 1523.

[77] *Examen* (1536), fol. 15v, item 78.

[78] *Castigationes* (1532), cap. 49, fols. 63v-64r.

[79] *Examen* (1536), fols. 14v-15r, items 74-78: in the Lyons, 1537, edition, p. 65 *et seq.*

only by the other editions of it which followed[80] and by Mundella's *Annotations* upon it, but by the rapid appearance of a series of similar dialogues between Brasavola and the old apothecary upon every variety of compound medicine offered for sale in the drugstores of Ferrara: syrups, pills, electuaries, powders, cathartics, trochees, unguents, plasters and collyria.[81] Tract after tract on these themes poured from his pen. The herbalist who had been only a lay figure in the first *Examen* dropped out entirely in the others, which further showed more of a tendency to multiply recipes from past authorities than to note new discoveries or personal experience and testing. None of these sequels approached anywhere near to the original *Examen* either in freshness and compactness of treatment or in scientific content.

There are a number of similarities between the *Castigationes* of Symphorien Champier and the *Examen* of Brasavola. I have made a detailed comparison of the two works in an effort to discover whether Brasavola was influenced by the slightly earlier *Castigationes,* but am inclined to doubt if he had even seen it. His view is often divergent, he omits points included in the much briefer work of Champier—the *Examen* is about ten times as long as the *Castigationes*—and includes more which it did not. The purpose and scope of the two works is considerably different, although they overlap on many points. Brasavola seems easily the more forceful writer and original investigator. Sometimes he has later information than Champier and shows that past errors are being detected and that knowledge of materia medica is making progress. For example, while Champier complains that "our modern physicians" make the mistake of using resin of the larch tree for terebinth,[82] Brasavola says that true terebinth is now imported from Cyprus to Venice, cooked in round lumps so that it may be shipped easier.[83]

[80] Besides the editions mentioned above, there were others at Venice, 1540 and Lyons, 1544, 1546 and 1555.

[81] For the full titles, dates and editions consult the printed catalogues of the British Museum and Bibliothèque Nationale.

[82] *Castigationes* (1532), cap. 15, fol. 30v: ". . . recentiores ac neoterici nostri medici communiter errant ponentes resinam laricis pro terebinthina."

[83] *Examen* (1536), item 404. "Ex Cipro Venetias affertur nunc vera terebinthina. Alias laricina pro terebinthina utebantur. Nunc error detectus est et veram terebinthinam portant sed

The *Examen* of Brasavola was also anteceded by a few years by another much slighter and less influential work, the *Annotations* upon the first four books of Dioscorides on herbs by Cornelius Petrus, a physician and citizen of Leyden. These were dated from Leyden on December 1, 1532, and printed at Antwerp in January, 1533.[84] He remarks in his preface that past descriptions of herbs are often very incorrect and even senseless, that there is a great variety of opinions, and that simples are neglected by many present physicians and apothecaries. The notes of Petrus consist mainly in giving the different modern names of the simples, but he also notices herbs of which there is no mention in Dioscorides.[85] With his brief comments on Dioscorides Petrus printed *Experiments and Antidotes* by himself and by Ioannes Spiringus, a physician of the university of Louvain, and a third tract on marvelous occult things in nature. Remarking that hypericon perforata is also called demon-chaser (*fuga demonis*), Petrus adds that theologians hold that spirits are not subject to bodies. But he cites Tobias against them and says that he has often proved that this herb annuls witchcraft and manifests all possession by demons.[86] For stupor the remedy of flogging with nettles was advised by a certain chemist who was overcome by quicksilver fumes.[87] For nosebleed dried human blood is recommended or the mere suspension of red coral about the neck or the dung of swine. Spiringus preferred goat dung for this purpose, but horse manure will do, if neither of the others is obtainable.[88] Among remedies for toothache Petrus suggests crusts of toast applied to the gums and sprinkled with vinegar.[89] Singultus is removed if the fingers are thrust into the

ut commodius vehatur eam coquunt et in massas rotundas veluti placentas congerunt."

[84] *Annotatiunculae aliquot Cornelii Petri Leydenensis physici in quatuor libros Dioscoridis Anazarbei. Experimenta et Antidota contra varios morbos. De rebus occultis in natura mirandis et alia quaedam lectu digna MDXXXIII mense Maio.* Copy used: BN 8° Te[138].51. At fol. (H vii) recto, "Ioan. Grapheus excudebat anno MDXXXIII mense Ianua. Antwerpiae."

[85] *Ibid.*, fols. D iii recto—(Dvi) recto, De herbis quarum apud Dioscoridem nulla fit mentio.

[86] *Ibid.*, fol. C iii recto.

[87] *Ibid.*, fol. (D viii) verso.

[88] *Ibid.*, fol. E iii recto.

[89] *Idem.*

ears and moved about.[90] The miracles of nature and wonderful novelties include such assertions as that cows change color when transferred to new pastures, and that the heat of the sun extinguishes the heat of fire, as well as the usual tricks and secrets found in such collections. The remedies listed include the electuary of Arnald of Villanova called the Hand of God and the cure for pest which Leonard of Bertipaglia says was revealed by a demon.

Ruellius or Jean Ruelle of Soissons, the translator of Dioscorides, also published a work on the nature of plants in 1536, the same year that Brasavola's *Examen* first appeared in print.[91] In his preface to Francis I Ruellius explains that he had been led to undertake the work by finding Dioscorides, Theophrastus, Pliny and Galen so often in disagreement. This has impelled him to traverse vast solitudes, mountain ridges, inaccessible lakes, and perilous precipices. No less laborious has been his thumbing of authorities, or his inquiries of farmers, vintners and laborers in search of the French names for plants. He further represents the subject of which he treats as having lain untouched for many centuries, which suggests that he did not extend his inquiries as far as he might have in the direction of Albertus Magnus *De vegetabilibus et plantis* and other medieval writings. His work both in style and substance is couched largely in terms of the classical writers, with some allusion to "more recent Greeks" like Actuarius, and to vegetation of the New World. He has, however, no correct or first-hand information as to cinnamon. His book is dignified, bulky and includes a large number of plants. After a score of introductory chapters, in which are considered the parts of plants, their colors, taste and odors, nomenclature etc., he takes up particular plants, first exoteric ones, then trees in alphabetical order, then others. But in each chapter there seems to be no particular order or method observed. Weather presages and the influence of the stars come in,[92] and such asser-

[90] *Ibid.*, fol. F recto.

[91] Ioannes Ruellius, *De natura stirpium libri tres*, Paris, 1536, folio. Copy used: BM 453.f.1.

[92] *Ibid.*, pp. 616-23; lib. II, caps. 151-152.

tions are made as that the ant rests in the interlunar interval but works nights during the full of the moon.[93]

Other works on the use of herbs especially in pharmacy which followed close on the heels of Brasavola's book were Dorsten's *Botanicon,* printed at Frankfurt in 1540,[94] and a work by Remaclus Fusch on the nomenclature of all plants today in frequent use by pharmacists, which was printed at Paris in 1541 and at Venice in 1542.[95] Gesner accused Fusch of using Brasavola for names in other languages and of committing many errors in orthography and false interpretations.[96] Gesner felt, however, that in general a new era had dawned in pharmacy and that medieval or fifteenth century publications like the *Antidotarium* of Nicolaus or the *Lumen apothecariorum* of Quiricus de Augustis, of which there had been so many incunable editions, or the *Thesaurus aromatariorum* of Paulus Suardus, were barbarous and antiquated both in language and content, and inferior to the better among recent publications, such as that of Jacobus Sylvius.[97]

In 1553 Sébastien Colin, a Huguenot physician born in Fontenay in 1519, published at Tours under a pseudonym a violent attack upon "the abuses and deceits" of apothecaries.[98] He ac-

[93] *Ibid.*, p. 615.

[94] Theodericus Dorstenius, *Botanicon continens herbarum aliorumque simplicium quorum usus in medicinis est descriptiones et imagines ex praecipuis utriusque linguae authoribus cum corollario eorum quae a Neotericis observata usuque comprobata sunt.* Francof., Egenolphus, 1540, in fol. cited by Gesner (1545), fol. 608v. See F. W. E. Roth, "Theodor Dorsten, ein deutscher Botaniker, 1521-1548," *Archiv f. die Gesch. d. Naturwiss.,* II (1910), 141-45.

[95] *Nomenclaturae plantarum omnium quarum hodie apud pharmacopolas usus est magis frequens iuxta Graecorum Lat. Gall. Ital. Hisp. et Germanorum sententiam iam noviter collectae ordine literarum.* Paris, 1541; Venet., 1542. Ernst Weil, *Remaclus Fusch, Arzt, Botaniker und Pharmakolog,* Munich, 1928.

[96] Gesner (1545), fol. 581r-v. Despite this censure, Fusch's pharmaceutical publication continued. I have seen the following: Remaclus F. Lymburgenses, *Pharmacorum omnium quae in communi sunt practicantium usu Tabulae decem,* Parisiis apud Aegidium Gothinum sub insigni Spei iuxta Collegium Cameracense, 1569. A text accompanies the tables. Copy used: Berne N.208.

[97] Gesner (1545), fols. 540v, 576r.

[98] *Déclaration des abus et tromperies que font les apothecaires, fort utile à ung chascun studieux et curieux de sa santé, par M. Lisset Benancio,* Tours, G. Bourges, 1553. A new edition which I have used was published by Paul Dorveaux in 1901. Lisset Benancio is an anagram for Sébastien Colin.

cused them of "enormous abuses and horrible larcenies" and of overcharging for simple herbs. He asserted that there was no town or village that was not full of apothecaries and barbers who tried to play the physician and issued bad prescriptions without consulting a doctor of medicine or knowing Hippocrates and Galen. He advised patients not to send samples of their urine to apothecaries to show physicians. He accused the apothecaries of substituting other ingredients for those in a prescription which they did not have on hand, and of carrying on other occupations along with pharmacy. They adulterate the most expensive drugs and make such mistakes as considering sandaracha to be gum, whereas it is a red arsenic. Dorveaux has pointed out that Colin was not free from similar errors himself. He criticized physicians, surgeons and Arabists as well as apothecaries. He cites Manard and Fuchs, but the names of Brasavola and Leonicenus do not appear in his Index.

Pierre Braillier,[99] an apothecary of Lyons, in 1557 hit back against such criticism of apothecaries in a work in which he accused physicians and surgeons of various errors and cited Champier's *Mirror of Apothecaries*.[100] He charged even Galen, Hippocrates and Avicenna with mistakes and advised the physician not to rely on them so much "que tu n'en fisses quelque experience."[101] He had seen artisans in Lyons who had never studied medicine or surgery cure patients who had been given up by their physicians and surgeons.[102] He criticized physicians for the shortness of their calls upon the sick, attacked the use of distilled waters and of oils, contended that drink was beneficial in cases of fever, that old wine was not hotter than new, that mercury heated and did not chill, and that camphor was

[99] The catalogue of the Bibliothèque Nationale still represents this name as a pseudonym of Palissy, but Dorveaux, *op. cit.*, pp. xii, xxi, and A. F. Lièvre, *Histoire des protestants et des églises réformées du Poitou*, 1856-1860, III, 72-73, deny this and trace back the error to the 1777 edition of the works of Palissy.

[100] *Declaration des abus et ignorances des medecins . . . par Pierre Braillner marchand apotiquaire de Lyon*, A Lyon Par Michel Ioue. Dedication to a noble of Lyons "ce premier de Ianuier 1557." Copy used: BN T[25].4.

[101] *Ibid.*, p. 61.

[102] *Ibid.*, p. 102.

hot.[103] He questioned whether Grecian and Arabic medicines were beneficial for Frenchmen, and accused the physicians of preferring ignorant apothecaries who would not contradict them.[104]

Without going into further publications aroused by Braillier's reply[105] and as a mild corrective to such violent interchange of abuse we may note that Conrad Gesner in 1565 dedicated a discussion of bitumen and naphtha in very complimentary terms to Valerand Dovrez, an apothecary of Lyons hailing from Lille. He spoke of Dovrez' incomparable zeal and diligence in acquainting himself with every kind of medicinal simple in Germany, France, Italy and Istria, and of his enjoying the friendship of the most famous physicians of Lyons, Dalechamps and Bauhin.[106]

The book of Garcia da Orta on the medicinal simples of India, first published at Goa in Portuguese in 1563,[107] enjoyed the immense advantage of being written on the spot by an author who tells only what he himself has seen "or learned by indefatigable inquiry from others in India,"[108] where he had practiced medicine for more than thirty years. The standards which he attempted to set himself may be seen in the statements that "our

[103] *Ibid.*, pp. 24, 27, 41, 34, 66-67, 73-74, 76-78.

[104] *Ibid.*, pp. 94-95, 97.

[105] For these see Dorveaux, *op. cit.* I may, however, add John Securis, *A Detection and Querimonie of the daily enormities and abuses committed in physick*, London, 1566: Huntington Library Photostats, List 4, Item 114. Securis also issued annual astrological predictions between 1562 and 1573: see Hellmann (1924), p. 32.

[106] *De bitumine et cognatis ei Naphtha (id est, vulgi petroleo) Pissasphalto et Electro Corollarium.* This was printed with the tract of Goebelius, *De succino*. Copy used: BN S. 19908.

[107] *Coloquios dos simples e drogas he cousas medicinais da India,* Goa, 1563. There is a bibliographical study of the work by H. J. Paoli in *Archivio di storia della scienza* (now, *Archeion*), II (1921), 202-10.

I have used the English translation by Sir Clements Markham, *Colloquies on the Simples and Drugs of India by Garcia da Orta,* with an introduction and notes, London, 1913, 509 pp. Edition of 250 copies only. It is based on the standard edition in 2 vols. by the Conde de Ficalho, Lisbon, 1891, 1895.

The Latin epitome by Carolus Clusius which appeared at Antwerp in 1567, 1574, 1579, 1593, 1605, etc. was very different from the original, as was the Italian translation of Venice, 1582, and the French version of Lyons, 1619. Varnhagen's edition of Lisbon, 1872 was also imperfect.

[108] Markham's introduction, p. xii. Garcia knew little of northern India and says, p. 482, "We are very little conversant with things in the kingdom of Delhi."

knowledge is a very small part of what we are ignorant of," and "I have no hatred except for errors, and no love except for the truth."[109] He also possessed a good fund of common sense, as may be illustrated by his remark that "any distant and unknown country was called India by the ancients."[110] Moreover, "long distance makes long lies."[111] Such being the case, the romantic attitude of ancient and medieval writers towards India as a distant land of marvels is displaced in his pages by a more matter-of-fact and scientific viewpoint.

The colloquial form of Garcia da Orta's book is very likely patterned after the *Examen* of Brasavola, and he was probably also affected by its spirit and content, but he sometimes criticizes that author and goes several steps farther than he in questioning of classical authorities and approval of Arabic writers. He condemns the recent idolatry of Greek authors but confesses that "even I, when in Spain, did not dare to say anything against Galen or against the Greeks."[112] Or again he expostulates with his interlocutor, "Do not try to frighten me with Dioscorides or Galen, because I merely speak the truth and say what I know."[113] And again, "Does it not appear to you that Galen and Dioscorides may not have exhausted the subject?"[114] He shows that Dioscorides knew little of India or its products.[115] Mace, nutmeg, sandal-wood, cardamomo and many other things were unknown to the Greeks.[116] New things are being constantly found.[117] On the other hand, Garcia defends the Arabic writers against their recent critics.[118] He upholds Mesue concerning aloes against Manard[119] and asserts that "as regards India the Arabs are better authorities and err less than the Greeks."[120] This does not mean that he does not occasionally correct particular statements by them.[121] Concerning pepper, "all agree with one accord not

[109] Markham's translation, pp. 105, 148.
[110] *Ibid.*, p. 292.
[111] *Ibid.*, p. 89.
[112] *Ibid.*, p. 275.
[113] *Ibid.*, p. 60.
[114] *Ibid.*, pp. 170-71.
[115] *Ibid.*, pp. 403, 449.
[116] *Ibid.*, pp. 275, 397, 101, 105. Also tamarind, p. 424; anacardus, fifth colloquy.
[117] *Ibid.*, p. 275.
[118] *Ibid.*, pp. 13, 105-6, 113.
[119] *Ibid.*, p. 15.
[120] *Ibid.*, p. 436.
[121] *Ibid.*, p. 23, Averroes is corrected; p. 437, "Mesue told the best he knew and had heard but he is not altogether right." Serapion is often corrected. At pp. 81, 89 and 92, he and Avicenna

to tell the truth." Dioscorides may be pardoned, but modern writers like Brasavola might easily ascertain the truth if they took the trouble.[122] Garcia also criticizes the Latin translator, Gerard of Cremona, whom he calls an Andalusian who did not understand Avicenna's Arabic, and who should have left untranslated various names which he did not understand and wrongly identified.[123]

Garcia da Orta further offers considerable interesting information concerning the trade in drugs and spices, and Hindu medicine and customs. What he has to say concerning gems and poisons will be discussed in our chapters on those subjects. Somewhat similar works to that of da Orta were that of Monardes on medicinal simples from the New World and that of Acosta on spices and drugs from oriental India. Clusius translated both from the Spanish, reducing the latter, like the *Colloquies* of da Orta, to an epitome.

We have heard Brasavola contend that there was no cinnamon to be had today such as Galen had described. He realized, however, that it was unlikely that even the Roman emperors would have had access to any region unknown in the sixteenth century, when so much more of the earth's surface had been visited, and spices in particular had been brought to Europe in such quantities. He therefore concluded that cinnamon must have become extinct since Galen's time.[124] This was still the opinion of Scaliger and of Erastus in 1564, except that the latter held, since the places where the spices grow were much better known now than to the Romans, that cassia must be about the same as cinnamon.[125] Meanwhile in 1563 Garcia da Orta had pointed out that canella, the second inner bark or rind of the tree, was the same as Galen's cinnamon and as cassia. With the publication of the Latin epitome by Clusius in 1567 and subse-

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are corrected regarding camphor and calamum aromaticum.

[122] *Ibid.*, p. 369.

[123] *Ibid.*, pp. 41-42, 409.

[124] *Examen* (1537), pp. 305-8.

[125] Thomas Erastus, *Examen de simplicibus quae ad compositionem theriacae Andromachi requiruntur*, 1607, but dated at its close, December 21, 1564. Copy used: BM 1038.b.1.

quent editions,[126] this information became available in western Europe. Garcia further affirmed that Theophrastus and Brasavola were wrong concerning cinnamon, with regard to which "you can get more knowledge now from the Portuguese in one day than was known to the Romans after a hundred years." The ancient writers saw it only after "it had come from such a distance that they could not have had a correct notice of it." Its high price gave rise to "a thousand fables which Pliny and Herodotus repeat." Garcia regarded cinnamon as the only really edible spice and Ceylon as the sole home of the best cinnamon.[127]

The work of Garcia da Orta was freely copied as to cinnamon and other simples in the *Discursos de las cosas aromaticas* which Juan Fragoso, physician and surgeon to Philip II, published in 1572.[128] It comprised a book on spices in twelve chapters. It seems not to have been made available in Latin until 1600 when a translation by Israel Spachius, M.D., professor at Strasburg appeared.[129] Fragoso fancied that the vexed mystery of dragon's blood had been solved by a bush and fruit which had been brought to the king from the Canaries, and of which the flower resembled a dragon with long neck, open mouth, erect hair and long tail. From this bush or tree when cut there flowed a gum or tear which they call dragon's blood and which some feel certain is the true cinnabar of the ancients. It does not liquefy in wine or alcohol, as does the adulterated variety made of brazilwood and resin or some other gum.[130]

[126] *Aromatum et simplicium . . . apud Indos nascentium historia, Tertia editio,* Antwerp, 1579, I, 15, pp. 56-64.

[127] *Colloquies,* London, 1913, pp. 127-29, 119, 117, 131-32.

[128] Juan Fragoso, *Discursos de las cosas aromaticas arboles y frutales y de otras muchas medicinas simplices que se traen de la India Oriental,* Madrid, 1572, 8vo. Copy used: BM 546.c.12.

[129] *Aromatum fructuum et simplicium aliquot medicamentorum ex India utraque et Orientali et Occidentali in Europam delatorum quorum iam est usus plurimus historia brevis utilis et iucunda.* Conscripta primum Hispanice a Ioanne Fragoso Philippi II Hispan. regis medico et chirurgo. Nunc Latine edita opera ac studio Israelis Spachii M.D. et professoris Argentinensis cum notis marginalibus atque indice. Argentinae excudebat Iodocus Martinus anno MDC.

[130] *Ibid.,* III, 15, fol. 49r: "Unde constat antiquorum et multorum modernorum ignorantia qui numquam eo pervenerunt ut scirent quid esset sanguis draconis et quare ita diceretur."

Concerning amber Fragoso was still perplexed. Some identified it with the sperm of the whale, some with sea-foam, others—with whom he seemed inclined to agree—with bitumen from springs in the sea.[131] João de Barros called it the dung of birds; Symphorien Champier, the liver of a marine fish; and Garcia da Orta—who was right as usual, although Fragoso appears not to realize it—a fossil from the earth varying with different regions. It was highly esteemed in India, where the natives mixed it with their food as a medicament, and was now used in Europe as a cordial. It prevented epilepsy, if placed over the heart; checked paralysis, if the spine was anointed with it; and acted as a restorative, if one smelled of it.[132]

As to how much improvement there actually was in botanical knowledge we shall have something to say in a later chapter on the naturalists of the sixteenth century. Of pharmaceutical conditions at the end of that century we get a glimpse in a treatise of Silvaticus on theriac.[133] Through the century pharmacy had been fascinated by the problem whether theriac could still be prepared as Andromachus and Galen had prepared it for the Roman emperors.[134] Addressing the medical college of Milan in

[131] Valerius Cordus in his *Annotations on Dioscorides* had identified succinum, amber and camphor with bitumen. So had Severinus Goebelius, *De succino libri duo,* edited by Gesner in 1565. Cordus in another work, *De halosantho seu sperma ceti,* printed posthumously at Zurich in 1566 with a *Corollarium* by Gesner, had identified the halosanthos of the ancients with spermaceti. Gesner, after reviewing the opinions of other authors—Encelius, Leonhard Fuchs, Ianus Cornarius and Mattioli—expressed his own view that halosanthos was *flos salis,* as Pliny held, and that the sperm or fat of the whale had nothing in common with amber.

Pierre Braillier, *Declaration des abus et ignorances des medecins,* dedication dated from Lyons, Jan. 1, 1557, pp. 83-85, taunted physicians with not knowing what amber was and opined that it was an adulterated mixture passed off on Europeans by the Turks and Arabs.

Pierre Belon, *Les observations de plusieurs singularitez,* 1553, II, 72, fols. 134v-135r, held that yellow amber was not a mineral but the gum of a tree.

[132] Fragoso (1600), IV, 2, fols. 89r, 91r. Much of the passage seems to be copied from Clusius's Epitome of Garcia da Orta: see the third edition, Antwerp, 1579, I, 1, pp. 5-8.

[133] Jo. Bapt. Silvaticus, *De compositione et usu theriacae libri duo,* Heidelberg, 1597. Also with Erastus, *Examen de simplicibus,* 1607, which is the copy I have examined: BM 1038.-b.1. with the title, *Tractatus de compositione et usu theriacae Andromachi.*

[134] T. Erastus, *Examen de simplicibus quae ad compositionem theriacae Andromachi requiruntur,* 1607.

1596 Silvaticus says that they do well not to allow theriac and Mithridatic to be compounded in that city without their consent, since these historic compounds are very difficult to prepare. It is not only essential to mix them in the right proportions but all their ingredients must be exactly known. Silvaticus thereupon devotes 390 pages to the composition of theriac, distinguishing six orders of ingredients. He then adds 245 pages on its use. Judging from the thirty-five chapters of this second book, it was considered good for almost everything. As I have shown elsewhere, theriac was one of the few elaborate compound medicines which continued to be recommended by the enlightened writers of the French *Encyclopédie* in the eighteenth century.[135]

[135] Lynn Thorndike, "L'Encyclopédie and the History of Science," *Isis*, VI (1924), p. 385.

CHAPTER XXI

POISONS, FASCINATION, AND HYDROPHOBIA

Venenorum non esse ad arbitrium venefici certum terminum
—BACCI

Lorenz Beheim, who was prefect of artillery under pope Alexander VI, illustrates the interest in poisons at this time. Caesar Borgia consulted him on this subject as well as on technical and military matters and forged writings, while among the papers of Wilibald Pirckheimer, the noted Nürnberg patrician, is found a recipe for a slow poison in Beheim's handwriting with a conjuration of the devil.[1]

In view of the orgy of poisoning which has often been attributed to the Borgias and to Italians of the Renaissance period, it may surprise some that no work on poisons seems to have been printed until the third decade of the sixteenth century, when Ferdinand Ponzetti dedicated his work on poisons to Agostino Nifo, whom he called a faithful interpreter of the hidden things of nature. The treatise was first published in 1521 at Rome.[2] The author, originally a physician, became an apostolic secretary in 1499, bishop of Molfetta in 1517, cardinal of St. Pancras and bishop of Grosseto in 1522, and died in 1527. He had already printed a work on natural philosophy at Rome in 1515.[3] His treatise on poisons was reprinted in 1562 together with the much longer early fifteenth century work of Sante Ardoino.[4]

[1] E. Reicke, "Der Bamberger Kanonikus Lorenz Beheim (1457-1521), Pirckheimers Freund," *Forschungen z. Gesch. Bayerns*, XIV (1906), 16-17.

[2] *Libellus de venenis*, In aedibus J. Mazochii, Romae, 1521, fol.: BM 546.-i.9.

[3] *Tertia pars naturalis philosophiae* etc. Apud J. Mazochium, Romae, 1515, fol.: BM 536.1.6.

[4] *Ferdinandi Ponzetti tituli S. Pancratii Presbyteri Cardin. Melfitensis, De venenis libri tres ante annos xl editi nunc vero multo emendatiores quam antea typis excusi cum indice locupletissimo*, Basileae.

The work occupies pp. 515-573 of

Although Ponzetti represents his book as compiled from previous authors, he seldom mentions these by name, except for such ancients as Dioscorides, Hippocrates, Galen, Aristotle and a single reference to Avicenna. But he usually refers to "the Arabs" in a vague, general way, while medieval Latin writers on poisons are not cited individually. To call the work a mere compendium or compilation would not be quite fair, since the arrangement seems to some extent Ponzetti's own and he has added certain details from his own experience or knowledge. The first of the three books is largely given over to theoretical questions such as whether the elements are poisonous, whether it is expedient to posit occult virtues, whether a human being can be nourished on poison, whether poisons kill extrinsically, whether they have a determined period, and how the *complexio* resists them. In reply to the query whether poisons can take effect without contact, as in the case of the torpedo fish or the women in Libya with double pupils in their eyes who are said to kill men by their glance, he replies that there is always some subtle connection as there is in the influence of the stars upon inferiors, so that while things may act upon one another without tangential mathematical contact, they may not do so without some physical or astrological connection.[5] As for astrology, Ponzetti holds that the stars have less curative power over poisons than they exercise over other diseases.[6] In explaining why some poisons act only after a lapse of time, however, he states that astrologers think that Saturn and Mars are the significators of poisons, whose effects therefore follow the movement of their conjunctions and oppositions.[7]

Ponzetti has an interesting chapter on those snake charmers who call themselves of the household of St. Paul, but whom he regards as descendants of the Psylli and Marsi of antiquity. He describes unguents by which they protect their bodies. When

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the same volume with Sante Ardoino and although itself undated was presumably printed in the same year, 1562, in which the preface by Theodor Zwinger to the work of Ardoino is dated. I have used this edition of which I own a copy.

[5] *Ibid.*, I, 4.

[6] *Ibid.*, III, 1.

[7] *Ibid.*, III, 18.

they catch snakes, they hold them by the tail and spit on their heads, for human saliva has a property against snakes. Also, however, they feed the snakes on bran and remove their teeth by stuffing their mouths with bread. Before eating venom they eat tripe which retains the venom temporarily, then they swallow a lot of hot water mixed with oil and butter and vomit the tripe and poison with it. They say that they test the legitimacy of their children by putting an asp in the infants' hands. If the child is not bitten, they accept it as legitimate offspring; if it is, the husband accuses his wife of adultery. One of them swore to Ponzetti that when anyone reported that someone else had been snakebitten, they told him not to move, signed him in the name of the Father, Son and Holy Ghost, gave him a drink of water tempered with terra sigillata, and pronounced an incantation. He would straightway vomit, and thus the actual snakebitten person would be cured by absent treatment. But another member of the House of St. Paul told Ponzetti that this was a lie.[8]

Ponzetti recognizes that one must not be too credulous. He states that many things come to men's lips from hearsay and imagination which cannot be proved by experience or reason. He rejects as fabulous that the hydra has many heads and that when one is cut off seven grow in its place, or that the phoenix is regenerated from its ashes, or that the salamander lives in fire.[9] He accepts the basilisk but holds that it poisons by exhalations rather than mere glance. It has no hearing because its excessive heat disturbs the air which makes hearing possible.[10] He also accepts such remedies for poisons as the bezoar stone that is generated from the tears shed by stags; powdered emerald, which is of so great virtue that it strengthens our eyes but destroys those of the serpent tyrus and of the crocodile; and the fat of the same crocodile.[11]

Ponzetti was one of the authors utilized in a *Giftiger* printed at Frankfurt in 1567.[12] This volume also included extracts from

[8] *Ibid.*, II, 5.
[9] *Ibid.*, III, 12.
[10] *Ibid.*, III, 10.
[11] *Ibid.*, II, 11.
[12] Sudhoff, *Versuch einer Kritik der Echtheit der Paracelsischen Schriften*, I (1894), item 84.

Paracelsus, Cardan, Dioscorides, Gesner and the *Antidotus Saxonicus* of Ioannes Moibanus.

Antonio of Cartagena added a discussion of fascination to his volume, published at Alcalà in 1530, on the pest, signs of fevers, and critical days, because it was a topic very rarely discussed by medical men and seemed to him closely related to the themes of pest and poison.[13] He had already in a work on the eye proved to his own satisfaction contrary to the common opinion that vision was by extramission. He now asserts that, if this be not the case, fascination would be impossible. But he has seen in his time men who fascinated all that they looked upon, and other men whose mere breath cured persons who had been bitten by mad dogs.[14] He rejects, however, the belief of Avicenna that the mind can affect other bodies than its own. After discussing the views of Aquinas, Albertus Magnus and Gentile da Foligno, he adopts as the basis of fascination a combination of the celestial influence suggested by Albertus and a vitiating of the air by visual rays and spirits.[15] The spirits of the fascinator must have been poisoned by some celestial quality or by bad humors of his body. The celestial influence must also be favorable to the infection of the air by those spirits, and the person to be fascinated must be disposed to infection. So great is the latitude of the human *complexio* that it is not surprising that a man with an extreme constitution is poisonous to one of medium temperament. Such fascination acts naturally without being controlled by the will and is most potent in summertime. The persons most apt to receive this power from the stars are old melancholic or hot choleric temperaments, while children of a moist and tender con-

[13] Antonius Cartaginensis, *Liber de peste, de signis febrium, et de diebus criticis. Additus est etiam huic operi libellus eiusdem de fascinatione,* Compluti, 1530, double columned folio. Copy used: BM c.63.m.15, in which the treatise on fascination comes first, preceding that on the pest. The opening words, "Quia in hoc libro de peste egi . . ." indicate, however, that it was composed subsequently to the pest tract.

The British Museum also has a separate copy of the *Libellus de fascinatione* (541.g.3), but it appears to be merely that section of the above edition bound separately.

[14] *Ibid.*, fol. 11r, Tractatus primus inquirit an fascinatio possibilis est.

[15] *Ibid.*, caps. 2-6.

stitution are the most readily affected.[16] It is, however, often difficult to tell whether young children are fascinated or are suffering from soured milk. Hence Antonio gives cures for both and adds that remedies for epileptic children are equally efficacious for the fascinated. Galen, in Antonio's opinion, did not deny the existence of fascination but only opposed the employment of incantations and the like to cure it. In our Spain, Antonio adds, there are oldwives who serve demons rather than their Creator and essay to cure fascinated children by means of figures and characters, whereas they should receive the same sort of medical treatment as the diseased and poisoned.[17] Antonio of Cartagena was a professor of medicine at Alcalà who later went to France and became royal physician to Francis I.

In his remarkable work on the simples and drugs of India Garcia da Orta set limits to the extent of his credulity as to poisons. He refused to believe that the same plant could have both a poisonous root and a fruit which was an antidote therefor, or that the bark on the west side of a tree was an antidote to the poisonous rind on its east side. He was ready to agree, however, that the same plant might have a root which was cold in quality, and leaves and fruit that were hot.[18] He rather clung to the belief that the horn of the unicorn was good against poison, but admitted that there was no unicorn in India, that it was probably the same as a rhinoceros—which too he had never seen—and that much that was said concerning it was uncertain and not worth repeating.[19] He said that men had learned of the virtue of a certain herb—Páo de Cobra—against the venom of the cobra from observing the mongoose anoint itself with it before fighting that snake.[20] He still accepted the bezoar stone, found in the paunch of he-goats in Persia and Khorasan, as an antidote against poison and melancholy, and also recommended against

[16] *Ibid.*, cap. 7, fol. 5r-v.

[17] *Ibid.*, fols. 6r-8r, Tractatus secundus de notis fascinationis et cura.

[18] *Colloquies on the Simples and Drugs of India by Garcia da Orta*, translated with an introduction and notes by Sir Clements Markham, London, 1913, pp. 483-84.

[19] *Ibid.*, pp. 270-71.

[20] *Ibid.*, p. 336.

poison a stone found in the skin of a porcupine in a region bordering upon Malacca.[21]

The work on poisons of Jaques Grévin of Clermont near Beauvais, a physician of Paris, was first published in French and dedicated to Queen Elizabeth of England.[22] It manifests something of the naïveté and verbosity which are apt to characterize works of that period written in the vernacular. At the same time it follows the order of Nicander to a large extent and quotes other ancient poets and medical authors like Ausonius and Celsus. Such recent writers as Agricola, Cardan, and Mattioli are also utilized. On the other hand, Leonicenus is not cited concerning the dipsas snake. There is nothing new or original about the plan, contents or method of treatment. But Grévin occasionally disagrees with his authorities. He argues against Mattioli that snakes are of cold not hot complexion, since he had himself handled one and found it as cold as ice.[23] He also notes that Mattioli thought the tarantula was a lizard rather than a spider.[24] He censures Fernel for resorting to superstitious remedies and ceremonies against hydrophobia such as suspending verses of scripture from the neck.[25]

Indeed, the best feature of the work is its sceptical and realistic attitude. Grévin regards the tales told about the basilisk, if not the animal itself, as fabulous, and holds that if such animals as the basilisk and torpedo poison at all, they do so by harmful exhalations from their bodies and not by their glance or mere presence.[26] Similarly, discussing reputed fascination he opines that old women have injured children by kissing them rather than by the evil eye.[27] Grévin admits the existence of sorcery and necromancy by the aid of evil spirits, which can be cured by God alone. But he thinks that ignorant persons attribute maladies of which they do not know the causes to demons, sorcerers and witches, and that a good physician should be con-

[21] *Ibid.*, pp. 363-64, 470.

[22] Jaques Grévin, *Deux livres des venins*, Anvers, 1567-1568. Copy used: BN 4^{0} Tf[18].21. A Latin translation appeared at Antwerp in 1571.

[23] *Ibid.*, pp. 25-28.

[24] *Ibid.*, pp. 117, 125.

[25] *Ibid.*, p. 170.

[26] *Ibid.*, pp. 30, 105.

[27] *Ibid.*, p. 39.

sulted in such cases.[28] There is no operative force in words, but natural magic may produce effects by employing specific and occult virtues, while magicians often induce apparitions and imaginations in the human brain by such natural agencies as potions, incense and unguents without resort to demons.[29] Grévin also expresses doubt as to many substances supposed to detect the presence of poisons, such as serpent's tongue, toadstone and the turquoise—with which he had experimented and never found it to change color in the neighborhood of poisons. He has as little faith in a candle placed in a chandelier made from the foot of a dead vulture and "an infinity of other lies put forward by Piso, Menelbus, Simonides, Aristodemus, Pherecydes,[30] William of England, Peter of Abano, Albertus Magnus, Peter of Spain and others." He will not deny, however, that some gems like the emerald, agate, sapphire and pearl, if powdered and taken in the mouth can cure poisoned persons, "since such things have often been tested by experience." But he does not believe that they will have this effect if merely worn as amulets.[31] Nor does he always reject the authors just mentioned as unreliable, since in another passage he cites Albertus, Peter of Abano and Simon Portius concerning women who have lived on nothing but air for ten, twenty or thirty years.[32]

Besides writing on poisons, Grévin touched on a subject which was much mooted in the period of the Paracelsan revival, namely, the virtues of antimony, whose praises had already been sung by John of Rupescissa in the fourteenth century. Grévin wrote in reply to a treatise on antimony by Loys de Launay, a physician of la Rochelle, of which he gives an "Extraict sommaire." Launay held that Mattioli was the first to set forth the singular secrets of antimony. He denied that it was a poison, or authors on poisons would have included it, and Mattioli would not have commended it. He listed several other new drugs to prove that it was no argument against antimony that its medical use was

[28] *Ibid.*, p. 9.
[29] *Ibid.*, pp. 34-36.
[30] These five names are all taken from Aetius: see T I, 574.
[31] Grévin, *op. cit.*, p. 195.
[32] *Ibid.*, p. 28.

unknown to the ancients. He further pointed out that drugs are now employed which the ancients called poisons, for example, vitriol in quartan fever. He admitted that there was a certain malignity in antimony from its affinity with lead but argued that this was eliminated in the process of its chemical preparation. He denied that it was a violent drug, because it was not very hot although it did provoke vomiting. Grévin accuses him of taking refuge in occult and celestial virtues and in appeals to experience, and of belittling common medicines such as scammony and rhubarb.

Grévin takes the position that the admirers of antimony have gone too far and are often ignorant persons. He does not deny that there are great virtues in metals and many secrets as yet hid from us, and he approves of the alchemical extraction of oils and quintessences, if made by qualified masters. But he cannot approve of antimony as now prepared. He contends that it is a poison, not a medicament, that borax has no virtue of purifying antimony, and that calcination of antimony is not beneficial.[33] In a second discourse on the same subject Grévin seems merely to enlarge on the points already made except that he prefixes to his treatise some letters against the use of antimony from doctors of Paris.[34]

In 1583 Albertus Scheligius addressed from Padua to Stephen, king of Poland, a short work on poison taken down from the lips of his master at that university, Hieronymus Mercurialis of Forlì. The work appeared in print at Venice in 1584.[35] The

[33] Jaques Grévin, *Discours sur les vertus et facultez de l'antimoine, contre ce qu'en a escrit maistre Loys de Launay*, Paris, 1566, 8vo, 34 fols. Copy used: BN 8° Td^{21}.31(2).

[34] *Le second Discours sur les vertus et facultez de l'antimoine*, Paris, s.d., 8vo. Copy used: BN 8° Te^{151}.73(2).

[35] *De venenis et morbis venenosis tractatus locupletissimi variaque doctrina referti non solum medicis verumetiam philosophis magnopere utiles; ex voce excellentissimi Hieronymi Mercurialis Foroliuien. medici clarissimi diligenter excepti atque in libros duos digesti opera Alberti Scheligii Vbarschauiensis*, cum licentia et privilegio, Venetiis, Apud Paulum Meietum bibliopolam Pat. MDLXXXIIII. I own a copy. I have also seen ascribed to Mercurialis a *Tractatus de maculis pestiferis et de hydrophobia*, Padua, 1580, but have not found it. G. M. Nardi, "Il pensiero di Girolamo Mercuriale sul veleno del cane rabbioso," *Rivista di storia delle scienze mediche e naturali*, 29 (1938), 32-33, is based on "Il breve trattato di Girolamo

twenty-two chapters of the longer first book are devoted to general matters such as the definition of poison, how poison acts, and preservation from it by care as to one's food and by medicaments. The eleven chapters of the second book consider a few illustrations only of particular poisons, beginning with the asp and ending with fungi. Mercurialis, as reported by his pupil, has none of the scepticism of Grévin, although he cites Averroes as deriding the stories of persons nourished on poison.[36] While with the emperor Maximilian, he had seen a dead basilisk preserved among his treasures.[37] He twice cites Theophrastus for the action of slow poisons at a fixed future date.[38] His work is almost wholly a compilation from past authorities, chiefly classical. Some use is made of Avicenna, Averroes and Rasis, of Maimonides, Albertus Magnus and Peter of Abano. But the writers on the special subject of poisons in the fourteenth and fifteenth centuries are ignored, while frequent citation occurs from the *Homilies* of Basil and general medical compilation of Nicholas of Florence. Mercurialis says that wearing arsenic over the heart has proved beneficial in time of pest, and that drinking water helps those who have taken arsenic, as he has seen from his dogs and is said of mice.[39] On the other hand, whereas swine ordinarily suffer no harm from the sting of scorpions, if they enter water afterwards, they die, because their hide is softened thereby.[40]

The most impressive feature of the work of Mercurialis is its retention of the keen interest in problems and dubia which we saw in our third and fourth volumes marked the scholastic works of the fourteenth and fifteenth centuries. Not only is one chapter devoted to five such problems, and the chapter immediately following it to the question, Whether venom is extinguished by venom, "and some other most beautiful Dubia,"[41]

Mercuriale—De veneno canis rabidi seu de hidrofobia," or lectures given at Padua about 1577. No date of publication is given or manuscript cited.

[36] *De venenis*, I, 9, fol. 11r.

[37] *Ibid.*, I, 21, fol. 26v.

[38] *Ibid.*, I, 7, fol. 8v; II, 10, fol. 41r.

[39] *Ibid.*, II, 9, fol. 39v.

[40] *Ibid.*, I, 15, fol. 19v.

[41] *Ibid.*, I, 14, 15, fols. 17v-20r.

but such queries are raised throughout the book. For example, it is asked how aconite kills men and brutes, if their genitals are merely touched by it;[42] why cows are more easily affected by the sting of a scorpion than swine are;[43] why the excrements of venomous animals do not stink,[44] why odors are hostile to serpents.[45]

Mercurialis says that the ancients were not accustomed to eat frogs, and advises those who would avoid being poisoned to abstain from both frogs and eels.[46] He believes in antipathies in nature and that hellebore cures insanity, and aconite, the bite of a scorpion.[47] He gives three means of detecting the presence of poison at table: serpent's horn, which sweats when poison is near; auricalchum, dishes made of which change color if there is poison in them; and an emerald worn on the hand, which loses its green color when poison is offered.[48] Mercurialis cites the astrologers as associating each poison with some star, but he also notes an argument—none too impressive—of Pico della Mirandola against them.[49]

Johann Varismann of Danzig in 1586 addressed to the town council of that free city a little treatise in nineteen chapters on the bite of a mad dog and hydrophobia[50] which shows that little progress had been made of late in that regard. The description of the signs by which it can be told that a dog is mad resemble those in works of the fourteenth and fifteenth centuries,[51] except that Varismann is somewhat wordier. A certain amount of scepticism is shown, it is true. Discussing the causes of rabies, Varismann rejects the influence of the dog-star and even suggests that the whole question of the influence of the stars is a very thorny one. In another passage he denies the statement of Oger Ferrier that certain words preserve a person who has been bitten by a

[42] *Ibid.*, II, 10, fol. 41r.
[43] *Ibid.*, II, 15, fol. 19v.
[44] *Ibid.*, II, 14, fol. 19r.
[45] *Ibid.*, I, 17, fol. 22r.
[46] *Idem.*
[47] *Ibid.*, I, 12, fols. 15v-16r.
[48] *Ibid.*, I, 16, fol. 20r-v.
[49] *Ibid.*, I, 12, fol. 15r.
[50] Iohannes Varismannus Dantiscanus, *De rabidi canis morsu ac hydrophobia,* Regiomonti typis Geo. Osterbergeri, 1586. Copy used: BM 1191.f.1.(1.).
[51] T (1929), pp. 116-17; T III, 530 *et seq.*; IV, 224.

mad dog from contracting hydrophobia.[52] He explains that this notion has been refuted by Thomas Erastus. Nor does his own experience bear out the assertion of Julien Le Paulmier that there are periods in the accessions of hydrophobia as there are critical days in acute diseases.[53]

But the credulity of Varismann exceeds his scepticism or reliance on experience, and he retails a number of unbelievable stories. Instead of accounting for rabies by the influence of the dog-star, he ascribes it to worms which grow under the dog's tongue. Hunters and peasants have assured him of this and added that the animal may sometimes be cured in the early stages of the disease by cutting the worm out. Varismann long regarded this as fabulous, but when he found similar statements in such ancient and recent writers as Sextus Platonicus[54] on medicine from animals, Phaemon the Greek in the Latin translation by Andreas Aurifaber, and Simon Simonius—who learned it from Stephen, king of Poland, and then proved it by his own experience—he began to accept it.[55] In a later chapter he quotes Hollerius on internal diseases concerning an Italian whose too frequent smelling of the herb basilica generated a scorpion in his brain, and Cornelius Gemma about a woman who died of terrible headaches, after which a post-mortem disclosed worms in her brain and meninges.[56] That lingering under the shade of a sorb tree brings on a recurrence of hydrophobia he attributes to some recondite and inexplicable property of the sorb rather than to its exuding a melancholy vapor.[57] And as some scars reopen, when the time of year comes around at which the wound was inflicted, so there is danger of hydrophobia recurring at the time of the original attack. Such mystic annualism would hardly seem preferable to ordinary astrology.

Varismann cites a previous sixteenth century treatise on his theme by Hieronymus Mercurialis[58] but appears to make more

[52] Ioh. Varismannus, *De rabidi canis morsu*, 1586, cap. 17, citing Augerius Ferrerius, *lib. 2 meth. medendi*, cap. 1.

[53] Varismann, *op. cit.*, cap. 8.

[54] Or Sextus Papirius Placidus: see T I, 599.

[55] Varismann, *op. cit.*, cap. 5.

[56] *Ibid.*, cap. 15.

[57] *Ibid.*, cap. 19.

[58] *Ibid.*, cap. 8, "in tractatu quem de rabidi canis morsu et nata istinc hydrophobia sigillatim edidit." The

use of the recent work of Le Paulmier on contagious diseases.[59] Its author was a member of the medical faculty at Paris and physician to Henry III and Francis, duke of Anjou.[60] According to Varismann, he had discovered three things with regard to hydrophobia that had passed unnoticed both by the ancients and by recent writers, so deep hidden seemed to be their causes in the inmost recesses of nature. The first discovery was that persons bitten in the face never recover. The second was that the patient will not recover, if water touches the wound. The third was that the mere sight of water aggravates the disease.[61] Varismann further set great store by a new and sacred antidote for hydrophobia which Le Paulmier had devised. It consisted of powdered leaves of rue, vervain, sage, plantain, oakfern, wormwood, mint, mugwort, herb of St. John, betonica and other herbs taken in wine, three hours before meals, if the patient already had developed hydrophobia, or applied externally as a plaster to the wound[62] when first contracted.

In the copy which I used at the British Museum the work of Varismann was bound not inappropriately with that of Codronchi, printed nine years later, on diseases produced by sorcery.[63]

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work referred to is presumably Hieronymus Mercurialis, *Tractatus de maculis pestiferis et de hydrophobia,* Padua, 1580, mentioned in note 35 above.

[59] Iul. Palmarii, Constantini, medici Parisiensis, *De morbis contagiosis libri septem ad amplissimum senatum Parisiensem,* Parisiis Apud Dionysium Du-Val, sub Pegaso, in vico Bellovaco, 1578, 433 pp. Copy used: BN 4^{o}.Td^{49}.2. The privilege to print is dated April 28, 1572, and, in the dedication to the Parlement of Paris, Le Paulmier explains that the printing of the book six years before was interrupted by civil war. It comprises two books on syphilis, one on mercury, one on elephantiasis, one on the bite of mad dogs and hydrophobia, and two on the pest. There were later editions at Frankfurt, 1601 and The Hague, 1664.

[60] Claude Stephen Le Paulmier, *Julien Le Paulmier, docteur régent de la Faculté de médecine de Paris, médecin du roi Henri III et de François, duc d'Anjou,* Nogent-le-Rotrou, 1894, 44 pp. Extrait des Mémoires de la Société de Paris et de l'Ile-de-France, tome XXI.

[61] Varismann, *op. cit.,* cap. 8.

[62] *Ibid.,* cap. 18, "Foliorum rutae verbenae salviae minoris plantaginis polypodii absinthii vulgaris mentae arthemisiae melissophylli bethonicae hyperici centaurei minoris . . ." "Salviae minoris" may refer to some other herb than sage. I have verified the recipe from Palmarius (1578), p. 277.

[63] It is treated of below in Chapter 46.

To Varismann's description of Le Paulmier's discussion a few details may be added from that work itself. It tells of a rustic afflicted with hydrophobia who gave it to his children by insisting upon kissing them farewell. The common people are so certain that advanced cases are incurable that they strangle them. Le Paulmier's statement of the signs of a mad dog is the stock one which we have noted in fourteenth century authors. He asserts that hydrophobia appears at no fixed time after the bite but on the fourth, seventh, ninth, seventeenth or twentieth day, sometimes the fortieth, or sometimes not for a year. He states that he saw twenty wolves afflicted with rabies rush out of the forest and attack other animals.[64] The faith in compound medicines at this time was shown by Le Paulmier's master, Fernel, preferring one of sixty-nine ingredients to mercury as a cure for syphilis. To these sixty-nine Le Paulmier had added a few more since Fernel's death.[65]

Andrea Bacci, who had lectured on poisons at the university of Rome in the first year of the pontificate of Sixtus V, published there in 1586 a volume on poisons and the bite of a mad dog and its cure. He dedicated the work to cardinal Decio Azzolino.[66] Bacci had begun to practice medicine at Serrasanquirico in the middle of the century, and wrote various works on baths, medicinal simples, gems, theriac, wines, and the properties of the mysterious ancient Alce and Alicorno.[67] Bacci notes that Theodore Zvigger of Augsburg before him had thought out a thorough method as to poisons.[68] Bacci further cites the ancients a good

[64] The tract on mad dogs and hydrophobia occupies pp. 265-79.

[65] *Ibid.*, p. 28.

[66] *De venenis et antidotis prolegomena seu communia praecepta ad humanam vitam tuendam saluberrima in quibus diffinitiva methodus venenorum proponitur per genera ac differentias suas partes passiones praeservandi modum et communia ad eorum curationem antidota complectens. De canis rabiosi morsu et eius curatione ab Andrea Baccio Elpidiano medico atque philosopho in almae urbis gymnasio doctore.* Cum licentia superiorum. Romae apud Vincentium Accoltum MDLXXXVI Impensis Ioannis Martinelli. Copy used: BM 957.1.23.

[67] Filippo Vecchietti, *Biblioteca Picena,* II (1791), 2-7.

[68] Bacci, *De venenis,* p. 9. I do not know who is meant. Theodor Zwinger, author of the encyclopedia *Theatrum humanae vitae,* was born in Basel, not Augsburg.

deal and even the Arabic medical authors but seldom the medieval Latin writers of tracts on poisons. In the tract on the bite of mad dogs, raising the question whether persons with hydrophobia void minute puppies in their urine or imagine that they see dogs in water, Bacci cites *Conciliator,* Differentia 79, and Gentile da Foligno on Avicenna as affirming the former.[69] But he cites only the *Conciliator* of Peter of Abano, not his treatise on poisons, although it had been printed many times even before 1500. Bacci himself asserts that there is no doubt they imagine it, as he has seen. He denies that the maiden fed on poison would have poisoned Alexander the Great, had he lain with her, because what she ate would have been transformed into nutrition.[70] He also denies that a fixed time can be set for the action of poisons at the will of the poisoner, but he credits a case of hydrophobia developing thirty-six days after the person had been bitten and the wound had healed.[71] He himself has not sufficiently tested amulets against poison which are supposed to act by their whole substance. He mentions a number such as unicorn horn which sweats at the approach of venom, the gem aetites which prevents one from swallowing poisoned food, and the foot of a vulture which, used as a candle-holder, extinguishes the light in the presence of poison. But he advises anyone who suspects that what he has eaten is poisoned to vomit it, even if eaten at his own table.[72] Bacci proposed a fuller treatment of poisons in ten books[73] but apparently did not complete or publish it.

In a little brochure on philters in nine chapters published at Hamburg in 1599, Johann Bokel, whose pest tract of 1577 we notice elsewhere, discussed whether men's minds were moved by philters.[74] Remarking that error is very persistent when once

[69] *Ibid.*, p. 76.
[70] *Ibid.*, pp. 30-31.
[71] *Ibid.*, p. 69.
[72] *Ibid.*, pp. 51-52.
[73] *Ibid.*, pp. 82-83. Among the medical works listed by Kobolt, *Baierisches Gelehrten-Lexicon,* 1795, of Edmund Hollyng, an Englishman who came to Ingolstadt in 1588 and died there in 1612 is a *De venenis,* 1599, 4to, which I have failed to find.
[74] J. Bokelius, *De philtris utrum animi hominum his commoveantur necne,* Hamburg, 1599. Copy used: BN R. 7043.

it has become rooted, Bokel asserts that the mind or soul cannot be excited to love by drugs. Medea, for all her skill in magic, failed to win Jason's love, and Dido, that of Aeneas. To argue from the effect of philters on dogs is not permissible, because dogs have a stronger sense of smell than men. Bokel rather weakens his case by saying that insanity is more frequently induced by philters than is love. For even if love is not akin to madness, yet, if philters cause insanity, they evidently do affect the mind.

While Bokel may reject philters, he still believes not only in the existence of the devil, but that the devil is a natural magician. He represents him as a foe of the divine order in nature, which he tries to upset and to induce men to abandon natural law and causes for his magical fallacies. Bokel thinks of the demon as an aerial spirit, more tenuous and subtle than the air itself, who mingles with human animal spirits and so disturbs them with false imaginations that men believe in magic. Yet the devil can do nothing preternatural. His marvels are not wrought as deceived men think, but in some manner unknown to us, yet still natural. Bokel may think that he is maintaining natural law and a fixed order of causes, but he cannot be said to have reduced occult influences and fears either very much or effectively.

The subject of fascination was again considered by Franciscus Perez Cascales, a physician of Guadalajara, at the close of his book on diseases of boys, published at Madrid in 1611, the question being whether there was any physical fascination by which infants and children could be affected. The author had little that was new to advance on the problem but cited various previous writers as denying the possibility of natural fascination. Among these were cardinal Pierre d'Ailly in his treatise on perspective, Cirvelo, Leonardus Vairus, Andreas Laurentius,[75] Laurentius Ananias or d'Anania (lib. 4 "de natura daemonum"), Scaliger, Vallesius and Fernel. On the other hand, he quotes Antonius de

[75] Presumably the same author by whom Graesse cites a work on the royal touch: Andreas Laurentius, *De mirabili strumas sanandi vi solis Galliae regibus Christo divinitus concessa,* etc. Paris, 1609. Laurentius died the same year, having been physician to Henry IV.

Carthagena, that fascination is the operation of one thing on another arising from celestial influence, and that old women fascinate because the menstrual blood is retained in their veins. Against this and Pliny's statement that the presence of a menstruating woman clouds a mirror, Perez Cascales argues that, while the retained blood might putrefy and injure the woman herself, it could not induce any injury or contagion in others. He further sensibly observes that another body could be poisoned more easily through smelling or breathing than through the eye. There is another kind of fascination, magical by pact with demons, which we should have been glad to hear our author deny. But he does little more than mention it, limiting his refutation to the physical or natural variety. Thereby the door, we fear, was opened the more to the witchcraft delusion, and we find Perez Cascales citing Delrio and the *Malleus maleficarum*.[76]

[76] Franciscus Perez Cascales de Guadalajara, *Liber de affectionibus puerorum una cum tractatu de morbo illo vulgariter garrotillo appellato, cum duabus quaestionibus. Altera, de gerentibus utero rem appetentibus denegatam. Altera vero de fascinatione.* Matriti, 1611, 4to. *De fascinatione* occurs at fols. 120-29. Copy used: BM 1178.f.3.

CHAPTER XXII

FRACASTORO (1478-1553)

Klar spricht sich der Geist und der Character des Zeitalters dieser beiden grossen Aerzte in diesen ihren beiderseitigen Geistesproducten aus.

—RITTMANN ON FRACASTORO AND FERNEL

Girolamo Fracastoro was born in 1478 or a little later and died of apoplexy in 1553, the fit occurring at dinner but death following only in the evening. He studied at Padua under Pomponazzi in mathematics, philosophy and medicine. Among his fellow students were Cremonini, later a cardinal, the astrologer, Luca Gaurico, and the editor of voyages of discovery, Ramusio. In 1502, some say at the age of nineteen, he received the B.A. degree at Padua and then taught logic there for a year or two.[1] He accompanied the Venetian general, Livianus, as poet and then practiced medicine with éclat, being sought by the leading Venetians and foreign potentates. He followed the voyages of discovery with interest and noted the new lands on wooden world maps. His favorite retreat, to which he alludes in his writings, was on the hill of Incaffi between the Adige and the Lago di Garda. There his house, with a fireplace in every room and his wooden chair, was still preserved a century ago when Valery, the librarian of the Bibliothèque Nationale of Paris, visited it.[2] There he composed his famous poem, *Syphilis,* thence he was summoned to act as physician at Trent to members of the Council, and there he passed away on August 8, 1553.

Fracastoro's great medical and scientific poem, *Syphilis,* con-

[1] Tiraboschi, *Storia della letteratura italiana,* Milan, 1824, VII, 2134.

[2] Valery (i.e. Antoine Claude Pasquin), *Travels in Italy,* Paris, 1842, English translation by C. E. Clifton, p. 120 *et seq.* G. Sandri, "Il sepolcro di Girolamo Fracastoro," *Bollettino della Società letteraria di Verona,* XIV (1938), 35-39, shows that Fracastoro was not buried in the church of S. Eufemia of Incaffi but of Verona.

tinued to harbor two traditional beliefs which science and medicine have since largely discarded: the use of compound medicines containing many ingredients, and confidence in the influence of the planets on human health and happiness. The outbreak of the *morbus gallicus* is attributed to a conjunction of Saturn, Jupiter and Mars in Cancer, while Leo X is told, "Under thy auspices, O Leo, the malign influences of the stars have vanished, and Jupiter has not poured upon us any but the propitious fires of his purest rays."[3] Fracastoro also refused to regard the disease as contagious, holding that it had attacked some persons who had in no way exposed themselves to it. Its spread was rather due to corruption of the air under the influence of the stars. The above apostrophizing of Leo X shows that Fracastoro's poem was composed a decade or so before it was first printed in 1530.

In 1538 were printed together two works by Fracastoro, one astronomical, the other medical, on the movements of the heavenly bodies and on critical days, *Homocentricorum sive de stellis liber,* and *De causis criticorum dierum.* The former work has been magnified as paving the way for the Copernican theory by calling into question the epicycles and eccentrics of the Ptolemaic hypothesis. But to attempt to re-establish the homocentric hypothesis of Aristotle and other ancients was a step backward in the antiquarian and reactionary spirit of the miscalled Italian renaissance rather than a step forward from Ptolemaic and medieval astronomy. Giovanni Battista Amico (1512-1538) had already published in 1536 a brief work of 26 leaves including figures on the movements of the heavenly bodies according to Peripatetic principles without eccentrics and epicycles.[4] It appeared again at Venice in 1537 and then at Paris in 1540.

In his preface Fracastoro acknowledges that he owes the main idea of the work to his master, Giambattista della Torre. In any case the attempt to show that the planets always maintain the

[3] Anonymous prose translation, The Philmar Company, St. Louis, 1911, p. 28.

[4] *Joannis Baptistae Amici. . . Opusculum de motibus corporum coelestium juxta principia peripatetica sine eccentricis et epicylis,* Venetiis, 1536.

same distance from the earth is cumbrous and unconvincing, requiring on the one hand a movement by latitude as well as longitude and a large number of supplementary orbs to retard or hasten the movement of each planet, and on the other hand the supposition that the parts of the sky vary in density so that light is variously refracted and the heavenly bodies thereby appear at one time nearer or larger than at another. Whereas Campanus of Novara in the thirteenth century had required only thirty-four movements to expound the Ptolemaic system, and John Tolhopf in the fifteenth century had attempted to reduce these to twenty-eight, Fracastoro needs ten orbs for Saturn alone, eleven each for Jupiter, Venus and Mercury, nine for Mars, four for the sun, and so on, including a special orb below the moon for comets to move in. In his preface Fracastoro, however, professes to regard the discovery of new orbs in the sky as an improvement upon the ancients analogous to the recent discovery of new lands and continents here below. William, landgrave of Hesse, writing to Caspar Peucer concerning the new star of 1572, stated that Fracastoro had constructed his astronomical theories "without sufficient observation and demonstration," while Tycho Brahe condemned them as full of absurdities.[5]

In connection with his discussion of refraction in the sky as well as in the air Fracastoro makes certain comparisons with refracting lenses which seem to have led to the notion that he made some approach to the invention of the telescope or microscope. Scipio Maffei in his *Verona illustrata,* first published in 1732, p. 179, quotes Fracastoro as saying in his *Homocentrica* that seen through certain glasses the moon and stars seem very near and not farther off than the tops of towers,[6] and again that if one looks through two ocular lenses superimposed one on the other, one will see everything much larger and clearer.[7] Maffei seems

[5] *Tychonis Brahe Opera omnia,* III (1916), 114, 116.

[6] *Homocentrica,* sectio tertia, cap. 23: "Quinimo quaedam specilla ocularia fiunt tantae densitatis ut si per ea quis aut lunam aut aliud syderum spectet, adeo propinqua illa iudicet ut ne turres ipsas excedant, quare nec mirum videri debet si per orbium partes idem quoque contingat."

[7] "Si quis per duo specilla ocularia perspiciat altero alteri superposito maiora multo et propinquiora videbit omnia." In the 1621 edition of the

to regard this latter passage as having reference to a sort of microscope, but Heller in his *Geschichte der Physik* states that Fracastoro's contribution to the telescope reduces to the fact that "er zwei Linsengläser auf einander legte, wodurch er vergrösserte Bilder erhielt."[8] In the same chapter Fracastoro states that if a lens is placed mid-way between the eye and the object, it makes the object much larger, if however it is placed near the eyes or near the object, it renders the object far smaller[9]—neither of which statements seems to be true.

In his treatise on the causes of critical days Fracastoro rebuts the Galenic and astrological explanation of them by quarters of the moon as occurring especially on the seventh, fourteenth, and twentieth or twenty-first day, although he accepts these days as the most critical, and professes otherwise to venerate both astrology and Galen. He does not, however, revert to the hypothesis of yet more ancient writers as he did in the *Homocentrica,* but rejects the Pythagorean ascription of critical days to the virtue of number in general and seven in particular on the ground that neither number nor quantity can be the principle of action. Again this hardly seems consistent with the attitude expressed in the preface to the *Homocentrica* that to posit eccentrics was to think iniquitously and impiously of those divine bodies and to assign them situations and figures quite unbefitting the sky.

To connecting critical days with the moon Fracastoro objects that the seventh and other critical days of a disease rarely coincide with the seventh or other day of the moon. Therefore astrologers reckon from the day on which the patient fell ill, but Fracastoro rejects this method as too artificial, varying with each patient and inexplicable by the positions of the moon. In-

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Homocentrica, sectio secunda, cap. 8 (p. 63), the order is different, "et per duo specilla ocularia si quis perspiciat" etc.

[8] August Heller, *Geschichte der Physik von Aristoteles bis auf die neueste Zeit,* I, 1882, p. 343.

[9] *Homocentrica,* II, 8, p. 65 of the 1621 edition: "Si enim specillum in medio ponatur inter rem et oculum multo maiorem eandem refert, si vero aut prope oculos aut prope rem statuatur longe minorem reddit."

stead he proposes to demonstrate that all reckoning of days in crises depends on causes within ourselves, namely the local motion of the humors. A crisis occurs only when more than one humor is disordered. Now cholera is moved every third day and melancholy every fourth day. If therefore the disease is acute and rapid, melancholy will develop on the first day and will next coincide with the motion of cholera on the seventh, which will therefore be critical. The next coincidence of the two humors would be on the thirteenth day rather than the fourteenth, but acute diseases rarely reach to the thirteenth day. By a like line of reasoning Fracastoro makes the fourteenth the critical day par excellence for a slower disease in which melancholy is moved only on the second day. There may also, however, be a crisis on the twentieth day in this case, while in the third case, where melancholy develops only beginning with the third day, the twenty-first day is liable to be the most critical, which serves to explain Galen's difficulty as to the twentieth and twenty-first days. It is for the skilled physician by careful observation to determine whether cholera and melancholy abound on the first day or later and consequently when the crisis will come and, on the other hand, what days will be quiet and suited for bleeding or administering drugs. It would not seem that a doctor who followed Fracastoro's advice would succeed any better than one who adhered to the astrological way. The line of reasoning pursued bears a certain resemblance to that of Michael Savonarola in his effort to explain why leap-years are unfavorable to generation, vegetation, and bathing in mineral springs, and perhaps was suggested to Fracastoro by reading that fifteenth century author.[10] In his periodization of the movements of the four humors and his basing crises in disease upon their local motion Fracastoro appears as a traditional Galenist and far removed from the Paracelsan theory of disease. He closes the treatise by excusing himself for having ventured to disagree on a single point with Galen, "the parent of medicine, whom in other matters we venerate and worship as a god."

[10] T IV, 210.

Certain other works of Fracastoro in the natural field dealt with trite topics and may be briefly dismissed: a poem on hunting dogs, a long discourse on the inundation of the Nile in response to another on that time-worn topic by his friend Ramusio, an opinion on the dispute between two contemporary physicians of Verona, Antonio Fumanello and Bartholomeo Gaiono, whether wine was hot and wet in quality,[11] and a discussion of the soul, left incomplete at the time of his death, which may be related to the earlier controversy aroused by Pomponazzi anent the teaching of Aristotle as to the mortality or immortality of the soul.

Those who have ascribed extreme modernity to Fracastoro's theory of contagion have generally shut their eyes not only to the preceding medieval advance in the knowledge of contagious diseases and of methods of quarantine and prophylaxis against them, but also to the fact that in the thinking of Fracastoro himself the conception of contagion and contagious disease was very closely allied to the quite ancient and magical notion of sympathy and antipathy. His book on the sympathy and antipathy of things and his three books on contagion and contagious diseases and their cure were printed together in the first edition of Venice, 1546, and the third edition of Lyons, 1554. The second edition I have not seen. Moreover, in the preface to the treatise on sympathy and antipathy he states that the nature of contagion cannot be understood without them.[12] It is therefore logical and in ac-

[11] Franciscus Bonafides, professor of the practice of medicine at Padua in 1531 was another to enter this controversy: Riccoboni, *De gymnasio Patavino*, Patavii, 1598, fol. 21v.

[12] Yet in *Les trois livres de Jérôme Fracastor sur le contagion, les maladies contagieuses et leur traitement, Traduction et notes par Léon Meunier*, Paris, Société d'éditions scientifiques, 1893, and again in the History of Medicine Series issued under the auspices of the Library of the New York Academy of Medicine (Vol. II, New York, Putnam's, 1930). English translation by W. C. Wright, the three books on contagion have been issued without their fellow on sympathy and antipathy. Similarly Charles and Dorothea Singer write in *Annals of Medical History*, I (1917), 11, note, 55: "The 'De sympathia et antipathia rerum' appeared at the same time and in the same volume. With this work, however, we are not here concerned." Such is the way that we "gloss over our Augustine" and refuse to view the past as it really was.

Sounder although older was the attitude of Dr. Alexander Rittmann in

cordance with his own plan to consider his discussion of sympathy and antipathy before proceeding to his theory of contagion. This order also holds true in general for the history of ideas, where magic almost always precedes and lays the foundation for science, and where some philosophical generalization or surmise almost invariably antedates a more concrete suggestion or discovery of actual fact. True it is that Fracastoro attempts a physical and natural rather than magical explanation of the phenomena of sympathy and antipathy, just as he is not content to explain contagion merely as an occult property.[13] But this does not alter the fact that the conception of such relationships was magical in origin and essence. Fracastoro, indeed, admits that there is nothing more marvelous or less understood in all the realm of nature.[14]

The philosophy of sympathy and antipathy as developed by Fracastoro is founded on a number of very ancient and time-worn beliefs and examples. All is set forth in terms of the Aristotelian philosophy with no trace of experimental method. It is

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his paper, "Hieronymus Fracastorius Veronensis als Begründer der Contagionslehre," *Abhandlungen z. Gesch. d. Med.*, Breslau, 1869 and in his *Culturgeschichtliche Abhandlungen*, Brünn, 1870. At p. 213 of the latter, comparing Fracastorius and Fernel, Rittmann wrote: "Jener hat die Richtung seiner Forschergeistes in seinem Buche, 'De sympathia et antipathia,' dieser in seinem Buche, 'De abditis rerum causis,' niedergelegt." Rittmann accordingly gave an analysis of the *De sympathia et antipathia* before proceeding to analyze the *De contagione et contagiosis morbis.*

I cannot commend the work of G. G. Rossi, *Fracastoro in re all' aristotelismo e alle scienze nel rinascimento*, 1893. That of R. Massalongo, "Girolamo Fracastoro und die Renaissance der Medizin in Italien," in *Atti del R. Istituto Veneto di Scienze*, 74 (1914-1915), lxii pp., is a general sketch, oratorical in style, too scornful of the preceding medieval period, too eulogistic of the cinquecento. The renaissance of medicine in Italy goes back rather to Constantinus Africanus in the eleventh century.

[13] See the Praefatio to both works. I do not, however, find substantiation for the assertion of Giannini in 1618 that Fracastoro in his book on Sympathy called occult properties "the asylum of ignorance." Tommaso Giannini, *De substantia caeli et stellarum efficientia disputationes Aristotelicae*, Venetiis, 1618, II, 6, p. 207: ". . . lib. de sympathia et antipathia occultas proprietates irridere hasque inscitiae asylum nominare."

[14] The first chapter of his treatise on sympathy and antipathy opens: "Primum autem de latenti rerum consensu et dissensu quam sympathiam et antipathiam dicunt agamus, quo nihil admirabilius est in tota natura, nihil scitu desideratum magis."

based on the doctrine of the continuity of nature and avoidance of a vacuum, on the tendency of the elements towards their own natural places, on rarefaction and condensation, on the attraction of like for like and the mutual repulsion of contraries, on the consent and dissent of the elements concerning contrary qualities, on the analogy of things in action, on the marvelous concord between the senses and their objects, on the conception of sentient nature which was to bulk so large later in Giordano Bruno and Campanella. Such emotional reactions as pleasure and appetite, sadness and hate, fear, admiration, ecstasy, laughter, and anger are all interpreted in terms of sympathy and antipathy. Blushing, modesty and shamefacedness are nothing but sadness for one's own defect in the presence of another, because of which there is a movement of the blood and heat to those parts which labor most. Incidentally Fracastoro will not accept the explanation that the magnet turns toward the polar star as certain herbs turn toward the sun. For no attraction can be exercised by the stars except that which is made by heat *per accidens*. He therefore ascribes the turning of the magnetic needle to the existence of mountains of iron and magnet at the poles. He suggests further that the supposed stopping of a ship by the little sea-fish, the echeneis, may really be due to magnetic mountains of whose propinquity the echeneis is merely a sign. Again he suggests that the eighth month's child dies not because of the influence of the planet Saturn but because some seed gives birth in seven months and other only after nine months. But why, it may be asked of Fracastoro, does it do so, if number is not a principle of action? To the explanation of the magnetic needle Ramusio objected that no magnetic mountains had been found near the poles, whereas such a mountain in the neighborhood of Italy exercised no such effect upon the magnetic needle. He also propounded a number of puzzling cases of antipathies.

In trying to find place for the existence of sympathies and antipathies in nature and yet maintain the Aristotelian physical principle of no action without contact, Fracastoro was forced to resort to various refinements and subtleties such as distinguish-

ing spiritual from material forms, or crass forms from those tenuous and superficial forms which are their images and species. He spoke of the contraction and union of like things as produced by the substance through spiritual species.[15] The turning of the magnetic needle towards the pole because of the mountains of iron and magnet located there require that their species should be propagated an incredible distance to our seas. Since corporal species could not be disseminated that far, they must be spiritual.[16] Such spiritualizing of physical and natural forces does not seem a vast improvement over resort to astral or demon influence, or to magical *mana,* in order to account for supposed marvels.

Coming to contagion, Fracastoro adduces sore eyes as a case of infection at a distance. Certain minute "seminaries" and insensible particles of contagion are borne through the air by exhalation, evaporation and the like. Garrison in his history of medicine remarks: "Fracastoro states, with wonderful clairvoyance, the modern theory of infection by micro-organisms." But who would have expected him to attribute the spread of disease to large bodies or macro-organisms? He raises the question whether all contagion is putrefaction and whether all putrefaction is contagious. Another question is why some diseases are contagious, some only slightly so, and some not at all. Dry fevers like cholera give off minute particles which do not adhere to other bodies and so are not infectious, whereas sordid diseases are sticky and contagious. Contagion differs from poison in that persons who have been poisoned do not infect others. Poison acts either by a spiritual or material quality. In the former case it corrupts the body by driving out its innate heat and producing intolerable sadness, but it cannot generate its like, since all generation is from first qualities. In the latter case, the poison is hot or cold, but neither of these is contagious. Seed beds and sordid or corrupt matter is Fracastoro's oft repeated explanation of contagion. Like the medieval pest tracts, he makes the air

[15] *De sympathia et antipathia,* cap. 5, *Opera,* Geneva, 1671, p. 17.

[16] *Ibid.,* cap. 7, pp. 28-29.

their greatest conveyor, "although nothing prevents their coming from waters and swamps and other sources." He admits that astrologers often predict future diseases and epidemics just as they announced the recent syphilis or Gallic disease long before it appeared. He also ascribes epidemics, as had been done at the time of the Black Death, to conjunctions of the planets. Thus in the last analysis he does attribute contagion to macro-organisms. Other signs of approaching pestilence are frequent fires in the air, winds and mists and floods, dead fish on the shore, swarms of insects, especially locusts, and earthquakes. The seminaria of disease spread rapidly in the human system—it is here that we have Fracastoro's chief contribution—and cause that one of the four humors to which they have the closest analogy to putrefy speedily and profoundly. But Fracastoro holds that contagion ceases in a dead body, since the seeds of contagion are extinguished together with the innate heat. He then considers various particular contagious diseases such as contagious phthisis, rabies and syphilis. If it is true, as has often been stated, that reclining under the sorb tree produces a recurrence of rabies, Fracastoro would ascribe this to vapors emitted by the tree.

As an example of the background for Fracastoro's ideas concerning contagion we may adduce a letter written by Erasmus to Wolsey's physician in connection with the third great outbreak of the sweating sickness in England in 1517.[17] In recommending better ventilation, he stated that what air now enters buildings comes in draughts through holes and corners full of pestilential emanations. In this case the air is thought of as not necessarily infected, by the stars or otherwise, until it passes through filthy crevices where it picks up the germs of disease.

[17] Attention was called to this letter by Edward Berdoe, *Origin and Growth of the Healing Art,* 1893, pp. 356-57, but his hailing Erasmus as "our first sanitary reformer" overlooks the earlier sanitary legislation and administration in medieval towns.

CHAPTER XXIII

ANATOMY FROM CARPI TO VESALIUS

Jacobus Carpensis primus quoque procul omni dubio anatomicae artis quam Vesalius postea perfecit restaurator

—FALLOPPIA

Public dissections and the study of anatomy had prevailed in Italy for at least two centuries before the sixteenth, while in surgery there had been skilled practitioners who were also not without a considerable fund of book knowledge. Therefore the publication in 1543 of the *De humani corporis fabrica* of Vesalius should not be regarded as a bolt from the blue. There was further marked activity and progress in anatomy during the sixteenth century, especially in Italy, where in addition to Achillini we have the names of Berengario da Carpi, Falloppia, Colombo, Eustachio and Aquapendente to set beside that of Vesalius. Between the works of Carpi and Vesalius, in the years from 1535 to 1541, appeared treatises by Andreas de Laguna, Nicolaus Massa, and John Dryander. These intermediary works help us to form some conception of the changing opinion and emphasis in anatomical studies and writings between 1521 and 1543. Finally, in connection with *De humani corporis fabrica* we shall note the subsequent comments and criticisms of Falloppia and the replies thereto of Vesalius.

It is not the intention to estimate or expound the exact amount of correct anatomical knowledge and of new discovery in the human body for any one of these worthies. This would require of me and perhaps also of most of my readers more anatomical knowledge than is at our command. It is the intention by actual examination of the texts of Carpi, Massa, Dryander, Vesalius and Falloppia to get and give some idea at first-hand of their attitudes, especially to their predecessors and contemporaries in

the same field and to the world at large of nature and of the occult. Apart from mere technical advance and improvement, what position do they occupy in the general history of the relations between magic and experimental science? We have seen Achillini encourage physiognomy and chiromancy as well as engage in anatomical studies. How far does Carpi or Vesalius continue such an attitude?

In outward form at least the main work of Carpi in the field of anatomy was a commentary upon the medieval handbook of Mundinus.[1] Carpi states that in view of the many and great altercations between writers upon anatomy he has decided to set down summarily in the form of a commentary what he has seen in long experience of operating upon the bodies of the living and dissecting those of the dead and what he has learned by voluminous reading. His guide will be the excellent Mundinus of Bologna, though in the exposition of that fundamental text he will make additions from his own observations, from the authority of divine Galen, and from reason. Carpi defends Mundinus on the one hand against those who have criticized his book as inadequate and erroneous, and on the other against those who have misinterpreted his statements. He affirms that his *Anatomia* has no equal, because no book either of ancient or recent writers tells so much in so few words. "He assuredly was of divine genius," and if anyone corrupts or attacks him, that person is envious and evil-tongued.[2] Carpi admits that Mundinus sometimes was in error.[3] On the other hand, he sometimes maintained a correct view, in which actual dissections have led Carpi to

[1] The title page of the editio princeps of 1521 reads: "Carpi Commentaria cum amplissimis Additionibus super anatomia mundini una cum textu eiusdem in pristinum et verum nitorem redacto."

The colophon at fol. 527v runs thus: "Hic finiunt Commentaria cum digressionibus amplissimis una die compositis Altera vero sub Impressorio cudine positis Auctore Eximio Artium et Medicinae Doctore Domino Magistro Iacobo Berengario Carpensi Chirurgiam ordinariam in Almo Gynasio Bononiensi docente Anno Virginei partus MDXXI Impressum Bononiae per Hieronyum de Benedictis Pridie Nonas Martii MDXXI."

[2] For Carpi's statements thus far see his dedicatory preface to cardinal Giulio de' Medici, and the first pages of his work.

[3] *Ibid.*, fols. 172r, 184v-185r.

agree, on points where all before him—Haly, Rasis, Averroes and Avicenna—and most moderns since have followed Galen in an erroneous view.[4] This does not mean that Carpi regarded Galen as usually in error. In one passage he states that he always accepts Galen's views except where observation is at discord with them.[5] Carpi complains that anatomical writers follow authorities like cattle and warns the reader not to be deceived "by some of our moderns who involve anatomy with authorities and not with observation."[6] But he himself once follows Mundinus's order of presentation, although he admits that the order observed in dissections in the schools may be better.[7] He prides himself on having restored the text of Mundinus to its pristine correctness, and criticizes previous commentators for having tried to explain a corrupt passage that rendered the text meaningless and ridiculous.[8]

Despite this high praise of Mundinus by so qualified an anatomist as Carpi, within less than twenty years the humanist prejudice against medieval writers was to reach such a pitch that the statutes of the medical faculty of Tübingen of 1538 were to forbid further use of the work of Mundinus as a textbook in anatomy—it had hitherto been in use there—on the ground that it was full of innumerable falsehoods and errors.[9] Somewhat similarly Conrad Gesner, in his *Universal Library* of 1545, stated that the anatomy of Mundinus was not undeservedly neglected today, since it was written in an impure style and was not infrequently mistaken as to facts. Gesner showed how little he knew about the matter by citing only editions of 1513 and 1527 of the *Anatomy* and by listing as distinct from its author

[4] *Ibid.*, fols. 203v-204r.

[5] *Ibid.*, fol. 412v.

[6] *Ibid.*, fols, 204r, 398r.

[7] *Ibid.*, fol. 400r: "licet forte melius incipere ab anatomia linguae in ostensione anatomica quae communiter fit in scholis quia primo occurrit lingua in ostensione, deinde os lauda, tamen sequemur Mundinum."

[8] *Ibid.*, fols. 457r, 391r. The incorrect reading alluded to in the latter passage occurs in the edition of Mundinus of 1507, but is amended in the text accompanying Carpi's commentary in its edition of 1521.

[9] "Mundini de anatome scriptum quod hactenus ad eam rem adhibitum est quod mendis et erratis innumeris refertum sit prorsus negligendum erit": cited by Stübler in his work on Leonhard Fuchs, 1928, p. 7, from the book of Roth on the university of Tübingen.

the Mundinus cited in the tables of Elluchasem, the Mundinus of Bologna cited by Guy de Chauliac, and the Mundinus of Florence who commented on Mesue.[10] As a matter of fact the *Anatomy* of Mundinus had not yet passed into disuse. Six years after Gesner wrote it was printed once more with a commentary by Matthaeus Curtius, the distinguished teacher of medicine at Padua, Pisa and Bologna, and with a dedication by J. Canappaeus addressed to none other than Vesalius himself.[11]

In this connection it is deserving of note that much of the criticism of Mundinus in the first half of the sixteenth century was not the outcome of anatomical knowledge and research, but dictated by humanistic prejudice and a desire to rank ancient Greek medicine above that of the Arabs and medieval Latins. Thus Leonhart Fuchs in 1530[12] had the effrontery to accuse Mundinus and Alessandro Benedetti of anatomical errors simply because they disagreed with Galen, although both had dissected a great deal more than Fuchs, whose attack on them was based merely upon his reading of ancient authorities and not upon practical knowledge. Then when Vesalius turned about and criticized Galen on the basis of practical anatomical knowledge, it was erroneously assumed by certain historians that all previous medieval writers had merely followed the authority of Galen and had no anatomical experience of their own, whereas really this reproach should be made only of men like Fuchs.

Carpi indeed resembled the humanists and classical scholars of his age in his interest in textual criticism and depreciation of earlier medieval translations. He boasted of possessing a superior text of Galen which had been corrected by a learned

[10] Gesner (1545), fol. 514r.

[11] M. Curtius, *In Mundini Anatomen commentarius,* Lyons, Th. Paganus, 1551, 16mo. Curtius, however, had died in 1544.

[12] Leonhart Fuchs, *Errata recentiorum medicorum LX numero adiectis eorum confutationibus,* Haganoae, Joh. Secerius, 1530. See also Eberhard Stübler, *Leonhart Fuchs,* Münchener Beiträge z. Gesch. u. Lit. d. Naturwiss. u. Medizin, Heft 13-14, 1928.

Fuchs was severely criticized in his turn by Sebastian Montuus, doctor of arts and medicine, in *Annotatiunculae . . . in errata recentiorum medicorum per Leonardum Fuchsium Germanum collecta,* Lyons, 1533. Copy used: BM 775.a.1 .

Greek.[13] Or he asserted that the old translation of Aristotle cited by Dino, Gentile, Ugo and Niccolò was bad.[14] He pointed out a place in which the text of Hippocrates was corrupt,[15] and criticized the medieval translator of Avicenna from the Arabic, Gerard of Cremona.[16] On the other hand, he did not agree with Nicolaus Leonicenus that the *Liber de iuvamentis membrorum* was not by Galen.[17] Rather he held that it was the same work translated from the Arabic as the *De utilitate partium* or *particularum* which had been rendered from the Greek. He further disagreed a number of times with statements made by Leonicenus in his treatise on the errors of Pliny,[18] and he criticized the recent dictionary of Calepinus at least twice.[19] Mundinus on the contrary he found to have upheld a correct view contrary to the translation of Avicenna by Gerard.[20]

Carpi's questioning the authenticity of texts extended to medieval as well as classical writers. Thus he doubted if the exposition of Avicenna on a certain point really was by Dino del Garbo, since some said that it was by a disciple of Dino. Carpi himself possessed a parchment manuscript of the commentary attributed to a disciple of Dino. Others thought that the exposition was by some other Dino than del Garbo.[21]

If Carpi criticized medieval translations, this does not mean that such censure was extended by him to medieval authors in general or that he slighted them by leaving them unnoticed. On the contrary, the range of his citation of past authors is very extensive and precise, even minute, and seems to show a command of pretty much the entire literature of medieval Latin and Arabic medicine. Thus he cites Haly and Averroes,[22] or Maimonides on the meaning of Galen in a certain passage[23] and Mesue in a chapter on the oil of philosophers.[24] He not merely

[13] Carpi, *Commentaria . . . super anatomia Mundini*, 1521, fol. 237r-v.
[14] *Ibid.*, fol. 232v.
[15] *Ibid.*, fol. 247v.
[16] *Ibid.*, fol. 91v.
[17] *Ibid.*, fols. 89v, 361v, 388v.
[18] *Ibid.*, fols, 105v, 116v, 376v-377v, 395r.
[19] *Ibid.*, fols. 40v, 103v-104r.
[20] *Ibid.*, fol. 92r.
[21] *Ibid.*, fol. 264r.
[22] *Ibid.*, fol. 66v.
[23] *Ibid.*, fol. 65v, "Rabi dicat de mente G. XVI de util."
[24] *Ibid.*, fol. 54r, "teste Mesue in c. proprio de oleo philosophorum."

names recent humanistic writers like Galeotto Marzio da Narni,[25] or Ludovicus Caelius and Georgius Valla,[26] but such representatives of medieval scholastic medicine as Petrus Hispanus in his comments 38 to 42 inclusive on the *Universal Diets* of Isaac, Gentile da Foligno whom he terms "speculator eximius," the Conciliator, Nicolaus aggregator,[27] which expression probably refers to Niccolò Bertrucci of Florence rather than to the *Antidotarium Nicolai,* Trusianus,[28] Jacobus de Partibus, and Matthaeus de Gradibus.[29] His exactness of citation may be illustrated by a passage in which he contends that the gall bladder is not nourished by choler as some think but by blood from an aforesaid small vein in which blood is mixed with some choler. "And on this point see Tommaso del Garbo in his *Summa,* book one, tractate iii, the 28th question on humors."[30]

Indeed, just as the successive post-glossators and Bartolists in the field of law kept piling up citations of their predecessors, so Carpi as the last commentator on Mundinus cited so extensively and exhaustively on all mooted points from the previous medieval medical literature that he left little to add in this respect and so may be said to have cleared the way for Vesalius and subsequent sixteenth century anatomists. After discussing the relative merits of the view of Hippocrates and Galen on the one hand and of Aristotle on the other as to whether women have sperm as well as menstruum, he refers the reader who cares to go into the question more deeply to Averroes, second book of the *Colliget,* chapters 9 and 10, and elsewhere, and to Avicenna, *Prima Primi,* on members and virtues. "And in his books on animals he also treats of that matter most copiously. And in the 20th and 21st fen of the Third *Canon.*" And to *Conciliator,* Differentiae 34, 35 and 36 and 37, and to Dino del Garbo on the work of Hippocrates on the nature of the foetus, and to Dino Junior on the chapter on the generation of the embryo, and to

[25] *Ibid.*, fol. 22v.
[26] *Ibid.*, fol. 328r.
[27] *Ibid.*, fols. 57r, 49r, 66r, 41v.
[28] Meaning Turisanus de Turisanis, or Turrisianus or Torrigiano, author of *Plusquam commentum* and other works.
[29] Or, more fully, Johannes Matthaeus Ferrarius de Gradibus.
[30] Carpi, *Commentaria,* fol. 154v.

Tommaso del Garbo on the same chapter, and to Trusianus the monk, second book of the *Techni*, comments 52 and 53 and elsewhere there. And to James of Forlì on the second book of *Techni* and on *Prima Primi* concerning members and on the chapter on the generation of the embryo. And to Gentile's discussion of the same chapter and on the 20th and 21st fen of the Third *Canon* in many places, and on *Prima Primi* concerning members and on the second *Techni*. And to Nicolaus Nicoli in his sixth sermo and to Ugo Bencius on the *Prima Primi* and second *Techni* where is discussion of the generative members. And to Zerbi in his anatomy, and to many others who have written of such matters.[31] Or in another place, after stating the attitudes of Conciliator, Dino and Tommaso del Garbo as to a problem which has further been discussed "by many other pillars of medicine," Carpi states that the view which appeals to him most is that of James of Forlì who in second *Techni* and elsewhere has solved that problem most lucidly.[32]

On occasion Carpi could marshal theological as well as medical authorities. In regard to the active or passive participation of male and female in the act of conception, he cites Scotus in two passages, Bonaventura in the third book of the *Sentences*, fourth distinction, in the questions concerning the conception of Christ, Cajetan in his commentaries on Aquinas, and Franciscus de Mayronis in his commentary on the *Sentences*. To these authorities Carpi refers the reader for further information.[33] But he rejects as erroneous the more recently expressed opinion of Agostino Nifo in his second disputation on the eighth book of the *Metaphysics*.[34] Here again, as in the case of Leonicenus, Carpi seems more inclined to criticize recent humanistic scholars and philosophers than his medieval authorities, although he is also free in expressing his dissent from the latter.[35] Ugo Bencius or Hugh of Siena of the fifteenth century he calls a most solid

[31] *Ibid.*, fol. 239r.
[32] *Ibid.*, fol. 280v.
[33] *Ibid.*, fol. 278r.
[34] *Ibid.*, fols. 278v-279r.
[35] *Ibid.*, fol. 97r, "sicut tenet Gentilis qui hic loci dormitavit." At fol. 171r he follows Rasis and Albucasis rather than Guy de Chauliac or Avicenna and those "who rely only on the authority of Avicenna."

philosopher and asserts that the explanation of vomiting by the muscles of the stomach has already been exhaustively given by many experts and especially by most subtle Ugo Bentius, *Prima Aphor., aphor. ii.*[36]

The writer on anatomy whom Carpi most frequently criticized adversely was his immediate predecessor, Gabriel Zerbus or Zerbi of Verona, who had taught at Padua, then at Bologna from 1475 to 1483, then at Rome, and had died in Dalmatia in 1505.[37] Early in his commentary on Mundinus Carpi assailed Zerbi violently for a slur upon the Bolognese character which he ascribes to him. He accused Zerbi of having purloined two vases from a bishop who was his patient and of having two sons who were hanged within a month of each other at Rome under Julius II, as Carpi himself had witnessed.[38] During the remainder of the book Carpi makes, so far as I noted, no further attack on Zerbi's moral character or members of his family, but he repeatedly disagrees with his text. He defends Mundinus against Zerbi's criticisms,[39] and accuses the latter of errors,[40] self-contradiction,[41] and calling very difficult to observe what was most familiar to anyone trained in anatomy.[42] Zerbi said that Galen called a certain part of the body endinoydea, but Carpi does not find that Galen gave it any such specific name, referring

[36] *Ibid.*, fols. 131v-132v.

[37] See Chevalier; also Dallari, *I rotuli*, I, 99, 101, 102, 104, 109, 112, 115, 118. In the Bologna faculty lists the name is spelled Gerbus rather than Zerbus. P. Capparoni, "Les maîtres d'anatomie à l'Athénée romain de la Sapienza pendant le XVI^e siècle," *V^e Cong. Internat. d'Hist. de la Méd.*, 1926, p. 97, says that a brief of Innocent VIII shows that Zerbi taught at Rome after 1480 until a larger salary attracted him to Padua. But perhaps the 1480 is a slip or misprint for a later date.

[38] Carpi, *Commentaria . . . super anatomia Mundini*, 1521, fol. 17v.

[39] At fol. 121v Carpi defends Mundinus against Zerbi's criticism by suggesting that the latter must have used a corrupt text of Mundinus. At fol. 122r he says: "Praeterea Zerbus etiam errat quia non ponit pinguedinem in mesenterii substantia sicut facit et Mundinus et sensus."

[40] Some instances are: fol. 31v; fol. 78r, "Et certe Zerbus imaginatur chimeram in hoc"; fol. 99v, "Zerbi et Iacobi de Partibus error"; fol. 330r, "teste Zerbo cui non credo"; fol. 128v, "Contra Nicolaum et Zerbum"; fol. 144r, "Contra Zerbum"; fol. 162v, "Error Zerbi"; fol. 177v, "et de istis est Zerbus cui ego non credo"; fol. 451r, "sed iudicio meo errat Zerbus."

[41] *Ibid.*, fol. 488r, "ergo Zerbus contradicit sibi ipsi."

[42] *Ibid.*, fol. 349r.

to it merely as a second cartilage.[43] Or Carpi does not accept Zerbi's interpretation of a passage by Albertus Magnus.[44] Sometimes, however, Carpi expresses agreement with Zerbi[45] or calls him the greatest compiler of anatomy and praiseworthy despite his frequent deviations from the truth.[46] By the time Carpi wrote, Zerbi had his school of followers as well as Jacobus de Partibus or Jacques Despars. For Carpi once remarks, "And let the Zerbists and Partists be content with this exposition of ours, for such is the truth.[47]

Carpi not merely cited numerous scholastic authorities but displayed a fondness for prolonging and rehearsing various discussions of the late medieval centuries, such as whether the water that flowed with the blood from the side of Christ at the crucifixion was natural or miraculous, whether fat is of a cold *complexio* especially that surrounding the heart, whether women have sperma as well as menstruum, whether bleeding between the thumb and index finger is beneficial for ophthalmia, and whether one should bleed the right or left side in the case of splenetic patients. Discussion of this last point dated back at least to Guy de Chauliac, while for bleeding for ophthalmia Carpi cites Galen, Canamusali, William of Piacenza and others, and had himself seen disorders of the eyes and head relieved thereby a hundred times.[48] After giving various opinions whether the fat about the heart is hot or cold, Carpi notes that a thing may be called hot or cold or dry or moist in several different senses, according as it is considered as a medicine or a food, or as a mixture, or from the agent preparing the material, or from the final agent, or *per se* or *per accidens,* or actually or potentially.[49] Peter of Abano went so far as to hold that the *complexio* of the

[43] *Ibid.*, fol. 398v-399r.

[44] *Ibid.*, fol. 320v, "sed non credo Albertum intellexisse eo modo quod dicit Zerbus."

[45] *Ibid.*, fol. 214r; fol. 341v, "Nota tamen lector quod Zerbus dicit oppositum . . . et iudicio meo dicit verum"; fol. 511r, "Videatur etiam Zerbus qui optime dicit de ossibus in universali ad quem remitto legentes brevitatis gratia."

[46] *Ibid.*, fol. 258v: "et Zerbus inter alios multa dicit super hoc qui in rei veritate est maximus aggregator anatomiae et laude dignus quamvis sepissime deviet a veritate."

[47] *Ibid.*, fol. 301r.

[48] *Ibid.*, fols. 170r-171r.

[49] *Ibid.*, fol. 57v.

fat about the heart was of another nature than other fat.[50] Some argue that the heat of the heart itself does not prevent congelation being produced by cold air about the heart, just as liquid lead is congealed by cold air. Others say that the heart is hot only inside and cold on the outside and that therefore the fat about the heart is generated not *per accidens* but *per se*, which is the view advanced by John Baldus of Florence who wrote on the third book of the *Canon* of Avicenna.[51] Zerbi had made the covering of the heart cold in the seventh order of complexion of members receding from the skin, and dry in the sixth order of dry members. Carpi makes a further distinction between *innata complexio* and *complexio influens*. These scholastic quibbles and fine-drawn distinctions in which he occasionally indulged were perhaps inevitable so long as one attempted to adhere to the old theory of four primary qualities.[52]

On the question as to the water and blood from the side of the Crucified Carpi cites the theological authorities, Nicholas of Lyra, Scotus and Aquinas. His own opinion is that the water of the pericardia cannot issue from the breast of a wounded body in the color of water, and that therefore the incident must have been miraculous. But he adds that some persons of questionable orthodoxy argue that the water may have flowed out first, because the blood had been congealed in the muscles and skin of the breast by the flogging and scourging to which the body of Christ had been subjected.[53]

Despite his interest on the one hand in humanistic textual criticism and on the other in the citation of scholastic authorities and the prolongation of late medieval debates, Carpi was primarily an anatomist who relied first and foremost upon his own observations and experience. Again and again he states whether these agree or not with the findings of previous writers. For example, "that statement of Zerbus"—as to the descent of moisture from the head to the lungs to the testicles—"I neither blame nor approve nor do I understand it from any anatomy which I

[50] *Ibid.*, fol. 59v.

[51] *Ibid.*, fol. 60v. On John Baldus of Florence see further T (1929), p. 27.

[52] *Ibid.*, fol. 62r-v.

[53] *Ibid.*, fols. 336v-338r.

have performed."[54] Or Carpi says that he maintains silence as to the number of bones in the head, "since I am not in agreement with others, especially since I seem to reckon two extra bones above the other authors. In other points I am in accord with Galen and his followers."[55] At other times he is more outspoken as to his new contributions, affirming that beyond those things which are said there by Mundinus there are many things worthy of note to be said by us, and that he implores aid from God because he hopes to bring to light information "concerning the brain not unuseful to our posterity."[56] In this last case it must be admitted that it was merely an opinion of his own that he had to offer, but he also in his text and admirable plates gives us the outcome of his dissections, observations and experiments.

Carpi states that he has dissected human heads more than a hundred times solely in order to observe the rete mirabile, despite which he is still somewhat confused concerning it, but that Galen seems to have been mistaken with regard to it.[57] Or he says that he often has the part of the body in question before him as he writes.[58] He remarks that anatomy supports the belief of medical men against Aristotle that the brain and not the heart has the virtue of feeling and moving, that is, is the center of the sensory and motory system.[59] Examples of his purposive experimentation in connection with dissection are his disproving the assertion of Zerbus that there is a sieve in the kidneys by injecting hot water with a syringe, whereupon the organs merely swelled up but no water went through,[60] and his showing by a similar experiment with the bladder of a nine months' child not yet born that there was no other opening than the urinary pores.[61] He was nevertheless modest about laying claim to new anatomical discoveries. With regard to nose muscles he says, "However, I submit this opinion of mine to the learned and I put myself in their hands, since I do not wish to boast of the invention of any member which has not been mentioned by so

[54] *Ibid.*, fol. 296v.
[55] *Ibid.*, fol. 413v.
[56] *Ibid.*, fol. 429v.
[57] *Ibid.*, fol. 459r.
[58] *Ibid.*, fol. 484v.
[59] *Ibid.*, fol. 346r.
[60] *Ibid.*, fol. 178v.
[61] *Ibid.*, fol. 260r-v.

many and so great experts and physicians and philosophers."[62] But he laughs at the ignorant crowd of physicians in his time who think that the os sacrum is not in the back but in the breast. At Bologna there long were and still are some doctors of no little reputation who asserted this even at public dissections, so that the poor students led by the blind fell with them into the ditch.[63] He also is surprised that younger medical men believe in a division of the human womb into cells.[64]

Carpi further gives interesting details from his own medical and surgical practice and that of others. It was his custom to wash the wounds of the head with wine.[65] He had embalmed the bodies of the archbishop of Turin and of the reverend Laurentius de Flisco and never saw human hearts so fat.[66] He and his contemporaries employed a different mode of operating for stone in the bladder than that of Mundinus, but he defers explaining it until his work on surgery.[67] Ignorant surgeons in operating in the mouth sometimes opened up the saliva outlets so that the patient's mouth filled up with spittle.[68] Although a wound of the trachea was regarded as fatal, Carpi prided himself on having cured such cases.[69] In a case in which he was associated with Leonello of Faenza of a woman who died while pregnant, he opened the womb expecting to find two foetuses, "if not fully alive, at least so that they could be baptized," but instead found one foetus half-alive outside the womb among the intestines and in the womb a hard apostema larger than the foetus. The women of the household baptized the foetus.[70] It thus appears to have been considered important and even imperative in Italy at this time that even unborn infants who would not live should be baptized. But inasmuch as a priest was not called in to perform the rite, perhaps the practice should be regarded as a popular superstition not sanctioned by the church.[71]

[62] *Ibid.*, fol. 466r.
[63] *Ibid.*, fol. 492r-v.
[64] *Ibid.*, fol. 218r.
[65] *Ibid.*, fol. 414r.
[66] *Ibid.*, fol. 345r.
[67] *Ibid.*, fol. 304v.
[68] *Ibid.*, fols. 401v-402r.
[69] *Ibid.*, fol. 385r.
[70] *Ibid.*, fols. 111v-112r.
[71] An addition for the year 1299 to the *Chronicon breve a Christo nato ad annum 1294* of Baldwin of Ninove, telling of a monstrous birth with two heads, six teeth in either mouth, four

Carpi approaches the same subject when in speaking of monstrous births he states that if they are to be considered human and baptized, they should be generated from a woman and not from brute animals.[72] Carpi affirms that he saw a woman who bore an animal like a toad—perhaps a misshapen congenital idiot.[73] He further asserts that when a mere lad he saw a superfoetatum, born after the fifth month beyond the one first conceived, "who lived, but that woman was a virago."[74] He further declares that it is quite true that at Rome in the time of Leo X a mule bore a mule.[75] He also accepts the statement of Ptolemy and Haly that under certain constellations monstrous men like prophets and enchanters are born.[76]

The influence of the sky upon inferior nature was accepted by Carpi as it was by most of his contemporaries. He believed that animals and minerals and all things in the world were generated by forms in the sky which disposed them so and so.[77] He noted that all the Peripatetics agreed that the heart in the human body was like the first intelligence among the spheres, while Egidius on the pulse called it the sun of the microcosm.[78] But Carpi also believed that there were many secrets in nature to which the human mind could not penetrate.[79] He was not very favorable to Tommaso del Garbo's astrological explanation of the eighth month's child dying or the attribution of the first month of the formation of the child to the planet Saturn. He preferred a medical explanation.[80] But the birth of monsters he attributed to the action of the stars.[81]

To physiognomy and chiromancy Carpi makes some allusion but he cannot be said to dwell upon them fondly or approvingly. Once he remarks, "And so in physiognomy an oblong chin de-

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arms and four legs, says, "et iste foetus ab obstetrice baptizatus mox defunctus est." *Recucil des chroniques de Flandre,* II (1841), 735.

[72] Carpi, *Commentaria,* fol. 287r.

[73] *Idem.*

[74] *Ibid.,* fol. 283r, "Ego tamen Carpi dum essem valde iuvenis vidi unum superfoetatum nasci post quintum mensem ultra unum primo conceptum qui vixit sed illa mulier erat virago."

[75] *Ibid.,* fol. 270r.

[76] *Ibid.,* fol. 281v.

[77] *Ibid.,* fol. 235v.

[78] *Ibid.,* fol. 339r.

[79] *Ibid.,* fol. 236r.

[80] *Ibid.,* fols. 268v-269r.

[81] *Ibid.,* fol. 287r.

notes a mild man."[82] Or he notes that some chiromancers relate a protuberance of the little finger to Venus, and others to Mercury, or that there are divers lines in the hand which concern the chiromancer rather than the anatomist and which he therefore says no more of.[83] In still a third passage, after devoting half a page to chiromancy, he refers his readers for further information to books on that subject, "for here I pursue other and more useful matters."[84] He rejected the notion of Albumasar, Zerbus and others that the number of nodes on the umbilicus of the first-born indicated the number of children that the mother would have. He had questioned many experienced mid-wives on this point and they called it a pure fiction.[85] On the other hand, Carpi repeats without criticism the statement of Peter of Abano in the 97th Differentia of the *Conciliator,* that the head is a most divine member because it is the seat of the rational soul and also of sneezing, which is a sacred and holy augural sign according to Aristotle's *History of Animals,* I, xi.[86]

Concerning the parts and functions of the human body or the bodies of other animals Carpi still cherished a number of notions which have since come to be regarded as antiquated and erroneous, not to say superstitious, while others were more in accord with present beliefs and interests. He discussed what was the noblest part of the heart and in that connection remarked, "And we use very often a bone from the heart of a stag in medicines." It was often adulterated, he complained, but a strong cordial.[87] Or he adds to Mundinus for the benefit of his students the doctrine that the lungs feed the soul by transforming the air breathed into vital and animal spirits.[88] With Aristotle in the *History of Animals* he believed that the growth of hair was not regulated by the soul and therefore might continue after death.[89] With Peter of Abano he agreed that the teeth alone keep growing all life through, since otherwise they would eventu-

[82] *Ibid.*, fol. 22v.
[83] *Ibid.*, fol. 35v.
[84] *Ibid.*, fol. 31r.
[85] *Ibid.*, fol. 263r.
[86] *Ibid.*, fol. 404r.
[87] *Ibid.*, fol. 344v.
[88] *Ibid.*, fol. 360v.
[89] *Ibid.*, fol. 405v.

ally be worn off.[90] In performing the operation of trepanning the skull Carpi had often noticed that rustics or persons of the lower classes who wore no headgear possessed thicker and harder skulls. He therefore advised fathers to let their sons go bareheaded or with only very light caps or hats, so that nature might protect the head. "For when nature perceives aid from art in any member it does not come to the aid of that member abundantly but in diminished amount."[91]

Carpi drew a distinction between dolichocephalic and brachiocephalic persons, stating that those with long heads have the ventricles of the brain distinct and so think clearly, while the roundheads have confused ventricles and minds. He quotes Peter of Abano that the Genoese and some inhabitants of Gaul were confused in their intellectual operations because their heads were compressed artificially in infancy to be round and pointed on top, a practice which Carpi assures us no longer prevailed among the Genoese of his time. On the more general subject he cites Galen and Hippocrates and refers the reader to Avicenna for further information, but it does not seem to me that Avicenna makes so sharp a distinction between roundheaded and long-headed persons as Carpi.[92] In addition to this adumbration of modern interest in anthropology may be noted Carpi's citation of Boccaccio, *De genealogia deorum,* IV, 68, for what might seem a prehistoric find made by peasants near Drepanum, Sicily. They discovered a large underground cave with a gigantic man with a wooden club in his left hand. All crumbled to dust at the touch, but 1500 pounds of lead remained from the club, and from the body three teeth, of huge size and weighing one hundred ounces Drepanese, which were preserved in the local church of the Annunciation. The fore part of the skull would hold many modes of grain, and the os cruris was estimated by skilled geometricians to exceed two hundred cubits in length. Carpi's comment is that it was a matter worth noting and remembering, "although it seems very difficult to believe."[93]

[90] *Ibid.,* fol. 232v.
[91] *Ibid.,* fol. 410r.
[92] *Ibid.,* fol. 411r.
[93] *Ibid.,* fol. 14r.

According to Carpi, the cynocephalus was the only animal other than man which was addicted to self abuse. A scholar of his had told him of one which, when caught in the act, was as overcome by shame, as if it had been endowed with reason.[94]

Before the first edition of his *Commentary* on Mundinus, Carpi had published at Bologna in 1518 a briefer treatise on fracture of the skull.[95] In it, too, we find frequent citation of previous medieval Latin writers: Hugo, Lanfranc, Henry, Roland, Conciliator, Dino del Garbo, Gentile da Foligno, Petrus de Argellata, Jacobus de Partibus, Nicholas of Florence, Turrisianus, Maphaeus, Anselm of Genoa, Leonard of Bertipaglia, as well as citation of Greeks and Arabs. Again Carpi recognizes a possible occult influence of the sky.[95a] Another feature is the acquaintance shown with Jewish medical practitioners whom Carpi calls empirics. Some younger Latins, including Hugh of Lucca and Theodoric, adhered to the same sect. The Jews especially employ pigments and potions. A friend of his father, called Jacob the Jew, who cured Ercole d'Este and others, once took Carpi with him to the fields, where he collected the herbs for such a potion.[96]

Another passage concerns the relations between physicians and surgeons. Carpi says that today physicians disdain to be called surgeons but, in order to make more money, associate operating surgeons with themselves. "And so the blind lead the blind and both fall into the ditch." This reproach was to be repeated by Vesalius who, whether carelessly or maliciously, extended it to apply to the previous medieval period. But Carpi says that from the time of Avicenna to that of Guy de Chauliac all medical men were both physicians and surgeons. He believes that many physicians of his time would operate, if they knew how, but no one is a skilled surgeon who has not devoted himself

[94] *Ibid.*, fol. 13r.

[95] *Tractatus de fractura calve sive cranei a Carpo editus*, Bologna per Hieronymum de Benedictis, 1518, 4to, 105 fols. I have examined this edition at the Academy of Medicine, New York, which also has the edition of Venice, 1535. Other editions were at Leyden in 1629 and 1651.

[95a] *Ibid.*, fol. 49.

[96] *Ibid.*, fol. 58r.

to the art from boyhood. But more faith is to be placed in present-day physicians than in the surgeons who are a rough, crude crowd who do not know which way they are turning.[97]

Andreas de Laguna, a Spaniard of Segovia and translator from the Greek, in 1535 published at Paris a brief work on anatomy. In the preface he promised to say nothing which he could not substantiate by the authority either of Hippocrates, Galen, Celsus, Plato, Aristotle, Pliny, or Alexander of Aphrodisias.[98] Such authoritarian anatomy under the impulse of the classical reaction was contrary alike to the Italian activity in dissection since Mundinus and to the growing interest in anatomy in the sixteenth century.

A transition and sort of half-way house between the writings of Carpi and Vesalius is provided by the rather bumptious treatise on anatomy of Nicolaus Massa, printed at Venice in November, 1536,[99] and dedicated to pope Paul III, thereby suggesting that the church did not frown upon the study of anatomy as some have held. Despite the publication of the *De fabrica* of Vesalius in 1543, there was another edition of Massa's work on anatomy in 1559.[100] It was not, however, mentioned by Gesner in his *Universal Library* of 1545, although he listed Massa's works on pestilential fever and syphilis, published at Venice in 1540 and Basel in 1536 respectively.[101] In the collection of treatises on baths printed at Venice in 1553 there was included a letter of August 27, 1524 by Massa on certain baths taken from his volume of medicinal epistles.[102]

The modesty and restraint of Carpi are wanting in Massa

[97] *Ibid.*, fols. 29v-30r.

[98] Gesner (1545), fols. 39v-40r.

[99] Nicolaus Massa, *Liber introductorius anatomiae sive dissectionis corporis humani nunc primum ab ipso auctore in lucem editus in quo quamplurima membra operationes et utilitates tam ab antiquis quam a modernis prętermissa manifestantur.* Venetiis in vico sancti Moysi aput signum archangeli Raphaelis In edibus Francisci Bindoni ac Maphei Pasini sociorum accuratissime impressum Mense Novembri MDXXXVI. The dedication to Paul III is dated on the Ides of November, 1536. Copy used: BN 4° Ta⁹. 19. 108 leaves.

[100] Copy at Paris: Bn 4° Ta⁹. 45.

[101] Gesner (1545), fol. 522r.

[102] *De balneis omnia quae extant,* Venet, apud Iuntas, 1553, fols. 299v-302v. Nicolaus Massa, *Medicinalium epistolarum liber, Ep. XXVI, De balneis Calderinis.*

whose very title proclaims that there will be revealed members of the body, operations and utilities which had been passed over by the ancients as well as the moderns. In the dedication to Paul III he further claims to have gathered fruits far better than those which are read in other fields of letters. He had promised the philosopher, Hieronymus Marcellus, to write an introductory book on anatomy, "because I have often shown many members unknown to the ancients, and not members only but not a few operations passed over by and unknown to them." Marcellus should thank God that under Massa's leadership he has so mastered the parts of the human body that he need envy no one of their time.[103]

Massa's conceit with himself is equaled only by his fault-finding with his contemporaries and predecessors in the field of anatomy. There are very few who study anatomy in his time, and he has little respect for many recent writers on the subject who were read everywhere in the schools and were esteemed as oracles —two utterances which come very close to being mutually incompatible but are made by him on the same page.[104] Modern anatomists write a great deal that is not essential to the science of dissection and indulge in sophistic arguments, questions between Aristotle and Galen, glosses and distinctions which so befog the minds of youthful students that they fail to grasp anatomy itself.[105] Avicenna, Mundinus, Zerbus and Carpi are all at one time or another criticized by name,[106] while Fuchs, without being named, is more sharply and justly criticized for the

[103] Massa, *Liber introd. anatomiae,* 1536, fol. 3r.

[104] *Idem,* "cum pauci admodum sint qui Anatomiae hac tempestate studeant . . . ignaviae multorum recentiorum de anatomia scribentium qui passim per scholas et gymnasia legebantur . . . et uti oracula habebantur." See also cap. 7, fol. 18v, "cum nostris temporibus pauci admodum reperiantur qui scienter operentur."

[105] *Ibid.,* fols. 3v, 15v.

[106] *Ibid.,* cap. 5, fol. 14, "Neque attendes verbis Avicenne et Mundini dicentium venam devenire ad gibbum epatis cum sint contraria sensui"; cap. 4, fol. 12v, "neque Mondinus ipsas cognovit"; cap. 3, fol. 10r, "In hoc etiam deceptus est Iacobus Carpensis vir alioqui doctus qui fatetur se tot homines secasse et quamplurimi alii etiam ut Zerbus et quidam moderni qui nomine solum res cognoscunt." For other criticisms of Avicenna and Mundinus see fols. 28r and 94v.

errors which he perpetrated himself while collecting those of others at second hand.[107] Indeed Massa is more bitter in his criticism of the attitude of contemporaries towards anatomy—"moderns who know things only by name" or who "trusting in the dicta and questions current in the schools have failed to observe"[108]—than he is of past writers. Only a few months ago one of the leading physicians of Venice denied that the muscles of the abdomen had wide bands surrounding the longitudinal muscles. "But others who had seen an actual dissection with me only smiled and made no reply to him."[109] The last statement shows that anatomy had its following as well as its opponents or those indifferent to it, and that Massa's pessimism as to his own time is somewhat overdrawn. It laid, however, the foundation for a like attitude by Vesalius and has been repeated by subsequent historians. But the physician of repute who committed errors in anatomy was something of a stock figure and already has been encountered in the pages of Carpi.

Massa himself warns the reader not to think that he attacks the ancients. Their knowledge may have often been imperfect but they constitute our foundation. He asserts that after Galen the science of anatomy was handed over to oblivion, but he does not sympathize with current attacks upon "the most wise Arabs." Avicenna he can on occasion call most learned and a faithful interpreter of Galen. And he still, like Carpi, follows the method which Mundinus, "a man most celebrated in dissection," handed down.[110] In the present volume he sets down only what can be seen in a single dissection and is most essential in medicine, although he realizes that all the members cannot be seen in one cadaver. But he leaves the other parts for a more copious future volume,[111] which seems not to have been executed.

The chief claims to distinction of his little volume, which is still so largely drawn up in the manner of Mundinus, are: its omission of the discussion of late medieval questions to which

[107] *Ibid.*, cap. 12, fol. 22v.

[108] *Ibid.*, fol. 10r, "confisi in dictis et questionibus per scolas currentibus dimiserunt sensum."

[109] *Ibid.*, fol. 3v.

[110] *Ibid.*, fols. 4r, 5r. On Avicenna, fol. 9v.

[111] *Ibid.*, fol. 5r.

Carpi gave much space, its insistence upon the importance of actual and frequent dissection as against disputations and use of authorities—in which, however, it is not much different from Carpi—its statement of the author's personal clinical experience and dissection at Venice "in the hospital of Sts. Peter and Paul" or "in the convent of Sts. John and Paul," and its setting forth of what Massa claims as new discoveries or rediscoveries. These, however, hardly measure up to what the title page and preface had led us to expect.

Before Vesalius Massa promises that "we shall see whether the members of apes are entirely similar to those of man as some have believed." He states that many brutes resemble man in some respects but not in all. Indeed, the beasts differ from one another in their anatomical structure. "For the members of a deer differ from those of a lion, since the soul of the deer differs from the soul of the lion."[112]

Some of Massa's personal observations and experiences are definitely dated. He was able to examine bodies emaciated by hunger "in the most unhappy year of penury, 1527."[113] From the kidneys certain passages or pores often connect with the emulgent artery together with the urinary pore. "But you will not see this in all cases, although many have believed that it is found in all, for I have seen it only once in a body dissected by me in 1532."[114] In 1526 he observed a case of death from suffocation of the womb from retention of the menstrua.[115] Regarding the disputed third ventricle of the heart Massa notes that a small cavity may sometimes be discerned in the thick wall between the right and left ventricles, as he found and showed in 1534 in a certain cadaver which had a heart of such magnitude as he never saw in another man.[116] He had dissected a monstrous birth resembling Siamese twins which had two hearts in one

[112] *Ibid.*, cap. 3, fol. 8v.
[113] *Ibid.*, cap. 2, fol. 7v.
[114] *Ibid.*, cap. 18, fol. 32v.
[115] *Ibid.*, cap. 23, fol. 44r.
[116] *Ibid.*, cap. 28, fol. 56r. Massa adds, "Vidi etiam istam tertiam cavitatem seu ventriculum in aliis sed non in omnibus." At fols. 56v-57r he refers to another post-mortem of 1533 "in coenobio divorum Joannis et Pauli," and at fol. 77r mentions a freak case seen in 1532 of double muscles.

capsule, only a single stomach and liver, and imperfect intestines and membrum virile.[117] Like his medieval predecessors he mentions noted patients by name such as Bartolameo de Panzatis, a most celebrated noble of Florence.[118]

Massa claimed to be the rediscoverer "in our time" of the fleshy covering or muscular membrane enveloping the entire body which no one had noticed or adequately described since Avicenna, although Mundinus had mentioned it.[119] It does not seem to occur to Massa that Mundinus may have merely mentioned it as being obvious and well known. Vesalius has a chapter on the same membrane[120] which he says the Arabs were the first so far as he knows to call the fleshy membrane. Vesalius adds that some of his contemporaries recognize its existence only in the abdomen, and that others, when he demonstrated that it extended throughout the body, would not admit that it was the same as that described by Galen, because there was fat between it and the skin which was not the case in the apes dissected by Galen.[121] Vesalius says nothing of Massa's claim to have rediscovered the membrane.

Massa hoped to discuss the anatomy of the muscles more fully in another treatise and there tell of certain muscles unknown to moderns, such as that which proceeds from the chest to the mandible, and many overlooked by the ancients, such as those which move the glottis or caput bronchi in the formation of sounds and in breathing, which have a chord in the middle, and also the two muscles moving the tongue externally.[122] How far

[117] *Ibid.*, cap. 28, fols. 57v-58r. He also asserts that he had dissected the body of a man with only one testicle: cap. 20, fol. 36v.

[118] *Ibid.*, cap. 27, fols. 50v-51r.

[119] *Ibid.*, cap. 3, "De dignotione panniculi carnosi sive musculi membranei vel totius corporis involucri," fol. 10r, "Hi omnes testes sunt me inventorem fuisse huiusce panniculi nostris temporibus neque alium post Avicennam videbis qui hunc panniculum viderit aut cognoverit quoniam neque Mundinus eum ostendit ex suis scriptis quamvis ipse dixerit panniculum carnosum esse post pinguedinem quoniam neque ortum neque quantitatem ostendit."

[120] *De humani corporis fabrica*, 1543, printed at Basel by Ioannes Oporinus, II, 5, p. 231, "De cute, cuticula, et membrana per universum corpus cuti subiecta praeterea et adipe inter cutem membranamque carnosam reposito."

[121] *Ibid.*, p. 233.

[122] *Liber introd. anatomiae*, 1536, cap. 25, fol. 47v. See too cap. 30, fol. 61v.

this program was fulfilled by Vesalius in his book on the muscles I have not been able to make out[123]: at least he gives no credit whatever for any suggestions to Massa.

Massa asserted that the rete mirabile of arteries was not a figment of Galen, as some had dared to affirm, and that he had often found it and shown it to the bystanders, although in dead bodies it was harder to see than in living and required the application of candles and eye-glasses.[124] Vesalius on the contrary held that Galen had imagined its existence in the human body. So well known to all, however, was the name, rete mirabile, that Vesalius confessed that when he dissected a human head he commonly dissected the head of a sheep or cow at the same time so that he might not disappoint the spectators and damage his reputation in their estimation by his inability to find the rete mirabile.[125] Again Vesalius makes no reference to Massa. Indeed, so far as I have observed, he never mentions him. This silence must not be taken to indicate that he was unaware of the existence of Massa's book or had not read it, since in general Vesalius abstains from naming other contemporary or recent anatomists.

The work of Vesalius was not a mere introductory treatise like that of Massa, but the fuller, magisterial presentation of the subject which Massa had hoped to write. It did not follow the order of Mundinus and that of actual dissection, as Carpi had done, but presented the subject of human anatomy in seven books in the Galenic order, the first devoted to the bones, the second to the muscles, and so on. Its numerous and elaborate plates with their minute lettering and description surpassed anything that had been seen before, at least in print or in

[123] *De humani corporis fabrica,* II, 21, p. 257, "Duo musculi dissectionum ignorati professoribus et ab osse u referente enati ac in laryngis operculi radicem inserti," perhaps may refer to two of the muscles mentioned by Massa.

[124] *Liber introd. anatomiae,* 1536, cap. 39, fol. 89v: "Neque mirentur anatomiste si quandoque non viderint hoc rete quoniam quando sunt inanitae arteriae spiritu rubeo sunt fere insensibiles sed appositis candelis et ocularis si visus non deseruit videbis saltem processus arteriarum subtilissimarum in modum subtilissimorum villorum. . . ."

[125] *De humani corporis fabrica,* p. 642, line 19: also 50, 34; 52, 38; 310, 44; 524, 8.

known manuscripts. It thus did in a sense mark an epoch in the history of anatomy but not in the way or to the extent that has sometimes been fancied and stated.

While two centuries and more of anatomical observation and practice were thus approaching their culmination in the Italian peninsula, beyond the Alps and Rhine in Germany at Marburg public dissections were just being instituted; and a few brief and elementary anatomical treatises published. Philip of Hesse permitted the use of the corpses of criminals who had died in prison or upon the gallows, and the first anatomies at the university were held on June 1, 1535, and March 1, 1536, by John Dryander, ordinary professor of medicine.[126] On October 25, 1536, Dryander further delivered an oration before the university commending and urging the study of anatomy.[127] It was printed in the following year together with a treatise by Dryander on the anatomy of the head, consisting of a dozen or so figures of the head with explanation on the opposite pages of the parts shown. The volume further included the *Anatomia porci* of Copho and a discussion of the anatomy of the infant taken from the "commentaries of the most illustrious anatomist, Gabriel de Zerbis,"[128] whom we have heard Carpi criticize. In his oration Dryander advocated state or municipal support for the study of anatomy, praised Philip for permitting public dissections, and noted that even the papists, despite their carrying pious zeal as to funerals and burial almost to the point of superstition, permitted dissection of dead bodies.

Dryander, who also wrote in the fields of mathematics and

[126] The announcement of the rector to this effect is printed in the volume mentioned in note 128: "Rector academiae Marpurgensis rerum medicarum studioso S.D.P.," etc.

[127] *In praelectionem medicam oratio qua anatomiae necessarium studium commendatur Marpurgi à Ioan. Dryandro in frequentissimo eius Academiae consessu habita VIII kalend. Novemb. Anno MDXXXVI.* At fols. (a iv)r-d verso of the volume listed in note 128.

[128] *Anatomiae hoc est corporis humani dissectionis pars prior in qua singula quae ad caput spectant recensentur membra atque singulae partes singulis suis ad vivum commodissime expressis figuris deliniantur. Omnia recens nata Per Io. Dryandrum medicum et mathematicum. Item Anatomia Porci ex traditione Cophonis. Anatomia Infantis ex Gabriele de Zerbis.* Marpurgi apud Eucharium Cervicornum Anno 1537 mense Iunio.

astronomy,[129] showed in the aforesaid oration on anatomy that he shared the astrological viewpoint. In it he states that God has written in the sky those things which He has willed that men should know, and that the human body is a microcosm in which brain and heart correspond to sun and moon in the heavens. Indeed, he employs this correspondence between the human body and the universe as an argument for anatomical investigation.[130] Dryander also illustrates that close relation between anatomy and chiromancy to which we have earlier alluded. In 1538 he published without giving the author's name the work on chiromancy of Antiochus Tibertus,[131] composed and first printed at Bologna in 1494.[132]

In the years 1540-1541[133] Dryander reverted to anatomy again by publishing the work of Mundinus. In the preface he justified this action by affirming that for two hundred odd years Mundinus had reigned uninterruptedly in the universities and that, although his Latin might be barbarous, he set forth in excellent and succinct order the most essential points anent dissection. Dryander further declared that his age would be in a bad way, if it studied astronomy and cosmography only from works written in good Latin, and pointed out that such manuals as Donatus and Sacrobosco were still employed in their fields. He granted, however, that the text of Mundinus was corrupt and needed to be restored to its pristine purity, and he further expressed the opinion that where it disagreed with Aristotle or Galen it was usually wrong, and that some of its statements were not consonant with reason and experience. That Dryander was not well qualified to pass upon such matters is suggested, however, by one of his specific criticisms. Quoting Mundinus as having said

[129] He had published in 1537 a tract on astronomical rings and explanations in German of the astronomical instrument known as the cylinder and of the material sphere. The same year he edited the work of Abraham Judaeus on nativities and in 1544 a *Cosmography* by someone whose name he could not give.

[130] *Ibid.*, fol. b ii verso.

[131] *De chyromantia libri tres authoris cuiusdam vetustissimi per Ioannem Dryandrum restituti.* Mogunt., Ivo Schöffer, 1538, 8vo (Graesse).

[132] Hain *15519; T IV, 462.

[133] The edition is dated 1540 on the title page but at the close of a "Censura de Mundini Anatomicis commentariis" on the last page, fol. 67v, we read, "Vale lector optime. MDXLI."

that, since the voice is a movement, voluntary or made by voluntary motion, its origin should be in the brain, Dryander comments that this line of reasoning is false and contrary to Galen's statement that the brain is not moved locally in any way. But Mundinus would seem to have meant merely that the brain was the seat of the will and the mover, not the moved.[134] This approval and use of Mundinus by Dryander at Marburg is to be contrasted with the prohibition of further use of Mundinus at Tübingen two years before to which we have already alluded.

Continuing our chronological survey, we come in the year 1543 to the *De humani corporis fabrica* of Andreas Vesalius. In the very preface, which one fears is as much of the work as some admirers of Vesalius have read, he does an injustice to medieval medicine and makes sweeping statements which have often since been repeated but are only partially true at best and so misleading that they would better have never been uttered. If some of the regret which historians of science have expressed over Osiander's preface to Copernicus *De revolutionibus* were transferred to Vesalius's preface to *De humani corporis fabrica,* it might be better all around. Vesalius asserts that nothing more pestilential could have afflicted medicine than that which happened especially after the filthy inflow of Goths and Mansor, king of the Persians, namely, that the hand, the chief instrument in healing, was so neglected that manual operation was left to vulgar and uninstructed persons such as barbers or surgeons who hardly had the rank of domestic servants, while the composition of drugs was abandoned to pharmacists until the knowledge of many was forgotten. He follows this up with the statement that today in medicine those who are thoroughly learned abstain from manual operations as from the pest lest they be traduced by the pundits of medicine to the uneducated public as barbers. This exaggerated utterance, which perhaps had its origin in some personal slight suffered by Vesalius, or may be merely an exaggeration of what we have heard Carpi and Massa say, warns us that the previous asseveration was equally overdrawn. The

[134] *Op.* cit., fol. 44v.

existence of such conditions in what he elsewhere calls "our happy age" was no reason for his shouldering the blame for them upon the preceding medieval period, concerning which he seems to have had more humanistic prejudice than accurate knowledge.

It is seldom that Vesalius cites specifically and individually by name other authorities in his field than Hippocrates and Galen, although occasionally he likes to roll a list of classical names off his tongue.[135] He more often alludes to the Arabic writers generically than to any particular ones, saying for example, "but the Arabs are hallucinated."[136] Avicenna forms an occasional exception,[137] but the interest in him is partly as having possibly been acquainted with works of Galen that are not now extant,[138] although he may have known of them only indirectly through Oribasius. Medieval Latin writers are mentioned only to ridicule some statement by them, as when the onus for the notion that there are seven cells in the womb is laid upon Michael Scot and Albertus Magnus.[139] Or the theory of three cells of the brain and the distribution among them of the functions of imagination, ratiocination and memory is placed at the door of "Thomas, Scotus, Albertus and his cohorts." It was illustrated by a picture in the *Margarita philosophica* of 1503 which Vesalius used to study as a schoolboy, but is disproved by dissection of the brains of quadrupeds which have the same ventricles but lack the rational soul.[140] Vesalius says nothing of Carpi's recent and previous critical discussion of the cells both of the womb and of the brain, although he seems to have imitated

[135] *De humani corporis fabrica*, VI, 15, "Zeno, Chrysippos, Posidonios," etc. VII, 6 (p. 635), "apud Herophilum aut Andream aut Marinum aut Lycum." In his preface he bemoans the loss of such ancient medical authors as Eudemus, Herophilos, Marinos, Andreas and Lycos.

[136] *Ibid.*, II, 42 (p. 303 in edition of 1543): "Verum Arabes hallucinantur." Another example is II, 43 (p. 309): "quemadmodum fecerunt Arabes." See also III, 9 (p. 290); I, 28 (p. 126).

[137] *Ibid.*, thus at III, 5 (pp. 273-74) his names for veins are given, while at p. 233 a marginal note indicates that some Hebrew words are "ex Avicenna."

[138] *Ibid.*, II, 49 (p. 227 which should be 327).

[139] *Ibid.*, V, 15 (p. 531). A little later at p. 538 Pliny and Albert are accused of false assertion concerning menstrual blood.

[140] *Ibid.*, VII, 1 (pp. 623-24).

the former. Massa too had already denied that the womb had more than one cell.[141] Indeed as a rule Vesalius mentions no recent anatomists by name, and in the case of his general allusions to "professors of dissection" it is sometimes not easy to tell whether he has ancients or moderns or both in mind.[142] If, however, we did not know from other sources that the teaching and study of anatomy had been flourishing for some time, we might infer it between the lines of Vesalius's own text, and he even makes such explicit admissions as that there is hardly any university today which does not possess a skeleton for use in instruction.[143] In the same passage, however, he has just represented the study of anatomy as a recent and almost personal revival.[144] This failure to recognize the work of his predecessors and contemporaries in his own field of anatomy seems the more attributable to jealous silence on the part of Vesalius, because he has taken the trouble to mention by name and to praise highly certain other living persons, such as his youthful assistant in anatomy at Brussels, Antonius Succha[145] or Johannes Baptista Montanus, professor at Padua, who had revised the text of Galen,[146] or the professor of philosophy there, Marcus Antonius Genua, who is called "non modo musicorum absolutissimus verum et nostrae aetatis philosophorum eximium decus," and Wolphgangus Herwort, a patrician of Augsburg.[147] Or he praises the present podestà of Padua, Marcus Antonius Contarenus for

[141] *Liber introd. anatomiae,* cap. 23, fols. 44v-45r.

[142] In *De humani corporis fabrica,* at V, 16 (p. 539) we have "veterum dissectionis professorum"; in V, 17 (p. 541), "Galenum reliquosque dissectionis professores"; in VI, 16 (p. 602), "Galenus et caeteri dissectionis professores"; II, 21 (p. 257), "Duo musculi dissectionum ignorati professoribus"; p. 258, "ne aliorum dissectionis professorum placita prorsus interturbarentur"; II, 48 (p. 324), "antehac dissectionis Professoribus incogniti fuerint"; V, 9 (p. 513), "Anatomes professores audacissime asserunt."

[143] *Ibid.,* V, 19 (p. 548).

[144] *Ibid.,* V, 19 (p. 547): "idque potissimum in nostra huius seculi felicitate quando una cum ceteris disciplinis Anatome prorsus sopita eo usque promoverit ut omnia quae hoc opere persequor una eademque hyeme et Patavii et Bononiae in ea spectantium frequentia ad eum modum non semel aggressus sim quo praesentes septem libros digessi."

[145] *Ibid.,* II, 22, p. 260.

[146] *Ibid.,* II, 43 (p. 309). Vesalius eulogizes him at some length.

[147] *Ibid.,* I, 7 (p. 35).

his learning and for supplying himself with plenty of cadavers.[148] Vesalius even gives the names of two contemporaries who can move their ears,[149] although he does not put them in capitals as he did the names of Succha, Genua and Herwort, or speak of them with such adulation. This failure of Vesalius to mention contemporaries engaged in dissecting was complained of by Dryander.[150]

Whereas Carpi had put his work in the form of a commentary on the medieval manual of Mundinus which he praised highly, although also adding much to it and occasionally correcting it, Vesalius practically passes over Mundinus in silence and makes the anatomical writings of Galen rather his point of departure. He was concerned to restore the text of Galen to its original form,[151] and had found three errors in numbers in all manuscripts of the first book of Galen, *De administrandis sectionibus,* that he had seen.[152] He was not slow to point out Galen's errors, but he was more opposed to "those who today call themselves Galenists" but do not study anatomy and dissect as Galen did,[153] or who try to excuse and explain away Galen's errors after these have been indicated.[154]

The work of Vesalius of course contains indications, or at least assertions, of discovery of anatomical details unknown to previous writers on and students of the subject,[155] and denials on the basis of personal dissection and observation of previous beliefs and statements which he rejects as figments.[156] It alludes to dissections at Bologna and Padua,[157] to the cemetery of the Innocents and the monastery of Lazarus at Paris, or narrates with lively satisfaction—not to say, ghoulish glee—how Vesalius him-

[148] *Ibid.*, VII, 18 (p. 651).

[149] *Ibid.*, II, 13 (p. 242).

[150] *Vesalii ad Joach. Roelants Epistola, Opera,* II (1725), 675.

[151] *De humani corporis fabrica,* II, 43 (p. 309): "Verum haec cum innumeris aliis pro mea virili in Galeno sunt restituta."

[152] *Idem.*

[153] *Ibid.*, II, 58 (pp. 243-44 or 342-44), "qui sese Galenicos hodie appellitant." Also II, 22 (p. 261), "qui hodie sese Galenicos profitentur."

[154] *Ibid.*, III, 7 (p. 282).

[155] Examples are *Ibid.*, III, 8 (p. 286); III, 9 (p. 288).

[156] See *Ibid.*, V, 9 (p. 513); V, 7 (pp. 506-7).

[157] *Ibid.*, II, 22 (p. 261); III, 7 (p. 279).

self with Gemma Frisius robbed the gallows outside Louvain and later allowed himself to be shut outside the town gates at night to get more bones,[158] and how students at Padua stole from the tomb the corpse of the mistress of a monk of St. Anthony and skinned it to prevent its identification.[159]

Anent the historical relations between science and theology a passage or two from *De humani corporis fabrica* may be noticed. In condemning the belief in seven cells in the womb Vesalius alludes to scholastic theologians, among whom, he says, there is more frequent disputation as to generation than among medical men, and who attend his lectures in crowds whenever the genital organs are to be shown.[160] Besides this unkind cut Vesalius perhaps indulges in a Niphian or Pomponazzian innuendo when, having urged that there may well be water in the heart and having observed that the bodies of criminals hanged or suspended on crosses today swell up greatly from water in the bladder, he states that he will drop this idle discussion lest he become involved in a theological controversy as to the water and blood that flowed from the side of the Crucified and mix up his account of the effect of the sun's heat upon suspended bodies with the Gospel according to St. John[161] A certain bone in the human body was said to be incorruptible and to serve as the seed from which the resurrection of the body would take place at the judgment day. Vesalius says that he will leave the discussion of this "dogma" to the theologians "who vindicate to themselves alone free thought and expression of opinion concerning the resurrection and immortality of souls."[162]

While Vesalius continues relatively few of the late medieval discussions of which Carpi was still fond, like that just mentioned

[158] *Ibid.*, I, 59 (pp. 161-62).

[159] *Ibid.*, V, 15 (p. 538).

[160] *Ibid.*, V, 15 (p. 531): "quibus frequentior de genitalibus et semine quam medicis disputatio est quosque quum generationis organa in scholis ostendimus frequentissimos habemus spectatores."

[161] *Ibid.*, VI, 8 (pp. 584-85): "Caeterum nugaci hac disceptatione relicta ad cor properemus ne tandem in theologorum quaestionem qua de mysteriis plena Salvatoris nostri Iesu Christi aqua sanctissime pertractant incidamus ac divi Iohannis verissimum Evangelium his nostris de solis calore in suspensis vi rationibus et carnificinis minime misceamus."

[162] *Ibid.*, I, 28 (p. 126).

concerning the water from the side of the Crucified, there are some references to the occult arts in his *De humani corporis fabrica.* The incorruptible bone just referred to is further described as that concerning which the magi and followers of occult philosophy have written so prolixly and which is called by the Arabs Albadaran. Vesalius declares it better known to the superstitious than to students of anatomy. Three harlots of Venice had murdered a male infant for the sake of this bone and its heart which they had torn out of the still living body.[163] In listing the muscles of the hand Vesalius alludes to those at the base of the thumb which make a protuberance which the chiromancers call the mountain of Venus or mountain of Mars, and which Galen mistook for a single muscle. A like mass of flesh at the base of the little finger is called the mountain of the moon by the chiromancers. Vesalius further mentions the line of the hand which they call the line of life and of the heart.[164] Thus Vesalius at least recognizes the existence of the art of chiromancy, if he is noncommittal as to its merits or defects. On the other hand, except as the aforesaid phrases are suggestive of astrological chiromancy, little or no interest in astrology and the influence of the stars is shown in *De humani corporis fabrica.*

In his work on surgery, however, Vesalius accepts the opinion of Plato that the sky is the seed-bed or cradle of forms, and that from it come the more secret and hidden powers and forces which are to be found in all things. He now agrees with Mesue—an Arabic author!—that simples, in purging the body of humors, act by their whole substance, property, form or species, that is, by occult and celestial virtue, and not, as Galen held, by the action of like on like or contrary on contrary. With such occult virtues Vesalius closely associated the sympathy and antipathy of things, and he called the magnetic compass a miracle indeed unknown to the ancients.[165]

Thus, while Vesalius might try to shake off the dust of the

[163] *Idem.*

[164] *Ibid.*, II, 43 (p. 308).

[165] Vesalius, *Chirurgia magna,* lib. VII, cap. iii: edition of 1725, II, 1133-35.

middle ages and the errors of Galen, he still retained some of the occult conceptions which were common in the sixteenth century.

The anatomy of Vesalius was received with acclaim from the start. Gesner, in his *Universal Library* of 1545, devoted far more space to it than to the magnum opus of Copernicus printed in the same year, 1543. He listed Carpi but apparently did not know of his *Commentary* on Mundinus, mentioning only his much slighter *Isagogae breves,* as published by Henry Sybold at Strasburg in 1530, in which edition the anatomical illustrations are much smaller and less distinct than in that of Bologna, 1523. It is a rather pathetic circumstance that, although in this short introduction Carpi proudly referred the reader for fuller information to his *Commentary* on Mundinus, "for which even envy will love me after my death,"[106] there was to be no second edition of his magnum opus, but two more of the *Isagogae* at Strasburg, 1530, and Venice, 1535, with a belated English translation in 1660 and 1664, while the tract on the fracture of the skull also ran through several editions. That the longer commentary was not reprinted suggests that its content and mode of presentation no longer suited the taste of the time. Gesner said that, after the most accurate anatomy of Vesalius, almost anything on the subject written by others, especially by barbarous authors, should be judged useless so far as reading it was concerned, although past authors should not be defrauded of their

[106] *Isagogae breves et exactissimae in anatomiam humani corporis per illustrem medicum Carpum in inclito Bononiensi gymnasio ordinarium Chyrurgiae professorem.* Sybold's dedicatory epistle is dated, "Argentorati quarto nonas Iunii 1530." At fol. B 5 verso: "Qui tamen melius hos musculos et multa alia perscrutari intendit ad nostra super Mundino commentaria recursum habeat, de quorum labore post mortem me amabit invidia." Copy used: BM 548.b.1.

This edition not only has much inferior plates but omits Carpi's dedicatory preface, farewell to the reader, and other preliminary and final matter found in the elegant edition of Bologna, 1523. *Isagogae Breves perlucide ac uberrime in Anatomiam humani corporis a communi Medicorum Academia usitatam a Carpo in Almo Bononiensi Gymnasio Ordinariam Chirurgie Docente ad suorum Scholasticorum preces in lucem date.* Impressum et noviter revissum Bononie per Benedictum Hectoris. 8o fols. Copy used: BM 7421.ee.19. The above passage here occurs at fol. 8v. For other references to his *Commentary* on Mundinus see fols. 23r, 55v, 74v. The text alludes to a patient as alive and well "at this hour, June, 10, 1523": *ibid.,* fol. 23r.

due meed of praise for outstanding intellectual ability, or for having vigorously contributed to education in their field in their day and generation.[167] Thus Gesner gave the pitch for the subsequent chorus of historians with reference to the predecessors of Vesalius. He also mentioned two early works of Vesalius of which we seldom hear:[168] a paraphrase on the ninth book of Rasis to Almansor, printed at Basel by Robert Winter, and a letter on bleeding by the same printer in 1539.[169] The former title comes as something of a surprise in view of the classical snobbery which we encounter in the pages of *De humani corporis fabrica.*

However, we learn from Vesalius himself in a letter of June 13, 1546, from Regensburg to Roelants that he had composed a huge volume of *Annotations* with a paraphrase on all ten books of Rasis to Almansor which, together with all the works of Galen that he had used in learning anatomy and filled with marginal notes, he burned on leaving Italy for the imperial court in a moment of petulancy because of criticism to which he had been subjected by contemporary physicians. His paraphrase of Rasis had collated the teaching of the Arabs with Galen and other Greeks.[170]

A correcter appraisal of the relative merits of Carpi and Vesalius than that implied by Gesner was made by a pupil and admirer of the latter, the anatomist Falloppia, who called Carpi "beyond all doubt the first restorer of the art of anatomy which Vesalius afterwards perfected."[171]

In addressing his *Anatomical Observations*[172] to Pietro Manna, a physician of Cremona, Falloppia said that when he first read

[167] Gesner (1545), fol. 352r.

[168] *Ibid.*, fol. 42r-v.

[169] *Epistola docens venam axillarem dextri cubiti in dolore laterali secandam et melancholicum succum ex venae portae ramis ad sedem pertinentibus purgari,* Basel, Robert Winter, 1539.

[170] Vesalius, *Opera,* II (1725), 680-81.

[171] Falloppius, *Observationes anatomicae,* 1561, fol. 25r, "Jacobus Carpensis primus quoque procul omni dubio anatomicae artis quam Vesalius postea perfecit restaurator."

G. A. Favaro, *Gabrielle Falloppia modenese . . . studio biografico,* 1928.

[172] *Gabrielis Falloppii medici Mutinensis Observationes Anatomicae ad Petrum Mannam medicum Cremonensem cum privilegio summi pontificis regis Philippi senatusque Veneti,* Venetiis apud Marcum Antonium Ulmum, 1561. It is also printed in the *Opera* of Vesalius, II(1725), 687-758.

the definitive work of Vesalius, he decided never to write on anatomy. Though Vesalius at times might be a trifle too critical of Galen, he usually was right. Then Falloppia began to wonder, if Hippocrates, Aristotle, Erasistratus, Marinos, Herophilos and Galen had all erred, whether Vesalius might not sometimes be mistaken too. He therefore was emboldened to undertake the present work in which he ventures to disagree with Vesalius on some points, although always speaking of him with great respect.

Falloppia sent a copy of his work to Vesalius who began his reply or *Examen* of it within three days of receiving it. He expressed delight with it. He praised Falloppia's industry in the pursuit of anatomy since that time when it was reborn—alluding presumably to his own *Fabrica*—and his richer knowledge of the art. He accepted the *Observations* in general as an appendix to his own work.[173] He did not, however, always agree with them in particular and in the *Examen* sometimes maintained his original position or was patronizingly ironical at Falloppia's expense.[174] He explained that he had no opportunity for dissection at Madrid but hoped to have a future opportunity and to review his work on the human body.[175] Falloppia excused Vesalius for not having read the work of Galen on the dissection of muscles, which had not appeared in the Latin translation of Augustinus Gadaldinus until after the publication of the *De humani corporis fabrica*. In it Galen mentioned muscles of the jaws which had escaped Vesalius.[176] Vesalius promised to read it as soon as he could find a copy and admitted that he had only just read Oribasius, from whom Falloppia had drawn some suggestions,[177] and claimed the discovery of an eyelid muscle.[178]

Falloppia was not the first critic of Vesalius, for he says that some men who are bold in accusing Vesalius really do nothing but follow in his footsteps and add nothing that has been passed over by him.[179] Colombo had called a figment a muscle in the nostrils noted by Vesalius, but Falloppia was not yet ready to

[173] Vesalius, *Opera*, 1725, II, 761.
[174] *Ibid.*, II, 783-84, 790.
[175] *Ibid.*, II, 830.
[176] *Observationes*, 1561, fols. 75v-76r; *Opera* of Vesalius, II, 715.
[177] *Opera*, II, 783.
[178] *Observationes*, 1561, fols. 64r-66r.
[179] *Ibid.*, fol. 75v.

agree with him.[180] For himself Falloppia held that "divine Vesalius" had enumerated only seven eye muscles when there were eight.[181] Vesalius replied that he could not agree as to an eighth muscle and that Falloppia was wrong concerning two others.[182] Vesalius had counted nine muscles that moved the tongue, and Valverda ten, but Falloppia could not find that many.[183] Falloppia also felt constrained in the interest of truth to dissent from the dogmas of Vesalius as to the muscles of the head and the intercostal muscles.[184] Falloppia agreed with Vesalius and had nothing new to add as to the muscles moving the hand, elbow and arm, but with reference to the part of the palm which Antiochus Tibertus called the mountain of the moon he noted a discovery, not indeed of his own but of Giovanni Battista Cannani of Ferrara.[185] Modern anatomists assert that there are ten muscles moving the thigh, but there is an eleventh which they pass over.[186]

For all his anatomical research, Falloppia still believed that the veins originated in the liver and not in the heart. He alludes to a disputation which he had written against the Aristotelians "in defense of this opinion of the medical profession."[187] Falloppia died before he was forty but had already won an enviable reputation. Melchior Guilandinus, the Prussian who became head of the botanical garden at Padua, in a letter to Conrad Gesner called Falloppia by no means the least of the medical faculty at Padua, easily the first of the anatomists of this age, an unconquered athlete in the palaestra of medicinal simples, and an Italian Hercules in surgery.[188]

[180] *Ibid.*, fol. 66v.
[181] *Observationes*, fol. 68r-v.
[182] *Opera*, II, 782.
[183] *Observationes*, fol. 74r.
[184] *Ibid.*, fols. 80r, 83v, 95r, 96v-97r.
[185] *Ibid.*, fol. 102r-v.
[186] *Ibid.*, fol. 112r.
[187] *Ibid.*, fol. 114r.
[188] Matthiolus, *Epistolarum* lib. II, 1598, pp. 85-88.

CHAPTER XXIV

ALCHEMY DURING THE FIRST HALF OF THE SIXTEENTH CENTURY[1]

Permultos veterum authorum scripsisse praeclara volumina
—COELUM PHILOSOPHORUM

Just as almost no alchemical treatises had been printed during the period of incunabula, so they appeared but slowly in the sixteenth century. One reason for this may have been the prejudice against Arabic and medieval Latin authors which prevailed in the fields of medicine and astrology and the lack of any authentic texts of ancient Greek writers in the field of alchemy comparable to Galen, Hippocrates and Ptolemy. The dubious name of Hermes was all that alchemy had to offer by way of a focus for a classical revival. So for the most part alchemy remained relatively quiescent in laboratory and manuscript[2] until the Paracelsan revival of the second half of the century. There was, however, a gradually increasing publication during the first half of the century.

Hieronymus Brunschwig's work on distillation which had been first printed in 1500 continued to reappear in further editions during the sixteenth century. Four of the alchemical treatises ascribed to Arnald of Villanova were included in the *editio princeps* of his works, published at Lyons in 1504. Repeated editions of Arnald's collected works during the first half

[1] This chapter first appeared in *Ambix,* II (1938), 26-37. Some additions and alterations have since been made.

[2] That there was a widespread circulation of alchemical literature in manuscript form is suggested not only by the number of extant MSS of the fifteenth century, but by the score and more of different alchemical authors and treatises cited in the letters in German of an alchemist of Lausitz from 1496 to 1506. See W. Ganzenmüller, "Briefe eines Lausitzer Alchemisten aus den Jahren 1496-1506," *Zeitschrift f. Angewandte Chemie,* 48-49 (1935), 761-64.

of the century attest the popularity of his medicine and its pre-Paracelsan association with alchemy, astrology and magic. A not unfavorable attitude towards alchemy and the possibility of the transmutation of metals was shown in the influential general textbook, the *Margarita philosophica,* of which the first edition appeared in 1503.

An alchemical tract by Ludovicus Lazarellus or Lodovico Lazzarelli of San Severino near Naples, which is preserved in a Riccardian manuscript at Florence,[3] is an entirely different work from his *Crater Hermetis,* which was first printed in 1505 and is not alchemical. The two share, however, the feature of a common interest in Hermes, whose *Emerald Tablet* is soon cited in the alchemical tract. Lazarellus says that his teacher in alchemy was John Richard de Branchiis of Burgundy, who began to instruct him in 1495 and who himself had become proficient in the art from reading the works of Raymond Lull and Arnald of Villanova and from long practice. From this it would seem likely that Lazarellus writes after 1500, and the handwriting of his tract seems of the early sixteenth century. According to Lancillotti[4] and Tiraboschi,[5] however, Lazarellus was born in 1450 and died in 1500. He sets forth the usual alchemical process of calcination, solution, purification, projection and multiplication in seven chapters. He cites Picatrix as author of the *Clavis sapientiae,* a title more often associated with the name of Albertus Magnus. He speaks of astrological images and celestial magic in which Zoroaster excelled and cites Thebit and Ptolemy, presumably as names to whom books of such images were ascribed.

The same manuscript further contains a "treatise of master

[3] FR 984 (Lami, III, xx), paper, octavo. On the title page is written: "Lud. Lazereli, Raym. Lulli et Io. de Branchis Tractatus de Alchimia." On the recto of the next leaf is an Index in which the first entry is, "Ludovici Lazareli Vade mecum h. e. tractatus de alchimia." This treatise occupies fols. 1r-8r and opens, "Hermes theologorum alchimistarumque pater uno verborum contextu. . . ."

[4] *Ludovici Lazzarelli Septempedani . . . Bombyx . . . cum commentariis Ioanne Francisco Lancillottio a Staphylo auctore,* Aesii, 1765. Cited by P. O. Kristeller, "Marsilio Ficino e Lodovico Lazzarelli," *Annali della R. Scuola Normale Superiore di Pisa,* VII (1938), p. 240.

[5] Edition of Milan, 1824, VI, 1441.

Raymond Lull to his dearest nephew on investigation of the stone," which is, so far as I know, the earliest occurrence of this particular work of the Lullian alchemical corpus.[6] After it follow excerpts from Lullian alchemy "in volgare,"[7] chemical tables,[8] a sonnet in Italian on alchemy,[9] and a secret recipe for the elixir invented by the aforesaid de Branchiis—now called John Rigaud de Branchis—when he was in Siena in 1494, with the cooperation of Albert, a physician of Perugia.[10] This secret John had revealed to Lazarellus with his own mouth. Lazarellus therefore appears to have been responsible for the putting together of this alchemical manuscript in its entirety.

An alchemical poem which was composed in the early years of the sixteenth century was the *Crisopeia* or *Chrysopoeia* of Johannes Aurelius Augurellus. Pavanello, who has given an analysis of it with quotations,[11] is of the opinion that Augurellus

[6] FR 984, fols. 8v-16v: titulus, "Incipit tractatus magistri Raymundi Lulii ad nepotem suum carissimum de lapidis investigatione"; incipit, "Scito quod sapientes in miraculo lapidis posuerunt multas operationes. . . ." Captions indicative of the contents are:

fol. 8v, Quomodo philosophi reliquerunt quod non est nisi unus solus lapis
Quomodo spiritus lapidis habet potentiam vivificandi corpus
9r, Preparatio
9v, Quomodo aqua secunda capiatur per se
Quomodo flegma capiatur per se
10r, Quomodo calcinetur terra
Quomodo aqua secunda rectificatur
10v, Tabula subtilitatis iacet in hoc capitulo extrahendi animam a corpore
12r, Sequitur lapidis vivificatio
12v, Ut spiritus congelatus in sulfur extrahatur a terra
13r, Quod lapis est corpus aereum spirituale et corporale
15r, De fixatione aeris in quo continetur tintura
De tinctura et fixatione lapidis cum aere
15v, Alius modus levior cerandi elixirii
16r, Alius modus creandi(?) elixirii.

[7] FR 984, fols. 18r-33r.

[8] FR 984, fols. 17r-18r, with an exposition of them at fols. 34v-35v.

[9] FR 984, fol. 36r.

[10] FR 984, fols. 33v-34r: "Arcanum clexeris de inventione magistri Ioannis Rigaudii de Branchis quod ipse Senarum in civitate fecit in societate magistri Alberti Perusini phisici anno 1494 anno ante adventum in Italia Caroli octavi regis Francorum. Quod arcanum ipse magister Joanes mihi ex maxima sui liberalitate ore proprio revelaret. Accepit primo succum lunarie septies distillatum . . ./. . . secundum numerum algorismi in proiectionem ad perfectionem deducit. Deo gratias."

[11] G. Pavanello, *Un maestro del quattrocento, Giovanni Aurelio Augurello,* Venice, 1905.

began it about 1500, and there are references in it to the siege of Padua in 1509. The first edition, however, was at Venice in 1515.[12] Three years later Froben issued another at Basel. The poem was dedicated to pope Leo X, whose Maecenate in Medicean Rome extended to alchemy as well as poetry, as we shall see again in the case of Pantheus in 1518, and whose credulity, as we have already seen, embraced yet other occult arts than that of transmutation.

Thomas Arfoncinus or Arsoncinus, writing later in the century, gave as a proof that neither civil nor canon laws paid much attention to the *Extravagans,* "Spondent quas," of John XXII against alchemists the fact that Augurellus had dedicated and presented his poem on alchemy to Leo X, to whom the gift had been most welcome.[13] In the case of Pantheus, however, we shall see that the *Extravagans* apparently had some effect, although not, it is true, under Leo X.

The interest in Raymond Lull at Paris at the close of the fifteenth and beginning of the sixteenth century among men like Jacques Lefèvre d'Etaples, who in 1491 was reading Lull on contemplation, and Charles de Bouelles, whose *Life* of Lull was written in 1511 and printed at Paris in 1514, seems hardly to have extended to the alchemical writings attributed to him. In Spain, however, the Cistercian, Jacobus Januarius, in his *Ars metaphysicalis naturalis ordinis,* published at Valencia in 1506, not only expounded the Lullian art but accepted the Lullian alchemical writings as authentic.[14] The printing of works from the Lullian alchemical collection seems first to have started in 1514 when, together with medical works of Giamatteo Ferrari

[12] DWS 815 is mistaken in representing the *Chrysopoeia* as printed at Verona in 1491. The volume of poems then published by Augurellus (GW 2861) did not include it, as Ferguson, I, 56, has already pointed out.

[13] J. C. Fanianus, *De iure artis alchemiae hoc est Variorum auctorum et praesertim iurisconsultorum Iudicia et Responsa ad quaestionem quotidianam, An alchemia sit ars legitima?* Basileae, 1576, p. 113. Zetzner IV (1659), 248-53.

[14] Ivo Salzinger, *Beati Raymundi Lulli Opera Omnia,* Moguntiae, I (1721), Testimonia virorum illustrium, pp. 6-7: "Carolus Bovillus, Vita Lullii scripta a. 1511 ed. Parisiis typis Ascensianis a. 1514 quam Benedictus Gonon inseruit Vitis Patrum Occidentis, ed. Lyons, 1626, Lib. 6."

da Grado, Maimonides and Arnald of Villanova, was printed the *De secretis naturae* or work on the fifth essence of "the sacred doctor, Raymond Lull."[15] It comprised the preliminary dialogue with the monk, opening, "Contristatus erat Raymundus . . ." and the Lullified version of John of Rupescissa's work on the fifth essence, opening, "Deus gloriose cum tue sublimis bonitatis ac infinite potestatis. . . ." It did not include the *Tertia distinctio* nor the concluding Disputation with the monk. This was also the case in an edition of Augsburg, 1518. For a score of years and more thereafter, the *De secretis naturae* seems to have been the only treatise printed from the Lullian alchemical corpus. But it was re-issued several times. There was an edition of 1520 which fails to specify its place of publication, another of 1521 at Venice, and a third at Lyons in 1535, this time again with the *Consilia* of Giamatteo Ferrari da Grado, a fourth by Ryff at Strasburg in 1541, a fifth at Venice in 1542, and a sixth at Nürnberg in 1546.

In an edition of the work of Albertus Magnus on minerals at Oppenheim in 1518—it had already been printed four times in the fifteenth century—its semi-favorable discussion of alchemy was counteracted by a concluding exhortation of Virgilius of Salzburg against alchemy in the form of six verses in German, with the Latin headings, "De alchimie phantastica fatiga Exhortatio Virgilii Saltzburgensis," and, "Ne studentes alchimie splendori sese occupent rhythmos curavi subscribere vulgares."

Apparently the only alchemical incunabula known are two of works ascribed to Geber, one containing the *Summa perfectionis magisterii, Liber trium verborum,* and *Investigatio magisterii,*[16] the other a *Flos naturarum* of 1473.[17] There was a lull in Geberian publication during the first quarter of the sixteenth century, until about 1525 Marcellus Silber issued at Rome

[15] Joh. Math. de Gradibus, *Consilia,* Venice, 1514, fols. 103r, col. 1–113v, col. 1: "Incipit liber prime distinctionis secretorum nature seu quinte essentie sacri doctoris magistri Raymundi Lulii de insula maioricarum. . . ."

[16] Hain 7505, Pellechet 5004, *British Museum Catalogue of Books Printed in the Fifteenth Century,* IV, 124. At Rome by Eucharius Silber, date uncertain.

[17] Hain 7504; E. Darmstaedter, "Die 'Geber'-Inkunable Hain 7504," *Archiv f. Gesch. d. Medizin,* 16 (1925), 214-

an edition similar to that by Eucharius except that the *Testament* of Geber was added to the other three works, while the non-Geberian contents of the earlier volume were replaced by Avicenna on minerals. Something more closely resembling the earlier edition appeared at Strasburg in 1529 and 1531, while a printing at Venice, 1542, was more like that of Marcellus Silber. Meanwhile, in a larger and more inclusive volume, which was printed at Nürnberg in 1541 by J. Petreius, Geberian alchemical treatises were combined with medieval Latin authors in that field: the *Speculum alchemiae* ascribed to Roger Bacon, the *Correctorium* ascribed to Richard of England, the *Rosarius minor,* the commentary of Hortulanus on the *Emerald Tablet* of Hermes. In 1545 Geber appeared in print again at Berne.

But we must turn back chronologically to 1518 again to consider a work by a contemporary. Johannes Augustinus Pantheus, a priest of Venice, published there on December 30, 1518, an *Art of Metallic Transmutation* with a permit from the council of Ten and an edict of pope Leo X,[18] dated the last day of February, 1517, giving him the exclusive right of printing the work in the papal states. The work is also dedicated to Leo. In view of the reported prohibition of the practice of alchemy by the Venetian government in 1468 or 1488[19]—to which we shall find Pantheus himself referring in a later work—it is surprising that the Ten sanctioned this publication in 1518. Our Pantheus or Panteo was possibly the son of Joannes Antonius Pantheus of Verona, who composed a work on hot baths in the region around Verona[20] and died in 1497.

17, knew of copies only in Jena and Vienna. Though containing some alchemical recipes, the work deals chiefly with magico-medical uses of parts of the human body, also with unlucky days. Darmstaedter doubted if its author may be identified either with the writer of the *Summa perfectionis* or with the Jabir ibn Haiyan of Berthelot.

[18] On the title page, "Ars transmutationis metallicae cum Leonis X ponti. max. et conci. capi. decemvirorum Venetorum edicto"; colophon, fol. 38v, "Commentarium transmutationis metallicae Io. Augustini Panthei sacerdotis Veneti sub Leone X pontifice maximo ac Leonardo Lauretano optimo principe in aedibus Ioannis Tacuini impressorum accuratissimi Venetiis editum tertio Kalen. Ianuarii MDXIX."

[19] T, IV, 349, n. 76.

[20] *Confabulationes de thermis quae in Veronensi agro sunt,* in *De balneis omnia quae extant,* Venetiis apud Iuntas, 1553, fols. 110-141. The trea-

In his preface to the pope, Pantheus describes his booklet as very recently put together from varied reading of the philosophers. He wishes it to contain the sincere truth of the secret of transmutation, to abolish deceits and incredulity, to reveal the stone to the sons of wisdom and to conceal it from the ignorant. Reading his book would have saved those who have followed false interpretations all their time and expense. Similarly in a second preface to the reader he promises to elucidate completely this most weighty theme of the transmutation of metals. Actually he only succeeds in making the matter more mysterious by various charts, diagrams and columns of letters and numbers as well as the *Tetragrammaton* and Greek and Hebrew characters. After the manner of the Lullian alchemical treatises he sets letters for stages in the process of transmutation and gives diagrams of the four elements and primary qualities. There is a pageful of names which he says all signify the same thing. Numerical equivalents are given for the different letters of the alphabet, and the totals are added up at the base of the columns. In addition to this mystic reckoning, such tremendous secrets are imparted as that the first principle of nature is matter and that the second principle is heat. Fire and water are represented on the authority of Morienus and of Albertus "in libro perigeneseos" as the two principal elements from which air and earth are generated. It is explained that air is generated from the heat of fire and the moisture of water, while earth comes from the dryness of fire and the coldness of water combined.

Other alchemical authorities cited are Hermes "in his allegory," which concerns a crow and hence would hardly seem to be the *Emerald Tablet,* and "in his *Secret,* namely, the Vine (or, Staff) of the Wise," the *Turba philosophorum,* Geber, Alphidius, the author of *Perfectum magisterium,* the author of *The Three Words,* Ioannitius, Avicenna, Rodianus, Rosinus and Vincent.

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tise takes the form of a dialogue between the author, Hermolaus Barbarus, and Aleardus de Indemontibus or Pedemontius, a physician of Verona.

In the printed catalogue of the Bibliothèque Nationale, Paris, vol. 129, p. 859, the two Pantheus's are confused under a single designation.

Some of these Pantheus could have consulted only in manuscripts.

After the *Art of Metallic Transmutation* ends with the date, September 7, 1518, there follows in our edition a new title page inscribed, "Commentary of the Theory of the Metallic Art of Transmutation." It is addressed to a noble Pole named William Hyerosky. In it Pantheus alludes to "those Institutes of ours edited in former years" and over which he has heard that Hyerosky pores day and night. He denies that these *Institutes* were incomplete as published and left something for verbal interpretation like the cabala. But he now explains what his Hebrew characters represent and the numerical value of some letters. He adds some recipes, then reverts to columns of numbers in his closing pages. It is at the close of this Commentary that we find the final date of publication, December 30, 1518. It is not quite clear whether by the title, *Institutes,* Pantheus refers to the preceding *Ars transmutationis,* which may have circulated in manuscript form for some time before being printed, or to some other earlier production of his.

It seems probable that, after the publication of this volume of 1518, someone called to the attention of its author or the papal court or the Venetian government the existence of a papal decretal and a decree of Venice against alchemists. For in 1530 Pantheus brought out with the same printer at Venice a book entitled, *Voarchadumia contra alchimiam: ars distincta ab archimia et sophia.* As this title suggests, he now professed to be writing not on alchemy but on Voarchadumia, an art distinct from alchemy. This Voarchadumia he represented as true wisdom, the very opposite of alchemy, a sort of "cabala of metals," handed down from Tubal Cain through the Chaldeans and Indians. Alchemy he now execrated in agreement with the *Extravagans* of pope John XXII opening, "Spondent quas non exhibent divitias pauperes alchimiste . . .", with the constitution against counterfeiters of the emperor Constantine, and with the decree of the council of Ten against alchemists with the addition beginning, "Tollenda sunt de medio. . . ." With this disavowal

Pantheus again obtained permission to print from the apostolic legate and the council of Ten, and the work opens with prefaces to the doge and to the papal legate. Yet he repeats most of his work of 1518 in the course of the *Voarchadumia*. The volume also includes woodcuts of alchemical furnaces and apparatus and a bird's-eye view of Venice and its surroundings. Both the *Voarchadumia* and the work of 1518 were reprinted together at Paris in 1550, and again, but omitting both the papal edict and the preface to the pope, in the second volume of Zetzner's *Theatrum chemicum* as published in 1613 and in 1659.

The last publication by Pantheus which we have to note is astronomical rather than alchemical, being a *Lunario perpetuo* printed at Venice in 1535, but has this interesting connection with gold-making still, that the author is described as not only a priest but "a refiner of gold of Venice."[21]

To Giovanni Francesco Pico della Mirandola is attributed a work on gold of dubious authenticity, since it was not published until a half century after his death. Caesar Caprilius, who first edited it in 1586,[22] in his dedication from Ferrara on December 18, 1585, to cardinal d'Este says that it was given to him after Pico's death in 1533 by his daugter Julia. The manuscript was now in a very bad state of preservation and marred by errors of the copyist to whom Pico dictated it. While not minimizing the difficulties of transmutation,[23] the work lists five ways of making gold by art,[24] contends that this is easier today when metals and minerals are mined which were unknown to antiquity,[25] and gives some recent instances of successful transmutation.[26] It also tells of a consumptive who was cured by potable gold.[27] Jurists and

[21] Giov. Agostin Pantheo (De Vinegia Affinatore de oro et sacerdote), *Lunario perpetuo con la dimostratione della scala della Epacta*, etc., Vinegia, 1535.

[22] Io. *Francisci Pici Mirandulae et Concordiae Domini de auro libri tres, opus sane aureum in quo de auro tum aestimando tum conficiendo tum utendo ingeniose et docte disseritur*, Venetiis, J. B. Somaschus, 1586. Copy used: BM 1032.c.2.(1.). The three books fill 131 pages. There were other editions at Ferrara, 1587 and Ursel, 1598.

[23] Edition of 1586, II, 3 and III, 6, pp. 35, 124-25, 129.

[24] *Ibid.*, II, 8.

[25] *Ibid.*, II, 10, pp. 77-78.

[26] *Ibid.*, III, 2, pp. 104-6.

[27] *Ibid.*, I, 4, p. 13.

schoolmen are cited pro and con as to alchemy, as in the earlier publication of Fanianus.[28]

In his prognostication of 1523, which we have considered in another chapter, John Abiosus of Bagnoli in the kingdom of Naples inserted a digressive chapter of some seven pages on a most marvelous medicine. It involved separation of the elements and extraction of the fifth essence, the dissolving of precious stones, and the employment of potable gold. Many alchemical authors and titles are cited: John of Rupescissa, John of Damascus on decoctions and distillations of herbs, Christopher of Paris, Rasis in the *Liber luminum,* Galen in the book of secret medicine, five titles by Arnald of Villanova, four from the Lullian corpus, and others attributed to Aquinas, Albertus Magnus and Roger Bacon. Such medical authorities as Avicenna and Conciliator (Peter of Abano) are also cited. Abiosus asserts that he has cured pestilential diseases by certain potions and plasters applied to the breasts and pulse within twelve hours of the first infection. The chapter is another illustration of the fact that alchemical medicine anteceded Paracelsus.[29]

Symphorien Champier's letter against alchemy and the inconsistency between Agrippa's preaching against and practice of the art have been noted in previous chapters. A correspondent of Agrippa in 1531 cited the work to which we next turn, the *Coelum philosophorum* of Philip Ulstad.[30]

According to Graesse and Ferguson this *Heaven of The Philosophers* of Philip Ulstad was first printed at Fribourg in Switzerland in 1525, but Gesner states that it was composed there in that year but printed at Strasburg in 1528.[31] The British Museum catalogue, however, lists an edition of Strasburg, 1526, as well. In any case the work became very popular and was frequently published thereafter both in Latin editions and in French and German translations.[32] The full title states that the work was drawn from such authors at John of Rupescissa, Ray-

[28] *Ibid.,* II, 3, pp. 32-38.
[29] Abiosus, *Vaticinium,* Naples, 1523, II, 10 bis.
[30] Agrippa, *Epistolae,* VI, 32.
[31] Gesner (1545), fol. 559r.
[32] Ferguson, II, 482-83.

mond Lull, Arnald of Villanova and Albertus Magnus.[33] It is chiefly concerned with the fifth essence, its extraction and modes of distillation, and so would seem to owe the most to John of Rupescissa. Potable gold and *aqua vitae* also receive considerable attention. In the preface, dated 1543 in the edition of 1544 which I used, Ulstad says that the Lullian alchemical corpus is as yet little known.[34] The *Coelum philosophorum* appeared in French translation at Paris in 1546 and 1550.[35] Between these dates Rupescissa's work on the fifth essence was printed at Lyons in French translation in 1549,[36] whereas the first complete Latin edition of it under Rupescissa's name, as distinct from the Lullified version of it published under the name of Raymond Lull from 1514 on, was that by Gratarolus at Basel in 1561.[37] Ulstad is said by Gesner and Ferguson to have been a patrician of Nürnberg who taught medicine at Fribourg. A pest tract by him was printed at Basel in 1526.[38]

In a volume of medical opuscula published by Joannes Petrus Arlunus in 1532 that author speaks well of an alchemical remedy of the fifth essence or potable gold,[39] thereby perhaps showing the influence of the *Coelum philosophorum.*

[33] I have used an edition of Paris, 1544: *Coelum philosophorum seu secreta naturae id est quomodo non solum e vino sed etiam ex omnibus metallis fructibus carne ovis radicibus herbis et aliis quam plurimis quinta essentia sive aqua vitae ad conservationem humani corporis debeat educi. Liber tum medicis ac chirurgis tum pharmacopolis imo et omnibus sanitatis retinendae studiosis pernecessarius. Ex variis authoribus Ioanne de Rupescissa Raymundo Lullio Arnaldo de Villanova Albertoque Magno a Philippo Ulstadio adiectis clarissimis figuris collectus.* 95 fols.

[34] "Ad paucorum enim manus pervenisse video Mercuriorum librum aut Testamentum aut Codicillum aut reliquos Raymundi libros."

[35] *Le ciel des philosophes où sont contenuz les secretz de nature et comme l'homme se peult tenir en santé et longuement vivre . . . extraict des livres de Arnauld de Villeneufue du grand Albert Raymond Lulle Jehan de la Roche Tranchée et plusiers autres bons auth. de nouveau trad. de latin en français,* Paris, 1546 et aussi 1550.

[36] *La vertu et propriété de la grande essence de toutes choses, faite en latin par Ioannes de Rupescissa et mise en françois par Antoine Du Moulin,* Lyon, J. de Tournes, 1549, 156 pp.

[37] *Joannis de Rupescissa qui ante cccxx annos vixit de consideratione quintae essentiae rerum omnium opus egregium,* etc. Basileae, 1561.

[38] Philipp Ulstad, *De epidemia tractatus,* Basileae, 1526, 8vo: copy at BM 1167.c.6.(1).

[39] *Index operis Io. P. Arluni . . . De faciliori alimento summula. De faciliori alimento tripartitus commen-*

A work in French on cosmetics published by André Le Fournier in 1530[40] was to be cited by Gesner twenty-four years later for various distilled waters such as one distilled from puppies to prevent hair from growing again.[41]

Oronce Finé, royal professor of mathematics at Paris, not only was given to astrology but in 1535 and 1537 transcribed such alchemical tracts as the *Semita recta* attributed to Albertus Magnus, the *Small Rosary* of Arnald of Villanova, and the *Turba philosophorum*.[42] Three other alchemical manuscripts preserved in the Bibliothèque Nationale once belonged to Finé. One of them is dated 1542.[43]

The discussion of metals by Matthesius at Wittenberg did not concern itself with the subject of their transmutation and so is included in our chapter on the Circle of Melanchthon rather than here. Certain publications in German, although having the word alchemy in their titles, dealt primarily with practical arts: *Alchimia, Das ist Alle Farben Wasser Olea Salia und Alumina,* printed at Strasburg in 1539 by Cammerlander, and *Rechter Gebrauch d'Alchemei mitt vil bissher verborgenen nutzbaren vund luztigen Künsten,* first printed in 1531, then as *Künstbüchlin* with additional recipes in 1537, 1538, and subsequently.[44]

The *Pirotechnia* of Vannuccio or Vannocio Biringuccio or Biringucci seems to have been first printed in 1540, after which

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tarius. De potu balnearum commentarius. De lotii difficultate commentarius. De articulari morbo. De spirandi difficultate. De seminis fluore. De febre quartana. De suffusione. (Milan), G. Pontius; V. Gauoti impendio. 116 fols. Copy used: BM 544.k.1. The volume is a beautiful piece of printing with wide margins. The passage cited occurs in *De lotii difficultate* at fols. LXIVv-LXVr.

[40] Andreas Furnerius, *La decoration d'humaine nature et a ornement des dames,* 1530. Copy seen: BM 1174.d.2.

[41] Euonymus Philiatrus, *De remediis secretis,* Zurich, 1554, p. 72, 281.

[42] See the full description of BN 7147 by James Corbett, *Catalogue des Manuscrits alchimiques latins: Manuscrits des bibliothèques publiques de Paris,* Bruxelles, 1939, pp. 55-64.

[43] BN 7160A, 15th century, fol. 101v, "Maintenant suis à Monsieur Oronce Finé, lecteur, mathématicien du Roy, demeurant rue des Lavandières, près les Carmes, en l'Université de Paris" BN 7163, 15th century, fol. 1, "sub Orontii possessione." BN 7169, 16th century, fol. 1, "Orontii Finei Delphinatis, regii mathematicarum professoris, 1542." Corbett, *op. cit.,* pp. 92, 116, 128.

[44] Ferguson, I, 19; II, 246.

there were several other editions before the end of the century.[45] *Pirotechnia* is not the full title,[46] and the text deals chiefly with metals and little with fireworks and artillery. The opening chapter is sceptical as to the possibility of transmutation. In general the book impressed me as a sixteenth century version in Italian of what one might find in Latin works of the three previous centuries.[47]

In 1542 was printed at Paris the work of F. Remaclus or Remaclus Fusch or Fuchs of Limburg entitled, *A History of All Waters which are in common use today among practitioners, their virtues and the correct method of distilling them.* A treatise on spices and aromatics accompanied it.[48] He also, Tiraqueau says, wrote a *Method of Curing Syphilis* (*Methodus curandi morbi Gallici*) and a nomenclature of plants.[49] He further published *Lives of Illustrious Physicians* who flourished and wrote during the previous century,[50] so that distillation was only one of his interests.

Fra Ambrogio Quistellio was an Augustinian who lectured at Padua on the Pauline Epistles and Gospel of St. John, and then was called to Rome as procurator general and subsequently vicar general of his order, dying there July 9, 1545. He is said

[45] The recent edition of 1914 by Aldo Mieli gives only a fraction of the work, less than two of its ten books.

[46] The full title runs: *De La Pirotechnia Libri x dove ampiamente si tratta non solo di ogni sorte & diversita di Miniere ma anchora quanto si ricera intorno a la prattica di quelle cose di quel che si appartienne a l'arte de la fusione ouer gitto de metalli come d'ogni altra cosa simile a questa. Composti per il S. Vanoccio Biringuccio Sennese.* Venice, Venturio Roffinello, 1540.

[47] For a more enthusiastic estimate the reader may turn to Icilio Guareschi, *Vannochio Biringucci e la chimica tecnica,* 1904.

[48] F. Remaclus, *Historia omnium aquarum quae in communi hodie practicantium sunt usu vires et recta eas distillandi ratio. Accessit conditorum (ut vocant) et specierum Aromaticorum quorum usus frequentior apud pharmacopolas tractatus etc.* Parisiis, J. Foucher, 8vo.

[49] Tiraquellus, *De nobilitate,* cap. 31.

[50] Remaclus Fuchsius, *Illustrium medicorum qui superiori saeculo floruerunt ac scripserunt vitae,* Paris, 1541, 12mo. Allut. *Étude biographique et bibliographique sur Symphorien Champier, Lyons,* 1859, p. 250, describes the work as "petit in 8vo Parisiis apud Petrum Gromorsum sub Phoenice, 1542." The printed catalogue of the Bibliothèque Nationale, Paris, lists two editions, both "apud P. Gromorsum" and in octavo, but one of 1541 and one of 1542.

by Vedova,[51] who seems to follow Scardeone in this, not only to have held that long study of Aristotle was not essential to an understanding of the Bible,[52] despite which he commented upon *De generatione et corruptione,* but to have composed a work on the vanity of alchemy. It is not noted in the alchemical bibliographies of Ferguson and H. C. Bolton, and probably remained in manuscript.

The name of Chrysogonus Polydorus appears in the 1541 and 1545 editions of works of Geber as that of the editor. Gratarolus, writing in 1561, had no doubt that the editor's real name was Osiander,[53] presumably the same person who put Copernicus, *De revolutionibus,* through the press. His preface affirms the truth of transmutation. It is stated that Aristotle and Theophrastus wrote on metals, although these works are no longer extant. In any case later writers who have followed reason and experience have greatly advanced the subject and probably have outdistanced whatever Aristotle and Theophrastus may have discovered.

Giovanni Bracesco of Brescia in 1544 published at Venice his exposition of Geber in dialogue form in Italian. It appeared in Latin translation at Nürnberg in 1548 together with another dialogue on the mysteries of Lullian alchemy. The printer, Johannes Petreius, in a note to the reader alludes to his recent editions of works by Raymond Lull and Geber, whose hidden secrets these dialogues will now disclose. The same volume included a tract on the tree of life which Bracesco had first issued in Italian at Rome in 1542. This Latin version of Bracesco's dialogues was also printed at Lyons in the same year 1548, while the

[51] Gius, Vedova, *Biografia degli scrittori padovani,* 1832-1836, II, 143-44. Bernardinus Scardeonius, *De antiquitate urbis Patavii,* for which I have used an edition of Basel, 1560, seems to have first been printed at Venice, Valgrisi, 1558. It was reprinted in the *Thesaurus* of Graevius, VI, iii.

[52] Ambrosius Quistellius, *Adversus philosophos qui asserunt divinam scripturam nequaquam posse percipi nisi ab his qui bonam vitae partem in Aristotelis et aliorum philosophorum lectione contriverunt,* Venetiis, 1537. Cited by Gandolfo, *Diss. hist. de ducentis celeberrimis augustinianis scriptoribus,* Rome, 1704, p. 59. Gandolfo dates the death of Quistellio in 1549.

[53] Yet Ferguson says, "I have found no indication of the author's real name." Federicus Chrisogonus Iadertinus was of course a different person.

dialogue on Geber was translated afresh by Gratarolus for his collection of 1561 entitled *Verae alchemiae* . . . etc. Gratarolus says in a preface that Bracesco presented him with this dialogue ten years ago in Italy. Bracesco was then seventy years old and had spent almost his entire life in alchemical studies poring over the books of the ancients. And the *Tree of Life,* as the dialogue is entitled, consists chiefly of citations.[54] The leading idea of Bracesco, if it be his own, is that mercurial water, the gold of the philosophers, and mercury may all be produced from iron, which is that stone sold for a cheap price to which alchemical tracts constantly refer. Gratarolus also printed "Some Matters of Practice explained from Geber by the learned and most expert old man, Giovanni Bracesco," a text of only two or three pages.

Robert Tauladanus in a letter of April 1, 1554, to John Michael Sterpinus from Turin refers to himself as a quite unknown youth (*adolescens*) of Aquitaine. His interest in alchemy led him first to Paris, then to Italy in order to see Sterpinus and Gaudentius Merula. When he reached Turin he learned that Merula was coming there to teach. Meanwhile he diverged to visit Sterpinus. He states that Merula had purged the text of the *Precious New Pearl* of Petrus Bonus, first published in 1546 in the version of Janus Lacinius, of more than three hundred errors. When Tauladanus saw Merula at Turin, he asked his opinion of the recent dialogue, *Lignum vitae,* of Giovanni Bracesco. Merula at first did not like to say what he thought but finally admitted that he had no very high opinion of Bracesco's work and encouraged Tauladanus to write out his criticisms of it. Tauladanus also sought out Bracesco in Italy, but the latter answered him in riddles or in a manner not to his taste. Returning to France, Tauladanus composed his *Animadversions Against Giovanni Bracesco, the Interpreter of Geber.* He was especially offended at Bracesco's seeking the philosophers' stone from iron. Tauladanus frequently quotes the Lullian alchemical writings with approval as well as cites Geber and other authors. The

[54] Following the preface of Gratarolus, the text proper of the *Lignum vitae* occupies pp. 3-46 of *Verae alchemiae.*

work of Tauladanus was published in 1561 by Gratarolus in *Verae alchemiae,*[55] but I have failed to find any trace of an earlier edition contemporary with his letter to Sterpinus.

Gaudentius Merula was born at Labezzaro near Novara and taught the classics at Milan.[56] His *Memorabilia*, printed at his native town in 1546, then at Venice in 1550, and at Lyons in 1556 in an enlarged edition, contain some alchemy as well as astrology, natural philosophy, history and theology. Marco Antonio Majoragio was the author of two orations, one in praise of gold, the other apologetic against Merula, but I do not know that either bore upon alchemy.[57] In Chapter 12 on Astrology at Bologna we have already noted citations of Gaudentius Merula in the posthumous *Musaeum metallicum* of Aldrovandi.[58] He was also cited by William Gilbert in 1600 as a previous writer on the magnet.[59]

A collection of alchemical opuscula, printed at Frankfurt in 1550, included the *Correctio fatuorum*, a *Clangor buccinae, Scala philosophorum, Opus mulierum et ludus puerorum, Rosarium philosophorum,* the *Semita semitae* of Arnald of Villanova, and works ascribed to Aristotle, Avicenna and Raymond Lull.[60] The Lullian tracts were the *Anima artis* and *Vade mecum.* The *Opus mulierum et ludus puerorum* is here said to derive from a manuscript of the time of the emperor Charles IV. To the second part or volume containing the *Rosarium philosophorum* is prefixed a brief list of alchemical authorities said to come from the *Speculum Naturale of* Vincent of Beauvais. Some seem of

[55] *Verae Alchemiae,* Basel, 1561, pp. 46-111. The letter to Sterpinus occupies pp. 47-48.

[56] Argellati, *Bibliotheca scriptorum Mediolanensium,* Milan, 1745, II, ii, 2132-34.

[57] The earliest edition of which I have found a notice is that of 1616, which I presume to be posthumous, since Majoragio had printed Paraphrases on Aristotle's two books on generation and corruption at Basel in 1554.

[58] Ulysses Aldrovandi, *Musaeum metallicum,* Bologna, 1648, IV, 33 and 59, pp. 685, 808, citing the *Memorabilia,* IV, 21.

[59] *De magnete magneticisque corporibus,* London, 1600, p. 7.

[60] *De alchimia opuscula complura veterum philosophorum . . .* , Francofurti, ex officina Cyriaci Jacobi, 1550. In 2 parts or volumes. All the treatises except *Clangor buccinae* are included in Thorndike and Kibre, *A Catalogue of Incipits of Mediaeval Scientific Writings in Latin,* 1937.

more recent date: Garsias, Raymond (Lull), "who flourished in our recent times," William Bishop called Huck, Aegidius master of the Hospital, who extracted a book concerning 125 stones, and Jacob Aranicus the Jew, who "taught me not a little in that art." In the dedication of the first part to Otto Henry, count Palatine of the Rhine and duke of Bavaria, Cyriacus Jacobus speaks in high terms of a Theophrastus Transsilvanus who had not long since used alchemical remedies to cure gout, leprosy and epilepsy, and who would seem to be no other than Paracelsus.

Interest in writings on alchemy was shown by bibliographical lists or notes which appeared in books published around the middle of the century. Gratarolo in 1561[61] mentioned such as to be found on the last leaf of the eighteenth chapter of the second book of Jean Fernel's *De abditis causis*, which first appeared in 1548, at the close of the edition of Geber at Berne in 1545, in Euonymus Philiatrus of Zurich (a pseudonym of Gesner), in Johann Lang's fifty-third epistle,[62] and in the *Nomenclator insignium scriptorum* of Robertus Constantinus, Paris, 1555, which last contained a list of alchemical authors and works, some of which were in Greek or in manuscript.

Falloppia, in a course of lectures on metals and minerals which he completed at Padua on July 20, 1557, mentioned a druggist of Treviso who had made gold from quicksilver in the presence of the college and senate of Venice. In consequence his fame had spread all over Italy, and the incident was cited as an experimental proof of the truth of transmutation.[63] Falloppia, however, asserted that he had deceived the Venetian senators and had been punished for it afterwards, and that, far from being enriched by gold-making, he had half died of hunger and hardly

[61] In the Prolegomena to *Verae alchemiae*.

[62] Both Euonymus Philiatrus, *Thesaurus de remediis secretis* and the *Letters* of Lang seem to have been first printed in 1554.

[63] It was still so cited in 1604 by Hoghelande, *Historiae aliquot transmutationis* . . . , Cologne, 1604, p. 27: "Experimentum pharmacarii Tarvisini qui coram Venetae Reipublicae duce et senatoribus aliquot argentum vivum in aurum purum convertit attestante Hieronymo Cardano et aliis pluribus."

been able to keep his pharmacy going.[64] Probably the incident had occurred some years before. It is of importance as showing the government of the very city which had issued a decree against alchemy dabbling in that art itself.[65]

[64] *Excellentissimi Gabrielis Falloppii de metallis seu fossilibus tractatus,* Venetiis ex officina Ludovici Avantii, MDLXIX: fol. 119v, "praeterea testem habemus fide dignissimum et iam facta est experientia, nam in Tarvisina civitate est seplasiarius quidam qui dicitur vulgo il spetiale dal Saracino. Seplasiarius ille praesente collegio et senatu Veneto ex argento vivo praeparato fecit aurum, nam confecerat quoddam suum lixivium ex hydrargyro et inspersit ipsum supra metalla, et factum est aurum, unde seplasiarus ille est iam in tota Italia nominatus"; fol. 123v, "O Tarvisinius ille pharmacopola fecit aurum presente senatu Veneto. Dico quod quemadmodum lusit senatores illos ita etiam punitus est et sua brachia id sciunt. Et profecto fecit tantum auri quod fame quasi moritur et in sua officina vix sunt vasa pharmacalia, unde sciatis quod sunt prorsus naenię quod ars faciat aurum."

Concerning a similar adventurer at Venice and in Bavaria towards the close of the century a very full account has been given by Ivo Striedinger, "Der Goldmacher Marco Bragadino, Archivkundliche Studie zur Kulturgeschichte des 16. Jahrhunderts," Munich, 1928, 379 pp., in *Archivalische Zeitschrift* herausg. vom Bayerischen Hauptstaatarchiv, Beiheft 2.

[65] Similarly Hoghelande, *op. cit.*, p. 24, says that gold does not displease the wise rulers of Venice, no matter whence it is imported, and that the Venetian minters are forbidden by strict decree of the senate to inquire whether it was made by chemical artifice. But this may be a misinterpretation of the Venetian decree against alchemy.

CHAPTER XXV

ELEMENTS AND OCCULT VIRTUES

Calorem in nobis cunctisque viventibus quendam inesse eumque divinum

—FERNEL[1]

In this chapter we illustrate the attitude which prevailed towards nature in mid-sixteenth century by four works, from the pens of as many authors, which were published within the space of ten years—roughly speaking the fifth decade of the century. These four authors represent as many different nationalities: Luiz was a Portuguese; cardinal Contarini, an Italian; Fernel, a Frenchman; and Walther Hermann Ryff, a German. This was the decade when also appeared two books by a Belgian and a Polish author respectively which have been the pride of historians of modern science, the *De humani corporis fabrica* of Vesalius and the *De revolutionibus* of Copernicus. The works of our four present authors were less specialized and magisterial, and adhered more to old conceptions and long-accepted beliefs: the four elements, occult properties and hidden causes, natural magic. If Copernicus and Vesalius applied themselves and their pens to newer themes and theories, that is no proof that they would not have still accepted most of the notions and doctrines to be found in these other writings contemporary with them.

Antonius Lodovicus or Antonio Luiz (Luis) was a physician of Lisbon most of whose works seem to have been published around the year 1540. Like many medical men of the first half of the century, he was an adherent to ancient Greek medicine and commented on the *Aphorisms* of Hippocrates and various books by Galen.[2] In addition to this, he followed the example which

[1] *Physiologia*, IV, i.

[2] Jöcher II, 2584; *A. Lodovici de re medica opera*, Olyssippone, 1540: BM 543.g.11.(3.).

Symphorien Champier had set in pointing out errors in a standard medieval medical work, the *Conciliator* of Peter of Abano, by indicating errors of the same author in his commentary on the *Problems* of Aristotle.[3] Luiz further published under his own name five books of problems which were, however, largely compiled from various Greek authors like Galen, Proclus, Plutarch, Plato, Aristotle and Dionysius.[4] In this volume he promised to issue another on occult properties and did so within the year.

In his five books on occult properties[5] Luiz declares that they are confirmed by the agreement of ancient writers and are attested by experience. They are not, however, to be explored by any reasoning or method. There are as many different substances and *complexiones* as there are particular bodies. Furthermore each and every part of a body has its own peculiar constitution and properties. Luiz distinguishes between the attraction exerted by occult properties and that produced by a vacuum. After such general discussion in the prohemium and first book, he devotes the second to the magnet, attraction and purgatives, the third to the occult properties of animals, the fourth to those of herbs and stones, while the closing fifth book is a mere epilogue of only two chapters. In general Luiz's work is one of little originality and includes such stock myths as those of the viper, the dipsas snake, and the girl nourished on poison. He is especially impressed by the fact, as he supposes, that venomous animals are a cure for their own bites. He opposes the position of Aristotle that animals do not fight from natural antipathy but because of hunger.[6] The five books of Luiz on occult properties are followed by a brief tract on empirical remedies, in which he asserts that medical procedures have been revealed by chance

[3] *De erroribus Petri Apponensis in Problematibus Aristotelis exponendis, De re medica opera*, 1540, fols. 109r-115r.

[4] *Problematum libri quinque*, Olyssippone. The date on the title page is 1539, but the colophon gives the year as 1540: BM 543.g.11.(1.).

[5] *De occultis proprietatibus libri quinque. De empericis et miscellaneis quibusdam liber unus. De pudore liber unus.* Lisbon, Lud. Rodriguez, March, 1540, BM C.54.k.7.(2.).

[6] Aristotle, *History of Animals*, IX, 2 (608b-609b) holds that animals fight for food but does not allude to natural antipathy.

through much experience, which reason would never have discovered over a long period of time.

The five books on the elements and their combinations of cardinal Gasparo Contarini (1483-1542),[7] to whom Pomponazzi had addressed his work on the question of the immortality of the soul, were published posthumously at Paris in 1548 by Ioannes Gaignaeus, chancellor of the university and a doctor of theology, who dedicated them to another cardinal, Marcellus Cervinus. Contarini who addresses Matteo Dandolo states that now, having a little time free from public affairs, he returns with delight to the study of nature which he had pursued as a youth. He warns Dandolo not to expect eloquence or an ornate style but in point of fact writes a very clear and readable work covering eighty-nine small leaves. He follows Aristotle and Galen rather than the Pythagoreans and atomists who would have the elements composed of atoms or triangles. He accepts privation or imperfection or not-being (*non ens*) as an explanation of fortune, chance and accidental happenings (*eventus per accidens*), which diviners and astrologers ignore when they think that they can deduce the causes and reasons of all effects from the heavenly bodies, and that therefore all happens of necessity. On the other hand, he believes that from the celestial bodies there flow into the elements not only light and motion but an ethereal warmth (*tepor*) which is not a body but an ethereal quality. The elements are matter which is formed by the celestial bodies and their minds (i.e. the movers or Intelligences of the spheres), and the institutor of nature imposed upon them the law of obedience to the heavens. Since the rays of the sun and all the stars converge on the earth and are reflected from its surface, they marvelously affect the air. Also exhalations are detached from the earth by the force of the stars. Moreover, in the generation of all compounds

[7] *Gasparis Contareni Cardinalis amplissimi philosophi sua aetate praestantissimi de elementis et eorum mixtionibus libri quinque cum indice copiosissima nunc primum in lucem editi . . .*, Paris, Nicolaus Dives, 1548: copies used BN R.9544-G and BM 536.b.1. There were other editions of Paris, 1564; Venice, 1589; Leyden, 1633; etc. A MS is Vatican Latin 3165. The discussion in this work of the earth's surface and relative amount of land and water has been treated in T (1929), pp. 209-11.

there is a celestial quality deduced from the heavenly body and from the moving intelligences. Contarini compares it to the generative force in the production of an animal. All this seems favorable to astrology, but Contarini warns that human affairs cannot be determined from celestial causes alone, since there are independent factors which must be taken into account. Since this is not done in divining astrology—an accusation, however, which many astrologers would probably not have admitted—it is clear to Contarini that the art cannot be true universally.[8]

Contarini believes that the sphere of fire far exceeds in magnitude all the other elements, since it has to fill in the great space between the air and the sphere of the moon. He places the generation of comets in the sphere of fire rather than the upper region of air, and makes it depend primarily upon a constipation of parts of that element so large that it cannot easily be dissolved, to which the exhalation from earth merely provides fuel.[9] Aristotle accounted for the Milky Way as he accounted for comets, but has not, Contarini explains, been followed in this by present Peripatetics who, observing that the Milky Way is perpetual and immutable, have inferred that it is an aggregation of stars whose bodies are too minute to be distinguished by us.[10] The other elements than fire are found only in an impure state and mixed together. Contarini holds that in addition to the tides there is another motion of the ocean from east to west, which had been noticed in sailing between Spain and England, in rounding the Cape of Good Hope, and in transatlantic voyages. The last took only about twenty-four days westward but three or four months returning.[11] According to natural order the earth would be entirely covered by water, but to make life possible the force of the stars has elevated dry land over part of the surface of the globe. Similarly in the human body the sinciput, a hard, heavy

[8] Contarini, fols. 10v, 75v, 28r, 30v, 60v, 42r-v.

[9] *Ibid.*, fol. 26r: repeated by Manutio (1557), fol. 18r-v. The references to Manutio are explained below in the text.

[10] Contarini, fol. 26v: Manutio (1557), fol. 19r.

[11] Contarini, fol. 32r-v: Manutio, fol. 33r.

and earthy bone which from the standpoint of matter should be in the lower part of the body, is placed in the head to protect it. In a sense, however, the earth is covered with water, since the air is full of clouds and vapors.[12]

To the view of Avicenna that the elements remain unchanged in the compound and to the opinion of Aquinas and most Latins that their forms exist only potentially and virtually in compounds, Contarini prefers the theory of Averroes that their forms are imperfect even in their pure state, resembling accidents rather than substantial forms, and so in compounds are neither perfect, as Avicenna held, nor corrupted, as the Latins thought. Of the four primary qualities heat excels the other three in activity and generates and dissolves all mixtures. But it has very little power of resistance, in which is seen a marvelous provision of the supreme Intelligence, since otherwise the universe would burn up. Humidity possesses less active power and greater resistance than either heat or cold. Water and earth are the matter or constituents of all perfect mixed bodies. Without a good deal of earth no body would be solid but would flow off in all directions and divide into the most minute parts. Without water the earthy parts could not cohere.[13]

Combustion is discussed with no little acumen. Fire requires continual feeding from which it can flow like a spring. The nearest or most fitting aliment for fire is the vapor of the air, especially if it be mixed with terrestrial dryness or exhalations. Oil sometimes extinguishes a fire better than water does because it is slower and stickier and keeps the fire from spreading. Earth and water, unless mixed with and mollified by air, will not support combustion but extinguish it. The force and species of fire varies with the materials in which it is. Fire may be generated in a number of ways: from other fire, by reflection of the sun's rays in a concave mirror, by rarefaction of air, or by motion and friction. Generation is the work of natural heat, corruption is produced by extraneous heat. Why some things are colder after

[12] Contarini, fol. 37r-v: Manutio, fol. 39v.

[13] Contarini, fols. 45r-47r, 58v-59r, 49r-50r, 56r-v.

digestion than before requires from Contarini explanation of the forced sort that d'Alembert was to satirize in the eighteenth century.[14]

Contarini believes that nature does not leap from one extreme to another but acts gradually through an ascending or descending scale. He tries to explain in terms of the primary qualities, hot and cold, wet and dry, such phenomena as that wood can be both broken and cut, while stone can be broken but not cut. Oil is thickened by either heat or cold but is hardened by neither because it contains so much air, which is also the reason why it floats on water.[15]

In the fifth and last book on flavors, odors and colors Contarini holds that art in cooking food or preserving fruit can produce flavors not found in nature. He distinguishes seven or eight flavors or tastes, and notes that the human sense of smell is very imperfect and that we often employ the names of flavors to explain varieties of odors. He argues against Aristotle[16] that brutes notice odors which bear no relation to their hunger, like those of flowers, or as the panther attracts other animals to it by its very agreeable odor. He observes that some colors are merely apparent and distinguishes seven chief colors. He doubts if the opuscule on colors ascribed to Aristotle is genuine.[17]

A brief treatise in Italian on the elements and their many notable effects which Paolo Manutio or Manuzio, noted classicist and son of the founders of the Aldine press, dedicated in 1557 to Paolo Giustiniano, abbot of S. Andrea di Busco,[18] is nothing but an abbreviated translation of the work of Contarini, limited chiefly to its first two books,[19] and omitting all its personal reminiscences. Since Manutio not only does not

[14] *Ibid.*, fols. 54r-56r, 59v-60r, 62r-63r.

[15] *Ibid.*, fols. 61r-v, 17r, 65v-66r.

[16] *De sensu et sensato*, 443b-444.

[17] Contarini, fols. 73v-74r, 75r, 79r, 80r, 81v.

[18] *De gli elementi e di molti loro notabili effetti*, Aldus, In Venetia, MDLVII. Con privilegio per anni x, quarto minori, 34 fols. Copy used: BM 537.c.1.

[19] Only with fol. 33r is the end of Contarini's second book reached. In previous footnotes I have indicated some particular correspondences between the texts of Manutio and Contarini.

mention Contarini whom he often repeats verbatim but in his preface professes to state in Italian "what the most learned philosophers have said on this subject in diverse books,"[20] his volume must be regarded as an overt and shameless piece of plagiarism, although as an abbreviated translation it is not unskilful. It was immediately translated back into Latin in 1558 by Jacques Charpentier, the foe of Ramus at the university of Paris, who in his turn made no mention of Manutio but simply described his work as a translation from the Italian.[21] This led François Rassius Noëns, a surgeon of Paris, to write in the same year in a bold hand in his copy at the close of Charpentier's dedication: "This rascal Charpentier has cheated the true author by not mentioning the author in Italian, the most learned Paul Manutio, son of Aldus, most polished in all literature. But he [Charpentier] is an impudent plagiarist," signed "Rassius."[22] But the more impudent plagiarism was that of Manutio from Contarini, for which he was only being repaid in his own coin, though apparently unwittingly, by Charpentier.

From Contarini's attempt to explain nature in terms of the four elements, four primary qualities, celestial influence, and privation, we revert again in the case of Fernel to hidden causes and occult properties. Jean Fernel of Amiens wrote various medical works: a *Methodus medendi,* seven books on physiology, and as many more on pathology.[23] L. Figard in his work on Fernel[24] seems to make of his hero more of an innovator, reformer, or original mind than the facts warrant. This is partly the result

[20] *Ibid.*, fol. 4r.

[21] *De elementis et variis eorum effectis iisque potissimum quae in meteoris apparent liber ex Italorum vernaculis Latinus factus per Iac. Carpentarium Bellouacum.* Parisiis ex typographia Matthaei Davidis via amygdalina ad veritatis insigne, 1558, 38 pp. Copy used: BM 538.e.27.(2.). Written across the title page of this copy is, "Franc. Rassius Noëns Chirurgus paris. 1558."

[22] *Ibid.*, p. 4: "Hic nebulo Carpentarius genuini autoris fraudavit tacito Italice lingue autore viro nempe doctiss. Paulo Manutio Aldi f. omnis litterature cultissimo. Sed est impudens plagiarius. Rassius."

[23] I have examined them in the Frankfurt, 1577, edition of his *Opera.* They have been analyzed by Alexander Rittmann, *Culturgeschichtliche Abhandlungen über die Reformation der Heilkunst,* Brünn, 1869-1870, III, 87-223.

[24] L. Figard, *Un médecin philosophe au XVIe siècle. Etude sur la psychologie de J. Fernel,* 1903, 8vo, 365 pp.

of the assumption that most of Fernel's medical contemporaries were exclusively devoted to theory, partly the outcome of an insufficient appreciation of medieval science and medicine before Fernel. When we turn to his works themselves, we find him dealing with the usual topics—elements, temperaments, spirits, innate heat, mental faculties, functions and humors—in much the traditional manner. Rittmann claimed for Fernel an objective standpoint against Galenism, a greater physiological and anatomical objectivity than his contemporaries, and more emphasis upon pathological anatomy.[25] But the century had already witnessed much activity in anatomical studies, while Fernel still follows Aristotle and Galen extensively. He continued the common medieval association of mathematics with medicine by a work on proportion published in 1528[26] and of medicine and astronomy by his *Cosmotheoria,* dedicated to king John of Portugal in 1528.[27] This work is primarily astronomical in character, with good figures of epicycles, eccentrics and deferents, and with tables of longitudes for various places. But there are hints of astrological doctrine, as when it is stated that the immobile zodiac of the starless *primum mobile* exerts virtue.[28] He also published in 1527 a *Monalosphaerium* in which he set forth such matters as the mansions of the moon and what to do in each of them, the aspects of the planets, critical days, the division of the zodiac into astrological houses, revolutions and nativities.

Figard has admitted that Fernel's early writings were full of astrology but has asserted that, as his mind developed, he condemned it absolutely and regretted having ever occupied himself with it. This is an argument or explanation which modern biographers have often put forward for their heroes, but it is not very plausible, for most men do not grow more sceptical but more

[25] Rittmann, *op. cit.,* pp. 100-101.

[26] *Joannis Fernelii . . . de proportionibus,* Parisiis ex aedibus S. Colinaei, 1528. In it he cites Jordanus, Campanus and Bradwardine as well as Euclid, and charges more recent writers—Bassanus Politus and Volumnius Rodulphus—with errors.

[27] On the title page the work is dated at Paris, in 1527, "in aedibus Simonis Colinaei." The apparent inconsistency is presumably due to the Parisian custom of beginning the new year with Easter.

[28] *Cosmotheoria,* I, xi, fol. 28v.

conservative as they become older. Astrology can scarcely be classed as a youthful folly or enthusiasm like writing love verses or preaching parlor radicalism. It was an old and firmly entrenched discipline which one might better be supposed to question when young but become increasingly reconciled to with advancing years. Religious qualms might in certain cases arise in later life as to youthful indulgence in extreme astrology, but intellectual development would seldom take that direction. In any case even Figard grants that in *De abditis rerum causis,* which Fernel did not print until 1548,[29] he accepted fully the influence of the celestial bodies on human life and health. Apparently Figard thinks of judicial astrology as merely genethlialogy. At least it is only the casting of nativities which he specifically pictures Fernel as condemning and for this condemnation he cites no passage in Fernel's own works but only the secondary authority of Guillaume Plancy's *Life of Fernel,* and that in the translation by Goulin.[30]

We come finally in our consideration of Fernel to the *De abditis rerum causis* itself. First printed at Paris in 1548, it ran through various editions, 1550, 1560, 1575, 1593, 1605, and so on, and became a very well-known book, influential throughout the remainder of the century.[31] In the preface to Henry II, Fernel adduces as justification for the publication of novelties in medicine the now trite trio of "modern" inventions—artillery, printing and the discovery of the new world—or the Christian revelation of the immortality of the soul. Yet in his *Physiologia,* II, 6-7, he had inveighed against the inane puerility of many younger men who thought that only the four qualities and not the four elements persisted in compounds. Apparently this, rather than belief in astrology, was the sort of thing that one outgrew as one became older and wiser. In any case Fernel's work on the hidden causes of things seems in many ways a quite

[29] Fernel says that it was composed long before, and he cited it in 1542, but had he repented of its astrology, he would have expunged it.

[30] Figard (1903), pp. 33-34.

[31] I have used the edition of 1550, "Venetiis Aedibus D. Petri et Ioan. Marie de Nicolinis de Sabio, Sumptibus autem D. Andreae Arrivabeni ad signum Putei. Anno Iubilei. MDL."

medieval performance rather than a modern novelty. He opens by stressing the importance of substantial form. He insists that such form cannot come from the parents but only from the influence of the sky and indirectly from God. All blind and mortal things were once divinely constituted and now are generated and governed by celestial virtue, which also is plainly divine. In each generated thing we find one kind of virtue from matter, another from the temperament of the qualities, a third from form. This third kind of virtue is occult and clearly divine, since there is no certain and manifest explanation of it. Fernel also essays to show that Galen believed that our souls are not from the elements but are of divine substance. Furthermore the spirits of the human body and of all living beings are divine, as is the heat engendered in them. Contarini, with his notion of ethereal warmth, would seem to antecede Fernel in this. Joachim Cureus rejected Fernel's derivation of innate heat directly from the sky.[32]

From such pre-Telesian and pre-Campanellian doctrine Fernel turns to occult diseases. He asserts that the cause of pest is occult, and that there is something occult in epidemics. Then he comes to occult properties of the form or substance as a whole, their diversity, and their origin from without, that is, from the stars. Thus a work which began with the conception of substantial form approaches its conclusion with the notion of occult virtue. There is, however, one more chapter in which such remedies are suggested as ashes of burnt swallows and dung of a white dog for angina and inflamation, foxes' lungs for asthma, a belt of wolf-gut for colic, blood of a goat for the stone. We cannot truthfully call such beliefs and practices characteristically medieval, for they originated in antiquity and persisted well into modern times. At least there was nothing novel about them.

Fernel's work on hidden causes was more often cited by subsequent writers in support of marvelous properties than against them. But sometimes the latter was the case. Thus Boquet notes that Scaliger, Riolan and Fernel denied that a wolf could make

[32] Cureus, *Libellus physicus*, 1572, II, 29.

a man lose his voice, whereas Cardan still held that there was something in the eyes of a wolf so contrary to man that it hindered breathing and consequently speaking.[33] I have failed, however, to find the citation in Fernel. Even if Fernel occasionally displayed such scepticism, we should have to discount it by other passages in which he repeats such beliefs as that eating the still palpitating heart of a swallow confers memory and intelligence, or that eyes of frogs removed before sunrise—while the frogs are released alive in the water—and bound on the patient's body relieve tertian fever.[34]

In the chapter on German Medicine we have seen that the publications of Walther Hermann Ryff were marked by pretense, plagiarism and incompetence. If, therefore, we now consider his commentary on the account of magic contained in the two opening chapters of Pliny's *Natural History*,[35] it is because he copied and printed what he thought would attract readers and sell, and so reflected the interests of others and of his

[33] Boquet, *Discours des sorciers avec six advis . . .*, 3rd edition, Lyon, 1610, pp. 190-91. Boquet merely cites *De abditis rerum causis*, cap. 17, without giving the number of the book in which the chapter occurs. Only the second book, however, has a seventeenth chapter. It contains no such assertion, nor is it covered by the Index.

[34] *De abditis rerum causis*, edition of 1577, II, 18.

[35] I reproduce the full title page except that I have dropped a good deal of the capitalization.

In Caii Plinii Secundi Naturalis historiae argutissimi scriptoris I et II cap. Libri XXX Commentarius Naturalis quidem Magiae compendiariam rationem planam mysteriis profundissimamque rerum secretissimarum contemplationem naturam potentiam qualitatem substantiam et virtutem totiusque naturae cognitionem complectens.

Cui praeterea adiecta est de fascinationibus Disputatio elegans et erudita ad cognoscendas naturae secretiores effectus mire utilis et necessaria.

Item de Incantatione et adiuratione collique suspensione Epistola incerti authoris una cum Ioannis Tritemii abbatis Spanchеymensis viri doctissimi occultiorisque philosophiae atque magicarum artium indagatoris solertissimi in libros suos Steganographie Epistola apologetica.

Quibus difficultates Plinianae praesertim magicae omnes explicantur et tolluntur ab quibusdam authoribus ac monumentis vetustissimis singulari diligentia excerpta.

In Plinianae lectionis studiosorum gratiam nunc primum conscripta et edita cura et diligentia. D. G. H. R. M. & M. MDXLVIII.

The printer was J. Mylius of Würzburg, and the book comprises 28 leaves in quarto. The tract on incantation, adjuration and suspension from the neck referred to is that of Costa ben Luca.

time, and not because his lucubrations possessed any independent value of their own. Its long and flamboyant title page is full of allusion to mysterious secrets and virtues of nature. In the text Ryff extols natural magic as "the absolute consummation of natural philosophy," and asserts that by the opportune application of natural virtues can be wrought marvels exceeding the ken of the human intellect. These are effected by the power of sympathy between things, by drawing down the virtues of the celestial bodies, by the power of the mind apart from the body, and by the virtue of numbers. Ryff believes that the ideas in the divine mind lie back of and act through the various configurations of the stars upon which all inferior virtues, occult or manifest, depend. He states that the world soul is called the fifth essence by many philosophers. Ryff is rather loose in his citations. Although he correctly cites Avicenna for the power of the rational soul over matter, he ascribes to Galen and Hippocrates as well as to the Platonists belief in the power over matter of certain human souls separated from the body. He represents Aquinas as accepting the doctrine of astrological images in the treatise, *De fato,* which is almost certainly spurious, while that doctrine is repeatedly rejected in Aquinas's works of undisputed authenticity. He interprets Pliny as listing physics, metaphysics and astrology as magic's three supporting or ancillary subjects, whereas what Pliny actually says is that magic has corrupted the three fields of medicine, religion and astrology. From natural magic Ryff differentiates the evil variety wrought by the aid of spirits. He lists the different varieties of its forbidden occult arts in much the usual way except for one or two odd names for kinds of divination, such as biteromancy or litteramancy for divining by the letters of personal names, and umbilicomancy by which midwives determine how many children there will be and how many years they will live. Berengario da Carpi in his commentary on the *Anatomy* of Mundinus had referred to a similar notion of Zerbus and others that the number of nodes on the umbilicus of the first-born indicated the number of subsequent children. But

when Carpi made inquiries of many very skilful midwives of long standing, they told him that it was a sheer lie.[36]

Ryff followed his commentary upon Pliny's account of magic with a disputation on fascination which borrowed largely from the *Symposiacs* of Plutarch. Ryff felt that fascination was a fact which must be taken seriously. Finally, to his own lucubrations he added reprints of the ninth century *Epistle on Incantation, Adjuration and Suspension from the Neck* by Costa ben Luca, although he thought its authorship uncertain, and of the apologetic preface of Trithemius to his *Steganographia.* Thus the entire volume catered to the interest in magic and curiosity as to occult arts.

[36] Edition of Bologna, 1521, fol. 263r: "et ita ego credo quia omnis umbilicus habet illam involutionem et to[r]tuositatem venarum et arteriarum a qua fiunt nodi predicti." Carpi thought, however, that thinness of the veins and arteries in the umbilicus might indicate the unlikelihood of further offspring.

CHAPTER XXVI

CARDAN

Cum omnium rerum quas indipisci humano generi licet nihil iucundius nihil praestantius veritatis cognitione videatur.
—CARDAN, *De propria vita*

The volûminous works of Jerome Cardan (1501-1576), which fill six huge tomes in the edition of 1663, are very repetitious. They ramble on and on without evidencing any inclination to stop. They contain much that would seem of no possible interest to anybody except apparently the author himself. Nevertheless, from the numerous citations of them by other writers of the century it becomes evident that they were read fairly extensively and that they exerted considerable influence. There were at least five editions of his *De subtilitate* in the years, 1550-1554, and three of *De rerum varietate* in 1557-1558. Their faults were to some extent those of their time, while occasionally they display rather unusual originality and intellectual hardihood. Cardan's writing is further characterized by a naïve and childish vanity and a tendency to psychoanalysis. The facts of his life and his penchant for seeing portents, omens and preternatural events in various trivial incidents that befell him have already been treated fully by Henry Morley.[1] We turn to his works and ideas.

De rerum varietate and *De subtilitate rerum* are works of an encyclopedic character and especially germane to our investigation. Cardan, however, in looking back over his life in *De propria vita,* written in 1575, said that he had covered only ten out of thirty-six fields of knowledge and urged future students to specialize still more. He had gone into the theory and practice of

[1] *Jerome Cardan. The life of Girolamo Cardan, of Milan, physician,* 2 vols., London, 1854.

medicine, but into neither surgery, anatomy, nor botany. He had devoted himself to astrology but not to astronomy or geography; to arithmetic and geometry, but not to music, optics, or weights. He knew Latin but not Greek; some other languages, but neither French nor Spanish. He had delved into the properties of things and natural magic, but not into questionable and evil arts like chiromancy, poisoning, chemistry, physiognomy, incantations and invocation of demons. He had studied dialectic but not grammar, rhetoric, altercative philosophy, ethics, theology, jurisprudence, versification, agriculture, or architecture, naval and military. It will be seen that, with the exception of mathematics, Cardan had failed to devote much attention to those subjects which are commonly thought of as having contributed most to the advancement of science in the sixteenth and seventeenth centuries. Equally noteworthy is his adherence to the paths of astrology and natural magic, serving to remind us that for him and for many other men of his time they still seemed to open up an avenue of great promise.

In the very field in which he is most celebrated, mathematics, Cardan continued the medieval tradition. Thus he wrote on circles in imitation of Campanus of Novara and commented upon the *Sphere* of Sacrobosco. Albertus Magnus he often cited with respect on animals but again questioned some of his statements and charged him with undue readiness to accept things upon hearsay.[2]

Cardan's attitude to the leading ancient authorities in science and medicine should also be noted. He wrote a commentary on the first and seventh books of Ptolemy's *Geography,* while he sometimes criticized Pliny as he did Albertus. Galen whom he placed eleventh in his list of leading intellects he praised for his medical skill but censured for his verbosity, which was a case of the pot's calling the kettle black. In 1536 he did not know what to prescribe for a patient whose heart dropped every fourth beat, because he had not yet read Galen, *De praesagiis ex pulsibus.* He believed in abandoning Galen and Aristotle when

[2] *De rerum varietate,* VII, 34-38.

reason and experiment showed that they were wrong, but he criticized Rondelet who in his work on fish seemed to Cardan to have gone out of his way to attack Aristotle or to have adopted a different view from Aristotle without good reason. He added that this criticism was less meant for Rondelet, of whose writings he in general approved, than for "those who impudently condemn great men and found new sects without having first digested the ancients, to the great detriment of the human race and of good letters." In making this statement, Cardan may have had Ramus or Paracelsus in mind. In his *Opus novum de proportionibus* he still explained acceleration in falling bodies by impulsion from the air displaced, like Aristotle.[3]

With the possible exception of himself, Cardan was not inclined to overestimate the importance of his contemporaries and of the men of the period called the Renaissance at the expense of the preceding medieval centuries, as so many of his coevals and writers since have been prone to do. Of his list of the world's ten leading intellects none were men of the Italian Renaissance or sixteenth century, but five ancient Greeks, three medieval Arabic writers, and two medieval Latins.[4] Again, after noting that the geniture of Regiomontanus was not up to his accomplishments or reputation, Cardan added that this was not surprising, since Regiomontanus had ascribed to himself many things produced by the labors of others. His *Tables of Directions* were based on those of Bianchini. The *Epitome of the Almagest* was the work of a Milanese before even Peurbach, the master of Regiomontanus, was born. The work on spherical triangles was entirely the invention of Geber of Spain, and *Ephemerides* were drawn up before the birth of Regiomontanus, Cardan possessing some for 1412.[5] Thus Cardan availed himself of a type of historical

[3] Duhem III (1913), 203.

[4] *De subtilitate rerum,* lib. XVI: *Opera,* edition of Lyons, 1663, III, 607.

[5] Hieron. Cardan, *De exempli's centum geniturarum: Opera,* edition of Lyons, 1663, V, 498. In *De rerum varietate,* XII, 59, Cardan puts the matter differently, stating that certain persons say they have seen printed *Ephemerides* for the year 1412, whereas printing itself was invented only in 1443. He continues that there may have been Ephemerides before printing, that at least they antedated Regiomontanus, but that Peurbach in especial and Regiomontanus in less degree deserves credit for diffusing them.

criticism no longer in favor, namely, the checking of a person's reputation and professed works by comparison with what should be expected astrologically from his nativity.

Truth is extolled by Cardan as the loftiest and most enjoyable human possession. He represents himself as hating a lie and as having never told one, and also flatters himself that he is a good judge of the credibility of witnesses and narrations. But although he doubts some things, he himself tells a good many tall stories and accepts more on the ground that their reporters were distinguished men who would not have lied about it. He explains that uneducated persons are more certain of what little they do know because they have no conception of eternal verities or the vastness and complexity of the universe to make them question their sense perceptions, as do learned men.

Although Cardan did not overestimate contemporary individuals and writers, he did think that his century represented a great advance in civilization. "Among natural prodigies," he writes in *De propria vita,*[6] "the first and rarest is that I was born in this age in which the whole globe became known, whereas the ancients knew little more than a third of it." Thus he realized that the voyages of discovery were a new factor, independent of the classical revival and distinguishing the modern period from both the ancient and medieval. He gave a fairly good enumeration of the new lands thus far discovered,[7] but on the other hand still displayed a tendency to cite Ptolemy more than he should. So great did he regard the advance in civilization involved in this increased knowledge of the globe that he feared that "as a consequence . . . in order to make an equal distribution, great calamities will follow: men grow more opinionated, good arts will decline and become contemned, and certainties will be exchanged for uncertainties. But these otherwhile; meanwhile we shall rejoice in flourishing pastures."[8]

Cardan closely associates with the voyages of discovery as if boons of his own century the invention of gunpowder and

[6] Cap. 41.
[7] *De rerum varietate,* I, 1, 3, 4, 9.
[8] *De propria vita,* cap. 41.

artillery, the mariner's compass and printing.[9] Similarly Ramus grouped artillery, typography and nautical navigation as three modern improvements which had followed the dissemination of mathematical instruction in Germany by the transfer of Henry of Hesse from the university of Paris to that of Vienna[10] (in 1382-1384). From such erroneous notions as to the chronology and provenance of the discoveries in question seems to have developed the common error among modern writers of speaking of the three inventions of the compass, gunpowder and printing as if they were roughly simultaneous and marked off medieval from modern times. Cardan makes what seem some rather exaggerated statements for his time concerning artillery. Having discussed the great force contained in thunderbolts he asserts that they have been thrown into the shade by recent cannon which can down an entire tower at one blow and throw sixty pounds of iron five thousand paces. Indeed, but for the danger of fracture, nothing would prevent shooting from the Germanies to India.[11] Among machines and instruments described by Cardan is a watch spring, while he delights in ciphers, natural secrets and various tricks and experiments.

Cardan evidently views religion from the outside without personal experience. He holds that Christianity is true, but that the church fathers and other religious writers who have tried to be philosophers or scientists have often made absurd statements.[12] He marvels at religious martyrs who have died with such constancy for all shades and varieties of religious belief and have offered themselves voluntarily for torture.[13] He has a long discussion of miracles in connection with other marvels,[14] and holds that miracles, immortality of the soul, and the belief in demons stand or fall together. He implies that in his time scepticism as to both the last is widespread, and that many think that this life is all.

[9] *Idem.*

[10] Petrus Ramus, *Math. scol.*, II, 64 (edition of 1569); cited by O. Hartwig, *Henricus de Langenstein dictus de Hassia*, 1857, p. 85.

[11] *De subtilitate*, lib. I, II: *Opera*, III, 361, 378.

[12] *De rerum varietate*, XIV, 58: *Opera*, III, 271.

[13] *Ibid.*, II, 13: *Opera*, III, 32.

[14] *Ibid.*, XV, 81.

Concerning demons Cardan has a long discussion,[15] in part devoted to repeating the work of Psellus. His own ideas have more interest and are his characteristic compound of critical detachment and naïve credulity. He warns repeatedly that he is treating the problem solely from the philosophical and not from the theological standpoint. It is evident that he is attempting to discuss the matter coolly and impartially, and he gives full weight to the arguments against the existence of such spiritual beings, for example, if they are beneficent beings, what arts have they ever invented or improved for mankind, or, if they are evil, why don't they injure those who deny their existence? But he finds irrefutable the personal testimony, as to their personal demons, of his own father or of a sage like Socrates, who would not deceive even to save his life. Julius Caesar, too, he believes had a solar genius, and the strange death bed visions of eminent men he thinks must be due to demons. On the other hand, he acutely observes that if Aristotle maintained silence regarding demons, it was probably either because he did not wish to seem to call Socrates a liar or because he did not wish to dispute the established religion of his time. Cardan concludes that some persons are sensible of the presence or existence of demons, while others are not; and that this divergence is probably caused by some peculiar force of nature or the stars. While he thus accepts the existence of spiritual beings, he reduces their activity to a rather slight and shadowy one. They are perhaps composed of purer and tenuous vapors of air and water so that they are invisible. They cannot move heavy weights—a limitation unfavorable to the witchcraft delusion, in which the devil was supposed to transport his worshipers through the air; they deceive our senses rather than really affect them; no one accomplishes anything worthy by their aid; their utterances are mere nonsense. They suffer readily and so are timid. They have leaders. They do not have the use of reason but are able to predict the future better than men who have. They live in the uppermost region of air which is purer, drier, and less cold than the

[15] *Ibid.*, XVI, 93.

intervening region between them and us, which they hate to cross as much as we would dislike to plunge into the depths of ocean in order to catch fish. Just as we catch only a very small fraction of all the fish in the sea, so the demons, no matter how malevolent they may be, catch only a few men with their plots and machinations. And as fish might well doubt the existence of any such beings as men and fishermen, so many men doubt the existence of demons. Men like Caesar and Socrates, who have established contact with demons, have usually come to some bad end, so that it is best not to attempt to invoke them. Cardan, however, repeats the association of seven angels with the seven planets which occurs in Michael Scot and other medieval writers. With the moon went Gabriel; with Mercury, Raphael; with Venus, Anael; with the sun, Michael; with Mars, Samael; Jupiter, Sachiel; and Saturn, Cassiel.[16]

In discussing natural phenomena Cardan sometimes displayed a power of observing details, but perhaps no greater than that of some of his medieval predecessors. On the other hand, sometimes his discussion of such matters seems puerile.

The four elements commonly accepted Cardan would reduce to three by omitting fire. His explanation of combustion approached the discovery of oxygen. The flame, he said, was only air being burned, and the fire was only consuming heat. The traditional four first qualities he reduced to two: heat from the sky and moisture from the three elements. He believed that the amount of earth greatly exceeded that of water, although he admitted that the earth was full of subterranean waters like a sponge.[17] Water always tended to flow downward and the only reason some of it remained above the earth was that there was no room for it within the earth. He thus abandoned the Aristotelian view that earth was the heaviest element and formed the innermost concentric sphere of the universe.

This and his omission of the sphere of fire prepared Cardan to question the Ptolemaic theory in general. He opposed epi-

[16] *De subtilitate,* lib. XX, *Opera,* III, 662.

[17] *De rerum varietate,* I, 1-2; X, 49; *De subtilitate* lib. II: *Opera,* III, 375.

cycles and eccentrics. But while he knew of the Copernican theory, he rejected it on the ground that so rapid a movement of the earth as it supposed could not pass unnoticed by men. He also was not ready to adopt Fracastoro's system but followed many features of it. Cardan already had abandoned the Aristotelian explanation of comets as earthy exhalations and substituted the equally erroneous explanation of both comets and the Milky Way as effects of the concourse and reflection of light in the sky.[18]

Of animals Cardan distinguished five kinds: birds, quadrupeds, fish, cetaceous and worms, thus distinguishing whales from fish. He believed that a change of habitat produced alteration in animals. He rejected the explanation (given in the twelfth century by Adelard of Bath) that some animals have horns for defense and suggested that it was due rather to their lack of upper teeth. He held that horses could utter five different sounds with different significations. He still accepted the spontaneous generation from putridity of certain forms of animal life, and the existence of such legendary animals as the barnacle geese and remora. He held, however, that the birds were not generated from driftwood but from the ocean itself and that the remora retarded the ship by taking hold of its rudder and making it wobble. He also accepted the existence of mermaids because he felt sure that Theodore Gaza and George of Trebizond would not have lied about the matter. Cardan cited both Albertus Magnus and Rondelet a great deal as to animals but often criticized the latter's views as to fish. He agreed with him against Aristotle, however, that at least some fish breathe air. The bee, though bloodless and small, was still for Cardan a text for moralizing, and he still insisted with Aristotle that all honey was made from dew and only the comb from the flowers. He had seen five winged serpents at Paris. The wings were so tiny that he believed them genuine; if fabricated, they would have been made larger.[19]

Gems have more marvelous virtues than either plants or animals because of their fewer functions and older formation. Also

[18] *De rerum varietate*, I, 1; II, 11.

[19] *De rerum varietate*, VII, 25-38.

the softer substance of plants and animals cannot receive so great force. There is no splendid gem that does not possess great virtue. Some promote longevity, others safety, wealth, love, divination, physical strength, and good fortune. Others are unfortunate and make us lazy, timid, sad. Cardan in *De subtilitate* repeatedly confirms what former writers have said of the virtues of gems by his own experience.[20] In a separate treatise on gems and colors he repeated and at least in part accepted the extreme powers attributed to gems by Marbod. But he denies that true gems are generated either in the sea or in animals,[21] which seems to reject pearls as well as bezoars.

To alchemy Cardan was surprisingly unfavorable, in view of his hospitable attitude towards magic, astrology and other forms of divination. He classed the chimaeras of the chemists with the vain hope of witches and the miserable, and denied that gold or silver could be distilled or a water made of either, but he cited some contemporaries in favor of transmutation.[22]

Cardan thought that nature surpassed art in marvels.[23] He not only, like most men of his century, accepted the existence of relations of sympathy and antipathy between things in nature as a means of explaining matters which would otherwise be difficult to accept as facts, but tried to analyze this relationship into ten varieties. These were cause and effect, or sky and elements; agreement in quality—that is, possession of the same degree of heat or moisture; similitude of substance; like causes; agent and patient; nutriment and thing nourished; the sympathy between heat and what conserves heat; by reason of common sense—as the relation between magnet and iron; sexual love; and lastly, celestial harmony and virtue of souls.[24]

It would be difficult to overstate the favorable attitude of Cardan towards astrology and various other forms of divination, and it would take too long to attempt to illustrate it in anything like full detail. He commented on the astrological *Quadripartitum* of Ptolemy, composed an *Encomium astrologiae,* issued

[20] *De subtilitate,* lib. VII, De lapidibus.
[21] *De rerum varietate,* V, 18, p. 51.
[22] *Ibid.,* XVI, 93, p. 318; X, 50-51.
[23] *Ibid.,* I, 4, p. 11.
[24] *Ibid.,* I, 1.

various collections of genitures of famous men, occasionally interpreted the horoscopes of contemporaries like Edward VI of England, and treated of such other branches of judicial astrology as interrogations and revolutions.[25] He recognized that the art was reduced to infamy by the fault of those practicing it, but proposed to vindicate it from attack and show that the influence of the stars upon men is manifest, and meet various objections that had been raised against astrology.[26] In *De rerum varietate* he again argued that no heat is generated except from the heavens; that some such cause as the stars is necessary to explain strange aberrations of human conduct, marvels, monsters, diseases and epidemics, weather variations, sects and heresies; and that opponents of astrology and deniers of the occult influence of the stars are impious enemies of eternal natural truth. In particular he advised in prediction for a given year consideration of previous years, when this or that planet occupied about the same position, while from the movement of the eighth sphere he himself predicted a great change in the Christian religion about the year 1800.[27] Or he asked why eggs laid after the new moon in the month of August do not rot.[28] Sudhoff has pointed out that astrology did not play as great a rôle in Cardan's medical writings as might have been expected. However, he accepted the principle that the stars should be observed in administering medicines, and in explaining critical days would take the sun as well as moon into account.[29]

Cardan carried his faith in the influence of the stars so far as to believe that gems, seals and rings carved under certain constellations would acquire the force of the signs and planets then dominant and confer such benefits as wisdom, honors, riches, favor with princes, power, fame, and insensibility to

[25] Most of Cardan's astrological compositions will be found in Vol. V of the Lyons, 1663 edition of his works.

[26] See the *Operis peroratio* of his *Aphorismorum astronomicorum segmenta septem: Opera,* 1663, V, 90.

[27] *De rerum varietate,* II, 11 and 13.

[28] *Ibid.,* VII, 39.

[29] *Sudhoff, Iatromathematiker,* 1902, pp. 62-63, and the works of Cardan there cited such as *De malo recentiorum medicorum medendi usu,* Venice, 1545, 77 fols., and *Contradicentium medicorum liber,* Venice, 1545, 188 fols.

pain.[30] Yet he had just stated, in conformity with his position elsewhere that there is no magic power or operative virtue in words or figures,[31] that it had been justly doubted whether seals possessed any virtue, that it was superstitious to ascribe force to seals on account of the figures cut in them, and that while a seal might make a man healthy, long-lived, mild or brave—presumably by the occult virtues of the gem used or the psychological effect on the wearer of the seal—it was absurd to think that it would win favor with princes for an ungracious person or make one wealthy without work, or render a soldier successful who was neither brave nor trained in military affairs. His attitude thus seems none too consistent. In selecting and making a seal he would observe four things: the effect sought, the material of which the seal was to be made, the constellations, and the man who intends to use the seal. To induce sleep he would choose a somniferous stone like hyacinth and carve on it something that would bring sleep to mind.

At least Cardan relished discussing such things as magic seals, whether they were superstitious or not. He liked to talk about magic and distinguished ten varieties. One was based on the occult properties of things, gems being the most potent. The second kind of magic was from the influence of the stars. The third came from consensus of the operations of the senses; the fourth from the relations between man and nature. The fifth consisted of auguries, prodigies and miracles. The sixth was from the operation of the soul when separated from the body; the seventh, from the whole man; the eighth, from the effect of the genius; the ninth, from fate; and the tenth from obscure causes within us.[32] Giordano Bruno[33] later likewise distinguished ten kinds of magic but they only in part coincided with Cardan's varieties.

Cardan attempted so far as possible to give a natural explanation for magical phenomena; the magic in which he was most interested was natural magic, and it he explained largely in terms

[30] *De rerum varietate,* liber XVI, caps. 89 and 90.

[31] *De secretis,* cap. 20.

[32] *De libris propriis:* edition of 1663, I, 145.

[33] *De magia,* III, 307 *et seq.*

of sympathy and antipathy. He tried to give a rational or natural explanation of Pliny's assertion that spitting on the hand with which a person had been struck would lessen his pain. The suffumigations of magicians he said were to clear the brain and not a sign of a cult of gods or demons.[34] He also denied that it was a demon that threw objects out of a certain house into the street. Concerning incantations he was rather sceptical, asking why they were generally employed only for such trivial purposes as keeping a chicken alive after its head had been perforated.[35] The magic art of Artefius he rejected as false, vain and involving demons. But he took four or five pages to outline it from an old manuscript in which were also works of Euclid and Campanus.[36]

Cardan was sometimes content with magic logic of the weakest sort in endeavoring to explain what he regarded as natural phenomena. Because the gem hyacinth loses its color when worn by sufferers from pestilential diseases, he argues that it must be good for those stricken with the pest and guard others therefrom. "Since all that is changed, changes, especially if that which is changed is weaker by nature."[37] Or when Aristotle says that pest is signified in a year when red frogs abound, since they are generated from moist and corrupt vapor, Cardan concludes that they are good for many medical purposes.[38]

Cardan often shows himself preoccupied with divination of the future. Although he professed to attribute some of it to demons, he also frequently sought to find a natural explanation for it, while he sometimes held that the existence of demons and their pacts with men were unproven.[39] Cardan believed that he himself was personally endowed with four peculiar powers: to go into a trance whenever he pleased, to see anything he wished by the force of his imaginative virtue, to foresee his own future in dreams or in his fingernails.[40] His father, he believed, had a personal demon, and Cardan tells of his family's being warned the same day miraculously of the death of a relative

[34] *De rerum varietate,* XVI, 90.
[35] *Ibid.,* cap. 92.
[36] *Ibid.,* cap 91, pp. 312-16.
[37] *Ibid.,* V, 19.
[38] *Ibid.,* VII, 38, p. 139.
[39] *Opera,* 1663, II, 548-49.
[40] *De rerum varietate,* VIII, 43.

forty-two miles away.[41] Thus certain men, especially those of melancholy temperament, exceed others in clairvoyancy and occult sense. This faculty reaches its height in prophets who are a sort of mean between ordinary men and separate intelligences, just as average men are a mean between irrational animals and prophets. Prophecy is a personal and natural gift which cannot be cultivated. Prophets are not born in all regions. They cannot possibly be born near the poles, and Palestine with its temperate climate and favoring stars is their chief if not sole region. Their parents may not be impious, since in such persons the humors would be bad. They foreknow the future universally rather than particularly and hence are not understood until after the event.[42]

Contrary to the usual medieval and Aristotelian view that some dreams are true and some, false, Cardan maintained that all are true and that some seem false only for certain reasons which he gives.[43] Dreams he classed among the marvelous properties of nature.[44] He recounted many of his own and wrote on the interpretation of dreams. His statements as to the significance of this or that animal seen in dreams were quoted in the many volumes of Aldrovandi at the end of the sixteenth and during the first half of the seventeenth century, often however with censure as idle reveries. In *De rerum varietate* he treated of various arts of divination, giving chiromancy four pages[45] and imputing truth even to geomancy on the ground that its figures stimulate the mind to intent inquiry and truth-telling.[46] One may acquire power of prediction by eating the hearts of certain animals or by carrying certain stones under one's tongue or about one's neck or worn in a ring. But this will not work for every man. Five things are necessary, one of them is being born under the planet Venus.[47] Cardan also wrote a separate treatise on divination

[41] *Ibid.*, XV, 84.

[42] "Cur prophetae dentur?" in *De animorum immortalitate: Opera*, 1663, II, 533-34.

[43] *De rerum varietate*, VIII, 44.

[44] *De propria vita*, cap. 37: "Proprietates quaedam naturales mirificae, inter quas somnia."

[45] *De rerum varietate*, XV, 79.

[46] *Ibid.*, XIV, 58, p. 270.

[47] *Idem.*

from thunder. In it he warned that whatever was superstitious, curious and directed to an evil end should be shunned, but suggested that unusual thunder and lightning are arcana of nature which have their significance.[48]

Cardan assures us that those who insist on natural principles laugh at the stories of witches and their sabbats as fabulous, and that hence great doubt has arisen concerning them. He then, however, argues that their confessions cannot be swept aside, for it is absurd to think that they would lie while under torture and in evident peril of their lives, or that they would all dream or imagine the same things. If their confessions are not true, the judges who accept them must be ignorant and cruel fools. As for the authority of Augustine in favor of witchcraft, however, Cardan grants that he filled his pages with too many absurd tales accepted on hearsay. He then accounts for the witches' aberrations and insensibility by his favorite theory that they suffer from the excess of black bile, and decides that most of the stories concerning them are untrue, and that the courts are often concerned to confiscate their property. He believes, however, in the evil eye and natural fascination. So-called witches are often justly punished for other crimes or impiety, but are sometimes merely stupid and do not make a genuine confession, and are treated like other persons accused of crimes. But everything connected with them is full of vanities, lies, repugnant statements and inconstant attitudes. Cardan therefore concludes that the sabbat is a myth, although persons may believe that they attend them, or may actually meet thrice a year as heretics and worshipers of demons, in which case they deserve death, or may be perpetuating the ancient pagan bacchanalian orgies.[49]

While very hospitable to the occult and marvelous and at times naïve in his credulity, Cardan not only made some bold departures from accepted scientific views and some new guesses or hypotheses as to nature, but also displayed insight, shrewd hard common sense and courageous defiance of accepted conventions in regard to man and society. He recognized in considera-

[48] *De fulgure*, cap. 12.

[49] *De rerum varietate*, XV, 80.

tion of the individual or of society that one must take into account human physiology, psychology and the motive of self-interest. He gave a good account of the peculiarities which distinguish man from other animals.[50] He believed that acquired characteristics may be hereditarily transmitted, asserting that his pup learned to carry stones in eight days because its parents had done so, whereas another dog would have taken two months to learn this. It would appear that dogs in general have acquired this trait since Cardan's day—unless he was mistaken. Dolphins like to be called Simon because their forebears have been so called.[51] The sons of the wisest men degenerate, it is true—one of Cardan's sons was beheaded for poisoning his wife and Cardan disinherited the other—but this is because "the mixture has reached the highest point of subtlety: therefore they are infirm physically and hence also in soul and character."[52]

The new races and peoples now brought to light impressed Cardan as much as the new lands. He has a good psychological estimate of the primitive or savage mind. If we call these peoples savages or barbarians, he says, it is not because they are wild, since they are more humane than many Greeks and Italians. Neither is it because they are immoral or lacking in intelligence. Nor is it because they are brutal, since many of these tribes are very gentle. The reason is rather that before they thoroughly understand a thing, they begin to react to it emotionally, or, as Cardan puts it, "Before a matter is understood they begin to rage and after they have become excited, it is very difficult to quiet them." Hence they are easy to impose upon. Cardan's psychological insight does not seem to have extended far enough, however, to see that these remarks would apply to many other persons than the barbarians. He went on to try to find a natural explanation for their attitude in violent changes of the weather or air caused by the great diversity of days and nights in those lands. At any rate these *barbari* cannot control their feelings

[50] *De rerum varietate,* VIII, 40.
[51] *Ibid.,* VII, 37, p. 114.
[52] *Ibid.,* VIII, 40: "Et ob id filii sapientissimorum ignavi videntur quia iam mixtio ad summum subtilitatis pervenit: igitur infirmi fiunt corpore atque ideo etiam anima."

and are liberty loving and seditious. Cardan doubted the stories of the ancients concerning a race of pygmies, because none had been found in his century when almost all the wonders of the world had been revealed, but he accepted the existence of Patagonian giants.

Cardan may be said to have represented a new school of history, opposing war and attempting to revise the estimate of the emperor Nero.[53] On the other hand he called Julius Caesar a betrayer of his country, adulterer, debaucher of boys, who slaughtered thousands of innocent men, destroyed countless cities without cause, and shed so much human blood merely because of his inordinate appetite for power.[54] Cardan would have rulers give more heed to economic interests and less to wars. When in England he advised young Edward VI to introduce the production of oil into that country somehow, the country lacking olive trees and nut trees,[55] advice which perhaps showed too slight regard for climatic considerations.

Cardan opposed the employment of torture in judicial procedure, arguing that there were better methods of getting at the truth, such as requiring the person to repeat his story after intervals of time.[56] Cardan approached the present attitude towards criminals in his theory that they were impelled to crime by their excess of atrabile humor, which also enabled them to endure torture and punishment unflinchingly. The heavier the penalties, the more they would continue a course of crime, and capital punishment was no deterrent. He urged instead long imprisonment during which the humor might be dissipated and and the criminal return to his normal senses.[57] This pathological interest may be further illustrated by a story—from an oration in praise of medicine by Erasmus—of an Italian of Spoleto who spoke beautiful German, although he had never been in Germany, until the doctor cured him of worms, when his proficiency in the language vanished together with the disease.[58]

[53] *Encomium Neronis,* edition of 1663, I, 179-220.
[54] *De rerum varietate,* XVI, 93, p. 333.
[55] *Ibid.,* VI, 23.
[56] *Ibid.,* XVI, 93, p. 322.
[57] *Ibid.,* VIII, 40, p. 148.
[58] *Ibid.,* VIII, 43, p. 164.

Cardan decried the teaching of patriotism and that one ought to die for one's country, pointing out that in the case of the ancient Romans, Carthaginians, Lacedaemonians and Athenians the patria was nothing but the agreement of petty tyrants to oppress the weak, timid and those who are for the most part innoxious. He then hedged somewhat, however, stating that he did not intend to bring this accusation against those cities which fight for their liberty or those princes who rule justly and beneficently.[59] Cities should not be celebrated for mere magnitude, but for their situation, buildings and institutions, three things which are apt to be accompanied by population, wealth and culture. The site should be near the sea on a navigable river surrounded by fruitful hills, fertile fields and with healthy air. The streets should be straight, wide, clean and well-kept. Of towns of his time Cardan admired Rouen greatly, except that it was situated a bit too far north and had no wine.[60]

In 1725 the author of a Leipzig dissertation on the superstition of Jerome Cardan in natural things regarded him as superstitious in his astrology, his belief in a world soul, his opinions concerning demons and the powers of precious stones.[61] A century or more before, Sanchez had characterized Cardan as "a most learned philosopher and physician of our age, but at the same time quite irrational and more like a delirious than a wise man."[62] He said that Cardan had included in his writings many ludicrous things unworthy of a philosopher and inconsistent with each other and with reason, and that Cardan himself was "inconstant, vague, uncertain," with much undigested knowledge, a good opinion of himself, and little prudence or restraint.[63]

[59] *De propria vita,* cap. 32.

[60] *De rerum varietate,* XVII, 96.

[61] Ioannes Carolus Teubner, *De superstitione Hieronymi Cardani in rebus naturalibus,* Lipsiae, Dec. 19, 1725, 40 pp.

[62] *De divinatione,* in *Opera* (1636), p. 46. Already quoted by L. Gerkrath, *Franz Sanches,* 1860, p. 21.

[63] *Ibid.,* p. 60.

CHAPTER XXVII

THREE TECHNOLOGISTS: TAISNIER, BESSON, AND PALISSY

Potiorem aetatis meae partem 53 annos nunc natus, in diversis studiorum generibus versatus, totam fere Europam magnam Africae Asiae Americaeque partem perlustravi, expertissimorum virorum ubique varias in diversis facultatibus opiniones colligens.
—TAISNIER, *Opus mathematicum*

Jean Taisnier of Hainault was somewhat lacking both in originality and intellectual honesty. William Gilbert accused him of having extracted his book on the magnet from the thirteenth century work of Petrus Peregrinus and published it as something new of his own.[1] His accompanying treatise on continuous or perpetual motion is said to be similarly indebted to Giovanni Battista Benedetti.[2] His device for perpetual motion by a wheel and magnets is, however, that given by Petrus Peregrinus. His eight books on chiromancy, physiognomy and astrology form a combination which would seem to have been suggested by the *Introductiones Apotelesmaticae* of Johannes ab Indagine, whom he admits he is largely following in the seventh and eighth books on physiognomy and astrology, while the chiromantic portion is drawn in great part from Cocles. I should not be surprised, if in discussing scientific instruments and mechanical inventions he has taken some leaves from the writings of Giovanni da Fontana. A good specific and brief example of his plagiarism is furnished by the opening passage of his *Opus mathematicum*. He says, "Rejecting the execrable vanities of the magic art—diabolical, I mean, not divine or natural magic—and rejecting other super-

[1] Gilbert, *De magnete . . .*, 1600, p. 5: "Ex hoc Petro Peregrino Iohannes Taisner Hannonius libellum extraxit et ut novum divulgavit."

[2] Hoefer, *Biographie générale*, 44, 785. More recently, Jules Deweert, "Jean Taisnier," *Annales du cercle archéologique d'Ath*, I (1912), 1-36, an article which I have been unable to consult.

stitions and the statements of those who have thought that all things happen from the stars by fatal necessity. . . ." This incipit, except that the very first Latin word is "Reiectis" instead of "Abiectis," is identical with that of Pitatus in his *Ephemerides* or *Almanach novum,* published in 1544. What is more, the passage had been quoted as "Verba Pitati" by G. Marstallerus in his *Encomia of the Art of Divination Which They Call Astrology,* printed in 1549. Yet in 1562 Taisnier reproduces the passage as his own opening words without acknowledgement either to Pitatus or to Marstallerus.

Despite this fact that Taisnier shamelessly utilized and rehearsed earlier writings, his combination of interest in occult arts or pseudo-sciences with technology, measurement, something of mathematical method, and a yearning for new discovery through physical experiment represents his own choice and selection and makes him of some significance in the history of magic and experimental science. Even if the personal observations and opinions with which his works are strewn are not always his own or to be accepted at their face value, they at least indicate that he chose to make this show of personal authority, experience and experimentation rather than merely cite others or comment upon an accepted text.

Taisnier was, at least on his own statement, a doctor of both laws and poet laureate as well as a musician, mathematician, medical man and philosopher. When he wrote his *Opus mathematicum,* he was fifty-three years old, had traveled over most of Europe and a great part of Africa, Asia and America—collecting, he says, the views of the most expert men wherever he went—and had taught in the universities of Rome, Ferrara, Venice (*sic*), Padua, Florence and Palermo.[3] In another work published the same year he says that years ago in the pontificate of Paul III he lectured at Rome, Ferrara and other Italian universities on mathematics to audiences of over three hundred hearers who used to crowd about him at the close of

[3] *Opus mathematicum,* I, 2. See also the opening words of the preface to Jacob Fugger, "Cum per multos annos elapsos totum fere orbem hinc inde oberraverim."

the lecture to ask questions. When he criticized Aristotle as not always free from error, he was asked by the cardinal of Florence, speaking for the pope, to prove his point and did so before another cardinal and a large audience.[4]

In his *History of the University of Rome* Carafa says that Taisnier tutored the children of the emperor, Charles V, and accompanied him on the Tunisian expedition.[5] Hoefer states that he taught the pages at Charles' court and went with the emperor to Tunis and Italy. At any rate, allusions to Charles V are not infrequent in his writings. At one time he was for some months in charge of the education of noble youths and choristers at Valladolid.[6] In 1538 he superintended Charles V's German choristers at Toledo. For some years before 1546 he was the head of a school or college at Lessines in Hainault with five assistant masters under him.[7] He dates chiromantic experiments of his in 1546, while teaching mathematics at Rome, in 1547 also at Rome, in 1549 and 1550 at Palermo, and in 1551 on February 18 and August 4 at Naples, when he was in command of the German troops in Calabria. His work on the use of the spherical ring was printed at Palermo in 1550.[8] That year he returned to Flanders to recruit singers to take back with him to Palermo, where he was in the service of cardinal Pietro Tagliana. In 1552 he became the director of the musicians of another cardinal, Francesco de Mendoza, and went to Rome, Florence, Venice, Trent and Malines. From 1555 to 1557 he was at Lessines again, teaching music and ancient and modern languages: Latin, Greek, French and Spanish.[9] According to Carafa, Taisnier in later life became prefect of music or capellmeister to the archbishop of Cologne and taught chiromancy there. At least he dates chiromantic experiments there in 1558 and 1561. And there he published his introduction to judicial

[4] *De motu*, p. 16.

[5] Josephus Carafa, *De gymnasio Romano et de eius professoribus*, Romae, 1751, p. 381.

[6] *Opus mathematicum*, 1562, p. 394. The Belgian *Biog. Nat.* gives the date as 1540.

[7] *Ibid.*, p. 398.

[8] *De usu annuli sphaerici libri tres in quibus quicquid ad geometriae perfectionem requiritur continetur*, Panhormi, 1550.

[9] *Biog. Nat.*, 24, 500.

astrology in 1559[10] and in 1562 the *Opus mathematicum*[11] and tracts on the magnet and on motion which were dedicated to the archbishop.[12]

In his work of 1550 on the spherical ring Taisnier tentatively proposed the following future publications: on the fabrication and use of a planisphere, on the mariner's compass of which Sacrobosco said nothing—while Taisnier says nothing of Petrus Peregrinus—and of the construction of two globes, celestial and terrestrial. In the *Introduction to Astrology* of 1559 Taisnier promised to set forth in eight books on its use a Material Sphere recently invented by him and never seen nor treated of previously by anyone. He also referred to "our book of Music" as already written,[13] but neither Carafa nor Hoefer lists it among his works. In the preface of 1562 to Fugger Taisnier

[10] *Astrologiae indiciariae ysagogica et totius divinatricis artis encomia cum nonnullis Habrahami Iudei et Luce Gaurici dictis. . . . In Epistola dedicatoria quatuor mathematicae quantitates cum earum laudibus et utilitate notantur.* Coloniae, Apud Arnoldum Birckmannum, 1559. Copy used: BM 718.d.26.

[11] *Opus mathematicum octo libros complectens innumeris propemodum figuris idealibus manuum et physiognomiae aliisque adornatum, quorum sex priores libri absolutissimae cheiromantiae theoricam praxim doctrinam artem et experientiam verissimam continent. Septimus physiognomiae dispositionem hominumque omnium qualitates et complexiones. Octavus periaxiomata de faciebus signorum et quid sol in unaquaque domo existens natis polliceatur. Remedia quoque omnium aegritudinum complectitur.* Cologne, 1562. Copy used: BM 531.n.11.

[12] *Opusculum perpetua memoria dignissimum de natura magnetis et eius effectibus. Item de motu continuo,* etc. Coloniae, 1562. 84 pp. Copy used: BM 8755.b.47.

[13] I reproduce the passage as of some possible interest to students of the history of music. Ep. dedic.

"Musica theorica practica et poetica mundana humana et instrumentalis choralis et figurata antiqua et moderna ab aliquibus nova dicta sive reservata qui arbitrabantur impositionem unius aut alterius dioesis aut diaschismatis in cantilena aut motteto diatonicum Musices genus in chromaticum verti differentiam Diatonici a Chromatico et Enarimonico penitus ignorantes quorum difficultatem in nostro libro Musicae satis exposui. Novumque quid ubi excogitare nituntur suarum cantilennarum tonos quae in Musicae principiis sistunt praetermittentes magnum errorem committunt notarum ligaturas valores in modo tempore et prolatione negligentes contrapuncta ut aiunt . . . harmoniosa fluentia currentia per minimam ad semi-minimam ad fugum reiterata in modo perfecto et imperfecto per hemiola maius et minus per sesquialtera sesquitertia sesquiquarta etc. Item contrapunctum 3.4.5.6.7. partium extemporaneum a diversis Cantoribus modulandum pro praedecessorum documentis in mentem revocent demum fiant cantores poetae opus absolutum praedecessorum exemplo provocati in sui memoriam et posteritatis usum linquentes."

spoke of projected treatises on the hierarchies of the angels, the construction and use of various astronomical and geometrical instruments, the theory and practice of music, the concordance of astrology with theology "such as cardinal Pierre d'Ailly, bishop of Cambrai, once brought to light," and on musical instruments.

In this connection it may be worth while to reproduce the lists of astronomical and musical instruments given in the dedicatory epistle to Taisnier's *Introduction to Astrology*. The astronomical instruments are: a solid sphere of heaven and earth, a material sphere, an astrolabe, a planisphere, an armilla of Ptolemy, an astronomical radius, a spherical ring, a torquetus, quadrants universal and particular, a *Meteoroscopium speculum cosmographicum,* cylinders general and particular, Jacob's rod, the great rule of Ptolemy, the quadrant of Regiomontanus, clocks universal and particular, quadrangular, horizontal, perpendicular and nocturnal, diverse mariners' compasses, "and other astronomical instruments almost infinite in number."

The musical instruments comprise pipes straight and oblique,[14] a monochord, claviterce, virginal, clavicord, clavicymbal,[15] lyre, lute,[16] zither, psaltery portable or fixed,[17] regale, organ, utrum, clareta, tuba cymbal, tympanum drum, Jerome's zither,[18] Jerome's tympanum, psaltery with ten chords, Jerome's tuba, Jerome's organ, Jerome's pipes, "and others almost innumerable of which we have made mention in our book on music."[19]

By way of practical inventions Taisnier lists the following triumphs of astronomy. Ships are guided to distant ports. Salt sea water is rendered potable. Various mills are driven by wind or water power. Proportionate models of ships and buildings are made. Instruments are devised for raising water in air. Mines are lighted. Shelters are constructed to approach and overthrow any site, town, tower, or edifice. Unlike most early writers on

[14] *Fistulae rectae et obliquae.*
[15] *Clavicombalum.*
[16] *Lutina sive testitudo.*
[17] *Psalterium portativum positum.*
[18] *Cythera Hieronymi.*
[19] For descriptions and pictures of most of these musical instruments consult *Syntagmatis musici Michaelis Praetorii tomus secundus de organographia,* Wolfenbüttel, 1619, index, and *Theatrum instrumentorum seu Sciagraphia Michaelis Praetorii,* Wolfenbüttel, 1620.

inventions, Taisnier ranks the invention of gunpowder, artillery and cannon balls as a benefit to humanity, on the theory that they are useful for defense of the fatherland, protection of one's body, and support of one's household. In *De motu* two ways of making sea water fresh are specified: one by straining it through wax, the other by passing it back and forth through a stone channel filled with pebbles.[20] To the ignorant populace it would seem ridiculous and impossible to say that anyone could descend to the bottom of the Rhine with dry clothing and without wetting the least part of his body and carrying a lighted torch with him. But at Toledo in 1538 Taisnier saw two Greeks submerge in a cacabo of great amplitude beneath the waters of the Tagus. However, they soon had to come up for air.[21]

Taisnier also tells of what were reckoned fast sailing voyages in his time. With favoring winds a vessel is said to have made the round trip from Antwerp to Compostela in a week, but Taisnier thinks that this could not be done without great danger of life and shipwreck, especially on the return voyage. He knows by experience, however, of a trireme of Malta which covered the 405 miles between Drepanum and Naples in thirty-seven hours. He advises that the proportions of a vessel be 300 parts long by 50 wide by 30 deep. He had often tested by mathematics the best construction to enable a boat to proceed against the current of a stream which was swollen in winter by wind and snow. He believes that there are magnets in the Ethiopian Sea which draw all the iron nails from ships and cause them to break into a thousand fragments, and that consequently the Cantabrian sailors navigating that sea fasten their ships with wooden pegs.[22]

The error of Aristotle which Taisnier exposed at Rome was his statement that a larger lump of gold or lead would fall faster than a smaller piece. This Taisnier undertook to disprove not by experiment, as Galileo is said to have done from the leaning tower of Pisa, but by mathematical reasoning which seems ingenious but is perhaps not original with him. Take the sphere

[20] *De motu*, p. 46.
[21] *Ibid.*, pp. 40, 43 *et seq.*
[22] *Ibid.*, pp. 41-44, 2.

F which is four times as large and heavy as the sphere G. Divide F into four spheres, I, K, M, and N, which will all be of the same size and weight as G. If placed on a line at equal distances apart and at the same distance from the ground as G, they will each and all reach the ground at the same instant as G, as will their center of gravity at a point half way between K and M. Therefore the center of gravity of F will also fall at the same speed as the center of gravity of G.[23]

Although Taisnier sometimes failed to acknowledge his debt to past writers whom he plagiarized shamelessly, he also cites many past authors by name. Sometimes, however, these citations are plagiarized. For example, in the field of chiromancy he lists Peter of Abano, Michael Scot, Michael Savonarola, Albertus Magnus, Tibertus Antiochus, Anthonius Cermisonus, Petrus de Archa, Andreas Corvus, Bartholomaeus Cocles, Tricassus, and John Indagine.[24] But this array of names is identical with that given in 1530 by Henry Cornelius Agrippa in the thirty-fifth chapter of his book *On the Uncertainty and Vanity of the Sciences.* The first three named and perhaps some others of the list wrote on physiognomy rather than chiromancy, while Albertus Magnus had no specific work in either field, although he believed in a general way in physiognomy. Taisnier further cites a *Chiromancy* of Hermes and the work of William Nurice (Mirica?) on physiognomy.[25] "Also Hieronymus de Manfredis wrote worthily enough of this art. Alfarabi and Blasius of Parma set forth some problems anent the fourth, fifth and sixth books of the *Physics.*"[26] Taisnier was aroused by a slurring remark of Polydore Vergil that chiromancers beg a penny to promise others riches. Polydore did not know, Taisnier retorts, that John Indagine, a most skilled chiromancer, was dean of the greater church of Frankfurt, or that Luca Gaurico, chiromancer and most expert astrologer, commanded fifteen hundred ducats a year for his lectures on mathesis at Ferrara and in 1539 became bishop of Giffoni. Taisnier praised the past astronomers and as-

[23] *De motu,* p. 25.
[24] *Opus mathematicum,* 1562, p. 7.
[25] *Ibid.,* pp. 20, 13.
[26] *Ibid.,* p. 13.

trologers, Campanus, Guido Bonatti, Peurbach and Regiomontanus.[27] He cited Witelo for proof of the statement that we always see more than half the sky above the horizon because of the curvature of the rays.[28]

Taisnier posed as a distinguished specialist in the art of chiromancy. He asserted, like Cocles, that his judgment had never gone astray in the examination of human hands,[29] and he gives many instances of his successful past readings of palms. After consulting many painters, he found it advisable to draw his own figures of hands in order to have them exact. For in this art the most exact proportion of hands is required for accurate judgment, a fact which previous chiromancers have ignored, "especially half-mad Tricasso who too severely afflicted Cocles and Corvus with reproaches and disapproved of the illustrated chiromancy of Corvus." If painters, sculptors, and architects would only observe this symmetry of the hand, they might more readily comprehend the symmetry of the human body as a whole. Taisnier further notes that Cocles and Tricasso were not mathematicians, "for mathesis requires not a multiplicity of words but ocular and graphic demonstrations." These Corvus gave and Taisnier agrees with him.[30] His own chiromancy is further "mathematical" in the sense of being very astrological.

Although writing in the year that such arts were listed in the *Index Expurgatorius* of Paul IV, Taisnier made no bones of associating with astrology not only chiromancy and physiognomy, but such forms of divination as oeomancy, pedomancy, pyromancy, oenomancy and metoposcopy, provided they did not indulge in rash and presumptuous judgments infringing divine power and human free will.[31] His chiromancy, however, went to the length of predicting from the lines of the hand inheritances, riches, imprisonment, death by poison or suffocation or witchcraft, hanging or decapitation.[32] In astrology he accepted

[27] *Ibid.*, p. 6.
[28] *De motu*, 1562, p. 39.
[29] *Opus mathematicum*, II, 27.
[30] *Ibid.*, II, 26. Taisnier would seem to have ascribed some of Cocles's criticisms of Corvus to Tricasso.
[31] *Astrologiae iudiciariae ysagogica*, 1559, Ep. dedic.
[32] *Opus mathematicum*, III, 1, 2, 5; V, 18.

the authority of Albumasar and Albertus Magnus that both the flood and the birth of Christ had been prefigured by the stars.[33] Moreover, it had been his observation from many genitures that those persons whose birth occurred when all seven planets were below the horizon lived longer than others. Charles V was born when all the planets except the moon were beneath the earth, yet lived fifty-eight years and more[34]—not a very convincing particular illustration of Taisnier's generalization.

Taisnier's tendency to avail himself of the labors and language of others, his many associations with the emperor Charles V, and his combination of mathematical, mechanical and occult interests bring to mind the dedication to Charles V, under the name of Pompilius Azalus of Piacenza, of the *Liber de omnibus rebus naturalibus* which was really composed by Giovanni da Fontana in the previous century.[35] But there seems to be no proof that Pompilius Azalus was an alias of Jean Taisnier, although there is evidence to suggest that both Taisnier and Jacques Besson, to whom we shall next turn our attention, were indebted to the writings of Giovanni da Fontana for some of their ideas.

The name of Jacques Besson figures in several fields of scientific endeavor in the sixteenth century. He made contributions to mathematics and perhaps to the employment of mathematical method in the natural sciences. He was something of a chemist and thereby was of service to medicine. He gave much time and thought to instruments and machinery. He also had his theories as to the earth's surface and its formation, so that his treatise on the art and science of finding waters and springs hidden beneath the earth is in a sense a geological discussion.

Little appears to be known of Besson's life except that in 1569, when he published the last-named treatise,[36] he was professor at Orléans. De Thou did not include him among the celebrities noted under the year of their death in his history

[33] This passage occurs soon after the beginning of the *Opus mathematicum*, 1562.

[34] *Astrologiae iudiciariae ysagogica*, 1559, fol. (H 6) recto.

[35] T IV, 150 *et seq.*

[36] Jacques Besson, *L'art et science de trouver les eaux et fontaines cachées soubs terre*, Orléans, 1569, 4to, 85 pp. Copy used: BN Inventaire V.9815.

of his own times. In the dedication of the treatise on finding subterranean waters Besson thanks François de Balsac for his favors to the university of Orléans and to himself, especially for bringing to the attention of the king and queen mother his works in the mathematical sciences, on which he has labored for the past twenty-five years "with infinite expense and effort." He hopes that by their favor he may receive some aid for his poor family and relief in his old age. He further refers to "this time of the civil wars" as inimical to letters. He says that he has enlarged for a second edition his *Art of Distilling* and *Cosmolabe,* and that he has a work not yet printed on duplication of the cube and two others on converting the curve into a straight line and vice versa—a feat held impossible by past and present mathematicians. He also is working on his book on Instruments and Machines.

Besson's interest in chemistry is shown in his treatise on extracting oils from woods and gum, first published at Zurich in 1559, with later editions in both Latin and French.[37] It is accompanied by an appreciation of Besson by Conrad Gesner which speaks of Besson as from Dauphiné.[38] Gesner further describes him as skilled in geometry and machinery, "of incomparable invention, and my best friend." His method of distilling oils is a great help to medicine. Gesner thinks that the empiric from whom Besson got the first suggestion of it was a German from Saxony or thereabouts, which leads Gesner to dilate—somewhat inappropriately and irrelevantly—on how much the useful arts owe to Germans. He also alludes to a discussion of metals by Besson. Gesner recognizes that previous centuries have not been wholly ignorant how to separate oils and other liquors by the chemical art, but he regards Besson's method as new.

[37] *Iacobi Bessoni De absoluta ratione extrahendi olea et aquas e medicamentis simplicibus accepta olim a quodam empirico postea vero ab eodem Bessono locupletata et rationibus experimentisque confirmata,* Tiguri apud Andream Gesnerum iuniorem, 1559, small octavo, 42 pp.: BM 1033.e.2. (2.); BN Te[147].14.

I have also used an edition of 1571 which gives both Latin and French in parallel columns: BN V.7120 (2).

[38] "Testimonium Conradi Gesneri de Iacobo Bessono Delphinate-Gallo."

Such oils, it may be added, were to occupy much space in the work of Porta on natural magic.

Besson gives three lists of herbs, seeds and aromas from which oily essences can be distilled. As in alchemical writings of the fourteenth and fifteenth centuries, the material, shape and size of the furnace are specified: also the number, quality and quantity of the vessels to be employed. Instructions follow how to extract oils from greasy woods, gums and harder varieties, and how to separate the viscous substance from the aqueous humor that has been distilled. Some exceptions to the usual rules are stated. The composition of a most fragrant balsam is described. Twenty-two questions are raised, as in the treatises of the preceding scholastic period. To the seventh, why putrefaction in horse manure or ashes is not a part of the process, the answer is that the oil would putrefy too. To the eighth, why a *balneum Mariae* is not employed, the reply is that it acts too slowly. In response to the thirteenth query, the oil of a simple is defined as "nothing else . . . than a certain unctuosity or *humidum radicale*"—that favorite phrase of late medieval scholasticism and the pseudo-Lullian alchemical corpus—"which gives being to the object in which it resides no less than form itself does." Once this unctuosity is removed, nothing remains of the simple species but waste matter (faeces). Besson denies however, that either the unctuosity of the simple or its fragrance is a fifth essence. He holds that it is sometimes obtained from cold seeds and herbs which have a thick juice, and not merely from dry and hot species.

The work on subterranean waters of Orléans, 1569, was written in French, and the style has the same fluid character as the subject, a garrulous flow which carries the reader along without much meaning reaching the brain. Besson writes long sentences which he cannot terminate crisply. At the beginning of each new chapter he is apt to spend a page repeating with relish what he has just said in the preceding chapter. From this tiresome loquacity a number of ideas may none the less be elicited. The work divides into three books, of which the first deals with the

generation, place and continuation of waters in general, above or below ground, since the beginning of the world. The second book tells how these waters may have since changed place, of the quantity and depth of those hidden in the earth, and where they can be found near the surface. The third book instructs how to improve waters known to be unhealthy and harmful, and how to conduct them elsewhere if necessary.

Besson presently craves license to treat his theme as a mathematician rather than as a physicist or theologian, arguing that others, like Ptolemy and Copernicus, have employed hypotheses which may not have been true but helped in arriving at the truth. Besson's theory of the elements is that water and earth were created first as the principles of all sensible things, and that subsequently fire and air were drawn by attenuation and resolution from the great waters "which inundated everywhere." For according both to the Bible and physics, the waters were above the earth before they retired into the sea and depths of the earth. Since the water was originally larger than the earth[39] and completely enclosed it, some of it evidently went into air and fire. Pure earth to begin with was white in color and without odor or savor. The earth's surface was made uneven to admit the waters before the sun and stars were formed or wind and rain occurred.[40] The bed of ocean is much lower than any dry land and is seamed with mountains, valleys and plains. However, the sea is nowhere so deep as the highest mountains rise above the earth's surface, a conclusion reached by Besson partly on the basis of the testimony of navigators and of coral fishers. The islands that appear from time to time in the sea are sustained from below and are not floating. The ocean was salt from the first, the earth too then being salt and not yet sweetened on its surface by the growth of vegetation.[41]

[39] Besson seems to say that the water was originally about a tenth larger but perhaps meant to say that it was ten times greater. *L'art et science de trouver les eaux*, 1569, I, 3: ". . . et fust plus grand d'environ la dixieme partie qu'elle selon la proportion et figure ronde qu'ont les quatre elemens l'un sur l'autre."

[40] *Ibid.*, I, 4.

[41] *Ibid.*, I, 5.

Besson's reasons for the first formation of mountains at creation are all from design rather than geological. Mountains serve as the limits and boundaries of realms and provinces; they separate various species of animals; they make the earth's surface more varied, ample and delectable, offering as it were several worlds in one, providing a cool retreat in hot countries, and watering the plains with streams. Finally, without an uneven surface, the waters of the sea would have found no issue underground.[42]

On the other hand, Besson showed unusual common sense and perspicacity for his time in holding that the rivers which flow into the sea are supplied by evaporation and rainfall, which they equal in amount. The springs on mountain sides descend from rainfall and do not mount through subterranean channels contrary to nature, as some have erroneously thought. One can observe that they augment or decrease with the rainfall. The deluge of Noah's day was caused by the turning back into water of air penned in the caverns of earth, with a resultant increased evaporation and clouds and rain for forty days.[43]

Old mountains gradually wear away—Besson alludes to avalanches in the Alps—and the earth's surface would become level, were it not for the formation of new mountains, partly by the break-up of existing ones, partly by the force of winds within and without the earth's surface which elevate the ground or pile up dust and sand. Volcanoes seem to be represented as caused by such winds. "Nature never remains idle."[44] Besson describes the subterranean caves of water as labyrinths of various chambers of different sizes, usually all on one level and about one hundred paces apart, with only one issue for the water. Such chambers are produced by the weight of mountains which exert an outward stress on their foundations leaving a space between these. Or they may be hollowed out by winds which penetrate there and by rain water which erodes the softer parts of the rocks. Some mountains have their channels

[42] *Ibid.*, I, 6.
[43] *Ibid.*, I, 8.
[44] *Ibid.*, II, 2-3.

for water more like flights of stairs or inclined planes, while in hills composed of earth the veins and tunnels of the water take the figure of the roots of large trees.[45] Mountains have different shapes such as the back of an ass or of a tortoise, or like a platform with bastions, and also are grouped together in various combinations.[46]

Besson discusses subterranean waters without mentioning the divining rod or superstitious practices. His closest approach there to an astrological way of thinking is his belief that winds are stirred up by the sun "and other planets and stars."[47] The influence of the sky on waters after they emerge from the earth seems to reduce to climatic effects.[48] Occasionally Besson makes an assertion which seems contrary to common sense, as that a fire is long nourished by the humidity of water.[49] In his chapter on sinking wells he seems, oddly enough, not to know of Artesian wells.[50] He treats of the generation underground of various earths, stones and metals, marked by different colors, odors and savors, and how subterranean waters are affected by these.[51]

Discussing what waters are drinkable, Besson puts rain water first, but thinks that water best which is often agitated and is light and aerated. Next he ranks a spring coming from an elevation which faces east and west, flows over sand, and is cold in hot weather and warm in winter. Third he puts river water. He advises filtration through sand to purify dubious waters. Cisterns should have at the bottom either one or two loads of pure sand from a stream or pebbles or a bottle of good vinegar corked with lime slaked in oil.[52]

Besson died before his *Theater of Instruments and Machines* was published in 1578, although he had already overseen the making of the plates for it. His earlier treatise on the *Cosmolabe or Universal Instrument,* dedicated to Catherine de' Medici and

[45] *Ibid.*, II, 4.
[46] *Ibid.*, II, 5.
[47] *Ibid.*, I, 5.
[48] *Ibid.*, III, 2.
[49] *Ibid.*, III, 2, p. 73.
[50] *Ibid.*, II, 8.
[51] *Ibid.*, III, 1.
[52] *Ibid.*, III, 3, pp. 77-83.

printed in 1567,[53] included some other devices, such an Archimedes' crane in which man power is multiplied by a succession of gears. There further is a digression on measuring the depth of the sea without a line. A light cone filled with air is attached to a heavier cone by two wires which are released by a spring when the tip of the heavier cone strikes the bottom. The time taken by the float to return to the surface after the lead strikes the bottom is to be measured by a water clock. We are told that heavy objects descend more rapidly towards the center of the earth, while light objects ascend more rapidly towards its circumference, for the Aristotelian reason that all natural motion accelerates as it approaches its natural place of rest. Such acceleration is in geometrical proportion, "for to move without proportion unequally or in arithmetical proportion would be absurd and against the said principle of Aristotle." Besson advised to note the times for the ascent of the float from varying depths and to compile tables of reference from which one could instantly determine the depth from the time elapsed.[54] In the preface Besson complains that two of his pupils, in order to win for themselves the reputation of being great masters, had without his knowledge or consent issued a corrupt, ill-arranged and erroneous version of his work, which he had shown to them and which they had further dedicated to great personages.

The *Theater of Instruments and Machines* was first printed in French with explanations of the figures by François Béroald,[55] while the Latin edition of 1582 contained additions by Julius Paschal of Messina. The mechanical devices depicted include lathes, screws, cyclometers for land and sea, mill wheels, pumps, paddlewheels, windmills, dredgers, pile-drivers, and cranes. The twelfth seems to be a walking-beam, run by wheels and operating a hammer. The thirteenth is a wood-saw which enables two men

[53] *Le cosmolabe ou instrument universel,* Paris, 1567, 4to, 287 pp. Copy used: BN V.7120 (1).

[54] *Ibid.,* II, 11.

[55] *Théâtre des instruments mathématiques et méchaniques de Jaques Besson . . . avec l'interpretation des figures d'iceluy par François Béroald,* Lyon, 1578, folio, 60 plates: BN Rés. V.440.

to do the work of eight. The telescoping bracket is employed a great deal. A rather clumsy variety of wheelbarrow, in which the weight of the load appears to rest on a little wheel, while a man by pushing moves two large wheels at the sides, is described as a new device (*plostelli genus novum*). But a chain of buckets for raising dirt is also called a new machine. Yet in a mill run by man power other men carry the grain on their backs in sacks up two flights of stairs. There is a device for ploughing with a three pronged plough by the aid of two ropes and a windlass and two extra men to run it. The cranes for unloading ships revolve on a screw. There is an arrangement for moving an obelisk. Zigzag flues prevent the wind from blowing smoke into the room or the rays of the sun from shining directly into the chimney. A pulpit, lectern or reading-stand moves up and down on a screw and is equipped with two mirrors adjusted by levers in which letters are reflected and magnified, "rendering reading expedite and less hard on the eyes." A well-bucket is raised more readily by suspending it between two pulleys. A very primitive sort of fire engine and hose is shown to throw water from a distance. The water is brought in pails by maids and poured into a tub from which one of them replenishes the engine with a ladle or scoop. There are also contrivances for launching vessels or raising wrecks and their cargoes with tongs. A similar engine had already been shown in the *Cosmolabe* of 1567. Besson is said to have spent a vast amount of time and thought in planning these instruments. It must be added that some of the plates seem needlessly complicated, reminding one a little of the absurdly elaborate arrangements shown in the funny papers for waking one in the morning and the like.

Very few of Besson's devices were essentially new inventions. Giovanni da Fontana in the previous century had measured the depth of water by the rise of submerged floats to the surface.[56] Revolving cranes were used still earlier in the middle ages, while chains of buckets probably date from fairly remote antiquity. A paddle-wheel turned by oxen is shown in an

[56] T IV, 173.

anonymous *De rebus bellicis* of 527 A.D., and others turned by men in more recent works such as that of Konrad Kyeser at the beginning of the fifteenth century.[57] Besson's work on machines was followed by others such as those of Ramelli[58] and Zonca.[59] That of Isaachi on inventions appeared the next year.[60]

The student of the history of medieval science sometimes has the feeling that artisans of the gilds and other practical workingmen possessed a technical knowledge and even a close contact with nature through observation and experience which did not find expression in learned Latin works or indeed in written form at all. With Bernard Palissy, son of a poor glass worker and himself successively a glass painter, land surveyor and potter, the artisan and practical man at last finds his way into print. His *Discours,* published in 1580, are a series of lively and amusing dialogues in French, of which he has been regarded as a master, although Theorique twits Pratique in them with not having either Greek or Latin "ny gueres bon François."[61] A like attitude had been shown in 1563 in his *Recepte véritable.*[62] It should be remembered, however, that in this and previous volumes we have had occasion to note various close approaches at least to the popular and empirical standpoint which we find in Palissy: the *Feuerwerksbuch,* for instance, printed at Augsburg in 1529 and composed a century earlier, or the writings of da Vinci and Paracelsus, and the attitude

[57] F. M. Feldhaus, *Ruhmesblätter der Technik,* I (1924), 245 *et seq.*

Wheelbarrows were known since the thirteenth century: L. Baudry de Saunier, *Histoire de la locomotion terrestre,* II (1936), 70.

[58] Agostino Ramelli, *Le diverse et artificiose machine,* Paris, 1588.

[59] Vittorio Zonca, *Novo teatro di machine e edificii,* Padua, 1607.

[60] G. B. Isaachi da Reggio, *Inventioni nelle quali si manifestano varii Secreti et utili avisi a Persone di Guerra,* Parma, Seth Viotto, 1579, 4to. Copy used: BM 58.a.4.

[61] Bernard Palissy, *Discours admirables,* Paris, 1580, pp. 108-9.

[62] *Recepte véritable par laquelle tous les hommes de France pourront apprendre à multiplier et augmenter leurs thrésors. Item ceux qui n'ont jamais eu cognoissance des lettres pourront apprendre une philosophie nécessaire à tous les habitants de la terre . . . Composé par Maître Bernard Palissy . . . demeurant en la ville de xainctes.* A la Rochelle, De l'imprimerie de Barthelemy Berton, MDLXIII. Reprinted by B. Fillon, *Les oeuvres de . . . Palissy,* Niort, 1888.

reflected in the works of Giovanni da Fontana, Leonard of Bertipaglia, and Sante Ardoino at the close of the first quarter of the fifteenth century. But Palissy is perhaps more purely the artisan than any of his predecessors.

Unfortunately, when the practical man of affairs sets out to express himself in literary composition, he is very inclined to turn to the nearest available encyclopedic work for suggestion and assistance. Nor is his choice of such a work always intelligent. This is not quite true of Palissy, but his pose of writing without Latin or Greek for those "without knowledge of letters" is considerably overdrawn. Duhem has shown that he was indebted to the 1556 French translation of Cardan's *De subtilitate*—and Cardan in turn to the notebooks of Leonardo da Vinci—for his ideas as to the formation of fossil shells and the part played by salt in the congelation and gradual formation of stone generally, and that, far from acknowledging this debt he maligned Cardan by ascribing to him without any justification the deluge theory of the deposit of these shells.[63] Such a startling example may well make us doubt whether any of the ideas expressed by Palissy in his works were his own.

On the other hand, what Cardan had expressed briefly and incidentally, although very neatly and clearly, Palissy elaborated at length with considerable illustration from his own observation and experience, especially with regard to the gradual formation of stones, a point to which he gave more attention than to the question how the shellfish had gotten where the fossils

[63] Duhem I (1906), 223-53; *Les livres de Hiérome Cardanus, traduits par Richard le Blanc*, 1556, fol. 151v; *De subtilitate*, lib. vii de lapidibus, cap. on Conchites, p. 221 in the Basel, 1554 edition.

Duhem perhaps stressed the passage in Palissy's *Recepte véritable* of 1563 overmuch and those in the *Discours* of 1580 not enough, and was not quite fair in poking fun at Palissy for his suggestion that the shells had been thrown away by men after eating the fish inside. In the *Discours*, p. 226, Palissy says that he tells his disciples that he thinks it strange that Belon and Rondelet did not describe and portray fossil fish as well as those they saw at Venice, "in order to know the fish which have formerly lived and generated abundantly in our regions, of which the stones where they have been petrified at the same time that these have been congealed serve us today as a record or original of the forms of the said fish." See also pp. 214-15 and 222, "l'eau et les poissons se sont petrifiez en un mesme temps."

were found. In developing this doctrine he showed acquaintance with geological strata and approached the theory of evolution.[64]

That Palissy was by no means the only person to observe natural phenomena at first hand in the sixteenth century is seen from his own references to specimens in the possession of others and to private collections of natural history, which were evidently becoming fairly frequent and popular. There was a great quantity of fossil shells in the cabinet of Monsieur de Roisi. When Palissy showed one to the master mason of the fortifications at Brest, the latter said that he had found plenty of them there. In the cabinet of a surgeon of Paris, Monsieur Race, there was a stone from a copper mine with a fish in it of the same material.[65] A physician told Palissy of having seen a petrified human foot in the cabinet of a seigneur, while another informant assured him that in the collection of a German prince there was a human body which was for the most part petrified. A person of quality in Auvergne had a pole drawn from a swamp of which the section that had been in the ground had turned to iron, that which had been in the water to stone, and the rest remained wood.[66] There also were numerous persons in and about Paris ready to pay a crown to hear Palissy give three lectures in 1575 and to see the stones, minerals, "and monstrous forms" in his own collection.[67]

In certain respects Palissy might seem quite sane and even sceptical in his criticism of contemporary beliefs and practices. He attacked alchemy, holding that the transmutation of metals or their artificial production by man was impossible, that only God and nature could form metals, that man can only mine, purify and work them over.[68] He also denied the medical value of potable gold[69] or of compound medicines like theriac with some three hundred different ingredients.[70] But this did not

[64] See especially this dialogue, Des pierres, in *Discours*, pp. 195-99, 229-30, 248.

[65] *Discours*, p. 130.

[66] *Ibid.*, pp. 203-5.

[67] *Ibid.*, pp. 207-11.

[68] *Discours*, p. 87 *et seq.*, Des metaux et alchemie.

[69] *Ibid.*, p. 138 *et seq.*, Traité de l'or potable.

[70] *Ibid.*, p. 148 *et seq.*, Du Mithridat ou theriaque.

mean that he rejected occult virtues, sympathy and antipathy, or mysterious long distance affinity in nature and man. He lost six children from worms before he learned of the herb of Saintonge that expels them from all human bodies.[71] Women giving milk, when far from their sleeping infants, feel in their breasts when the babes wake and cry. And Palissy knew of a wife who always sensed by some secret power the day of her husband's return.[72] Thus experience and observation, not to mention ignorance of Latin and Greek, have failed to dissipate the atmosphere of the mysterious and marvelous which is so favorable to the occult and magic. As to astrology in particular Palissy was noncommittal, both Theory and Practice in his dialogue professing ignorance of the science of the stars and Theory on that account objecting to recourse to the planets in order to prove gold a restorative.[73] Palissy still believed that animals such as frogs were sometimes generated in the air and fell in rain.[74] He still talked of working wonders[75] and of revealing secrets.[76]

[71] *Ibid.*, p. 172.

[72] *Ibid.*, pp. 113-14.

[73] *Ibid.*, p. 146, "ie n'entends rien en l'astrologie"; and p. 199, Practicque, "ie n'avois point estudie en l'astrologie pour contempler les astres."

[74] *Ibid.*, p. 220.

[75] *Ibid.*, pp. 176-77: "Si ie connoissois toutes les vertus des sals, ie penserois faire des choses merveilleuses."

[76] *Ibid.*, p. 207: ". . . bon de mettre en lumiere tous ces beaux secrets pour laisser à la posterité." Or p. 258, "Ie te die un autre secret fort estrange."

CHAPTER XXVIII

GRATAROLO

Haec ego Gulielmus doctor medicus cum ex mea oculata observatione tum aliorum Bergomatum medicorum veterum scriptis et longa praxi breviter et non obscure collegi ad proximi commodum.

No one man in the sixteenth century did more to circulate and to perpetuate a varied selection of curious works, past and present, in the fields of medicine, natural science and occult science than did Guglielmo Gratarolo or William Gratarolus, the physician of Bergamo who turned Protestant and settled at Basel.[1] It was he who snatched the work of Pomponazzi on incantations, written in 1520, almost literally as a brand from the burning, brought it from Italy north of the Alps, and printed it in 1556,[2] long after its author's death, with a preface to the elector Palatine. He was the first to publish the twelfth century *Dragmaticon* of William of Conches at Strasburg in 1567.[3] The previous editions had been of the original *Philosophia* under the wrong names of William of Hirsau and the venerable Bede. Gratarolo vaguely designated the author as "William without a surname" and gave a version of the text divided into six books. He pictured himself as rescuing it "as it were from destruction." He re-edited the early fourteenth century work of Peter of Abano on poisons, and that of Thurecensis in 1472 on comets. Jöcher ascribes to him an edition of the *Consilia* of Taddeo Alderotti and other medical authors. He published the

[1] For the religious difficulties of Gratarolo in Italy and his subsequent support of Calvin consult the index of Frederic C. Church, *The Italian Reformers, 1534-1564*, 1932. I have not seen what is said to be the only biography of Gratarolo by Giovanni Battista Gallizioli, *Della vita, degli studi, e degli scritti di Guglielmo Gratarolo filosofo e medico*, Bergamo, 1788.

[2] Church, *op. cit.*, p. 200 is in error in giving the date as 1554.

[3] T II, 51 *et seq.*

large folio alchemical miscellany known as *Verae alchemiae . . . doctrina,* separated the work of John of Rupescissa on the fifth essence from its Lullian perversion and contamination, issued the dialogues on alchemy of Giovanni Bracesco in Latin translation, and from the French turned into Latin what purported to be a narrative by Bernard of Treves. Thus he bridged the gap between the medieval period and his own time, and also did much to further the transit and dissemination of recent Italian works beyond the Alps.

Gratarolo is said to have studied at Padua under Pomponazzi. In the preface to his edition of *De incantationibus* he says that he purchased a manuscript of it at Padua twenty years since and left Italy for Germany six years ago, that is, in 1550 or 1551.[4] In the dedicatory preface to his medical work for travelers, which first appeared in 1561 when he was forty-five,[5] he speaks of having left Italy in the cause of truth and justice over ten years ago.[6] He came of a family of physicians and jurists. Among the former were Hieronimo Gratarolo and his son Antonio, our author's father Peregrino who had died at Bergamo in the pest year of 1528, a Simon who flourished before our author was born, and a young Giovanni. The jurists were represented by a Simon descended from the aforesaid physician of that name, by Pasquino, brother of the aforesaid Giovanni, and by Francesco to whom our author dedicated his work on the preservation of health by men of letters and magistrates and who was the brother-in-law of the aforesaid physician Hieronimo.[7]

The alchemical publications of Gratarolo may be viewed as constituting a transition from the alchemical works of the first

[4] Albrecht Burckhardt, *Geschichte der medizinischen Fakultät zu Basel, 1460-1900,* Basel, 1917, p. 53, says, however: "1549 musste er als Anhänger des Protestantismus sein Vaterland verlassen; er kam (1552 oder 1553) als Arzt nach Basel."

[5] See cap. 19, p. 110 in the edition of Cologne, 1571, which I have used.

[6] Dedicatory preface, page unnumbered, "Mihi autem ex Italia supra decem annos ob meram Dei gratia veritatem et iustitiam peregrino."

[7] *De literatorum et eorum qui magistratibus funguntur conservanda praeservandaque valetudine,* Paris, 1562, fol. 3v.

half of the century, treated in a previous chapter, to those of the Paracelsan revival, to which the chapter after this will turn.

In editing the treatise of John of Rupescissa on the fifth essence,[8] Gratarolo stated in the dedicatory epistle to Stephanus Lauraeus Amorfortius, physician to emperor Ferdinand, that a manuscript of the treatise had been in his possession for some years and that such copies were rare, although the work had been utilized by recent writers like Philip Ulstad in his *Coelum philosophorum*. Gratarolo professed to have corrected the errors of copyists and to believe that no text of the *Fifth Essence* would be found more correct than his. He admitted, however, having made additions to John of Rupescissa's argument, partly from other writers, partly his own. In this and other respects his version leaves much to be desired compared to the best manuscripts still available. He was more justified in thinking that, if his edition was compared with that which the enigmatic Raymond Lull had edited, it would be found lucid and easy reading and most useful. In Gratarolo's version of the *Fifth Essence* the first book is divided into 44 chapters, the second book into 20. With it he printed, professedly for the first time, the epistle of Arnald of Villanova to James of Toledo on human blood and its use in alchemy, and the *Ars operativa* ascribed to Raymond Lull,[9] while he re-edited the tract of Michael Savonarola on *Aqua vitae*—more correctly, he affirmed, than in the edition of 1534—and that by Cardan on ether or the fifth essence of wine.

In the same year Gratarolo published a much bulkier alchemical collection to which we shall refer by the first two words of the title, *Verae alchemiae*.[10] It included four works by Geber,

[8] *Joannis de Rupescissa qui ante cccxx annos vixit de Consideratione Quintae Essentie rerum omnium opus . . . egregium. Arnaldi de Villanova Epistola de Sanguine humano distillato. Raymundi Lullii Ars operativa et alia quaedam . . . nunc primum in lucem data. Accessit M. Savonarolae Libellus optimus de Aqua vitae nunc . . . correctior quam ante annos 27 editus. Item H. Cardani Libellus de Aethere, etc.* Basileae, 1561.

[9] Actually the *Ars operativa* had been included in the *Practica compendiosa artis Raymundi Lul.*, Lyons, 1523.

[10] *Verae alchemiae artisque metallicae citra aenigmata doctrina certusque modus scriptis tum novis tum veteribus nunc primum et fideliter*

five by Arnald of Villanova, eight ascribed to Raymond Lull, several by authors since 1500, many more from the period before 1500, and a large number of the miscellaneous recipes and extracts which are so common in alchemical manuscripts. Indeed, the treatises just mentioned were already found together in a single large and very important manuscript which many learned men had urged Gratarolo to publish and which his own conscience had impelled him to print for public information before his death, lest thereafter the labors involved in it perish utterly or fall into the hands of some avaricious and invidious individual.

To this extensive manuscript alchemical collection which underlies *Verae alchemiae* Gratarolo made certain additions of which we shall speak presently. He also was guilty of some omissions. At the close of *Summaria lapidis consideratio,* a tract attributed to Raymond Lull, he remarks, "I, Guglielmo Gratarolo, omitted to copy the rest because of the tedium of long iteration." His text of the *Liber lucis* of John of Rupescissa goes only a little way into the seventh part, where we are dismissed with the brief statement that of the two remaining chapters one dealt with the furnace, the other with methods of tincturing and of projection, "which also can be learned well enough elsewhere." But this statement and two or three more lines of comment may be by an earlier copyist of the manuscript rather than by Gratarolo.

More unmistakably by Gratarolo are several prefaces—to Ferdinand, count in Ortenburg, baron in Freyenstain and Karlspach, lord in Reicurt and Lill, imperial councillor, and his most gracious and considerate lord; to Ludwig Wolfgang ab Hapsburg; and to the reader—Prolegomena and editorial notes, a Latin translation of the dialogue of Bracesco, *Lignum vitae,* and a list of different names or synonyms for the philosophers' stone "collected by Guglielmo Gratarolo."[11] Probably an anonymous dialogue entitled *Chrysorrhoas* is also by Gratarolo, since

maiori ex parte editis comprehensus, Basileae, per H. Petri et P. Pernam, 1561.

[11] This was reprinted in English with four other alchemical tracts in 1652 long after his death: H.P., *Five Treatises of the Philosopher's Stone,* London, 4to.

it is printed in the same fine type as the Prolegomena. In the Prolegomena Gratarolo refers to the *Voarchadumia* of Pantheus and to the decrees of John XXII and Venice against alchemists. He implies that alchemy is now in bad odor but contends that it is more certain and known to fewer persons than is the Jewish Cabala.

The dialogue entitled *Chrysorrhoas* is between Chrysophilus—who has so far failed to achieve transmutation and may typify Gratarolus—and Paracelsus, who is not given that name but is called Theophrastus ab Hohenheim and is characterized as "a man, if Germany ever bore one, who is absolute artificer of this art." Thus we find the alchemical reputation of Paracelsus well established. He praises alchemy or chemistry, and asserts that by it one can make glass as hard as diamonds, cure desperate diseases with metallic remedies, prolong life, and, best of all, evolve a method of preparing the subtlest spirits by which metals may be increased and purified. He speaks very slightingly nevertheless of many previous books on alchemy especially those ascribed to Hermes, Mary the sister of Moses, Avicenna and Averroes, which are really, he says, by barbarous Europeans like Richard of England, Gilgil, Christopher of Paris, Morienus, Rosinus, and Stephanus. He is better disposed towards the writings of Geber and Simplicius, Roger Bacon, John of Rupescissa, Aloisius Marlianus, while he asserts that no one was of saner mind than the early sixteenth century alchemical poet, Ioannes Augustinus Augurellus. On the other hand, he condemns Raymond Lull for spoiling alchemy like everything else by his nonsensical method. Incidentally he seems to regard him as the author of the *Semita recta* usually attributed to Albertus Magnus. Chrysophilus wants to know how to make gold, but Theophrastus asserts that it is impossible to transmute metals, especially those that differ in weight and tenuity. Chrysophilus retorts that even the Arabs admit the possibility of transmutation, but Theophrastus further discourages him by asserting that fire is neither an element nor able to generate anything, but merely consumes. Chrysophilus none the less continues to praise Theophrastus. He has cured desperate cases

although he never entered the schools of medicine—scarcely an accurate statement—and by his medical knack and ethereal qualities has surpassed all the physicians of Europe. The pages of the collection which follow do not, however, include a single work ascribed to Paracelsus.

Gratarolo's other compositions, although less indebted to others and more serious in character than those of Symphorien Champier and Lorenz Fries, and although written in Latin, were hardly works of prime importance. Yet they were repeatedly reprinted and so illustrate the taste of the Latin reading public in the middle of the century. Some were on familiar and well-worn but favorite themes, such as baths, the pest, wine, poisons, weather prediction and physiognomy, which could apparently always attract readers. Others show a more novel twist, like his *Rule of Health for Men of Letters and Magistrates* and a book of advice for travelers. Occult interests played a considerable part in Gratarolo's own compositions as well as in the works of others which he edited and published. We shall now treat of his compositions in a little more detail and roughly in the order of their appearance.

The brief tract on baths which was printed in the collection, *De balneis,* published by Junta at Venice in 1553,[12] had perhaps been composed before Gratarolo left Italy, since it replies to an inquiry by Conrad Gesner concerning the baths of the Grisons (Rhaetia) and the region about Bergamo.

The treatise on weather prediction, which listed in alphabetical order various weather signs such as the behavior of certain animals, seems to have been first published in 1552.[13] It was reprinted in 1553 and again in 1554 with the works on memory and physiognomy,[14] and was revised by Gratarolo in 1558.[15]

[12] *De balneis,* 1553, I, fols. 192r, col. 1-193r, col. 2.

[13] *Prognostica naturalia de temporum mutatione perpetua authore Gulielmo Gratarolo,* Basileae, per J. Parcum, 8vo. The date is given as 1552 by the printed catalogue of the Bibliothèque Nationale, Paris, but Hellmann (1924), p. 41, gives 1553 as the year.

[14] By Nicolaus Episcopius junior at Basel. Gratarolo refers to the publication of the three works in the previous year in his preface of Feb. 1, 1554, to the treatise on memory.

[15] *Mundi constitutionum et tempestatum praedictiones certae ac perpe-*

In the sixteenth century treatises on improving the memory seem to have had a certain association, whether justified or not, with works of magic, necromancy and the notory art. This was perhaps because they employed devices akin to characters and incantations, or were connected in men's minds with secret writing and thought transference. Trithemius seems to have been concerned with all these subjects. Perazonus was put on the *Index* for writing on the notory art and memory. Giordano Bruno, who touched on magic in his writings, had been engaged, professedly at least, to teach the art of artificial memory to the Venetian noble who betrayed him in 1592 to the Inquisition and who was thought to have informed on Bruno because he had been disappointed in the results of his instruction. Bruno had previously in 1583 and 1591 printed two books of seals, characters and images, of which one was professedly mnemonic and the other at least partially so. It was therefore not surprising that Gratarolo should add to his writings in medicine and occult science a treatise on restoring, increasing and preserving the memory, and upon artificial memory. It first appeared at Zurich in 1553. In a subsequent preface of February 1, 1554, to Maximilian, king of Bohemia, Gratarolo apologized for the edition of the previous year as put out quicker than he had wished at the instance of friends and printer during his absence. But he further stated that this work and those on weather prediction and physiognomy had been composed many months before. The work was in sufficient demand to insure a number of subsequent printings, usually in the slightly occult company of the tracts on physiognomy and weather prediction. It and the physiognomy appeared in French translation as early as 1555,[16] and it was published in English translation in 1563.[17]

tuae, Basel, 1558. The work seems to have been variously entitled in different editions. In that of 1603 with works of Indagine, at pp. 281-312, three alternative titles are suggested: *Prognostica temporum; De temporum omnimoda mutatione perpetua et certissima signa et prognostica*, and *Temporum mutationes certae ex praedictione rerum quae in aere terra aut aqua sunt aut fiunt breviter et clare ordineque alphabetico descriptae*. I judge that this edition of 1603 reprints the original work of 1552 rather than the author's revision of 1558.

[16] *Discours notable des moyens pour*

It was primarily medical, listing various unguents, plasters and liniments supposed to be beneficial for the memory, and devoting only half a dozen pages to its second book on "local or artificial memory."[18] It must be said, however, that characters and incantations would probably do the memory more good than unguents and plasters would.

The pest tract by Gratarolo presumably was first printed in 1554, when is dated from Basel the dedication to Ascanius Marsus, imperial Nuncio to the Swiss.[19] The printer was perhaps Oporinus.[20] This tract differed from *Theses* of 1564 of which we shall speak later. Among the causes of pestilence Gratarolo recognized divine punishment of sin as well as celestial and inferior forces. In this he saw nothing incongruous or conflicting. The heavens as God's instrument poured evil afflations into inferiors whether by unfavorable aspects of the stars, comets or other bad aerial impressions. Gratarolo indicated various signs of coming pest in inferiors as well as in sky and air. If

conserver et augmenter la mémoire avec un traité de la physionomie . . . traduit du latin par E. Copé, Lyon, 1555, 16mo: BM 1388.a.22.

Another form of the title is: *Des préceptes et moyens de recouvrer augmenter et contregarder la mémoire avec un euvre singulier qui démontre à facilement prédire et juger des meurs et nature des hommes selon la considération des parties du corps, le tout traduit en françoys par Esti. Coppé.* Lyon, E. Barricat, 1555, 16mo: BN V.21873.

[17] *The Castel of Memorie* . . . Englished by W. Fulwod, Rouland Hall, London, 1563, 8vo: BM 51.a.25.

[18] *De memoria reparanda augenda conservandaque ac de reminiscentia tutiora omnimoda remedia praeceptiones optimae,* pp. 179-215, in the 1603 edition of Johannes ab Indagine, *Introductiones apotelesmaticae.* Other works on this subject were: L. Dolce, *Dialogo nel quale si ragiona del modo di accrescere et conservar la memoria,* Venice, Sessa, 1575; C. Rossellius, *Thesaurus artificiosae memoriae,* Venice, 1579.

[19] "Inclytae Basileae pridie Idus Quintilis MDLIIII," p. 4 in the Paris, 1561 edition which I have used: *Pestis descriptio causae signa omnigena et praeservatio authore Gulielmo Gratarolo Bergomate medico,* Parisiis apud Federicum Morellum in vico Bellovaco ad urbanam morum, 1561, 16mo, 32 pp. Copy used: Bern N.208. Other copies are: BN 8° Td^{53}.19; BM 7321.a.(2.). There was also an edition at Lyons in 1558.

[20] In the list of books printed by Oporinus which follows the "Oratio de ortu vita et obitu Joh. Oporini Basiliensis typographicorum Germaniae principis recitata in Argentinensi Academia ab Joanne Henrico Hainzelio Augustano authore Andrea Jocisco Silesio ethicorum in eadem Academia professore," in *Vitae selectae,* Vratislaviae, 1711, there is listed without date, "Guil. Grataroli de peste libellus."

trees seemed to burn up, if bread moulded during the night, if rabies was frequent among dogs, if wolves invaded the town, if birds deserted their nests and eggs and young; if earthworms, snakes and moles came out of the ground; if a spider was found in an acorn which had no hole on its surface; if roses and violets flowered again in autumn—all these were signs of corrupt air and coming pestilence. The plague will increase during conjunctions and oppositions of sun and moon, or when the latter is in certain relations to Saturn and Mars. More strictly medical are the signs mentioned by Gratarolo that show that one has the pest or that one will die of it. But he devotes less space to them. He regards the great mortality from pestilence as largely due to human negligence and stupidity—a rather unusual point-of-view. Less novel and, one fears, not very efficacious are his suggestions of things to hold in the mouth in the presence of the pest-stricken in order to avoid infection, and his various compound remedies.

In 1555, if not before, appeared Gratarolo's *Rule of Health for Men of Letters and Magistrates*,[21] his treatise on wine and other potables,[22] and probably his *Consilium* on preservation from poison.[23] The first of these works was translated into English in 1574.[24] Gratarolo says that he employs Arabic as well as Greek authorities, and that his work is intended for laymen rather than physicians.[25] One of his statements is that the

[21] *De literatorum et eorum qui magistratibus funguntur conservanda praeservandaque valetudine . . . autore Gulielmo Gratarolo . . .*, Basileae per H. Petri, 1555, 104 pp.; BN 8° Tc[33].1.

I have used a later edition: *De literatorum et eorum qui magistratibus funguntur conservanda praeservandaque valetudine illorum praecipue qui in aetate consistentiae vel non longe ab ea sunt Compendium cum ex probatioribus autoribus tum ex ratione ac fideli experientia concinnatum. Guliel. Gratarolo Bergomate Medico Autore.* Parisiis Apud Federicum Morellum in vico Bellouaco ad urbanam Morum, 1562, 101 fols. and Index of 7 pp. Copy used: Bern N 208 (3).

[22] *De vini natura artificio et usu deque omni re potabili*, Lyon, 1555, 16mo: BM 8307.a.27.

[23] *G. Grataroli Consilium de praeservatione a venenis*, 1555 [?]: BM 1167.d.14.(2).

[24] *A Direction for the Health of Magistrates and Students . . .* Written in Latin by G. G. and Englished by T.N. (Thomas Newton) and printed by W. How for A. Weale, London, 1574. A copy of this edition sold for 80 pounds sterling in 1925, and another was offered for 600 Swiss francs in 1939.

[25] Latin ed. of Paris, 1562, fols. 2r-4r.

testicles, particularly of cocks, are said to be better to eat than any other parts of the body.[26]

In 1561 appeared Gratarolo's *Regimen of Health for Travelers,* of which we shall presently say more. In that year he was called to Marburg as professor of medicine but returned to Basel a year later and in 1566 became dean there.[27]

In the collection of Galen's works, which was edited by Conrad Gesner and printed at Basel by H. Frobenius and N. Episcopius in 1562, Gratarolo contributed a new Index to the legitimate and genuine books, the Index of the spurious writings being by J. G. Stratander. The call to Marburg in 1561 made it necessary for Gratarolo to have help on the Index, so that Classes IV, V and VII were executed by two doctors of medicine and philosophy at Basel, H. Pantaleon and Theodorus. In the dedication of the Index Gratarolo well remarks that it is neither an inglorious nor superfluous labor to prepare an index but a useful and very necessary task, especially for longer works. It cannot be undertaken by anybody but only by a person skilled in the subject and trained in judgment. Of previous sixteenth century indices of the works of Galen Gratarolo says that that of Brasavola was most ample but suffered from superfluities and repetitions. That of Gemusaeus was mediocre and covered only a partial and defective edition of Galen's works. That by Mundella was like a compendium or epitome of Galen in alphabetical order.

On August 25, 1562, while at Marburg, Gratarolo dedicated to the landgrave of Hesse some opuscula, chiefly upon agricultural themes, which were published the following year at Strasburg.[28] In 1563, too, he is said to have published a work on the origin, progress and utility of medicine and botany.[29] "Theses

[26] *Ibid.,* fol. 39v.

[27] Albrecht Burckhardt, *Geschichte der medizinischen Fakultät zu Basel, 1460-1900,* 1917, p. 53.

[28] *Praefationes duae publice habitae anno 1562. Item Oratio . . . in qua sunt laudes agriculturae . . . Item Leges de re rustica . . . Dialysis quatuor librorum Virgilii in Georgicis generalis. Accedunt experimenta multa rei rusticae et hortensis, etc. Declamatio de laudibus et usu omnis philosophiae. Item Physicae propositiones . . . alias scriptae a P. Melanchthone,* Argentorati, 1563, 8vo.

[29] I have failed to find it.

proposed for disputation among lovers of medicine in this so perilous time when plague rages everywhere" were printed in 1564 at Basel, if not before.[30] Gratarolo died in 1568.

The work by Gratarolo for travelers,[31] although professedly primarily medical, is almost equally magical. It also brings out other traits of his personality besides his leaning towards the occult. At the same time it is something of a practical guide book with information as to place names, travel routes, and various hints to wayfarers. These bring home to us vividly the very different conditions of travel prevailing then and now. According to Gratarolo there was hitherto no satisfactory treatment of his theme in Latin, although Georgius Pictorius, physician of Hensisheim, had written a book in German of which he had made considerable use.

Charms to insure safety on journeys are listed in profusion by Gratarolo and doubtless would have made much more welcome gifts to the sixteenth century traveler than the equally useless and more bulky baskets of fruit and boxes of candy with which present-day ocean voyagers are deluged by their friends. There were various gems one might wear; Apuleius suggested a twig of vervain; Kiranus, a wolf's right eye; Sextus Carduus, the heart of a vulture. Or the herb artemisia would prevent one's being poisoned, attacked by beasts, sun-struck, or weary. The pedestrian should wear a sprig of myrtle. Betony would protect from witches, bad dreams, night journeys, and ambushes. Pliny said that the flower of an herb in Britain col-

[30] A. Burckhardt, *op. cit.*, p. 54, lists "Theses de peste, Argent., 15 1562, oktav. 12 pp." But the earliest edition I have found is: *G. G. Theses hoc tam periculoso pestis ubique grassantis tempore ad disputandum inter Philiatros propositae,* etc., Basileae, 1564, 8vo: BM 1167.c.22.(3.).

[31] *De regimine iter agentium vel equitum vel peditum vel navi vel curru seu rheda etc., viatoribus et peregrinatoribus quibusque utilissimi libri duo nunc primum editi authore Guilhelmo Gratarolo,* Basel, 1561, 8vo, 153 pp.

I have used the edition of Cologne, Petrus Horst, 1571, where the foregoing title appears only after the dedication to Egenolphus, baron of Rapolstein, etc. The form used on the title page is this: *Profiscentium seu magnis itineribus diversas terras obeuntium medicina quibuscunque valetudinis incommodis depellendis apprime necessaria. Autore Guilhelmo Gratarolo medico et philosopho.* Excudebat Petrus Horst Anno 1571, 186 pp. Copy used: Bern R.192 (2).

lected before one heard thunder and eaten would safeguard soldiers on the march. Or a number of charms are listed from past authorities for some one specific boon to wayfarers, such as preventing dogs from attacking them or barking at them, while to enable them to forecast the weather Gratarolo recommends his separate volume on that subject.

The sixteenth century traveler was liable to encounter stretches of country where food and drink were scarce. Gratarolo therefore suggests a number of comestibles a small quantity of which will satisfy or ward off hunger. They include marzipan, placenta of Genoa, German Krafftbrot, and pills compounded of almonds, liver and oil of violets. In this connection, too, the occult is not scorned, and Pliny is cited through Ruellius as to two herbs the Scythians hold in their mouths to slake thirst and hunger. But whether any such herbs are here and now available Gratarolo leaves to the herbalists to settle. In some places one must drink beer because the wine is so poor, while unwholesome or bitter water may be sprinkled with pennyroyal, or a linen sack of powdered coral may be soaked in it.

In this connection Gratarolo mentions a recent invention[32] by which bread is cut in squares and cooked and, while it is still hot, is put in malmsey or some other generous wine and covered over. When it is cold it is again dried or cooked in the furnace so that it becomes a dry and hard biscuit (*biscoctus*). Travelers carry this with them and, when wine is lacking, take water and put a bit of the biscuit in it until it softens, and so it can be used as bread for food, while the water acquires the taste and almost the bouquet of wine so that it is a pleasing drink. Meat powders and prunes were also known in Gratarolo's day. He was as great a believer in relieving thirst by holding objects in the mouth[33] as he had been in preventing plague infection by that method.

There follow successive chapters on wooing lost sleep, re-

[32] Cap. 3, p. 33, "Non diu est inventam esse hanc artem. . . ."

[33] Cap. 4, pp. 36-38.

lieving weariness and weakness, against diarrhoea and constipation, headaches which frequently afflict wayfarers from overexertion or too much drinking or exposure to the sun or vaporous foods. Alessandro Benedetti is cited to the effect that in Greece both men and women afflicted with sunstroke are relieved by pouring a cup of cold water on the pate. Chapters continue against nosebleed or bloody urine, ephemeral fever, and poison, in which last some of the charms already mentioned are reiterated. Then come chapters on the care of the feet and preservation or cure from snowblindness for those traveling in winter. Close-fitting glasses or goggles were already used to protect the eyes from heat and dust as well as against snow and cold. Chapter 14 deals with frostbite and other diseases from cold. Gratarolo warns that if a horseman is frozen he should not immediately be taken to a warm place, "for nature does not bear sudden changes," but should be moved to a temperate place and gradually thawed out.

In the next chapter on intoxication Gratarolo laments that, although everyone knows how harmful it is to body, soul and spirit, yet so easily are men, especially northerners, seduced by this pleasure that with no benefit to anyone and injury to themselves they drink not only of their own prompting but in a vain attempt at sociability, and so repeatedly drink to excess and drunkenness.

In the chapter on vermin (*Pediculi a corpore vel vestimentis ut tollendi et defensio a pulicibus*) Gratarolo assures us that pharmacists, at least in Germany, sell very cheaply an unguent which kills them and drives them away and which he has often seen rustics buying. A chapter on remedies for the sunburnt and wind-beaten would seem to belong logically earlier. Another follows on the care of the horses.

We have heard Gratarolo cite authorities, among whom he especially praises Cardan.[34] But he also writes from a wide travel experience of his own, on foot, horseback, ship, carriage, alone and with companions, through Italy, Switzerland, Ger-

[34] Edition of 1571, pp. 110-111, 138.

many, Burgundy and Savoy. When he comes, however, to the subject of cautions to be observed on the road and in inns he confesses that his own experience, wide as it has been, is too narrow to do this theme justice, which would require some aged merchant—Gratarolo was himself now forty-five—who had rivalled Ulysses in seeing many towns and human customs. A royal legate had told him that thieves were now so bold that towards nightfall at the very gate of a town they would cut the fastenings of the burden of the last pack-horse in a convoy or of a lone traveler and make off with the goods. In 1550 Gratarolo himself had foolishly displayed a well-lined purse at an inn in the Val Camonica north of Brescia. He was robbed of it while he slept but secured its return by standing in the door with drawn sword and refusing to allow anyone to leave the inn until it was restored to him, when the landlord found it in his bed. Later he gives instructions, which he states are from an author of two centuries ago, for converting gold and silver into an unrecognizable earth which can safely be carried with one and reconverted when necessary into the precious metals. John of Rupescissa is the author meant.[35] Inns were also infested by disagreeable practical jokers. Sixteen years since at Milan[36] the landlord showed Gratarolo his bed—"well enough made"—in a room with four or five others. When our author came to retire he fortunately turned the light on his bed first, for someone—presumably of those sharing the room with him—had put broken glass between the sheets. Yet he protests that he had done nothing to offend any of his fellow guests, "unless not to game or drink with such be an offense." In Germany almost nothing of this sort happened to him, especially in cities and towns, but there the country inns are very bad. Through the Swiss Alps bread or fodder is sometimes lacking. He gives

[35] T III, 359.

[36] F. C. Church, *The Italian Reformers*, 1932, p. 199, after noticing a letter written from Tirano on November 27, 1550, in which Gratarolo refused to return to Bergamo to stand trial before the Inquisition, says, "In these circumstances, we should hardly expect to find him at Milan in 1551 (as he was, according to the *Regimen*)." But sixteen years before 1561, the date of the first edition of the *Regimen*, would give 1545 or 1546, not 1551.

some hints concerning mountain travel and advises taking a map and watch or clock with compass attached as if these were not uncommon.

The first book of Gratarolo's advice for travelers occupies more than two-thirds of the little volume, but with the second book we come to the compelling theme of travel by water and on the sea. He contends that it is neither easy nor useful for those making their first voyage to keep from vomiting, and that this is often beneficial even to seasoned travelers. From Ziegler's book on northern regions—a work I have not had access to—is taken the statement that if the sea is infested with whales, they may be driven away by diluting castor oil with water and throwing it into the ocean. How superstitious Gratarolo's text is at times may be inferred from the following continuous passage.

"Of things which are said to prevent storms and aid voyagers Pliny advises eating lettuce; Apuleius, wearing a peony; Pliny, emerald and cerauneus, achates and celonitides (all gems); Albertus, epistritides; Kiranides, the bird alchion—probably meaning halcyon. Those who have been star-struck are cured if sprinkled with the lotion of an ass, as is found in the *Book on Easily Prepared Remedies.*

"These days are suspect to sailors—February 6, 12, 15, 17, 19, 20, March 1, 7, 15, 17, 19, 25, April 5, 6, 7, 12, 20, for on these days sailors say great changes of the sea are stirred up whether for tranquillity or storm."[37]

Gratarolo in the problem of the relative amounts of land and water on the earth's surface quotes the assertion of Cardan that as a result of the voyages of discovery the earth is seen not to be surrounded by the ocean but the ocean to be like a lake surrounded by land. For there is Brazil to the south and America to the north, and over 20,000 islands scattered everywhere through the ocean. As to the position and shape of the earth and whether it is mobile he still cites Aristotle's *De coelo,* II, 13, however.

[37] II, cap 1 (Edition of 1571, p. 137).

The last thirty pages of Gratarolo's work consist of various itineraries in which he indicates the chief places through which one must pass and the distance in miles (sometimes Italian, sometimes German) or leagues between each. Sometimes the route indicated seems rather roundabout, as when that from Basel to Rome goes via "Schaffhusen, Costantz, Trient" and Mantua. On the other hand, Gratarolo sometimes gives a more direct route than that taken by modern railroads, abandoning the river valleys and striking boldly across country. Sometimes alternative routes are given, as between Antwerp and Basel. Gratarolo gives the modern place names of his own time—sometimes in Italian, again in French or German—instead of the obsolete classical place names to which the humanists were addicted, in order, as he says, "that the traveler may be understood when he asks the way." As these geographical names have often altered, at least in their spelling, since then, it would seem that these itineraries and lists of place names may be of considerable linguistic and historical value. I append one or two specimens, omitting the mileage.

PADUA TO ROME

Angulara, Arqua de Salto, la Casa Salvatica, Oracan, Francolm, Ferrara, Torre de Loselin, St. Georgio, Bologna, Pianora, Lograno, Scaricalasino, Caurez, Fiorenzuola, Scarparia, Ponte San Piero, Fiorenza, San Cesan, Lolmo, Barbirino, Puodibonzo, Siena, San Michele de la Scala, Saravale, Buonconvento, Scancericho, Recorso, Paglia, Aquapendente, San Lorenzo, Bolsena, Montefiascon, Viterbo, Lago de Vigo, Roncignon, Sutri, Monte Rosso, Bachano, Lisola, Borgesto.

MILAN TO COMPOSTELA (giving the Italian names)

Liverna, Chivas, Torino, Rivole, Vigliana, San Giori, Susa, Insiles (*hinc intras in Delphinatum Viennae*), Houzon, Susana, Breenzon, San Martin, San Crespin, Embron, Corses, Talardo, Salsa i. San Lazaro, Empera (*hac intratur in Galliam Narbonensem seu Provenza*), Sadoron, Saur, Marmoran, Carpentras, Trin-

anguae, Vignon, Villanova (*hinc intratur proprie in Galliam*), Saragnaga, Besorza, Nemes, Lunel, Columbet, Mompelier, Lupian, San Tiberio, Bises, Campo Stagno, Hons, Franzarin, Marsaieta, Tribi, Carcasona i. Abran, Pedesora, Castilnovo, Villafrancha, Villa novella, Vagesia, Mongiscardo, Tolosa (*hinc exis ab Anseris lingua vulgo lingua d' ocha et intras Aquitania vulgo Guaxogna*), Lagabi, Lila, Gimon, Gobier, Marzan, Sivat, Baram, Laila, Monte Shivo, Marsegiach, Malborget, Nogia, Morlans, Borgo, Arber, Hortes, Pondhortes, Salva terra, Malborghet, Hostran, San Zan de pie de port, Roncisvalle (*Nunc Navarriam intras*) . . . etc., for a page more of names to Compostela.

CHAPTER XXIX

THE PARACELSAN REVIVAL

Non cessant enim universitatum sapientes Theophrastum et suos impugnare

—DORN, *Clavis*, 1566

Medico Paracelso ad miraculum usque medico quis post Hyppocratem similis? Quantum putem vidisset ille sobrius qui tantum potuit videre temulentus?

—GIORDANO BRUNO

Since our interest in this chapter is in the Paracelsan movement and its influence upon later sixteenth century thought rather than in Paracelsus himself, we shall make no great effort to distinguish between his own writings and those of his followers and interpreters, or between his own thought and that of his translators and editors. This would be a very difficult and thankless task, since whereas Huser for his edition of the collected works in 1589 still appears to have had many original manuscripts available, today only two letters and a *Consilium* are extant in this form.[1] Sudhoff in his preliminary critical bibliographical work[2] and subsequent modern edition of the works of Paracelsus[3] has probably accomplished all that can be

[1] There is, however, at Paris a MS of the Latin version of the astrological prognostication of 1536 with its 32 pictures which was not used by Sudhoff in editing the text but which does not seem copied from the printed edition, since it employs a different order, putting the "Expositio huius [brevis in the edition] prognostictionis" after the preface and before the text instead of at the close of the text as in the printed version. BN 16660, Prognosticatio Theophrasti Paracelsi ad Ferd. Romanorum regem a. 1536. The Praefatio is at fols. 2v-5r, 5v is blank, the Expositio at fols. 6r-8v. Then after a blank leaf the figures begin with the text underneath.

[2] Karl Sudhoff, *Versuch einer Kritik der Echtheit der Paracelsischen Schriften*, 1894, in 2 parts or vols. Henceforth to be cited as Sudhoff (1894).

[3] *Theophrast von Hohenheim gen. Paracelsus, Sämtliche Werke, herausgegeben von Karl Sudhoff:* I. Abteilung, Die medizinische, naturwissenschaftliche und philosophische Schriften; II. Abteilung, Die theologischen

done in this regard. The space and time at our command permit no exhaustive survey of the entire range of Paracelsan ideas.[4] Rather we shall sample the Paracelsan literature here and there, using what appeared in Latin as more widely influential than the more original Swiss-German of Paracelsus himself or the later French and English translations.

If little by Paracelsus had been printed during his lifetime, this continued to be the case for nearly a score of years after his death. During this period there were translations into low German of works already printed and publication for the first time of one or two items such as *Labyrinthus medicorum errantium* and *Dat Secreet der Philosophien.* In the *editio princeps* of 1553 the *Labyrinthus* was preceded by a preface in which Achates Morbach, candidate in medicine, complained that the healing art had now fallen into the hands of the lowest and worst classes of men—bathkeepers, druggists, cooks, actors and mountebanks. It was followed by a dialogue in which a philosopher accuses a medical quack before a judge. Neither of these accompanying texts seems to harmonize with the *Labyrinthus,* to which the aforesaid preface barely alludes. "Theophrastus Bombasius Germanus" was included in the long alphabetical list of physicians in Tiraqueau's *De nobilitate,*[5] but the only works by him which were mentioned were on surgery in German and concerning the degrees of simples and composition of recipes. This was probably repeated from Gesner. Apparently the characteristic views and writings of Paracelsus were as yet little known.

Already, however, in 1550 Cyriacus Jacobus had spoken of a recent Theophrastus Transsilvanus who had plumbed the mysteries of this art and found the matter which those ancient philosophers had concealed in their parables and, by applying

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und religionsphilosophischen Schriften. Henceforth to be cited as Paracelsus, ed. Sudhoff. The volumes cited will always be of I. Abteilung, since I shall not use the theological and religious works.

[4] For a general estimate consult Franz Strunz, *Theophrastus Paracelsus: Idee und Problem seiner Weltanschauung,* 2nd ed., 1937, 214 pp.

[5] The work seems to have first appeared in 1549, but the only edition I have seen is that of 1574. Tiraqueau died in 1558.

it to human bodies, had wrought wonders almost divine. For he had dared by its means to cure the three gravest diseases, gout, leprosy and epilepsy.[6]

From 1560 on, Adam à Bodenstein, Michael Toxites, Adam Schröter in Cracow, George Forberger, Balthasar Flöter, and Gerard Dorn vied with one another in translating and editing the compositions which Paracelsus had left in manuscript. When Albrecht V, duke of Bavaria, in 1569 ordered the monasteries on his lands to adhere to the teachings of Hippocrates and Galen rather than the new medicine,[7] he probably had that of Paracelsus in mind. In 1575 at Basel Perna printed a collected edition of twenty-six treatises which had been translated into Latin and which filled two volumes of 1700 pages. Bodenstein, according to Melchior Adam, not only published works of Paracelsus but in a letter to the Fuggers argued in favor of alchemy and the philosophers' stone, and composed a paraphrase of the *Rosarius* of Arnald of Villanova, and a tract on the relation of twelve herbs to the signs of the zodiac.[8]

The gradual development and oncoming of the Paracelsan revival is further attested by an opponent thereof, Thomas Erastus, writing in 1572. In a preface to Augustus, duke of Saxony, he states that years ago before Paracelsus was known, or at least before he had heard of him, he came across some of his works and, attracted by the novelty of their titles, began to read them. However, except for barbarous names, an incoherent and strangely confused style, and ideas which were incredibly absurd, uneducated and monstrous, he found nothing in them and so tossed them aside as a waste of time. Later the fame of Paracelsus increased, his remedies were used in practice and well spoken of, and he himself was effusively praised by many, including some persons whose judgment Erastus esteemed. He therefore began to read his works again more thoroughly but

[6] *De alchimia opuscula*, 1550. Copy used: BM 1032.c.1. The dedication is dated "Francofurti ad Moenum undecimo Calendas Aprilis Anno domini 50."

[7] Reusch, *Indices librorum prohibitorum des sechzehnten Jahrhunderts*, Tübingen, 1886, p. 331.

[8] *Vitae Germanorum medicorum.*

was repelled by them as before. He had started to refute the views of Paracelsus concerning antimony, when the ducal physician, Johann Hermann, urged him to refute the Paracelsan system as a whole, in which urging the imperial physician, Johann Crato, joined.[9]

Why was it that the works of Paracelsus, so few of which had been printed during his lifetime, began to be published extensively from the manuscripts only some twenty years after his death? We have seen that such posthumous publication was not uncommon then, and that other works often circulated for a time in manuscript form before the demand for them became sufficient to induce printing. Some other circumstances affecting this demand in the particular case of Paracelsus may be noted. His writing in German made it more difficult for his works to attract the attention of the general European learned world. Indeed, humanistic medicine, with its exaggerated faith in the ancient classical medical writers was so much in vogue during the earlier years of the sixteenth century that most men were not yet in the mood to welcome the Paracelsan doctrines. But by the middle of the century it was becoming evident that mere retranslation and textual criticism of the ancient Greek medical writers was not going to result in any vast improvement in the healing art and its related sciences. Rather, by turning away from the Arabic and medieval Latin authors was a gap and aching void created which the Paracelsan theory and practice did much to fill, especially since the Paracelsan medicine seemed more novel compared to classical than to medieval writings. It was in close accord with alchemical literature of the closing medieval centuries. Practically none of this literature had appeared in print before 1500 and therafter, as we have seen, it was published only gradually. Thus the reading public was being slowly prepared for the alchemistic medicine and chemical remedies of Paracelsus.

This was further evidenced by the *Thesaurus* of secret

[9] Thomas Erastus, *Disputationum de medicina nova P. Paracelsi pars prima*, 1572.

remedies which Conrad Gesner published in 1554 under the pseudonym, Euonymus Philatrus, and which he described as partly chemical as well as medical.[10] It left to a possible future volume "experiments and certain rare remedies which are taken whole or in their substance," and limited itself to medicaments consisting of a body's "purer part, that is, liquors, waters, oils or secret juices or those abstracted by distillation or other artificial methods" and to "secret arcana and remedies known hitherto to very few persons, which empirics concealed as mysteries."[11] The work is largely a compilation from previous writers such as Arnald of Villanova, Ulstad, Furnerius, Ryff, Cardan, Philologus and Massa. Gesner professes to have little faith in "curious and far-fetched remedies," but includes liquors of gems, a water distilled from human excrement to cure fistulas and ulcers, and the following water from snails. "Thirty white snails, two pounds of goat's milk, three ounces of pig's liver or fresh kid, a dram of powdered camphor, distilled in a glass alembic."[12]

According to Hoghelande, writing half a century later, an alchemical academy of nobles and wealthy men was formed at Mechlin during the captivity of the landgrave of Hesse (1547-1552). They had abundant apparatus and accomplished much that was worth publication but no transmutation. Finally the society broke up.[13]

Just as the Paracelsan revival was getting under way, Gratarolo, as we have seen in the preceding chapter, in the single year 1561 poured forth a rich flood of alchemical literature, including a dialogue in which Theophrastus ab Hohenheim participated. These publications by Gratarolo were rapidly followed by others of almost equal significance. The two chief works of the Lullian alchemical corpus, neither of which had

[10] *Thesaurus Evonymi Philiatri de remediis secretis liber physicus medicus et partim etiam Chymicus et oeconomicus in vinorum diversi saporis apparatu medicis et pharmacopolis necessarius nunc primum in lucem editus,* Tiguri per Andream Gesnerum F. Anno Domini MDLIIII. Copy used: BM 1034.e.1.

[11] *Ibid.,* p. 2, Argumentum.

[12] *Ibid.,* pp. 72, 459, 75, 288.

[13] Hoghelande, *Historiae aliquot transmutationis,* Cologne, 1604, pp. 35-36.

yet been printed, now appeared: the *Codicil* in 1563,[14] and the *Testament*—together with the *Compendium animae*—in 1566.[15] Both were printed at Cologne, while at Strasburg in 1566 came out the *editio princeps* of the much cited medieval alchemist, Senior (Arabice, Zadith ben Hamuel),[16] and a collection of Hermetic works including the commentary of Ortulanus on the *Emerald Tablet* of Hermes,[17] although it had been printed separately in 1541. Other items in this alchemical collection were *Seven Tractates* of Hermes[18] and the first edition of *Consilium coniugii de massa solis et lunae.*[19] This collection opened with a brief anonymous citing of legal opinions favorable to alchemy, which were to be further developed and multiplied under the name of Fanianus.[20] Another tract by Fanianus on transmutation had already been dated from Paris on October 19, 1559, and printed there in 1560.[21] In 1564 there appeared at Paris the work attributed to Morienus Romanus and the reply of Bernard of Treves to Thomas of Bologna.[22] The latter was

[14] *Liber qui Codicillus seu Vade Mecum inscribitur, in quo fontes alchimicae artis et reconditioris philosophiae traduntur, antehac numquam impressus.* Coloniae, apud Haerdes Arnoldi Birckmanni, 1563, 16mo.

[15] *Testamentum duobus libris universam artem chymicam complectens antehac numquam excusum. Item eiusdem Compendium animae transmutationis artis metallorum absolutum et perfectum editio princeps,* Coloniae, Joa. Birckmann, 1566, 12mo.

[16] *De chemia Senioris antiquissimi philosophi libellus ut brevis ita artem discentibus et exercentibus utilissimus et vere aureus nunc primum in lucem editus,* Argentorati, 1566, 12mo.

[17] *Ars chemica quod sit licita recte exercentibus probationes doctissimorum iurisconsultorum. Septem tractatus seu Capitula Hermetis Trismegisti aurei. Eiusdem Tabula Smaragdina in ipsius sepulchro inventa cum commento Hortulani philosophi. Studium Concilii Conjugii de massa solis et lunae. Opuscula studiosis artis secretissimae ut summe necessaria, ita lectu incundissima.* Argentorati excudebat Samuel Emmel, 1566, 18mo.

[18] For its incipits see T (1937), 142, 320.

[19] *Ibid.,* col. 433; Zetzner V (1660), 429-507; also printed at Frankfurt, 1605, in *Philosophiae chimicae quatuor vetustissima scripta,* and by Manget II (1702). Septier, *Manuscrits de la Bibliothèque d' Orléans,* 1820, represents MS 244, 16th century, as superior to the printed text.

[20] For the Basel, 1576, and subsequent editions and the contents of the work see T III, 48 *et seq.*

[21] Johannes Chrysippus Fanianus, *De arte metallicae metamorphoseos liber singularis quo omnia quae ad philosophici lapidis opus pertinent apertissime describuntur.* Paris, Guil. Guillard, 1560, 4to, 24 fols.

[22] Morienus Romanus, *De re metallica metallorum transmutatione et occulta summaque antiquorum medicina libellus (quem Robertus Castrensis de arabico in latinum transtulit). Item*

accompanied by scholia by Robert Vallée, who already in 1561 had printed a work on the truth and antiquity of the chemical art.[23] This latter work of some fifty pages is little more than a congeries of extracts and quotations from previous alchemical treatises. Its value is chiefly bibliographical as showing what alchemical authors were then read or at least known by name. Of his Latin authors I do not recognize Ephistus, Almazatus to the archbishop of Zaragoza, Pontius, Clement on secrets of nature, Androicus the bishop, Valerandus de Bosco, Peter of Villanova, brother of Arnald of Villanova, and Regor.[24] His list of Arabic alchemical authors is briefer and faulty,[25] and he laments the lack of Greek alchemical authors except that in the French royal library are said to be preserved in manuscripts Zosimus, Isaac the monk, and Blemidas. He then adds names

nunc primum in lucem prodit Bernardi Trevirensis Responsio ad Thomam de Bononia de mineralibus et elixiris seu pulveris philosophici compositione quae pars est secretioris phisicae scholiis aliquot per Robertum Vallensem Rugl. illustrata. Paris, Guil. Guillard, 1564, 4to, 72 fols.

[23] Robertus Vallensis, *De veritate et antiquitate artis chemicae et pulveris sive medicinae philosophorum sive auri potabilis materia et compositione . . .*, Parisiis, apud Federicum Morellum, 1561, 16mo, 48 fols. There was another edition at Leyden in 1593, which I have not seen. The edition of Montbéliard, 1602, which I have seen, adds at the close a manifest proof of the chemical art from Peter Apian in the form of an inscription found at Padua, which was not in the edition of 1561. Copy used: BM 1033.f.1.(1.).

[24] The full list is: *Ibid.*, pp. 30-31, "Ioannitius, Rosinus, Ephistus, Florus, Almazatus ad archiep. Saragotiae, Bernardus Comes Treverus qui turbam philosophorum a se collectam et aliam ab illa quae passim circumfertur et quam saepe citat scripsit, Ray. Lulli, Ioan. à Rupescissa, Pontius, Hortulanus, Clemens de secretis naturae, Gilbertus Cardinalis, B. Aegidius eremita cui adscribitur Canticum regium carmine Gallice scriptum in honorem conceptionis beatae Mariae, Magister Hospitalis, Androicus episcopus, Petrus et Durandus monachi, Valerandus de Bosco, Theodorus, Petrus a Villa nova frater Arnaldi, Summa textualis, de Sacro Bosco, B. Thomas de essentiis essentiarum et eiusdem breviloquium, Stephanus cuius est liber De magna et sacra scientia, Ioa. Dastinus Anglus, Holcot, Scotus, G. Parisiensis, Bernardus de Gravia, Dumbeleius, Aloisius Marlianus, Regor, Richardus anglicus peri chemeias cui titulum fecit Correctorium, et Ianus Lacinius a nonnullis visi . . . Sunt et alii quamplurimi libri auctoribus incertis. Multi etiam gallice adfabre scripti."

[25] *Ibid.*, pp. 29-30: "Arabice enim scripserunt Geber ille Abenhaen vel Ebenhaen, Habebacar, Markos, Ydrid, Yesid Constantinopolitanus, Albumazar, Avicenna sive Abuhali id est pater Hali, Rhazes, Hali, Morienus, Alphidius, Maria, Calid Babylonius de secretis secretorum, Adros, Chora, Carab, Seneca ad Adros regem Arabiae, et Sedacerius."

of a number of missing Greek authors, many of which seem apocryphal,[26] although Greek texts of others have since been printed. Robert makes an unfavorable allusion to the recent *Compendium of Natural Philosophy* of Titelmann when he says, "Nor should that influence you which Titelmann writes in his Compendium of Natural Philosophy, I, 24."[27]

In 1566 at London was published an *Exposition,* mainly in Italian, by Giouanbatista Agnello of Venice, of an *Apocalypse of the Secret Spirit,* a Latin text of eight pages. The commentary in eight chapters has numerous quotations and citations of alchemical authors: Rupescissa, Raymond Lull, Arnald of Villanova, John of Damascus, George Ripley, the Rosary of the Philosophers, Geber, Rasis, *Clangor buccinae,* John of Vienna, Hermes, Gratian, Morienus and the *Semita recta* of Albertus Magnus.[28]

In 1567 more Lullian alchemy appeared from the same presses whence had issued the *Codicil* and the *Testament.* Now came out another edition of *De secretis naturae,* with the addition of the *Accurtatio* and *Aquae,*[29] and an *editio princeps* of the *Book of Mercuries, Apertorium, Repertorium, Ars intellectiva* and *Magia naturalis.*[30] The year 1572 saw a second edition of the *Codicil,*[31] a first edition at Basel by Toxites of further works of

[26] *Ibid.,* p. 30: "Grece vero desiderantur Olympiodorus Alexandrinus, Osthanes, Pelagius Aphricanus, Zosimus, Isaac monachus, Blemidas, Theophilus, Synesius, Ptolemaeus, Euclides, Apuleius, Heliodorus ad Theodosium, Dardanus, Demetrius, Democritus, Arist. de mineralibus libr. 3, Theophrastus, Albugazel praeceptor Platonis in hac arte, Plato iunior in cuius Aphorismos seu scholia commentarium scripsit Hameth sive Hamech, et Seneca."

[27] *Ibid.,* p. 15.

[28] *Espositione di Giouanbatista Agnello sopra un libro intitolato Apocalypsis spiritus secreti.* In Londra appresso Giovanni Kingston à instantia di Pietri Angelino D.M.P., MDLXVI. Not listed in Ferguson. Cap. vii of the Espositione is in Latin. Copy used: BM 1032.c.2.(4.).

[29] *Raymundi Lulli doctissimi et celeberrimi philosophi de secretis naturae. Adiecta est eiusdem epistola ad regem Robertum de accuratione lapidis philosophorum: cui adiunctus est tractatus de aquis.* Coloniae, apud Ioannem Birckmannum, Anno DMLXVII, 8vo, 376 pp. Copy used, BM 8632.aaa.37.

[30] *Philosophi Mercuriorum liber iam tandem subsidio manuscripti exemplaris perfecte editus. Item eiusdem Apertorium, Repertorium, Artis intellectivae theorica et practica, Magia naturalis* etc. Coloniae Agrippinae, 1567, 8vo. Copy used: BM 1032.b.2.(2).

[31] *Codicillus seu Vade mecum . . . in quo fontes alchimicae artis ac philosophiae reconditioris uberrime tra-*

the Lullian corpus,[32] an elaborate alphabetical alchemical bibliography by Nazari,[33] and another alchemical collection, *Auriferae artis etc.*, which was comparable in variety and importance to *Verae alchemiae.*[34] It contained the *Turba philosophorum* and various other works which were at least supposed to be of ancient or Arabic origin, as well as some by Arnald of Villanova and other recent authors. Thus an outburst of alchemical publication accompanied or slightly preceded the printing of the works of Paracelsus. The torch had now been passed on from Italy to the Rhine valley and Paris. It only remained for the names of Paracelsus and his followers to replace those of the fourteenth century Catalans, Arnald of Villanova, Ramon Lull and John of Rupescissa. The *Archidoxa* is probably the most exclusively alchemical of the works of Paracelsus. It was first published in Latin translation at Cracow in 1569, whereupon six more editions followed in the course of the single year, 1570: two at Basel, two at Munich, one at Strasburg and one at Cologne.[35]

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duntur. Secunda editio in qua innumerabiles loci . . . restituuntur et multa prius omissa supplentur, Coloniae, apud haeredes Arnoldi Birckmanni, 1572, 16mo.

[32] *Raymundi Lullii Maioricani philosophi sui temporis doctissimi libelli aliquot chemici nunc primum excepte Vade Mecum in lucem opera doctoris Toxitae editi.* Basileae, apud Petrum Pernam, MDLXXII.

Actually of the works included only the *Testamentum novissimum, Elucidatio testamenti, Lux mercuriorum, Medicinae secretissimae,* and *Experimenta* seem first editions, the *Accurtatio* and *Compendium animae* having, as we have seen, been already printed, and *Lignum vitae* being the work of Bracesco, not Lull, and also already in print.

[33] G. B. Nazari, *Della tramutatione metallica,* Brescia, P. M. Marchetti, 1572. The bibliography fills pp. 135-44. Its extensiveness may be inferred from the fact that 10 titles are ascribed to Albertus Magnus, 20 to Arnald of Villanova, 9 to Avicenna, 12 to Geber, 13 to Hermes, 9 to Rasis, and 70 to Raymond Lull. I reproduce it in Appendix 3.

[34] *Auriferae artis quam chemiam vocant antiquissimi authores,* Basileae, apud Petrum Pernam, 1572, 12mo. In subsequent editions the order of the wording of the title was altered to *Artis auriferae.*

[35] Sudhoff I (1894), 173. On the alchemical side of Paracelsus consult especially Ernst Darmstaedter, "Arznei und Alchemie. Paracelsus-Studien." *Studien z. Gesch. d. Medizin,* Heft 20, 1931: and "Paracelsus, De natura rerum. Eine kritische Studie," in *Janus,* 37 (1933), 1-18, 48-62, 109-15. From p. 16 I quote: "Eine genauere Beschreibung von Ausgangsmaterialen und Endprodukten findet man in der alten Chemie selten und auch bei Paracelsus leider fast gar nicht . . . Die

Another reason for the Paracelsan revival in Germany in the later sixteenth century was that it appealed to much the same sort of minds as did the natural philosophy of Telesio in Italy at the same time. As for astrology and other occult arts, the belief in spirits and magic, the various quaint phantasies and strange marvels that characterize the works published under the name of Paracelsus, these would have been as welcome in any other decade of the sixteenth century. For these constituted the vortex in which all works upon nature and medicine of that century had to whirl, however resplendently scientific they may seem to shine and to shape their course.

According to Paracelsus, the four pillars of medicine were philosophy, astrology, alchemy and *Tugenden,* by which last he meant occult virtues. In his *Labyrinthus* he directed physicians away from past authorities to the books of divinity, of the firmament, of the four elements, of the anatomy of man the microcosm, and of experience. Further he asserted that the magic art was "the anatomy of medicine," revealing its inmost secrets. Without entirely denying the existence of the orthodox four elements, which indeed as we have just seen he frequently assumed, he stressed the basic importance of sulphur, mercury and salt. These substances, which had long been on the tongue of every alchemist, he insisted entered into the composition of animals and plants as well as of metals, were constituents of the human body and produced disease by their excess or paucity. Thus too much sulphur caused fever and the plague, too little led to gout. A superfluity of mercury resulted in paralysis and depression; and excess of salt in the system produced diarrhoea and dropsy. Or the distillation of sulphur from one organ to another caused delirium. Paracelsus, however, emphasized other causes of disease, such as tartar which is taken in with food and drink and, unless eliminated from the system by the excretory organs, becomes the mother of all diseases. But

besten Beschreibungen z. B. von Metallen gibt von älteren Autoren 'Geber' in seiner 'Summa Perfectionis Magisterii,' und Mann muss schon bis in die neuere Zeit gehen um z. B. so scharfe Definitionen von Silber und Gold zu finden."

Paracelsus, who wrote on invisible diseases, noted yet other causes of human ills, such as poison, witchcraft, the stars, demons, and God. As something of an offset to this array of causes producing disease, he, or at least one of his followers, Petrus Severinus,[36] reduced all diseases to four types: leprosy, gout, dropsy and epilepsy.

Paracelsus seems to have been fond of making fivefold as well as fourfold distinctions or divisions. In the *Paramirum* he listed five principles or causes of disease with corresponding cures: astral, poison, natural, spiritual and divine. In *De praesagiis vaticiniis et divinationibus* he distinguished five kinds of divination: that of prophets and sibyls from God alone and not from art, natural from signs in nature, human, of spirits or sortilegium, and augury which is from both animals and spirits.[37] In the same work he claimed to be the first to have described five species of astronomy each with its peculiar astrology: namely, of Olympus or the firmament, of magic conceded to those regenerated in Christ, of divinations from natural signs, of nigromancy by infernal spirits, and of nature.[38]

The detail of Paracelsan phantasy may be briefly illustrated by a passage from the *Archidoxa.* Stating that cows go all summer without drink in the Alps, air taking the place of water for them, he adds that a man could live without food if his feet were planted in the ground. He had seen a man who lived without food for six months, sustained solely by placing a sod upon his abdomen and replacing it with a freshly cut one as often as it dried up. He said afterwards that all the time he never felt hunger.[39] The same notion was repeated in the next century in slightly different style by Francis Bacon who told of a great man who cultivated longevity by having a fresh sod brought to

[36] In his *Idea medicinae philosophicae fundamenta continens totius doctrinae Paracelsicae Hippocraticae et Galenicae,* Basileae, 1571, 4to. Copy used: BM 543.c.4.

[37] Edition of Basel, 1569, p. 3.

[38] *Ibid.,* p. 58. Not content with this he presently (pp. 62-65) divides human astronomy into seven species and each of these into from three to five subdivisions.

[39] Dorn's translation, 1570, pp. 12-13.

him in bed every morning and holding his head over it "for a good pretty while."[40]

Paracelsus and his followers especially emphasized metallic medicaments such as potable gold and antimony. But Paracelsus had further put forward the doctrine of signatures, according to which plants and other simples indicated by their external appearance the complaints for which they were cures. If this was not enough, he was ready to resort at a pinch to amulets, talismans, incantations, and even counter magic against witchcraft. Not merely as a physician was he ready to try anything, but in his philosophy he drew no sharp dividing line between heavens and earth, natural and supernatural, or animate and inanimate. Besides dwelling upon macrocosm and microcrosm, upon astral causes of disease, he held that there was a star in man. In some passages he states that since the fall of Satan, all devils have had their seat in the elements. But in other passages he represents them as interfering with and affecting the influences of the heavens. He maintained that there was life in metals. He wrote on furies in sleep, on ghosts appearing after death, on gnomes in mines and mountains and underground, of nymphs, pygmies, woodsmen and salamanders. Treasure that men have hid or buried may be recovered, but that which the gnomes have gathered underground either cannot be reached or is at once lost again.[41] In short, for Paracelsus there is no such thing as natural law and consequently no such thing as natural science. Even the force of the stars may be sidetracked, thwarted or qualified by the interference of a demon. Even the most hopeless disease may yield to a timely incantation or magic rite. Everywhere there is mystery, animism, invisible forces. The physician has, so to speak, to move in a fourth dimension and continually watch his step at that.

Such was the impression which the lore of the past, ill-digested mayhap, and the popular superstition of the present, such was

[40] *Sylva sylvarum*, 928.

[41] Paracelsus, *De secretis naturae mysteriis libri tres* . . . per G. D. (Gerard Dorn) Latinitati donata, Basileae apud Petrum Pernam, 1570, p. 55 *et seq.*, caps. 5 and 7 of the second book, *De occulta philosophia*. Copy used: BM 7321.c.49.(2.).

the impact which his observation of diseases, physical and mental, made upon the receptive, bold and fantastic mind of the Quixotic knight-errant of medicine at the same time that Nicolaus Copernicus, settled for life in remote Frauenburg, was endeavoring to restore the movements of the universal spheres and bodies to circular regularity and uniformity. Yet he was a physician too. Such are the contrasts which are possible in the thought of the same period. But perhaps in his medical practice Copernicus was sometimes as unruly as Paracelsus: Tycho Brahe at least was something of a Paracelsan. Uniformity was becoming to the heavenly bodies, long conceived of as incorruptible. Irregularity and magic were more to be expected in the realm of inferior nature. Or at any rate Copernicus in medicine was less revolutionary than in his astronomy, remaining content medically as Sudhoff has noted,[42] with such works as the *Philonium* of Valescus de Taranta[43] of the late fourteenth and early fifteenth centuries

It was indeed a discouraging contrast in intellectual history, and a sad exhibition of human inability to detect the true and sober from the false and fantastic, that the same half century which refused to digest and accept the solid demonstrations of *De revolutionibus* should have swallowed eagerly the innumerable half-baked and incoherent tomes of Paracelsus and his followers. And more than this, that in the case of *De revolutionibus* the one doctrine that was perhaps most readily and generally accepted was the faulty one of an anomaly in the precession of the equinoxes. But this had its astrological attractions, just as the volumes of Paracelsus had their occult appeal. Yet during his lifetime Copernicus had been much more highly esteemed than Paracelsus and had been encouraged and urged to publish his work, while Paracelsus had been prohibited or discouraged from printing many of his writings. Why should so few be ready to accept the Copernican modifications of the Ptolemaic

[42] In *Verhandlungen d. Naturforsch. Ges. in Basel*, XVI, 361.

[43] Editions of the work were numerous in the fifteenth and sixteenth centuries, so that Copernicus was not peculiar in cherishing it.

system, when so many were ready to adopt the Paracelsan revolt against Hippocratic and Galenic medicine? If it be suggested that the recent progress in anatomy had already shaken faith in Galen, it may equally well be argued that recent geographical discovery had revealed the failings of the Ptolemaic geography.

From the writings and views of Paracelsus we pass on to those of certain representatives of his school in the second half of the century—Petrus Severinus, Gerard Dorn, Leo Suavius and John de Suchten—with some briefer indication of the position of those opposed to them and to transmutation. In a subsequent chapter on Libavius and Chemical Controversy we shall further illustrate varying shades of opinion then prevalent.

Petrus Severinus (1542-1602) published in 1571 an *Idea of Philosophic Medicine Containing the Foundations of the Entire Doctrine, Paracelsic, Hippocratic and Galenic,* which we have already had occasion to cite. Really his doctrine seems to be primarily Paracelsan. He praises Paracelsus for having revolutionized all medicine "in our times" and argues that new diseases which ancient medicines will not cure often yield to the absurd remedies of old-wives and empirics. Fernel took refuge in occult virtues, but Severinus feels that the ideas and remedies of Paracelsus are of great value in supplementing and correcting the medicine of Hippocrates and Galen. The work of Severinus was reprinted at Erfurt in 1616 and at The Hague in 1660. Severinus, who was born in Denmark, became royal physician there after a successful practice in Venice.

Gerard Dorn edited in Latin translation works of Paracelsus which had hitherto existed only in manuscript in German. Sudhoff has criticized Dorn's work as a translator sharply, but at least it was immediately influential. Of twenty-six treatises in Latin printed together by Perna in 1575 ten had been translated by Dorn in the years 1568-1570. Dorn further interpreted and commented upon the Paracelsan writings. In the third place, Dorn published works of his own devoted primarily to advocating and expounding a chemical or alchemical or Paracelsan phi-

losophy. More than once he voiced the contention that the prevailing state of thought and education was too pagan, literary and scholastic. In this iron and final age nothing but dregs of the arts remained, although some thought them very flourishing because of the ornate language in which they were clothed.[44] Dorn held that learning required a reform analogous to that which religion had undergone earlier in the century.[45] He affirmed that he had found a better philosophy in Paracelsus and those who followed nature, and a more Christian way of thinking than scholastic Aristotelianism or classical humanism. Paracelsus had impugned worldly and Gentile writers by sacred authorities.[46] Love divine called us to another form of thought than the empty philosophy of Aristotle and other sages of this world.[47] The body was a prison in which the virtues of the soul were impeded and the spirits of natural things could not exert their powers.[48] A mystic and spiritual method, a philosophy of love, was needed, and Dorn essayed or pretended to set it forth.[49]

Although Dorn associated this new school of thought with the name of Paracelsus and the current publication of his works, much of its actual inspiration seems earlier. Dorn, for example, shows frequent debt to the work of John of Rupescissa on the fifth essence. He adopts its position of abandoning the attempt to transmute baser metals into gold and of concentrating upon chemical remedies for the human body.[50] Once Dorn had tried

[44] *Paracelsi De summis naturis mysteriis commentarii tres a Gerardo Dorn conversi,* Basel, 1584, Dedicatory epistle to Frederick, count Palatine and duke of Bavaria. Copy used: BM 1032.b.18.(5.).

[45] See his preface to Charles, margrave of Baden, at the beginning of the *Philosophia magna* of Paracelsus, the dedication to Ludwig, duke of Wurtemberg, in Dorn's *Lapis metaphysicus aut philosophicus,* 1570, and the preface to *De secretis naturae mysteriis libri tres* . . . per G. D. latinitati donata, 1570.

[46] See the preface to Ferdinand, archduke of Austria, preceding Dorn's *Commentary* on the *Archidoxa* of Paracelsus, printed in 1584.

[47] Gerard Dorn, *Clavis totius philosophiae chymisticae,* Lyons, 1566, pp. 199-200.

[48] *Ibid.,* p. 267.

[49] *Ibid.,* pp. 200-42, are devoted to a colloquy between Soul, Body, Spirit and the Philosophy of Love, while pp. 243-50 seem to supply an alchemical exposition of this colloquy.

[50] *Chymisticum artificium,* 1568 (BM 1143.a.25), dedication to Frederick, duke of Bavaria and count Palatine.

to enrich himself by transmutation but had failed to make gold and then had turned to Paracelsan medicine. There is the difference here between Dorn and Rupescissa that the prohibition of his religious order deterred the latter from discussing the production of gold by art, whereas Dorn was convinced that "metallic substances do not transmute metals but merely color them."[51] He more exactly corresponds to Rupescissa in the doctrine that everything in nature has a fifth essence, of which the spirit of wine is the example par excellence. In nothing else is the fifth essence so abundant or so easily separated.[52] Furthermore the spirit of wine by mere infusion extracts all other spirits from their bodies, whether vegetable, mineral or animal.[53] Dorn also parallels Rupescissa in associating the fifth essence with the sky and stars. He even repeats chapter headings from *De consideratione quintae essentiae*.[54] The influence of the alchemical writings ascribed to Raymond Lull may also be traced in Dorn's works.

This extraction of essences and use of tinctures and their preservation in alcohol was a distinct advance over the use in pharmacy, medicine and chemistry of raw simples or equally crude parts thereof in their natural state. Dorn sometimes expresses its importance well, as when he writes that, while virtues may be extracted even from inanimate bodies, unless they are deduced further by the chemical art to their extreme potency, they will not be fit for any excellent work. On the other hand, the more they are purified and refined by sedulous chemical observation, the more they approach their first celestial influence and consequently penetrate and operate more efficaciously, so that what they accomplish as medicine for all sorts of infirmities seems almost miraculous.[55]

What Dorn has to say of the circulation or rotation of the

[51] *Clavis*, p. 133, preface to part II.
[52] *Lapis metaphysicus*, 1570, cap. 1.
[53] *Clavis*, III, 6 (pp. 87-88).
[54] See *Chymisticum artificium*, 1568, p. 102 *et seq.*: cap. 1, "De extractione quintae essentiae quam Coelum philosophorum nominamus"; cap. 2, "De stellarum nostrarum in caelum nostrum infixione."
[55] *Clavis*, II, 7 (p. 278).

elements[56] seems reminiscent of authors like Perscrutator and Walter of Odington who were earlier than John of Rupescissa in the fourteenth century. His distinguishing two of the traditional four elements as original and two as derivative might seem more in the manner of the sixteenth century, when various such modifications of the four elements theory were suggested. But we have heard Pantheus cite the medievals, Morienus and Albertus, that fire and water are the original elements from which air and earth are generated. Dorn too made fire and water the two principal elements, with fire ever striving to overcome the coldness and wetness of water, while air is merely rarefied water and earth solidified water. The elements may either exist in their simple state or unite in compounds or undergo decomposition. Natural bodies are resolved into the elements and the fifth essence. Dorn saw no conflict between the three Paracelsan principles—salt, sulphur and mercury—and the four elements. The remark of Paracelsus, "Every natural body can be resolved by art into three things only—salt, sulphur and mercury"—Dorn interprets to mean earth, fire and water, the fourth element not being mentioned because pure air cannot be separated by alchemy.[57]

Dorn's astrology was old and shopworn. Among chemists, he says, nature is called the excitation of the sky with the elements in the generation of all existing things by the twofold instrument of disposition and influx. Nature by corruption disposes matter to receive form and celestial influx, which at the determined time burst forth into actuality and specific form. Form is the power and action of the ethereal region on the elementary, acting on matter which receives its influence. "Matter is for us the whole elementary region."[58] The disposition of the stars inclines but does not necessitate, "for the stars are far inferior to the minds of men."[59] More exclusively Paracelsan, perhaps, is the assertion that true medicine and the most potent

[56] *Clavis*, I, 4 (pp. 19-21).
[57] *Clavis*, I, 5 (p. 23).
[58] *Clavis*, I, 4. The preceding statements are based on caps. 2 and 3.
[59] *Clavis*, II, 1 (p. 144).

virtue of medicine resides in the sidereal body, which is separated completely from its crass elemental body, the latter being impure and unfit for medical purposes.[60]

Dorn criticized many physicians for spending much time on the names and degrees and qualities of countless herbs, when the whole of physics could be practiced not superficially but profoundly with only seven metals, as many other minerals, twenty-five plants and some few animals.[61] He noted that the opponents of the chemical remedies called them corrosive and harmful.[62] As to potable gold he himself was hesitant, asserting that all seemed to labor in vain who tried to make it unless they resolved the gold into its first matter, that is, into quicksilver and sulphur.[63]

Dorn was hospitable to other forms of occult practice or speculation than alchemy and astrology. Three successive chapters of the *Clavis*[64] are devoted to the number three, and we are assured that God enjoys an uneven number. Poison can be drawn out by imposing on the wound the body of the poisonous animal, no matter how dried up it may have become. A physician or natural philosopher without experience of the nature of things would not credit this, but it is a well-known fact to chemists who investigate natural virtues and is to be explained by the magnetic force of nature.[65] Then occurs a passage which associates experimental method with the occult arts. Most men who see some experiment inquire no further but are content to use it alone and are not curious to investigate its source or cause. Experiment is evidently used here in the sense of a single empirical discovery, remedy or marvel. Dorn goes on to say that the *chymista physicus* is not content with the experience alone nor with the knowledge that it is from the sky. He investigates further with what part of the heavens it is connected and compares it with the anatomy of man the microcosm by four methods: geomancy, hydromancy, pyromancy and astrology. In his *Compendium*

[60] *Commentary on Archidoxa*, preface.
[61] *Chymisticum artificium*, 1568, pp. 154-55.
[62] *Ibid.*, praefatio.
[63] *Clavis*, pp. 36-37.
[64] *Clavis*, I, 7, 8, 9.
[65] *Clavis*, pp. 267-68.

astronomiae Dorn distinguished seven kinds of natural magic, six varieties of celestial magic, thirteen species of celestial astrology, and four species of signatures, two being physiognomy and chiromancy.[66] In a third work Dorn noted that the enemies of Paracelsus called him a necromancer because he knew the powers of superior bodies, investigated those of inferior bodies, and was a very bold experimenter. They also adduced his employment of characters as proof that he was a necromancer, but Dorn insisted that Paracelsus used characters only for medical purposes and the benefit of mankind.[67] He agreed with Paracelsus that magic was good, if not abused by conjuration of evil spirits and sorcery. Dorn further accepted the current doctrine of vitalism, holding that nothing in nature was destitute of life, which minerals enjoyed in an occult way, vegetation in a manifest manner, and animals most of all.[68] Somewhat cognate is the view attributed to Paracelsus that each member of the body has its own stomach in which its nutriment is cooked and the superfluous separated from what is needed.[69]

Except Paracelsus Dorn does not cite many authorities although as has been indicated most of his matter is second hand. Once at least he claims an idea as his own, affirming that so far as he can recall no one before has ever treated of the method of distillation of metals simply by fire and evaporation without use of vinegar, lye or other acids.[70] Much of his space is devoted to discussion of furnaces and vessels, sublimation and calcination, distillation of oils and waters for various complaints. Chemists, he states, investigate the latent forms of natural bodies by turning manifest into occult forms, by the corruption of specific and the generation of a more general form, by conversion of decomposed elements into compounds and of impure to pure.[71]

In 1567, the year after Dorn published the *Key to All Chemical*

[66] *Compendium astronomiae*, 1584, caps. 5, 6, 8, 15.

[67] Preface to Dorn's Latin translation of Paracelsus, *De summis naturae mysteriis*.

[68] *Chymisticum artificium*, 1568, pp. 12-26.

[69] *Clavis*, p. 149; *Lapis metaphysicus*, cap. 18, fol. k recto.

[70] *Clavis*, III, 7 (p. 89).

[71] *Clavis*, I, 6 (p. 27).

Philosophy, a somewhat similar volume appeared under the pen name, Leo Suavius. It comprised a *Compendium* of the philosophy and medicine of Paracelsus, with a biography of him, catalogue of his works, and scholia.[72] The author's real name was Jacques Gohory or Gohorry who died at Paris in 1576. His other publications had touched on various fields of literature and knowledge, although they were mainly translations into French from other languages. He had thus translated Amadis de Gaule, Machiavelli's *Discorsi,* writers in Italian on the new world, and the Latin treatise of Levinus Lemnius on occult marvels of nature. He commented on some of the old French romances and in 1572 invaded the field of botany with an *Instruction sur l'herbe petum.*[73]

Writing in Latin as Leo Suavius, Gohorry displayed a wide acquaintance with previous authors in that language and was as free with citations as Dorn had been reticent. Of contemporaries or recent writers he mentioned Cardan whom he criticized,[74] Wier with whom he disagreed,[75] Pomponazzi with whom he also disagreed,[76] Levinus Lemnius[77] whose *Occult Marvels and Secrets of Nature* he published the same year in French translation, Adam à Bodenstein,[78] a rival interpreter of Paracelsus, Henry Cornelius Agrippa, Nostradamus on unguents,[79] the *Genial Days* of Alessandro Alessandri,[80] and the *Voarchadumia* of Pantheus of Venice.[81] For magic, cabala, and the use of images many authors

[72] *Theophrasti Paracelsi philosophiae et medicinae utriusque universae compendium ex optimis quibuscumque eius libris cum scholiis in libros IIII eiusdem de vita longa . . . auctore Leone Suavio . . .*, Parisiis in aedibus Rovillii (s.d.), 8vo, 376 pp. of which the *Compendium* covers pp. 23-80. Also at Frankfurt, 1568, 8vo, 427 pp., and Basel, 1568—BM 1032.b.18.(2.), 334 pp.

[73] Gaillard, *Histoire de François Ier, IV* (1819), 225, says that Gohorry knew mathematics, and left in manuscript a history of the reigns of Charles VIII and Louis XII.

[74] *Op. cit.*, pp. 177-78, 312, 367.

[75] *Ibid.*, pp. 275-76, 277-78.

[76] *Ibid.*, p. 284.

[77] *Ibid.*, pp. 38, 369.

[78] *Ibid.*, p. 269, "Quis nisi coecus non intuetur has compositiones haud esse legitimas Paracelsi sed ab Adamo aut alio supposititias?"

[79] *Ibid.*, pp. 354, 367. The work referred to appears to be: *Receptes . . . de diverses façons de Fardemens et Senteurs pour illustrer et embellir la face. La seconde nous monstre la façon . . . de faire confitures,* Lyon, 1556, 16mo, 228 pp.

[80] *Ibid.*, p. 29.

[81] *Ibid.*, p. 192.

are cited, in especial Trithemius in his *De septem secundadeis.*[82] Another work by Trithemius, the *Steganographia,* is defended against the criticisms of Bovillus and Wier[83] as well as the censure of Cardan.[84]

From the closing fifteenth century Suavius cited such names as Hermolao Barbaro, Ficino, Pontano, and Pico della Mirandola, or, earlier in that century, the work on poisons of Sante Ardoino[85] or the *Static Experiments* of Nicholas of Cusa, the last for a method of extracting sweet from salt water by immersing a waxen sphere in the sea.[86] From the fourteenth century is listed a medical writer like Maino de' Maineri, although neither his name nor the title of his work seem accurately given.[87] Among the books of magic mentioned are Picatrix and Raziel from the thirteenth century.[88]

It is to past alchemical literature that Leo Suavius most frequently refers. He speaks highly of Roger Bacon from whom he thinks that Paracelsus took a great deal.[89] Indeed, our author's characteristic attitude and one explanation of his many citations is that the foundations of the present Paracelsan system are to be traced in previous writers.[90] The three Paracelsan elements, he states, were borrowed from the alchemists, especially Ioannes Valentianus.[91] The mysterious Artephius, for whose millenary longevity Suavius cites Roger Bacon,[92] was so highly esteemed by Suavius himself that he felt that no one could hope to succeed in alchemy without having read Artephius, from whom he repeated at length eight propositions or experiments.[93] Leo Suavius also cited Geber[94] and showed considerable familiarity with the alchemical treatises ascribed to Arnald of Villanova[95]

[82] *Ibid.*, p. 206.
[83] *Ibid.*, pp. 166-75.
[84] *Ibid.*, p. 177.
[85] *Ibid.*, p. 272.
[86] *Ibid.*, p. 375.
[87] *Ibid.*, p. 266, "Magnesius Magnensis lib. de conservanda sanitate."
[88] *Ibid.*, p. 367: I failed to note the exact page for Raziel.
[89] *Ibid.*, p. 24.
[90] *Ibid.*, p. 34, "Haec sunt ex antiquae philosophiae penetralibus tamquam praesentes Paracelsi institutionis fundamenta."
[91] *Ibid.*, p. 36, "a chymicis mutuatus maxime Ioanne Valentiano."
[92] *Ibid.*, p. 34.
[93] *Ibid.*, pp. 217-30.
[94] *Ibid.*, pp. 73, 259.
[95] *Ibid.*, p. 308, "Arnaldi de Villanova liber speculi"; p. 315, "Arnaldus in rosario magno, . . . ex Arnaldo in paraphrasi Rosarii sui"; p. 232, etc.

and to Raymond Lull.[96] He mentioned John of Rupescissa more than once but also attributed the doctrine of a fifth essence to Lull, although once in this connection he called him an ape and imitator.[97] Other alchemical works and authors cited are Rosarius minor, Thomas in *De essentiis essentiarum*, Bernard of Treves, Johannes (Bernardus?) de Gravia, Nicolas Flamel—who was not really an alchemist—and Matthew of Sicily.[98]

In the *Compendium* Suavius cited two writings of his own which have not yet been mentioned: a treatise on antimony[99] and another on shorthand and mystic writing[100] in the manner of Trithemius. It was printed in 1550[101] and cited then about the same authors whom we have heard mentioned seventeen years later in the alchemical volume.

Suavius gave a broader and more inclusive picture of Paracelsan tenets than did Dorn. Nor did he despair of transmutation, asserting that art could produce gold of a finer degree than the natural metal. He refused, however, to believe that gold could be reduced to a salt.[102] He gave the Paracelsan theory of disease as originating from the body as a base and not attributable to this or that humor, since the humors are mixed in a multiple manner in the body. In addition new diseases often come from the influence of the sky and cannot easily be cured without a knowledge of the stars. No diseases are incurable *per se*, not even epilepsy and dropsy. Physical science is necessary for the physician in order to know things of nature, chemistry in order to prepare these properly, and astronomy to time their administration. There are three kinds of medical men: those

[96] *Ibid.*, pp. 48-50, where *Epistola accurtatoria, liber magiae naturalis,* and *Aqua vitae* are cited; p. 315, "Raymundus in magia naturali"; p. 328, citation of the *Testament;* etc. *passim.*

[97] *Ibid.*, pp. 308, 313.

[98] *Ibid.*, pp. 49-50, 232, 249, 259, 266.

[99] *Ibid.*, pp. 73-74: "De antimonio libellum scripsimus nuper quidem nos adversus duos medicos de eo perperam inter se disceptantes ubi de eius facultatibus cumulate disseruimus." I could find no such work by Gohorry at either the British Museum or Bibliothèque Nationale, Paris.

[100] *Ibid.*, p. 192, "De mysteriis notarum."

[101] *De usu et mysteriis notarum liber; in quo vetusta literarum et numerorum ac divinorum ex Sibylla nominum ratio explicatur,* Paris, 1550.

[102] *Compendium* (1567), p. 64.

equipped by nature and the stars, those divinely endowed, and those educated against their natural inclination. The last make a failure of the profession.[103] The remedies suggested are also more characteristically Paracelsan and less exclusively Rupescissan than in Dorn's *Clavis*. Poisons are employed medically and arcana such as the celebrated laudanum, balsam, prepared gold, human blood and mumia. Antimony is recommended to purge and extol man because his *complexio* is like that of gold. To three states of mercury—crude, liquid as aqua vitae, and calcinated—correspond three remedial uses of it: in unguents for syphilis, in washes, and in fumigation.[104]

In inclination towards the occult there is little to choose between Suavius and Dorn. For Suavius man is a microcosm with a star within him and an Olympian spirit that tears away the veil and makes possible the cabalistic art.[105] Seals and characters have no power unless fabricated under due constellations, but the rational soul has great endowments and can alter other bodies than its own. "Nature according to Avicenna obeys the thoughts and vehement desires of the soul."[106] Such natural marvels as phoenix and basilisk are discussed,[107] and also the different kinds of demons.[108] Air is the home of invisible beings, water of nymphs. In the earth are gnomes, men of the forest, nocturnal women and giants. Indeed, all the elements contain something rational and irrational. Lorindt is a commotion of change in water, as a comet in the firmament is a presage and prophecy of marvelous things. The names of various beings are also given who insinuate themselves into rocks, trees, the blood, and other bodies and substances.[109]

Such is the reflection of Paracelsan teaching in the *Compendium* of Leo Suavius. That he could with equal facility interpret the opposing point of view is seen from the publication

[103] *Ibid.*, pp. 39-41.

[104] *Ibid.*, pp. 35-36, 41, 45-46, 71, 268.

[105] *Ibid.*, p. 42: "Duplices species corporum in unico physico corpore inveniuntur. Spiritus Olympicus qui umbram avellit (in quo consistit ars cabalistica) est astrum in homine. Elementa sunt matrices."

[106] *Ibid.*, p. 25.

[107] *Ibid.*, p. 323.

[108] *Ibid.*, p. 238 *et seq.*

[109] *Ibid.*, p. 27.

by Gohorry at Paris in 1575 of a *Discours responsif à celui d'Alexandre de la Tourette sur les secrets d l'art chimique et confection de l'or potable fait en la défense de la philosophie et médecine antiques contre la nouvelle paracelsique.* Leo Suavius had criticized Dorn's translation of Paracelsus and was sharply answered by Dorn in a tract of 1568.[110]

A manuscript at the Vatican preserves eighteen Paracelsan propositions by a John de Suchten or a Suchten, physician of the king of Poland.[111] Their tenor may be briefly illustrated. The tenth proposition maintains that the heat of sun and moon extracted by marvelous and occult artifice from the things in which it resides is the most absolute matter generated by God from the spirit of the world for the restoration and conservation of human nature but was utterly unknown to Galen, Avicenna, "and all the physicians of our time who go to apothecaries for their medicines." The eleventh proposition continues that the world spirit and the spirit of our body is one and the same spirit. The seventeenth proposition asserts that the fifth essence is not sold by or known to apothecaries, who prepare poisons rather than medicines. The last proposition adds that the heat of sun and moon does not appear in the schools of Bologna, Padua, Ferrara, Paris, Louvain and Wittenberg. Therefore those receiving their doctorate there are not physicians but impostors, triflers, thieves, robbers and sophists.

Such offensive utterances were sure to provoke a sharp reaction among the doctors of the old school, and we find echoes of it in the same manuscript, where two physicians of Augsburg, Lucas Stenglen[112] and Achilles Gassar,[113] append their censures

[110] *Veneni quod Leo (nescio quis) Suavius in Theophrasticos evomere conatur proprium in pectus eius per Gerardum Dorn retorsio,* Basel, Petrus Perna, 1568. Copy used: BM 1032.b. 18.(3.).

[111] Vatic. Palat. 1892, fol. 255, "Decem et octo propositiones quibus liquide demonstratur quid medicus sit quidque medicina ipsius. Item quibus remediis aegitudines a corporibus expellantur. Aegritudines quales sunt . . ./. . . ad corvos ablegarent. Joannes de Suchten Medicus regis Poloniae."

[112] *Ibid.,* fols. 256-7, "Antithesis rationalis paradoxis Johannis a Suchten medici regis Poloniae propositionibus adversaria . . ./. . . et scientiam simul. Lucas Stenglen physicus Augustanus."

[113] *Ibid.,* fols. 258-260, "Iudicium et censura Achillis P. Gasseri L. medici Augstburgensis de irrationalibus Joannis a Suchten propositionibus."

to de Suchten's propositions. Among other things Stenglen affirms that the chemical art offers much to mankind that is useful and praiseworthy, but that the entire force of medicine does not consist in it alone. That much is taught concerning the essence, force and function of the spirits and natural heat, also as to the heat of sun and stars "by our most illustrious preceptors" not only *viva voce* in class rooms but in books such as those of Montanus, Fernel, Fracastoro, Cardan and Gesner. "Therefore their disciples are true philosophers and physicians," while those are the impostors "who glory in that fifth essence alone" and practice the art before they have learned it. Stenglen adds that "it is absurd to seek a method of knowing and knowledge or scientific method and science simultaneously. Gassar waxes even more indignant, asserting that de Suchten has misrepresented the views both of astrologers and of natural philosophers (*phisici*), calling him mad and an "inept bletherer," and opining that he ought to be punished on the wheel. Such was the acerbity of sixteenth century controversy.

Just when the above interchange of views took place is not indicated in the manuscript, and seems difficult to determine. Gassar's astrological predictions and historical works alike were printed before 1550. Lucas Stengel or Stenglen, on the other hand, lived from 1523 to 1587, became a physician in Augsburg only in 1549, and published all his printed works at later dates. Of John de Suchten I have found no notices. Alexander de Suchten, on the other hand, was a well known Paracelsist of Danzig who became physician to the king of Poland about the middle of the century[114] and whose *De secretis antimonii* was printed by Toxites in 1570[115] and repeatedly thereafter. Whether John de Suchten is to be identified with Alexander or was a member of the same family who preceded or succeeded him as physician to the king of Poland remains a question. It may further

[114] *Biographisches Lexikon d. hervorragenden Aerzte.*

[115] *Liber unus de secretis antimonii, das ist, von der grossen heymligkeit des Antimonii die Artzney belangent,* ed. M. Toxites, Strasburg, 1570. An Edgar F. Smith MS of the 17th century at the University of Pennsylvania contains English translations both of this and another work by "Alexander van Suchten" entitled *Pandora* (ed. Benedictus Figulus, Strasburg, 1608).

be noted that Stengel or Stenglen also entered the lists of controversy with Toxites, his *Apologia* against whom was first published at Augsburg in 1565[116] and again in 1569.[117] Thomas Erastus included Suchten's articles as eighteen "Sarmatic" propositions of a Paracelsan in the third volume of his *Disputations* against Paracelsus. Since this volume is dated at its close at Heidelberg on July 1, 1572,[118] the eighteen propositions were probably enunciated some years before.

One or two sidelights on the Paracelsan revival may next be noted. Ramus, who for his part had had so many quarrels with the university authorities at Paris, who had attacked alike Aristotle in logic, Quintilian in rhetoric, and Euclid in geometry, and who planned to compose mathematical and other textbooks in French, the vernacular language, not unnaturally had a considerable fellow-feeling for Paracelsus, whom he regarded as having similarly popularized medicine in the German vernacular and whom he called the German Asclepiades.[119] Ramism therefore had certain affinities with Paracelsanism.

On May 7, 1572, in a letter full of mythological, meteorological and alchemical allusion, Johannes Pratensis recommended to Tycho Brahe a Dane of Wiberg who had recently come to Cologne as a "Greek, Arab, Galenic, Paracelsan, theologaster, philosopher, physician, syrup-mixer, chemist, or anything else you want."[120]

In 1579 at Padua Alessandro Carreri or Cariero addressed to the grand-duke of Tuscany a disputation whether simple and true metals can be generated by art.[121] It covers thirty-two pages exclusive of the dedication and is in scholastic form, first treat-

[116] *Apologia adversus stibii spongiam non ita dudum a Micaele Toxita in lucem editam*, Augsburg, 1565.

[117] *Apologia adversus Stelvii spongiam non ita dudum a M. Toxite . . . in lucem aeditam; in qua multa . . . de viribus et facultatibus Stimmios explicantur. Cui insuper adjuncta est Quaestio: num idipsum ab aegris citra ullum incommodum per os assumi possit.* Augustae Vindelicorum, 1569.

[118] Thomas Erastus, *Disputationum de nova P. Paracelsi medicina pars tertia*, 1572, p. 258, "Heidelbergae Kal. Iulii anno 1572."

[119] See his *Oratio de Basilea*, 1568, cited by Karl Sudhoff, *Verhandlungen der Naturforschenden Gesellschaft in Basel*, XVI, 362.

[120] Tycho Brahe, *Opera*, ed. Dreyer, VII (1924), 8.

[121] *Alexandri Carerii Magno Hetruriae duci possintne arte simplicia veraque metalla gigni*, Patavii, [1579]. Copy used: BM 45.e.21.

ing of the generation of metals, then setting forth arguments favorable to their transmutation, then proving the contrary view, and finally overthrowing the arguments for the art of alchemy. The reasoning is based largely on Aristotle and Plato but is rather brief, airy and amateurish. Carreri professes, however, to be versed in the generation of fossils and metals, which he regards as surpassing the powers of man and possible only in nature and by the action of the heavens. He nevertheless admits the great antiquity of the alchemical art and that it probably lay behind the myth of the golden fleece. He takes umbrage at Agricola's criticisms of Aristotle as to the generation of stones and metals. He refuses to accept the hypothesis that metals are compounds in varying degrees of sulphur and mercury. He cites Ludovicus Boccaferrea and Albertus Magnus, and affirms that Averroes in the first chapter of his paraphrase of the *Generation of Animals* ridicules alchemy as useless and harmful to mankind.

In Carreri's opinion art is able only to juxtapose and connect distinct bodies but not to effect a true mixture, a view which seems to exclude the conception of chemical change as well as the transmutation of metals. Later, however, he expresses approval of distilling and sublimating as producing oils of admirable virtue and most wholesome liquors, and as enabling us to learn the principles and constituents of things physical by thus resolving them. Alchemists generally believe that metals are generated by certain definite influences of the sky distinct from its light and motion. "These the Peripatetics do not concede." Even if such influences exist, they are unknown to man and not subject to the will and action of the artificer. Carreri further contends that alchemists are hopelessly handicapped by their attempt to produce metals in a place not destined by nature for this purpose. He also adduces the trite arguments that no alchemist has ever grown rich, and that some who have failed to transmute by other methods have resorted to impure spirits to attain their end.

It has already been implied that Carreri was more favorable to astrological influence than to alchemical transmutation. He

would subject all to divine providence and, following Aristotle in the first book of the *Meteorology,* make all mortal affairs somehow depend on the sky. In the opinion of the Peripatetics the sky is rather the conserving than the efficient cause. Various virtues of different planets and parts of the heavens govern or preside over this and that element and metal. Carreri marvels at those who deny that parts of the sky have distinct virtues, although he rejects astral influence apart from the motion and light of the celestial bodies. Of another treatise by him on the question of interpretation of dreams we shall treat in our chapter on divination.

The work of Carreri was also printed with another more favorable to the contentions of alchemy by Carolus Witestein or Wittesteyn, physician to Margaret of Austria, who addressed to cardinal Antonio Perenoto (1561-1586) and to the college of physicians at Rome a discussion of ten propositions concerned with nature and art and the fifth essence.[122]

In 1581 Jacques Fontaine of Provence published in French a *Dispute of the Elements Against the Paracelsists.* He argued that the mercury, sulphur and salt of the Paracelsists were really nothing new. "Their salt has been named by the ancients and will be in the future and is nothing else than the terrestrial part of natural bodies." Similarly mercury is the watery, and sulphur the aerial part of bodies. Fontaine therefore concludes that the Paracelsists "fill pages with useless words."[123] Fontaine also composed a brief *Detection of Paracelsan Magic* in four chapters, which was translated from French into Latin by another doctor of medicine.[124] In it he attacks Paracelsus for

[122] *Caroli Witestein seu a Petra Alba . . . Disceptatio philosophica de quinta chymicorum essentia. Accessit Alexandri Carerii Patavini Quaestio An metalla artis beneficio permutari possint,* Basel, Henricpetri, (1583?). Copies: BN R.33055; BM 1033.e.1.(2.).

The *Disceptatio* also is said to have been printed separately in 1579 at Aquila, apud Josephum Cacchium.

[123] *Discours de la puissance du ciel sur les corps inferieurs et principalement de l'influence contre les astrologues iudiciaires avec Une dispute des elements contre les Paracelsistes,* Paris, 1581. Despite the order of the title, the dispute against the Paracelsists comes first in the text. The *Discours* is treated in our chapter on Adversaries of Astrology.

[124] *Magiae Paracelsicae detectio authore D. I. Fontano in Aquensi Academia primario professore Regio e Gallico Idiomate in Latinum conversa opere D. Andreae doctoris medici: Opera,* 1613, pp. 313-25.

trying to promote his own reputation by condemning others and for professing to work marvels which are beyond nature and possible only by diabolical magic, although Paracelsus tried to conceal this behind a screen of alchemy, astrology, and the power of faith and imagination. Fontaine denies that imagination can produce such marvelous effects, especially in external bodies. He accuses Paracelsus of asserting the same things as Pomponazzi, and opposes his employment of images, words and characters in medicine.

Abraham Portaleone, a Jewish physician of Mantua, by whom medical *Consilia* are also extant,[125] composed three dialogues on gold addressed towards the close of 1583 to the duke of Mantua and Montferrat and published at Venice in 1584 with the license of the holy Inquisition and the most illustrious senate of Venice.[126] In these he denied the medical virtues attributed to ordinary natural gold, taken internally in potable or other form, on the ground that it was impervious to the action of heat. Gold according to his contention could become an efficacious remedy only after chemical treatment by calcination, reverberation, resolution, cementation and sublimation, after its death as vulgar gold, and its transformation into "sap of gold," a thing arcane, most perfect, of equal temperament and marvelous proportion of elementary virtues joined with solar and jovial virtue.[127] His Paracelsan prejudice and ignorance of the past development of alchemical thought were further shown by his suggestion that Pliny perhaps had such alchemical sap of gold in mind, when he affirmed that the limbs of hens were consumed if placed in liquid gold.[128] Besides vulgar and chemical gold he mentioned a third variety, divine, and thought that the cabalists spoke only of this divine gold.[129]

One of the interlocutors in the dialogues raised the question whether ordinary gold taken in potable form might not operate

[125] In MS BN 13004.

[126] Abraham e Porta Leonis, *De auro dialogi tres in quibus non solum de auri in re medica facultate verum etiam de specifica eius et caeterarum rerum forma ac duplici potestate qua mixtis in omnibus illa operatur copiose disputatur,* Venice, 1584, 4to. Copy used: BN R.8277.

[127] *Ibid.*, pp. 8, 42, 168.

[128] *Ibid.*, p. 10.

[129] *Ibid.*, p. 96.

by occult virtue. This involved a considerable discussion of that subject. But while Abraham was ready to ascribe extreme powers to occult virtue in other things, he seemed persistent in denying that natural gold taken internally or in potable form would exert any other virtue than if worn externally or otherwise applied.[130] Most potable gold, he held, merely gilded the human insides and impeded digestion.[131] He would not even admit that touching with gold protected from sorcery, stating that many children had been touched with gold for this purpose, and yet their mothers presently exclaimed vehemently that they had been fascinated.[132] He further asserted that so-called golden baths really had no gold or virtue from it.[133] Certain baths mentioned by Andrea Bacci might seem an exception but they contained the sap of gold not yet hardened by nature and analogous to the chemical essence.[134] That gold worn externally had no virtue as an amulet he implied by asserting that kings and popes wore it only for show.[135]

Yet Abraham maintains the occult influence of the stars against Averroes and Pico della Mirandola who held that they acted upon other objects only by their motion and light.[136] He affirms that all the flesh of a stag is edible except the tip of the tail which is poisonous "from its whole substance."[137] He is more cautious as to such virtues ascribed to gems as to render their bearer wise or victorious, stating that he would not have mentioned them, had he not found them in Avicenna and Albertus Magnus. Or when one interlocutor mentions cure of quartan fever by suspending a frog or beetle, the other is very sceptical and the first has to admit that he has not tested it personally. Yet he goes on to list the powers of the remora, torpedo, other gems, parts of animals which should be torn off while the animal is alive, the power of the diamond to restrict the force of the magnet, that of the sapphire against pestilential sores, of the gem heliotrope to check haemorrhage, of the sus-

[130] *Ibid.*, p. 94, "Aurum suas habere virtutes insitas plane assevero sed ob substantiae impassibilitatem huiusmodi virtutes non posse nobis proficere." See also pp. 5-6, 39, 73, 147.
[131] *Ibid.*, p. 9.
[132] *Ibid.*, p. 77.
[133] *Ibid.*, p. 114.
[134] *Ibid.*, pp. 115-16.
[135] *Ibid.*, p. 79.
[136] *Ibid.*, pp. 48-49.
[137] *Ibid.*, p. 35.

pended peony to stop epilepsy, and so on.[138] When Achryuasmus asks Dynachrysus whether he thinks that the ancients were really so stupid as to believe that the salamander extinguishes fire, the latter asks in reply, Don't you think that moderns are impudent to deny it? He grants that the salamander known today is easily reduced to ashes but asserts that the salamander of the ancients was not consumed by fire. Achryuasmus objects that Averroes declared that no animal was generated in fire, but Dynachrysus retorts that Ezechias escaped being sacrificed to Moloch by anointing the fire with the fat and blood of a salamander.[139] It does not seem to occur to either interlocutor that if the salamander had the property of extinguishing fire, it could hardly have been generated in fire or live therein.

After such credulousness it is a surprise to find the participants in the dialogues refusing to believe Averroes, *Colliget,* V, 24, that the stomach of an ostrich dissolves some of the gold it eats, or to accept the simple statement of Albertus Magnus that he had offered iron to ostriches and they had refused to swallow it.[140]

It is asked, If wine in which gold, silver or iron has been quenched does not cure by their virtue, why may not the wine be heated by other means? The answer is that boiling would spoil the effect of the wine, but that by the extinction of metals in it the faculty of the wine is finely excited. It is also admitted that gold quenched in wine loses a little weight, but not that this contributes anything to the medical properties of the wine or is chemically united with it.[141]

Of recent writers Abraham lists Falloppia, Brasavola and Chrisogonus as rejecting gold as a remedy, but Silvius, Levinus, Scaliger, Cardan and Amatus Lusitanus—as well as earlier Arabic and Latin authors—as favoring it.[142] He appears to have no knowledge of the recipes for potable gold to be found in medieval manuscripts.

Hoghelande[143] is sometimes said to have also written under

[138] *Ibid.*, pp. 55-72.

[139] *Ibid.*, pp. 168-72. Pliny and Aristotle are there cited concerning the winged quadruped Pyrausta which lives in the flames but dies on leaving them.

[140] *Ibid.*, pp. 128-29, 134.

[141] *Ibid.*, pp. 112-13, 166-67.

[142] *Ibid.*, pp. 1-2.

[143] He is generally called Ewaldus de

the fictitious name of Ewaldus Vogelius,[144] under which name there was published at Cologne in 1595 a methodical explanation of the alchemical ideas of Geber and Raymond Lull.[145] Under Hoghelande's own name there had appeared in 1594 a work on the difficulties of alchemy.[146] Ten years later in 1604 there was printed a collection of tales of gold making and stories of successful instances of transmutation,[147] addressed by him to his brother John, who had often expressed scepticism as to the truth of alchemy.[148] Hoghelande closes with expression of the hope that these specific cases will suffice to remove all doubt from his brother's mind as to the possibility of transmutation. At the same time he would not have his brother and nephews engage in alchemy but rather dissuade them because of the many difficulties.[149] To this publication Hoghelande appended a life of Raymond Lull intended to rebutt the false assertions of Eymeric and Guibert. According to Ferguson, Hoghelande published in 1610 at Frankfurt a work entitled *Merces alchimistarum*. In the work to his brother John Hoghelande refers to other treatises by himself: seven books on the philosophers' stone, together with the difficulties of alchemy, *Exercitationes* on the Paracelsan literature, and commentaries on the *opus animale* of Josephus Michelius of Lucca. These John will find ready to go to press in case his brother dies before their publication.[150] This Michelius became engaged in controversy with Libavius against whom he published an *Apologia chymica* in 1597, with a preface to the senate and people of Middelburg.[151]

Hoghelande, but Valerius Andreas, *Bibliotheca Belgica*, 1643, p. 822, speaks of him as Theobaldus de Hoghelande.

[144] Andreas, *op. cit.*, p. 215, calls Vogelius a physician of Brabant, while he speaks of Hoghelande as of Middelburg, Zeeland.

[145] *De lapidis physici conditionibus.*

[146] *De alchemiae difficultatibus*, Coloniae apud Henr. Falckenburg, 1594. Reprinted in Zetzner, *Theatrum chemicum*, I (1613), and in Manget.

[147] *Historiae aliquot transmutationis . . . pro defensione alcheymiae. . . . Adiecta est . . . R. Lullii vita*, Cologne, 1604. Copy used: BM 1033.e.34.

[148] The treatise is addressed, "Nobili atque docto viro Ioanni de Hoghelande fratri," and opens, "Dubitasti saepenumero Ioannes frater de veritate artis chymicae. . . ."

[149] *Ibid.*, pp. 37, 34.

[150] *Ibid.*, pp. 37-38.

[151] *Apologia chymica adversus invectivas A. Libavi . . . calumnias . . .*, Middelburgi, 1597. Copy used: BM 1035.b.6.

Oswald Croll (1580-1609) was an enthusiastic adherent of the Paracelsan revival, as may be seen from his *Basilica chymica,* published in the last year of his short life.[152] The treatise further supports the doctrine of man the microcosm, of which Croll erroneously lauds Paracelsus as the inventor,[153] and the doctrine of signatures, to which it devotes some eighty pages. Croll's literary style can only be called deplorable, abounding in sentences like too long asking of grace before meals, of which one forgets the beginning before the end is reached. His terrible flow of unctuous semi-religious language is perhaps the result of having listened to too many Calvinistic sermons, and he takes the name of God in vain as often as the president of a denominational college. His work was none the less to be much in demand, reappearing in Latin editions of 1620, 1622, 1647 and 1650, and in English translation in 1670.

Croll states that Paracelsus wrote for experts in a magic style and not for the vulgar, lest vulgar alchemists surpass all physicians and prostitute the art with great injury to nature. He concealed his mysteries under a varied nomenclature, and few understand his magic words.[154] Spurious and adulterine Theophrasts or Paracelsans are called by Croll "a most rascally set of men."[155] Croll accepts the Paracelsan tartar as a substance injurious to human health which is contained in all that we eat and drink, and which, unless eliminated in the excrement, becomes the mother of all diseases. Croll distinguishes four varieties of tartar: that found in things that grow in the earth, that in sea-food such as fish and oysters, that in the flesh of birds and quadrupeds, and that from the air and firmament.[156] There are astral, spiritual, imaginary and votal diseases, concerning which Paracelsus wrote peculiar books and which usually must be cured by astrological methods, not by herbs, minerals and animals. Against sorcery and incantations Paracelsus em-

[152] Oswaldus Crollius, *Basilica chimica, continens philosophicam propria laborum experientia confirmatam descriptionem et usum medicamentorum chimicorum selectissimorum lumine gratiae et naturae desumptorum: in fine libri additus est tractatus novus de signaturis rerum internis,* Francoforti, 1609.

[153] *Ibid.,* p. 67.

[154] *Ibid.,* p. 77.

[155] *Ibid.,* p. 7

[156] *Ibid.,* pp. 73-74.

ployed magical and supernatural procedure.[157] Men possess magnetic power over the stars just as the stars influence them. Besides the magic of Paracelsus, Croll adduced that of the most ancient cabalists of the Hebrews and their three worlds: elementary, angelic and archetype.[158]

Croll complained that most medical books and students were overburdened with a mass of false and idle recipes which he refused to accept. Instead he had thoroughly tested by his own manual experience the Spagyric arcana, which he could not learn by hearsay or from old writings but had won partly by prayers, partly by payment and exchange, from iatrochemists of vast experience during almost twenty years—he was only twenty-nine when he died—of laborious travel through France, Italy, Germany, Bohemia, Hungary and Poland. These precious remedies he now proposed freely to reveal for the poor sick and the public good, although many would be angry with him for breaking the Hermetic seal and revealing such secrets.[159] One is a compound of a dozen ingredients. Another is salt of pearls. Others are seals, amulets or pentacles formed in accordance with the constellations. Another is mumia prepared from the corpse of a redheaded man twenty-four years old who has suffered a violent death, cut into bits, sprinkled with powder of myrrh and aloes, soaked in alcohol, suspended in air and dried, and so on.[160] Croll asserts that there are more perfect medicines now than formerly, and that the harmony between the macrocosm and microcosm is better understood.[161] He is said by E. Meyer to have been the first to recommend such new preparations as sulphate of potash and volatile salt of amber (succinic acid). It is hard for us today, accustomed as we are to the precise and objective methods of the laboratory and their expression in emotionless scientific terminology and mathematical formulae, to realize that such discoveries might be made by a person so given to pious and mystical lingo, and so credulous as to occult influences, as Croll. But the truth may be that just such a person was the most likely to make them in his day and generation. "O tempora! O mores!"

[157] *Ibid.*, pp. 262-63.
[158] *Ibid.*, pp. 205-6.
[159] *Ibid.*, pp. 4-6.
[160] *Ibid.*, pp. 137-38, 162-63, 237-39, 257.
[161] *Ibid.*, p. 75.

Croll expressed the wish that contemporary botanists would give less time to nomenclature and more to the signatures of plants.[162] He believed that Adam in a state of nature had perfect knowledge of signatures and named everything aright. Some plants represent members of the human body, others suggest certain diseases for which they are remedies. Thus pepper with a crown represents the head and brain, and hence a decoction of it is beneficial in many head afflictions. Or the lily of the valley by its flower like a pendant drop suggests that it is a remedy for apoplexy. A doctor should be acquainted with chiromancy, for the lines of the hand indicate remedies suited to that individual. The human pulse corresponds to the motion of the firmament, and different human tempers and characters parallel animals, as parricides with hippopotami, gentle persons with lambs. Physicians and surgeons have learned many remedies and their virtues from brute animals which possess natural skill and innate medicinal art in such matters.[163]

A brief conspectus of how Paracelsan medicine was regarded by the general reading public of Latin works in the first half of the seventeenth century is provided by a discussion on chemical or spagiric medicine of some dozen pages or columns (1803-1815) in Alsted's encyclopedia, published in 1630. We are told that it makes much of the idea of macrocosm and microcosm and of the conception of a fifth essence: that it prefers medicines prepared from minerals to those derived from vegetables and animals: that it maintains the doctrine of signatures. Spagiric medicine attempts to produce a "mathematical and magico-physical conformation of the body so that it may be an apt instrument of the soul." The object of diet is that by food, drink, air, habitation and the like the spirit of the microcosm may attract the spirit of the universe. Favorite remedies are coral, pearls, amber, vitriol, nitre, sulphur, mercury, gold and antimony. The five Paracelsan causes of disease are given, Severinus is cited for the reduction of all diseases to four types, and finally the last eight pages embody the text of Johann Wolfgang Dienheim's *Medicina universalis* of 1610.

[162] *Ibid.*, Ad lectorem praefatio.

[163] For these passages see the new pagination of the section on signatures, pp. 17, 27, 51-52, 56, 68.

CHAPTER XXX

THOMAS ERASTUS

Non Hermes heic Trismegistus, sed acutus philosophus, elegans medicus, sincerus theologus, Haidelbergensis Academiae columen, Basiliensis lumen . . .

FROM ERASTUS'S EPITAPH

Thomas Liebler or Erastus (1523-1583) should have been a man of broad mind, since his education had been wide and varied. Of Swiss birth, he was trained in philosophy and theology at Basel from his eighteenth to his twenty-sixth year, then spent a number of years in Italy studying medicine at the universities of Bologna and Padua. He returned to Germany to become physician at the court of the count of Henneberg, then professor of medicine at the university of Heidelberg. In 1564 he participated in the council of the Palatinate and Wurtemberg at Maulbronn as to the presence of the body of Christ in the Eucharist and published two tracts on the subject. In opposition to the Calvinist use of excommunication he originated the doctrine as to the proper relations between church and state which was named after him Erastianism.[1] He lost favor with the elector Palatine, Frederick III, and in 1570 fell under the ecclesiastical ban for two years. In 1580 he went off to Basel as professor of theology and ethics.[2] He did not apply Erastianism to the relations between theology and science. A theological attitude may be said to color even his writings in the field of science, and he was more a master of it than of a truly scientific attitude. He opposed astrology partly upon biblical and religious grounds. In many respects he seems a sixteenth century reincarnation of Jean Gerson.

[1] J. N. Figgis, "Erastus and Erastianism," *Journal of Theological Studies*, II, 68.

[2] Eberhard Stübler, *Geschichte der medizinischen Fakultät der Universität Heidelberg, 1386-1925*, Heidelberg, 1926, p. 42 *et seq.*

The writings of Erastus also display that controversial temper, that crabbedness and want of good taste or tact, that lack of any sense of humor, that dry and narrow-minded erudition, that unwillingness to see the least merit in or excuse for another's point of view, which so generally characterize the literary and learned controversies of the sixteenth century. His works further manifest an expressed conviction that whoever fails to agree with him is either very stupid or very wicked, and an inclination to attribute as much as possible to God on the one hand and to the demons on the other, and as little as possible to either natural law or human initiative. These are qualities of the age of the reformation and of the witchcraft delusion which we are perhaps too apt to associate with Calvinism and the Puritans, but Catholics and Anglicans, inquisitors and Jesuits often laid themselves open to like charges. Indeed Erastus would restrict the church to purely spiritual functions. But his struggle against intolerant Calvinism did not serve to make him tolerant. Many a writer took a certain grim ascetic or dialectical satisfaction in maintaining religious tenets and moral standards which few really believed or practised. As a playful kitten ferociously bites its own tail, so the serious-minded writer of early modern times would employ his intellect to belittle intellectual achievements. Similarly Erastus by rather tortuous mazes of reasoning condemned a number of pseudo-scientific superstitions which today would be dismissed by a direct appeal to common sense—at bottom it probably influenced him too—and, on the other hand, confirmed a worse and more degrading error than any he condemned, namely, the belief in witchcraft. The dry detail of his dialectic need not concern us, nor the acidity of his argumentation, nor his classical interest in the definition and etymology of words, nor his feeble attempt to make some of his works lighter reading by expressing them in dialogue form. It will be enough to indicate his general position.

Against astrology Erastus composed *A Defense of the Book of Jerome Savonarola Concerning Divining Astrology against*

Christopher Stathmion, a Physician of Coburg. The preface is dated at Heidelberg in 1568, and the volume was printed at Paris in 1569.[3] The *Defense* is followed by a *Confutation* of 177 astrological theses.[4] Two books of letters by Erastus concerning divining astrology, directed to various persons but especially the above named Stathmion, were printed at Basel in 1580,[5] but the last letter in the volume is dated 1559.[6] We shall here limit our consideration to the former work.

On his return from Italy to Germany Erastus was shocked at the extent to which men were addicted to vain predictions of astrologers and at the astrological restrictions under which medical practice labored. It may seem surprising that he should accuse Germans of being more addicted to astrology than Italians in view of the numerous annual predictions printed in Italy before and after 1500, the rule at most Italian universities that the professor of astrology should issue each year a medical *Tacuinum,* and the prominence of such Italian astrologers as Paul of Middelburg and Luca Gaurico in the sixteenth century. However, we have seen the teaching of astrology decline at Bologna in the second half of the century, and it was the impression of Hellmann that during the course of the sixteenth century the publication of annual predictions fell off in Italy but increased in Germany. Erastus states that German *Ephemerides* note the times to scarify, to bleed, to administer drugs, and even to cut one's hair and nails, and observe every day of the moon, whereas the Italians hardly observe more than the full and new moon. Perhaps Erastus felt that the attacks upon astrology in Italy by such men as Pico della Mirandola and Savonarola had lessened its hold materially there. At any rate, as an antidote to the superstition poisoning Germany he had

[3] Thomas Erastus, *Defensio libelli Hieronymi Savonarolae de astrologia divinatrice adversus Christophorum Stathmionem medicum Coburgensem,* Paris, 1569. Melanchthon, it will be recalled, wrote to Stathmion concerning Pitatus.

[4] The *Confutatio thesium* begins at p. 124 and ends at p. 162. In another edition of Hanover, 1610, the *Confutatio* extends from p. 190 to p. 245.

[5] *De astrologia divinatrice epistolae D. Thomae Erasti . . . ad diversos scriptae et in duos libros digestae,* Basel, 1580.

[6] *Ibid.,* p. 236.

made a translation from the Italian into German of the book of Savonarola against astrologers. This aroused some opposition among German astrologers, and the aforesaid physician of Coburg, Christopher Stathmion, had contended that Savonarola's work did not apply to divination or astrology which was based on natural causes.

In the present work Erastus discusses divination and its divisions before turning to astrology in particular. He denies that any astrology is based on natural causes, but he does not support this conclusion by very convincing arguments. For instance, he asserts that no natural cause ever acts twice in exactly the same way so that it produces like effects, which would seem tantamount to a denial of any natural law and order. Yet he affirms later on that rhubarb always purges bile. He enters upon a detailed defense of the treatise of Savonarola and rebuttal of the arguments of Stathmion. It is doubtful whether the latter should be judged merely from Erastus's reply to them without access to Stathmion's own text. In any case the book of Savonarola, a mere popularization and rehash of that of Pico della Mirandola, seem hardly worth the attention that Stathmion and Erastus gave it. Erastus further refutes *seriatim* the contention that various passages in the Bible support astrology. He adopts the usual theological position that divination is the work of demons. He joins Pico and Savonarola in their wholesale onslaught upon astrology, to which he would appear to leave almost no field of activity.

In the first volume of his *Disputations Concerning the New Medicine of Paracelsus,* published in 1572, Erastus has more to say against astrology. It holds the first place in magic of which he utterly disapproves, and is the offscouring of all impious arts. The election of days and hours is forbidden by God, although He does not disapprove of observations of changes in the weather. Heat and light alone are received from the heavens, which do not confer marvelous virtues on things on earth. Spontaneous generation is not the work of the sky alone but also a property inherent in matter. Particular forces attributed to parts or aspects of the heavens and astrological

images are figments, and the sky does not excite to particular actions.[7]

Erastus again assailed astrology in a brief tract on the significations of comets, dated at its close on January 6, 1578.[8] Unfortunately his entire argument was based upon the incorrect Aristotelian conception of comets as terrestrial exhalations and therefore had no scientific validity. It evoked from Tycho Brahe the jibe that, if the attacks of Erastus upon astrology and Paracelsan medicine rested on no better reasoning than his defense of the Aristotelian doctrine of comets, neither the astrologers nor Paracelsists had much to fear from him.[9] Tycho again referred caustically to Erastus in his *Oration on the Mathematical Disciplines*, stating that in his errors he was true to his name and censuring him for his attacks upon astrology and Paracelsus as well as for his adherence to the Aristotelian doctrine of comets.[10] Gilbert noted that Erastus had agreed with Aristotle that comets were ignited bodies, and had advanced as an invincible argument therefor that, while the moon lost its light when within the shadow of the earth, comets were brighter by night than by day, and therefore did not receive their light from the sun. Gilbert retorted that most comets were beyond the moon and too far off to be within the shadow of the earth.[11]

[7] *Disputationum de medicina nova P. Paracelsi pars prima in qua quae de remediis superstitiosis et magicis curationibus ille prodidit praecipue examinantur*, 1572, pp. 140-65.

[8] *De cometarum significationibus sententia Thomae Erasti*, Basel, 1578: BM 531.e.7.(2.). I have used an edition of Basel, Perna, 1579, in which the work of Erastus follows that of Dudith on the same subject and occupies pp. 51-68: copy used, BM 532.c.12.(2.). Bound with the same volume as BM 532.e.12.(3.). but with a new pagination is *De cometis dissertationes novae clarissimorum virorum Thomae Erasti, Andreae Dudithii, Marci Squarcialupi, Symon Grynaei*, Ex officina Leonardi Ostenii sumptibus Petri Pernae, 1580. Here the tract of Erastus comes first at pp. 1-21 with new letters to Dudith and the reader preceding it. In a volume of the Columbia University library numbered 156.4 Er 1, the tract on comets is bound between two other works by Erastus, the *Disputatio de lamiis* and *Disputatio de auro potabili*, but with a pagination of its own. All three treatises seem printed by Petrus Perna at Basel in 1578.

[9] Tycho Brahe, *Opera*, edition of 1648, II, 207.

[10] Tycho Brahe, *Opera*, ed. Dreyer, I, 166-67.

[11] *De mundo nostro sublunari philosophia nova*, Amsterdam, 1651, III, 3; pp. 228-29.

Erastus denied that comets were natural causes of war, death of kings, and pestilence. The hot and dry air accompanying them should rather be salubrious, and had proved to be so in the case of the comets of 1556 and 1558. Erastus granted that comets were signs of drought and winds but held that for that very reason they could not produce pestilence, and that the air was usually purer after a comet than before it. He listed many deaths of kings which had occurred since 1558 and could not be ascribed to a comet. As usual he did not confine his argument to supposedly scientific and rational grounds but introduced the theological factor, holding that all we can learn from a comet is that God is warning us to mend our sins. Yet we have just heard him speak of a comet as a sign of drought and winds. Similarly he asserted that the rainbow not by its own nature but by pact and divine promise was given as a sign that the world will not perish by a future deluge. Yet in at least some respects the rainbow is a natural sign, for he had previously stated that one seen at evening indicated fine weather next day. Slight inconsistencies like these seem not to have ruffled Erastus and of course are more or less implicit in his confused combination of natural and theological viewpoints.

The four volumes of *Disputations* concerning and against the new Paracelsan medicine composed by Erastus illustrate on the one hand his opposition to the medical views of Paracelsus and his followers, and on the other hand his opposition to various occult arts and sciences, most of which he accuses Paracelsus of countenancing. His charges of drunkenness and blasphemy against Paracelsus we pass over.

Erastus commends Paracelsus for one thing, namely, his careful preparation of medicines and revival of distillation.[12] Later he states that he has recently been informed by Balthasar Brauchius, a physician trained in chemistry, that Paracelsus learned the artificial chemical preparation of medicines from Hieronymus Scallerus and Magenbuchius, physicians of Nürn-

[12] *Disputationum de medicina nova P. Paracelsi pars prima*, 1572, Praefatio ad candidum lectorem.

berg, and from Wulfgang Tahaufer of Augsburg.[13] In the fourth volume Erastus quotes Johann Crato that he had seen Paracelsus's medicines in a book written by a monk at Ulm two centuries ago, and an Italian physician that Paracelsus owed his mercurial medicines to Geber.[14]

Erastus delights in pointing out inconsistent statements by Paracelsus himself or divergent opinions of Paracelsus and his followers.[15] He attacks the doctrine of three elements, asserting that the comparison of the holy Trinity with salt, sulphur and mercury is accursed,[16] and that Paracelsus fabricates heaven from salt, mercury and sulphur.[17] Among various other objections which he raises against the Paracelsan triad is that these three elements have no distinct places as earth, water, air and fire have.[18] He further charges that it is little short of blasphemy to posit an absolute vacuum or *non ens* in created things,[19] and that body cannot be made incorporeal by natural virtue, nor thoughts changed into bodies.[20]

Paracelsus is further criticized for his views concerning the heavens. He is said to have believed that there are as many kinds of stars as there are distinct species on earth, to have attributed eclipses to the stars generating darkness, to have ascribed summer to hot stars rather than to the sun, to have held that some stars attract iron like magnets, and that the stars are nourished and have excrements.[21] He held that stars, metals and stones all live.[22] He explained rain in terms of salt, mercury and sulphur; thought that frogs sometimes fell with

[13] *Disputationum . . . pars altera,* 1572, p. 3. Concerning Johann Magenbuch see Will, *Nürnbergisches Gelehrten Lexicon,* Nürnberg, 1755-1758, pp. 530-32. The other names are unknown to me.

[14] *Disputationum . . . pars quarta et ultima,* 1573, pp. 300-301.

[15] See for example *Disputationum . . . pars tertia,* 1572, p. 256, "Paracelso contradicunt discipuli"; p. 257, "Si vere dixit Paracelsus, mentiuntur discipuli."

[16] *Disputationum . . . pars altera,* 1572, p. 71, "Scelerata comparatio Paracelsi S. Trinitatis cum sale sulphure mercurio."

[17] *Ibid.,* p. 84.

[18] *Ibid.,* p. 93.

[19] *Ibid.,* p. 105, "Parum abest a blasphemia quisquis in creatis rebus vacuum simpliciter sive non ens ponit."

[20] *Ibid.,* pp. 109, 117.

[21] *Ibid.,* pp. 234-38.

[22] *Ibid.,* pp. 257-59.

rain, or that stones were generated from vapor elevated in the atmosphere and condensed by the spirits of the sky.[23]

Erastus included in the second volume of his *Disputations* but with a separate pagination a treatise on the question whether transmutation of metals was possible,[24] which he answered in the negative. Most of this treatise seems to have been composed by 1566.[25]

The third volume opens with an attack on the Paracelsan doctrine of one panacea, variously styled balsam, arcanum, fifth essence, internal sun, mumia, tincture, and heat of sun and moon. Erastus maintains that the so-called fifth essences of things differ as much as the things themselves do.[26] He seems to go too far towards a total denial of chemical change when he asserts that acids and salts as such do not alter adjoining bodies but act only on the sense of taste.[27]

Another point on which Erastus and Paracelsus are at odds is as to the nature and causes of disease. The latter had attacked the humoral theory of disease. Erastus states that no one denies that seminaries of diseases—Fracastoro's phrase—or the aptitude of sickening are present in bodies, but he charges that the Paracelsans make diseases substances created by God after the creation of the world. Paracelsus distinguished between diseases generated from seed—or, germs—and those without seed. He also spoke of astral diseases. Erastus keeps complaining that Paracelsus did not distinguish between diseases and their causes. Further, diet or regimen did not seem to him necessary in sickness.[28]

In the fourth and last volume of the *Disputations* Erastus essays to demonstrate the true method of curing what Paracelsus called the four monarchs of all diseases, namely, epilepsy, elephantiasis—here substituted for leprosy—dropsy and gout,

[23] *Ibid.*, p. 245, "in libro de Tartareo."

[24] *Ibid.*, opposite p. 284 is the title, *Explicatio quaestionis famosae illius utrum ex metallis ignobilibus aurum verum et naturale arte conflari possit*, 1572. 123 pp.

[25] At p. 103 the text ends and is dated Heidelberg, 1566 August, but then resumes again to p. 123.

[26] *Disputationum . . . pars tertia*, 1572, p. 11.

[27] *Ibid.*, p. 112.

[28] *Ibid.*, pp. 158-243.

and to confute the Paracelsan method. To these he adds colic. The text contains such gems of thought and science as that the brain and its ventricles are devoid of sense, and that injury to them does not affect the voice or respiration or motion in brutes; that in vertigo the spirits are truly rotated; that Aristotle pronounced the rational soul immortal; and that large sneezing is small epilepsy.[29] The cautery is suggested as a way of curing epilepsy,[30] while the use of human blood or parts of corpses as medicines is condemned.[31]

Erastus denied the possibility of natural magic. Nor would he admit that the Magi of ancient Persia had been priests or sages. Their magic, too, he regarded as diabolical. He showed himself even more incensed at Pomponazzi for his favorable attitude towards magic in *De incantationibus* than at Paracelsus for asking what theologian ever cast out demons without magic and who that was unskilled in magic ever cured the sick.[32] Erastus considered impious the recital of incantations while plucking herbs, and all divination as the work of the devil. He would execute witches even if they had not accomplished any actual injury.[33] Astrology he condemned as the foundation of all other magic arts.[34] He censured Paracelsus for speaking approvingly of augury, prodigies, geomancy, pyromancy and necromancy.[35] and for condoning the receiving from demons remedies to be employed for good ends.[36] He also blamed Paracelsus for calling imagination "a star, forming all things at will."[37]

Some passages are quoted from Paracelsus against astrology but more in its favor.[38] Man is said by him to have two bodies, one from the elements, the other from the stars.[39] The statement is even attributed to Paracelsus that the transformation of a man into a wolf was effected by the influence of the sky.[40]

Erastus approves of the cabala if it is limited to anagogical

[29] *Ibid.*, pp. 32, 38, 45, 50.
[30] *Ibid.*, p. 129.
[31] *Ibid.*, p. 133 *et seq.*
[32] *Disputationum . . . pars prima*, pp. 75, 127-32.
[33] *Ibid.*, pp. 190-221.
[34] *Ibid.*, p. 230.
[35] *Ibid.*, pp. 227-28.
[36] *Ibid.*, pp. 182-83.
[37] *Ibid.*, p. 109.
[38] *Ibid.*, p. 233.
[39] *Ibid.*, p. 243.
[40] *Ibid.*, p. 244.

and symbolic interpretation of the Bible. But if it attempts to work wonders by concepts, words, characters, figures, prayers, and observance of hours, it is nothing but detestable magic, and he is surprised that so sound a scholar as Reuchlin put as much faith in it as he did.[41] Onomancy or divination by ascribing numerical values to the letters in persons' names is also censured by Erastus and he probably has the particular work of Annibale Raimondo on that art in mind.[42]

The next considerable work composed by Erastus after the four volumes of *Disputations* concerning the Paracelsan medicine was a discussion of occult virtues in medicine, published in 1574.[43] Henricus Smetius (1537-1614), physican to the elector palatine and professor at Heidelberg, had asked whether there were drugs which by occult virtue affect particular parts of the body, and, if so, how to know them, for it seemed disgraceful for a doctor of medicine to have to learn them from unskilled laymen. More particularly he asked the opinion of Erastus as to the powers of hydrargyrus (i.e., quicksilver) and antimony. In reply Erastus first considered whether there was any such thing as occult virtue or specific property. He cited Aristotle and Galen for its existence, Aristotle having taught that causes were not to be sought for all things, since there are many things whose nature human investigation cannot fathom. Erastus also adduced the usual argument from the action of the magnet for the existence of occult virtues. But he refused to accept the astrological explanation of occult virtues, although he recognized that it had the support of Aquinas and perhaps of Aristotle. He declared that he had refuted genethlialogy elsewhere and that the forms of species were not received from the stars but had been implanted directly by the Creator.

Occult virtue is not identical with substantial form, since it alters in certain herbs when they are transplanted or dried. Also it

[41] *Disputationum . . . pars altera,* 1572, pp. 17-18, 272-82.

[42] *Ibid.,* p. 279. Raimondo's work is treated in our chapter on Divination.

[43] Thomas Erastus, *De occultis pharmacorum potestatibus . . . Accessit disputatio . . . de medicamentorum purgantium facultate,* 1574. Copy used: BM 543.b.6.(4.).

may be weakened or removed by art. If aloes are frequently washed, they lose their power of purging, but Erastus contends that their substantial form remains. Moreover, substantial form is unique, whereas several occult virtues may reside in the same plant, one in its sap, one in its pith, another in the rind or bark. Erastus distinguishes two species of occult virtue. The first is a function of the substantial form, the others are properties of the temperament. Erastus classifies as occult virtues some powers of animals which more usually were explained as instances of sympathy and antipathy: for example, the ability to distinguish good from bad food almost from birth; the fleeing of a sheep from a wolf which it sees for the first time; the frightening of an elephant by the grunting of a pig, or of a lion by the crowing of a cock; or ducklings taking to water; also why some men dislike cheese and others abhor cats.

Galen is easily the author most frequently cited in this work on occult virtues. Yet, despite his preference for Galenic as against Paracelsan medicine, Erastus occasionally critizes Galen's views and is far from regarding him with unmixed adulation. Once he states that it is manifest that the words of Galen do not agree "with the perpetual experience of all ages." He has often tested Galen's recommendation to eat a crested lark for colic and has found it unavailing. Nor does experience bear out Galen's assurance that a root of peony suspended about the neck cures epileptics.[44]

Although Erastus cited Avicenna and Averroes as well as Galen, he was inclined to think that his contemporaries adhered too closely to the ancients and other past authorities who lacked the divine illumination which had been shed abroad since the religious reformation, a thought already expressed in his work against astrology.[45] Or, as he exclaimed in the treatise on occult virtues, "How many things are found today to be useless which

[44] For these strictures on Galen see *ibid.*, caps. 36, 45, 33.

[45] *Ibid.*, cap. 14: "Carebant enim luce que celitus nobis affulsit et certiora de his rebus docuit."

Defensio libelli Hier. Savonarolae, 1610, p. 84: "Scholasticos doctores qui lumen Evangelii quod coelitus nobis illuxit non viderunt et ob eam causam ad omnem superstitionem et curiosam impietatem proclives fuerunt."

are celebrated in the writings of many ancients! I do not speak of those which Galen repudiated but which he approved." Erastus was stupefied at the amount of nonsense which he found accepted as truth by the erudite.[46] We must remember, however, that ten years before, in his *Examination of the Simples Required for the Composition of the Theriac of Andromachus,* Erastus had complained that modern opium was not that of Dioscorides but rather Meconium and adulterated at that, and that Galen's cinnamon could be found no more.[47]

While Erastus accepted the existence of occult virtues to a certain extent, he was likely, as his criticisms of Galen have indicated, to reject or belittle many particular cases thereof. Venetian fishermen told him that the stupefying power of the torpedo was slight. He was hesitant as to the power of the blood of a goat to break the stone but noted that some physicians fed the goat beforehand on attenuating herbs. He remarks somewhat sarcastically that when virtues of gems are proved by experience to be non-existent, believers therein make the excuse that the specimens tested were artificial not natural gems or that their virtues have expired with age, as Albertus Magnus asserts, who "in these matters is a marvelously superstitious philosopher."

A lurid light is shed on medical practice of the time by Erastus's statement that he knew of a patient who drank the warm blood from the corpse of a man who had just been beheaded. But Erastus did not approve of such prescriptions and thought it cruel and inhuman even to eat cremated human skulls and bones. But he employed dog dung in a clyster.[48]

The question whether a drug by occult virtue can act on only one part of the body to the exclusion of others is discussed for several chapters.[49] Erastus holds that a drug good for one part of the body is not bad for others, that almost all drugs affect

[46] *De occultis pharmacorum potestatibus,* 1574, caps. 51, 53.

[47] *Examen de simplicibus quae ad compositionem theriacae Andromachi requiruntur,* 1607, but "datum 1564 Decembr. 21." Copy used: BM 1038.b.1.

[48] *De occultis pharmacorum potestatibus,* caps. 21, 44, 53, 52, 45, for the statements since the preceding note.

[49] *Ibid.,* caps. 38-42.

the stomach, and that they cannot of their own virtue direct themselves to certain members. If they have more effect upon one part than another, it is because they adhere there longer or meet less resistance there, or because they are stronger when they reach it. Thus many drugs which do not injure the stomach are dangerous to parts located beyond the stomach. But finally Erastus states that he will not flatly deny that there are medicaments especially beneficial to certain parts of the body by their entire substance or by an inexplicable property of temperament.[50] Experience is the only way by which such occult virtues may be known. The doctrine that like cures like Erastus is inclined to reject. Finally he deems the use of antimony very dangerous. Personally he would prefer to take a little longer time and be cured in safety.

Such is the treatise of Erastus on occult virtues in medicine. In its attempt to reduce the number of these which were believed in and employed in practice and to reject as unsupported by experience some of the assertions of past writers, it seems on the whole his most rational and commendable work.

Having condemned the use of antimony in the foregoing treatise, in a *Disputation Concerning Potable Gold*,[51] printed at Basel in 1578, Erastus continued his objurgations against Paracelsus and his school. He called Paracelsus "an evil magician, atheist, pig"; described his chief follower as a counterfeiter who turned physician; and termed the Paracelsists in general "either most ignorant or indubitably wicked." He again attacks the substitution of salt, mercury and sulphur for the old four elements and the Paracelsan denial of the four humors. He complains that Paracelsus introduced new elements and principles unheard of since the foundation of the world. For the alchemists before him merely held that mercury and sulphur were the principles of the metals, not two of the three principles of which all things are

[50] *Ibid.*, cap. 46.

[51] Thomas Erastus, *Disputatio de auro potabili*, Basel, Apud Petrum Pernam, 1578. Copy used: Columbia University library 156.4 Er 1, where it is bound with his *De lamiis* and *De cometarum significationibus*, but has a separate pagination. The preface is dated Jan. 6, 1578, the text, at p. 148, on Feb. 25, 1576.

composed. Paracelsus is said to have taught that men and metals were composed of the same elements and that metals were endowed with life. All those patients whom Paracelsus treated while at Basel are said to have died within a year after he left. Erastus opposes the contention of Paracelsus that men and nature have changed since antiquity, that the span of life has altered, that new remedies are required to meet the new conditions, and that changed constellations compel us to coin a new art of medicine.

Aside from this running fire against the Paracelsists, the main contention of the treatise is that potable gold or metals in other forms, especially if prepared by fire, are not fit to be taken internally. They are not food and least of all for man, whose brain is large and soft and who thus requires more liquid food than other animals. Even salts are not nutritious but good only as condiments or purgatives. Erastus further affirms that air and water are not food, although one would think that he would see that this weakens his argument. For the Paracelsists might reply: "True, but salt and air and water are necessary for human life. And so metals, even if not foods, are beneficial to health." The Paracelsists argued that the incorruptible preserves the corruptible, but Erastus denies that gold keeps the body from corruption. He holds that the spirits and powers of the human body are not increased without nutrition. Moreover, the metals are more than unnutritious, they are very sharp and eroding and hence are positively injurious, if taken internally. For ulcers and external ailments, however, Erastus recognizes as beyond controversy that medicaments made from metals are useful and even necessary. But he does not think much of unicorn powder, "which all antiquity ignored and which without any reason and cause is made so much of by almost everyone."

Dorn answered the attacks of Erastus against Paracelsus in 1583, admonishing him to recall his calumnies.[52] But that was in the last year of Erastus's life. Another controversy in

[52] Gerard Dorn, *Admonitio ad Erastum de revocandis calumniis in Paracelsum immerito dictis,* Frankfurt, 1583.

which he was engaged and which was interrupted by his death was that with Archangelus Mercenarius, professor of philosophy at Padua, on the subject of putridity. Mercenarius continued the discussion even after the death of Erastus, stating that he had heard that many other learned men would defend the view held by Erastus.[53]

The art of transmutation found another defender against Erastus in Gaston Duclo or Claveus, a legal magistrate of Nevers,[54] who further addressed a work on the philosophers' stone to prince Ernest, archbishop of Cologne.[55]

Despite certain violences of expression and crudities of reasoning, the reaction of Erastus against the astrology and iatrochemistry and excessive trust in occult virtues in his time was generally wholesome. The same cannot be said of his work on witches.[56] After spending some time over the definition of words for witch and magic, Erastus affirms that witches do exercise foul lust with demons, who are able to assume bodies that can be seen and touched even if these are not true flesh. He therefore urges the death penalty for witches. The other participant in the dialogue, Furnius, however, denies the possibility of sexual

[53] Mercenarius, *Adversus Erasti responsionem secunda de putredine disputatio,* Patavii apud Paulum Meietum, 1585, 60 fols., 19 caps.

[54] BN 14011, late 16th century, pp. 167-257: "Apologia Chrysopoeiae et Argyropoeiae adversus Thomam Erastum medicinae in schola Heidelbergensi doctorem et professorem. In qua disputatur et docetur An quid et quomodo sit Chrysopoeia et Argyropoeia sive ars transmutandi et perficiendi metalla. Et firmissimis rationibus ac demonstrationibus certisque experimentis quibusdam artem veram certam et facilem esse probatur et convincitur contraque Erasti adversus artem et doctrinam hanc prolata argumenta solide refutantur. Authore Gastone Claveo subpraeside Nivernensi. Scriptore vero Dionysio Furnio medicinae utriusque atque philosophiae doctore Neocomi Helvetiorum Anno 1596."

A marginal note indicates that the work had been printed at Nevers "apud Roussin," in 1590, in an octavo of 217 pages.

[55] *Ibid.*, pp. 259-320: "De recta et vera ratione progignendi lapidis philosophici seu salis argentifici et aurifici dilucide et compendiose explicatis. Ad serenissimum principem Ernestum Dei gratia Coloniae archiepiscopum etc. Authore Gastone Duclo subpraeside particulari in foro Nivernensi. Neocomi Anno 1596."

[56] Thomas Erastus, *Repetitio disputationis de lamiis seu strigibus,* Basileae Apud Petrum Pernam (1578). The preface is dated at Heidelberg on April 1, 1578, the text on July 1, 1577 (p. 127, "Cal. Iulii anno. 77."). Copies are: Columbia 156.4 Er 1; BM 719.d. 28.(4.).

intercourse with demons and objects that the confessions of witches are all imaginary, produced by melancholic delirium or forced by torture. Reginald Scot, in his *The Discoverie of Witchcraft* of 1584, called Erastus "a principall writer in behalf of witches omnipotencie."[57]

[57] *Op. cit.*, fol. A iiii verso.

APPENDICES

APPENDIX I

COCLES ON THE MORBUS GALLICUS

From the *Anastasis* (1504), VI, 243,
De inauditis ac malignis egritudinibus

Apparuit in pontificatu Alexandri sexti magni receptaculi vitiorum quedam egritudo que vulgo dicitur morbus gallicus et ut aliqui capitulantur saphati aut goxoni, que egritudo erat et ad presens est cum pustulis siccis vel humidis. Et origo earum ut plurimum erat ulceratio virge que pustule erant male et timende, nam in eis peccat materia salsa vel melancholica adusta adeo quod iudicatur quod sit materia leprosa. Nam accidit deturpatio faciei et qui currit cursus specialis in leprosis. Cuius erat et nunc est deprehensus totus orbis in omni etate et sexu et in omni complexione maxime in adustis et melancholicis. Adeo quod medietas gentium erat sic infecta ut plurimum in processu temporis tales moriuntur aut propter fluxum discintericum aut propter ulcera corrosiva aut perveniunt ad ptisim.

Vidi et curavi quosdam quorum virga corrodebatur cum summa celeritate nec potuerunt eis succurrere aliqui medici cum cauterio auctuali (sic) aut potentiali nec cum aliquibus medicinis. Et causa fuerit mala discrasia epatis que evaporabat ad caput ita quod ipsum discrasiatum reverberando transmittebat flegmaticam materiam ad iuncturas causando dolorem intensivum iuncturarum et presertim noctis tempore ita quod patiens continue languebat. Et morbus hic est quasi incurabilis saltem in recidivando cum iterum crucietur. Licet aliqui medici unguant infirmos cum diversis unguentis, ego aliquos curavi cum tali descriptione post cronicam evacuationem atque materiam digestam. Recipe assungie porcine munde libram unam, argenti vivi uncias tres, salis communis lytargyrii ana unciam unam, aque rosate unciam unam et semis. Et extingue argentum vivum cum predicta assungia in mortario et fiat unguentum et iunge iuncturas et sta in luto bene coopertus et fiat tribus vicibus in tribus diebus. Hoc provocat sudorem et materiam evaporat ad palatum et ipsum cum gingivis ulcerantur et hoc curavi sepe abluendo cum aqua alluminosa. De ulceribus corrosivis non loquor quia non est intentio mea. Numquam tamen

tales sunt robusti aut sani ut prius maxime illi qui fuerunt intensi in egritudine. Dicunt astrologi quod causa huius morbi fuit coniunctio iovis et saturni die 9 novembris 1484 et hoc secundum fidelissimam observationem magistri Dominici Marie Ferrariensis natione antiquitate vero Bononiensis civis efficitur suorum merito atque opere. Exarationem secundum vero communium fuit die 26 novembris et in applicatione coniunctionis versus finem ipsis testimonium paritatis prebuit sol. Et quia hec sub signo scorpionis fuit facta impressio ex membris hominis virgam et testiculos qui sunt sub eo signo coegit infirmari infirmitate que ex contrariis valde humoribus componitur et sic principium circa illas partes habuit per celestem causam.

Post confirmata fuit dicte coniunctionis malicia de anno 1492 cum fuit conventus quadrature martis cum saturno quorum alter e diametro alter vero per quartam circuli coniunctionis facte gradum pulsabant. Demum de anno 1495 iterum sub triplicitate aquea per centenam et vigenam zodiaci partem uniti et cum magne coniunctionis dominio morbum gallicum duxerunt. Morbus gallicus dicitur quia Galli primi habuerunt talem egritudinem in prelio Parthenopeo.

Inspexi in eorum manibus et inveni omnes habere lineam epaticam male complexionatam aut locum talis linee male conditionatum cum proportione linee capitis cum signis que dicta sunt in capitulo de podagrica dispositione. Et ut plurimum habent epar magnum aptum natum labi et caput humidum et colorem faciei inopum et facies eorum erant ulcerate et precipue nasus.

Huius egritudinis capitulum non reperitur apud medicos quia est egritudo mixta ex variis humoribus. Talis maligna constellatio induxit etiam fraudes rapinas mendacia et pessimos mores in individuis ita quod nati sub tali constellatione sunt pessimi. Et habuit etiam vigorem in multiplicandis cucullatis et fecit catervam novarum sectarum et hyppocritarum et eorum qui sine labore aliena vivunt quadra.

(One more paragraph on the astrological effects of conjunctions of the planets completes the chapter).

APPENDIX 2

WORKS ON CHIROMANCY IN MANUSCRIPTS AND INCUNABULA ARRANGED ALPHABETICALLY BY THEIR INCIPITS WITH SOME FURTHER NOTES

Ad habendum meliorem et certiorem inquisitionem manus aqua calida ablue . . .

Bern 353, 14-15c, f. 5v, followed by Cyromantia Aristotelis

Ad sciendum artem chiromanticam . . .

See "Secantur scientiae . . ."

Antequam ad explanandas huius artis methodos accedamus . . .

Antiochus Tibertus: T IV, 462. Anon.: FL Plut. 89 sup., cod. 35, ff. 217-271

Benedictus deus omnipotens qui machinam mundi . . .

"Summa cuiusdam Iohannis": BL Ashmole 1471, 14c, ff. 121-124v. Ascribed to Regiomontanus: Oxford, Corpus Christi 190, 15c, ff. 55-62. Anon.: BL Rawlinson D.1362, 14c, ff. 1-8v; BM Harl. 3353, item 4. These and seven other British MSS are listed by H. Craig, The Works of John Metham, 1916, p. xxvi.

Chiromantia . . . see Ciromantia

Ciromantia est ars demonstrans mores . . .

Aristotle, tr John of Seville: T. II, 266; Bern 353, 14-15c, ff. 6r-9r
See "Cum diversi diversa . . ."

Ciromantia est scientia docens predicere . . .

Almadel, De firmitate sex scientiarum: Speculum II (1927), 326-31

Ciromantia si vim vocabuli spectes . . .

Anon. Proem.: BM Sloane 3437, 17c, ff. 1-36
Text, "Manus bene proportionatae . . ."

Ciromantie requiritur cognitio in lune cognitione . . .

Roderick of Majorca, composed at Oxford: Escorial P.III.8, 14c, ff. 19-51r; BM Egerton 847; BM Sloane 513, 15c, ff. 84-90v; and see Craig, op. cit., pp. xxvii-xxviii

Cum aliquorum ignorantiam viderim de humani corporis . . .

"Incipit ars ciromancie edita a fratre Alberto de ordine predicatorum": BN 7420A, 14-15c, ff. 130r-131v, followed by a commentary

Cum ciromantia sit effectus scientie alicuius futuri . . .

BN 7420A, 14-15c, ff. 136r-138v

Cum determinare vellim de ciromantica dicam primo quid sit . . .

The Dominican Gelyra composed or copied it in Dauphiné in 1474: Clermont-Ferrand 47, 15c, ff. 205-212; CLM 657, 15c, f. 120; FR 921, ff. 10v-19r

Cum diversi diversa de arte ciromantie scripserunt . . .

Bern 353, 14-15c, ff. 1r-5r; Vatic. Palat. lat. 1892, 14-15c, ff. 126v-132v; Vienna 5307, 15c, ff. 121-140; CLM 657, 15c, f. 160. Printed as Cyromancia Aristotelis cum figuris, Ulm, 1490. Craig, op. cit., p. xxvii, says that this incipit is that of a preliminary treatise, while the second full treatise opens, "Ciromantia est ars demonstrans . . ."

Cum enim humane nature sane disposite . . .

"Incipit ciromantia Aristotelis philosophi": BN 7420A, 14-15c, ff. 132v-135v

Cum omni humane creature sane disponente . . .

Presumably a variant of the foregoing: Cambridge, Trinity College 1081, 15c, f. 110v

Cum quis voluerit amici alicuius predicere res . . .

Arthur Spaeth, Sales Catalogue One, No. 203, 15c, written in England, ff. 9r-10r

Cum tractare(?) vel unde ciromantia . . .

Cambridge, Emmanuel College 70, 15c, ff. 129-132

Cyromancia . . . see Ciromantia

Dum igitur velim determinare . . .

Introductio in chiromantiam: Vienna 4007, 15c, ff. 73-77
See "Cum determinare vellim . . ."

Ex divina philosophorum academia secundum nature vires . . .

Michael Scot(?): GW 6633-6642; T II, 331, n.2
See "Philosophus in libro . . ."

Exordium. Philosophus in libro . . .

See "Philosophus in libro . . ."

Ista ars sive scientia dicitur ciromantia a ciros . . .

Vienna 3059, 16c, ff. 123r-126v

Ista scientia dicitur ciromantia a cyros quod est manus et . . .

BN 15125, 14c, ff. 57v-59r, figures of hands at ff. 56v-57r and 59v

Linea vite vel cordis inter . . .

Vatic. lat. 3121, c.1400 A.D., ff. 54r-55r

Linee itaque in manu quidam triangulares . . .

BL Rawlinson D.1362, 14c, f. 8v

Linee naturales tres sunt in planitie omnis cyros . . .

"Incipit cyromancia cuiusdam": BN 7420A, 14-15c, ff. 135v-136r. In some MSS called "Chiromantia minor" and said to have been translated from the Arabic by Adelard. Craig, op. cit., p. xxv, lists eight British MSS and states that the work was printed as "Liber chiromantiae incerto authore" in the Mainz, 1541 edition of Antiochus Tibertus, but not in the 1494 edition.

Manus bene proportionatae signum sunt . . .

Anon.: BM Sloane 3437, 17c, ff. 1-36
Prol. "Ciromantia si vim . . ."

Manus in quinque digitos divisa est . . .

Vienna 3276, 14c, ff. 78-89
See "Philosophus in libro . . ."

Philosophus in libro de celo et mundo ad Alexandrum . . ."

GW 6633-6642. Titulus, "Ex divina philosophorum . . ."
Cap. 1 opens, "Manus in quinque . . ."

Quinque ad chyromantiam veniunt in considerationem . . .

Vienna 3059*, 16c, 31 ff.

Quoniam revelante domino in cuius pectore sunt omnes . . .

"Ego Iohannes philosophus": Oxford, All Souls 81, 15-16c, ff. 240-258v. The copyist in asking the prayers of the reader gives his name as Simon Schyringham.

Scientie secantur quemadmodum et res de quibus . . .

Oxford, New College 162, 15c, ff. 48-57; Vienna 5307, 15c, ff. 153-164
See "Secantur (Sequantur) scientie . . ."

Secantur (Sequantur) scientie inter se . . .

Cambridge, Emmanuel College 70, 15c, ff. 120-129; CLM 19690, ff. 36-59 (Zinner 9993); BN 7420A, 14-15c, ff. 139r-142v. Included by Cocles, Anastasis, 1504, as the work of Conciliator or Peter of Abano. Craig, op. cit., p. xxvii, lists six British MSS and says that the text proper opens, "Ad sciendum artem chiromanticam . . ."

Si linea vite erecta fuerit et continua . . .

BL Rawlinson C.677, 14c, ff. 1-3

Si linea vite sit grossa et inflata inter pollicem . . .

Vatic. Palat. lat. 1892, 15c, ff. 123r-126v

Si linea vite sit inflexa inter pollicem et digitum . . .

Vatic. Palat. lat. 1264, f. 244r-v

Tres sunt naturales linee omnis chiros . . .

Vienna 2525, 13c, ff. 58-59
See "Linee naturales tres sunt . . ."

BM Sloane 3464, 15c paper 12mo, ff. 1-11, is described in the long-hand catalogue as "Fragmentum de palmestria cum diagrammatibus manuum." Since the beginning is lacking, it is impossible to give its incipit. At f. 3r: ". . . ne falsa iudicia in predicti. valeant pro vulgari, Amen, AMEN etc. Explicit." At f. 3v is the heading, "De magnitudine digitorum"; at fol. 4r, "Capitulum de unguibus." Fol. 4v is blank; ff. 5r-9r are filled with diagrams of hands. On f. 9v are what seemed to me

medical rather than chiromantic notes or verses; f. 10r is blank; ff. 10v-11r contain two diagrams of hands.

Probably the works opening in different manuscripts, "Cum determinare vellim . . ." and "Dum igitur velim determinare . . ." are one and the same. However, their closing words as reported in the catalogues are different, the Vienna MS ending, ". . . sed ex pluribus," while the Clermont-Ferrand codex closes, ". . . omnia de iudicio cyromanticie sufficiant quantum ad presens. Explicit. Ad Rubon in Delphinatu anno 1474 manu propria in vigilia sancti Michaelis Gelyra ordinis Predicatorum." The last attests the frequent interest of the religious in chiromancy.

As its incipit suggests, the treatise opening, "Cum diversi diversa . . ." is intended to harmonize the existing diversity of works on chiromancy. It has eleven chapters in Bern 353 and twelve in Vatican Palatine Latin 1892. In the latter manuscript there is a prologue and "Excusatio huius artis," opening, "Primo videndum est utrum ars ista sit licita . . ." After this consideration whether the art is licit, the work proceeds to the method of judging, the division of the lines of the hand, and which are significant and which not. Other chapters are concerned with natural lines, the line of life, the linea mensalis, those lines that adjoin it, the linea tabularis vel media, the line of prosperity and its corresponding lines, the triangle located in the palm. In both manuscripts which I have seen the work is illustrated with figures of hands. In Bern 353 it ends: ". . . Hec sunt que de ista arte videbantur esse dicenda. Et scias quod meliora que de ista reperi recollegi ut potui." In the Vatican manuscript it closes: ". . . due equales possent esse in superioritate. De hiis tribus pono exemplum." Yet a third ending, ". . . indicia sunt significantes," is given by the catalogue for MS Vienna 5307.

All the entries in the *Gesamtkatalog der Wiegendrucke* under the caption, *Chiromantia,* are of the same text, of which there were no fewer than ten Latin and two Italian incunabula editions.[1] The work opens, "Ex divina philosophorum academia secundum nature vires ad extra chyromantitio diligentissime collectum. Exordium. Philosophus in libro de celo et mundo ad Alexandrum scribens. . . ." Thus the true incipit appears to be, "Philosophus in libro . . ." The work is in five chapters: on the lines of the hands and their names, the figures of the planets and the divine letters in them, the essence and accidents of the

[1] GW 6633-42 and 6643-44. At the British Museum I examined three of these numbered IA.22410, IA.20530 and IA.22365.

lines, signs on the fingers, and last of the physiognomy of the hand. Figures of hands accompany the text. The first chapter opens, "Manus in quinque digitos divisa est . . ." Although anonymous in all these editions, it is said to have sometimes been attributed to Michael Scot.[2]

More than one treatise in chiromancy is ascribed to an author vaguely designated as John or as John the philosopher. That opening, "Benedictus deus omnipotens . . ." is described in one manuscript as the Summa of a certain John, in another is more definitely attributed to "Iohannes Regiomontanus," and in a third is apparently anonymous. At the beginning of another treatise, opening, "Quoniam revelante domino . . ." we are told, "I, John the philosopher, from the codices of the philosophers collected flowers of the art of chiromancy and compiled them in the present book." Perhaps there is some confusion with John of Seville who is generally represented as the translator of the chiromancy which passes under the name of Aristotle or of Aristotle and Averroes, but has yet a third incipit, "Ciromantia est ars demonstrans mores . . ."

To Regiomontanus is further ascribed, in another manuscript, the chiromancy opening, "Scientie secantur quemadmodum . . .", but it also occurs anonymously.

[2] T II, 331,n.2.

APPENDIX 3

ALCHEMICAL BIBLIOGRAPHY

From G. B. Nazari, *Della tramutatione metallica sogni tre*, Brescia, 1572, III, 18, pp. 135-44. Different mentions of the same author have been brought together, but otherwise the original, only approximately alphabetical, order has been left undisturbed.

Albertus Magnus

- De mineralibus et rebus metallicis
- Semita recta
- Opus optimum et verissimum de secretis philosophorum
- Ars alchimica
- Opus de lapidibus
- De sigillis lapidum
- De generatione lapidum
- De mineralibus
- De comestione
- Semita semitae

Alphidii quidam tractatus

- Domus thesaurorum
- Quinque claves

Aurora consurgens

Antonius de Florentia

Antonii de Abbatia Epistolae due de lapide philosophorum

Arnaldus de Villanova

- Rosarium philosophorum
- Tractatus perfecti magisterii
- Epistola ad regem Neapolitanum
- Tractatus parabolarum
- Rosa novella prima
- Rosa novella secunda

Flos florum prima
Flos florum secunda
Liber de secretis naturae
Tractatus ad Iacobum de Toleto de maximo secreto medicinae
Recepta de compositione lapidis philosophorum
Doctrina nova
Lucidarium
Liber artis
Aurea rosa prima
Aurea rosa secunda
Compilationes philosophorum
Novum testamentum
De sublimatione mercurii epistola ad regem Robertum
Questiones essentiales et accidentales

Aristoteles

Ad Alessandrum tractatus de arte alchimiae
Sphera de octo figuris lapidis philosophici
De mutatione naturae
De secretis secretorum
Superadditio optima et perutilis
Liber perfecti magisterii sed tenetur fuisse Rasis

Aldemari canonici Carthusiensis et Guielmi Glosa super librum perfecti magisterii Geberis

Accursus glosator super rosarium Arnaldi

Andreae Omnisboni liber de auro potabile (*sic*)

Avicenna

Super operationem artis
Super lapide naturali
Super lapide vegetabili
De re recta ad regem Nasen
De anima
Conclusiones duodecim
Addita super quarto Methaurorum Aristotelis
De mineralibus
Decem capitula aquae

Alexandri regis Persarum Epistola docta

Apollonii de Polonia verbum abbreviatum

Allani quaedam dicta perpulcra

De rotatione elementorum

Archilaus

Turba
Opus de corporibus

Albumasaris opus valde pulcrum

Antonii de Parisio via vilis

Alberti de Padua tractatus

Alexandrinus ad Theo(do)siam sororem

Artis philosophus de secretis naturae

Artis regis liber de re philosophica

Andreae Albi medici Bononiensis de aquis dialogi

Alemanni de Bohemia de lapide philosophico ad Bonifacium VIII

Auctoritates quaedam contra Ioannem Bracescum Urciensem

Augustini Pantei ars transmutationis metallicae

Ars foelix et secreta et naturalis magia pro sanandis metallis

Adabesis tractatus de quo sit alchimia solis et lunae

Argumenta collecta ex dictis philosophorum contra dicentes argentum vivum esse lap. phil.

Arbor philosophiae secretae una cum principiis naturae

Alphabetum artis alchimiae

Armani de Pistoia quidam libellus

Arnolphini Lucensis epitome

(some single names beginning with A follow, which are here omitted)

Bernardi magni de Averna (see also below Comitis de Treves)

Epistola ad Thomam
De transmutatione metallorum
De probatione transmutationis
Correctio fatuorum
Opus super rosarium Arnaldi
De ablutione latonis

Bernardi medici practica prima et secunda

Bartholomei de ripa romea

Aurifactio
De lapidibus

Bonifinis

De philosophorum lapide
Collectanea super Geberum et Arnaldum

Belvigerius de arte transmutatoria

Bubeal de voce tractatus tres vz. de spiritibus artis, de vasibus, et de operatione specierum

Bellasii (Blasii?) de Parma, Lilium

Boni Ferrariensis Margarita preciosa et quedam epistolae

Bartholomaei de Coclitis Bononiensis liber de destillatoriis medicinae

Breviloquium artis philosophorum

Bellini dicta

Berengarii Epistola

Bendegid frater Klanbugales

(three names of philosophers from the Turba are omitted)

Christophorus Parisiensis

Lucidarium
Cithera sive Violetta
Summa minor
Alphabetum apertoriale
Arbor philosophiae secundum universalem scientiam

Particularia quaedam
De lapide vegetabili

F. Christophori Veneti opus praeclarum

Christophorus de Bononia, Super opere maiori

Compendium de dictis Hermetis

Cazaleni tractatus

(three or four attributions to Calid and many Claves are omitted)

Communis determinatio de natura solis et lunae

Calendarium solis et lunae

Compendium secretorum naturae

Clangor buccine

Coelum philosophorum de distillationibus

Compilationes philosophorum

Comentum super artem alchimiae

Comentum super librum Hermetis

Compostelle quaedam capitula

Comitis de Trevis Dominus vobiscum et aliud quoddam opus

Colorum natura opus secundum Aristotelem

Calvarius ad Henricum imperatorem

Camilli Pisaurensis libri tres

Calid Rachiadebi liber trium verborum et de qualitate lapidis

Cosmus de Medicis

Comerius

Dicta philosophorum antiquorum

Diomedis Arabici Speculum alchimiae primum et secundum

Dialogus artis cum quibusdam dictis philosophorum

Dialogus de libello aureo

Dauci de Sansonia liber aureus

Diabeses de Abesis de arte philosophica

Danielis Iustinap, cantinela (cantilena?)

Durandus monacus

Daniel de Capodistria

Euonomi Philiatrii de remediis secretis

Eustachius sive Eustopius medicus Germanus de destillationibus artis

Epistola solis et lunae

Epistola incerti auctoris

Evangelium artis

Eufrei libri xi

Epistola ad Philippum Francorum regem

Ex libro Thoy Greci opus incerti

Francisci de Santo Stephano Bononiensis epistola

Figurata compositio lapidis

Francisci de Ascissio tractatus

Florianus philosophus, tractatus

Florus philosophus de arte

Flos florum electus ex libris et experimentis philosophorum et est primus liber Mappe clavicule maioris

Floretis textus

Forarius

Geber

Summa perfectionis magisterii
Investigatio magisterii
Testamentum
De inventione veritatis sive perfectionis
Liber fornacum
De ponderibus artis
Sumarium summe quod dicitur lumen luminum

Liber denudatorum
De tribus ordinibus medicinarum
Liber radicum
Liber regni
Clavis thesaurorum

Gerardi O. M. ad Philippum regem Francorum de generatione solis et lunae

Gualterii de Flamma O.P. tractatus

Gaudium alchimie metallorum

Guielmi Sedacine lib. 4 de lapide

Gemma salutaris

Gratia Dei de lapide componendo

Galinacius de lapide maiori

Gerardi Dorn clavis totius philosophie chimistice

Gregorius philosophus

Gradus sapientie

Gigilides

Honorius Philadelphi dicti magistri artis de Florentia via intelligentiae vel Lilium

Hermes Trismegistus

Trium verborum
Practica pulcherrima
De transmutatione metallorum
De arte alchimiae
Brevis elixir
Secreta cum expositione Ortolani
Documentum de compositione lapidis
Opus artis
De universali virtute
De secretis secretorum artis
Tabula smaragdina
Septem tractatus divinarum rerum

Hiconomicum de compositione magni lapidis

Hali philosophi

Super lap. phil.
De secretis secretorum
De infirmitatibus serpentis philosophorum
De lapide in opere alchimico

F. Heliae

Ad componendum lapidem
De lapide phil.
Vade mecum

Hermanii de Bosenia Epistola

Habucaler sive Habulacher phil.

Haimo de lapide phil.

Hucitius philosophi tractatus

Hier. Cardani medici quaedam in arte

Hermogenis Epistola

(single names follow which are here omitted)

Iacobus de sancto Saturnitio

Ianua artis Raimundi Lulli ed. a d. Petro Dogni Ville montis albi presbitero

Investigatio lapidis phil.

Isidori Cantilena latina de toto opere lapidis

Iesis frater Bedegid

Interpretatio Ep. quae dicitur Alex.

Itaymon liber figuratus et pictus cum multis enigmatibus ad artem spectantibus

Johannes de Rupescissa

Liber lucis
Compendium artis

Quinta essentia
Abbreviatio
Secreta secretorum
Thesaurus mundi
Opus aliud

Johannes de Vascovia ars magne operationis

Johannes Fernel, De abditis rerum causis

Johannes de Saucia, Tractatus cum dictis quorundam philosophorum

Johannis Aurelii Augurelli

Ch(r)isopea
Opus de velo aureo
Carmina aliqua artis

Johannes Damascenus, Donum Dei

Johannis Vmbolei (Dombelay?) practica et quaedam e Ortolano

Johannes de Riccanicis, Clavis sapientie maioris artis

Johannes de Theuein, Opusculum

Johannes Tricibal, Opus

Johannes de Berle

Johannes, Abbreviatio pauperum

Johannes Arragonensis, Iter rectum viatorum

Johannes de Dacia, Rosarium

Johannes de Rodella, Opus maius

Johannis Augustini Panthei Vorarchadumia

Johannes Viennensis

Speculum elementorum
Lignum vitae

Johannis Baptiste Montani Veronensis

Opus de medicamentis metallicis arte alchemica parandis libri 18
De sublimationibus aliud opus

Johannis de S. Saturnitio opus (see Iacobus)

Johannis de Piscibus tractatus

Johannes Allicus

Johannis Gallici opus

Ianus Lacinius

Johannes Ramer de Voilda, opus

Johannes Demeus

Johannes de Mus

Klenbugasal Constantinopolitanus

Lamentatio solis cum artificio philosophico

Lapides quatuor philosophorum

Lex vel factio ad artem pertinens

Liber aquilae

Liber duodecim aquarum

Liber elixorum

Liber dictus lapis animalis

Liber lilii in occulta philosophia

Liber largissime artis philosophi

Liber largissime virginis

Liber novem iudicum in se continens questiones quingentas

Liber perfecti magisterii

Liber questionum et interrogationum sive propositionum

Liber metris versibus de alchimia

Lilium evulsum de spinis

Lilium intelligentiae

Lilium philosophorum

Lilius super Turbam philosophorum

Litere incerti auctoris in quibus tractatur de materia lapidis

Lucidarium carminibus compositum

Lucidarium de secretis philosophorum

Lucustor

Ludovici de Tridento Rosarium

Ludovici Lazarelli tractatus

Ludus puerorum

Lumen novum ab Avicenna extractum

Lumen novum aliud ubi sunt multa secreta de lapide

Lumen novum verae alchimiae

Lumen solis opus pulcrum

Mare magnum

Merlini alias Mahumeti philosophi allegoria

Medicina corporum artis

Mariae Iudae Epistola vel dialogus et practica

Michaelis Scoti questio

Morienus

Dialogus cum Calid rege
Tractatus super librum Hermetis de maiori et minori lapide
Dicta quaedam pulcra

Mireris tractatus ad discipulum

Marchos philosophus de arte philos.

Medulla ab Albenagro philosopho

Michaelis Pselli de conficiendo auro

Methuendus Hermetis discipulus

Mercurii Tremegistae opus

Marci Romani tractatus

Miseudis de arte alchimiae

Memphilii de proprietatibus corporum calcinandorum

Merlinus Cocalius

Nicolai Anglici opera duo

Nicolai Tonatani Epistola ad Alb. ma.

Nicolai Ursini tractatus

Nicolai Toncitani Epistola ad Io. Andream de Pignariis de arte divina

Noxius rex in Turba

Ortulani de horto marino

De arte philosophorum
Super Hermetem expositiones duo
Super epistolam Ieberis
Super Aristotelem de compositione lapidis
Alius tractatus

Ortus divitiarum sapientiae secretae

Osiander medicus de distillationibus

Orus Chrysorichites

Phenix ad Martium (Martinum?) regem Aragonensem

Peregrinus de Manchaurth (Maricourt?)

Petri de Zalento Epistola de occulta philosophia

Petri de Appono opera artis

Petri de Mesana summa philosophiae

Petri Fangene

Petri Silentii

Petri Boni Florensis Margarita preciosa

Petri Donati Veneti Annotationes super lap. phil. secundum Theoricam Raymundi Lulli

Porta lapidis vel paradi

Principia et propositiones per se note ac Theoremata in arte alchemica

Pauli Romani de Orsinis Lilium quo declarantur enigmata Amal.

Porta occulti lapidis

Praeceptorum sexaginta opus

Palmarium philosophorum seu quaedam abbreviatio

Praepositi Sidelensis opus

Progmensis pratica

Processus verus in maiori opere

Raymundi Lulii opera haec sunt:

Testamentum
Quaestionarium
Lux mercuriorum
Lapidarius
Epistola accurtatoria
Codicillus
De quinta essentia libri 4
Liber proprietatum
Practica sermocinalis
Ars fundamenti
Testamentum ultimum ad Carolum regem
Codicillus artis compendiose
Practica testamenti
Experimenta seu Apertorium
Mercuria
Magica maior
Magica minor
Opus duodecim lapidum preciosorum
Elucidatio testamenti
Anima artis et est secunda libri de distinctione quid sit alchemia
Conclusio summaria
De investigatione lapidis
Ars operativa
Apertorium

Practica abbreviata
Compendium codicilli
Claviculae apertorium
Lumen solis
Liber primus de 24 experimentorum totius naturae creatae
De furnis
De figura elementali
De generatione
De intentione alchimistarum seu magnae artis
De conservatione humanae vitae
De ponderositate et levitate elementorum
De regimine sanitatis
Ars compendiosa
Medicina magna et liber adictionum
De questionibus motis super lib. quinte essentie
Clavicula testamenti
Lumen naturae lapidis
Origo naturae nostrorum mercuriorum
Tractatus atramentorum
Liber aquarum medicinalium
Aphorismi super lapidem
Lamentatio philosophica
Anima artis super testamentum et codicillum
Ultimum testamentum
Apertorium testamenti cum clavibus
De ponderibus
Ars medicinae
Liber principiorum
Liber alchimistarum
Retractatio
Liber proprietatum (this title has already been listed)
Practica sermocinalis operis mineralis
Summa artis
Tractatus graduum magnae medicinae
Principium philosophiae
De intentione magnae artis
Secretum occultum
Apertorium cum omnibus clavibus ad intuendam artem secretam artis naturae

Septem rotarum
Tabulae quaedam
Liber divinitatis
De terminis inditis epistola prima
De terminis inditis epistola secunda
De terminis inditis epistola tertia
De angelis opus divinum de quinta essentia
Theorica quae dicitur codicillus maior

Rasis philosophi cognominati Malachiae

Libri viginti de arte
De triginta verbis
Lumen luminum
Trium verborum
Epistola solis et lunae
Duodecim aquarum
Dicta notabilia super compositionem
Liber in arte alchemica
Aliud opus

Rugerii Baconis Anglici

De minerali potestate artis alchimiae et naturae
Speculum secretorum
Liber claritatis
Tractatus divinae artis alchimiae
De lapide philosophorum

Rodiani liber trium verborum

Rosa novella preciosa

Rosa novella alia preciosa

Rosini dialogus ad Euthesim

Rosarius philosophus in libro suo

Robertus Castrensis super septem capitula Hermetis

Rugerius philosophus in arte alchemica

Rugerius Lombardus de secretis artis

Rigini Danielis cantilena vulgaris

Rachaelis philosophi liber artis

Ricardi Anglici correctio fatuorum

Raidabi Veradiani et Calid regis Persarum

Opus alchemicum
Liber secretorum
De compositione magni lapidis

F. Rainaldi Gaufredi opus abbreviatum

Racheli tractatus (see Rachaelis above)

Rosarius maior

Rosius philosophus

Rosarius minor

Rodulphi Anglici tractatus

Saturni Tremegisti sive fratris Heliae opus

Senioris philosophi Clavis sapientiae maioris

Soliloquium vel opus perfecti magisterii

Stephani Alexandri de secreta et magna scientia

Stephanus magnus

Secretorum artis opus

Summa artis brevis

Specularii liber

Stephanus medicus

Scala philosophorum

Simon philosophus

Synesius

Suphebes

Testus alchimistarum in duodecim conclusiones

S. Thomae de Aquino

Epistola

Epistola secunda
Comm. super Turbam
De esse et essentia

Tabula scientiae maioris

Thomae Ennii Phrisii orientalis medici archiepiscopi Treverensis opus de quinta solari essentia

Tractatus ex textu Florentii

(some other Tractatus are omitted here)

Thesaurus absconditus et summum secretum philosophorum

Theophili opus ad filium

Turba secretae philosophorum

Turbula alia philosophorum

Thebit

Themetrius

Thaphnutia virgo

Testamentum alchimiae

Verbum abbreviatum seu summula extracta ex libro speculi

Vincentii speculum et duo alia opera alchimiae

Vocabula oscura artis

Voythie liber Ludovici regis

Via universalis artis

Verba philosophorum de lapide

Vocabularium artis

Vandrius Senensis

Vainardi tractatus

Zamberti Mahometi filii liber de arte alchemiae

Zenonis philosophi tractatus

Zozimus philosophus