BRILL

ERUDITION AND THE REPUBLIC OF LETTERS
1 (2016) 261-304

Erudition and the Republic of Letters
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Vanitas vanitatum et super omnia vanitas: The Astronomer Heinrich Selder and A Newly Discovered Fourteenth-Century Critique of Astrology

C. P. E. Nothaft
All Souls College, High Street, Oxford OX1 4 AL, UK
philipp.nothaft@all-souls.ox.ac.uk

Abstract

A previously unknown treatise on historical chronology (*Tractatus de tempore dominice annunciationis, nativitatis et passionis*), written by a southern German author between 1371 and 1378, preserves an unusually sophisticated and penetrating scholarly critique of astrology. The main purpose of this article is to introduce and analyze this important work, which is characterized by its close attention to technical astronomical detail and the use of empirical data to refute astrological doctrines. Comparison will be made to the contemporary anti-astrological works of Nicole Oresme and Heinrich of Langenstein, from which the newly discovered *Tractatus* differs in a number of significant aspects, underscoring its originality. It will be argued that this anonymously transmitted work was authored by the obscure Swabian astronomer Heinrich Selder, whose *Canones tabularum Alphonsinarum* (1365) are noteworthy for their critical remarks on the Alfonsine Tables.

Keywords

Abū Maʿshar – astrology – criticisms of astrology – Heinrich of Langenstein – medieval astronomy – medieval science – Nicole Oresme – Heinrich Selder

 | DOI 10.1163/24055069-00103001

1 A Forgotten Astronomer...

The last name of the late medieval astronomer to whom part of the present article is devoted has been variously spelled in the manuscripts of his works.[1] We have such forms as (*Henricus/Hinricus/Heinricus*) *Selder*, *Salder, Sälder, Solder*, *Seldner*, as well as *de Salder* or *de Saldir*, although in the majority of cases no *de* is found in the Latin renditions, leaving the impression that 'Selder' was a family name. Information about Heinrich Selder's life and career is extremely scant, and his very existence has, until now, been barely noted by historians of medieval science. A look into Ernst Zinner's indispensable *Handschriftenverzeichnis* suggests that Selder's main claim to fame was a set of explanations or *Canones* for astronomical tables, preserved in six manuscripts. In addition to these codices, Zinner notes five stand-alone copies of a star catalogue that originated in a chapter of the *Canones*. This is a simple list of names and coordinates for 60 fixed stars, based on Ptolemy's *Almagest*, with longitudes adapted to the year 1340 CE.[2] It should be noted, however, that one of these supposedly separate star lists is, in fact, still embedded in a partial copy of the surrounding *Canones* and that the total number of manuscripts containing all or some part of these *Canones* (beyond the star catalogue) must be raised from 6 to at least 13.[3]

1 The opening lines of this article echo Lynn Thorndike, *A History of Magic and Experimental Science*, 8 vols. (New York, NY, 1923–1958), 3:325, to whose unsurpassed contributions to the history of late medieval astrology it is intended to pay tribute. I am grateful to David Juste for his helpful remarks on a previous draft of this article.

2 Ernst Zinner, *Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes* (Munich, 1925), 297 (no. 9599–9609), 497. The incipit of the commentary ('Licet multi libri sunt conscripti') is recorded in Lynn Thorndike and Pearl Kibre, *A Catalogue of Incipits of Mediaeval Scientific Writings in Latin*, rev. ed. (London, 1963), col. 828. For some later mentions of Selder's works, see Thorndike, *A History*, 4:94–95 n. 31; Thorndike, 'Notes on Some Astronomical, Astrological and Mathematical Manuscripts of the Bibliothèque Nationale, Paris', *Journal of the Warburg and Courtauld Institutes* 20 (1957), 112–172, at 115–116, 122–125, 145; Paul Kunitzsch, *Typen von Sternverzeichnissen in astronomischen Handschriften des zehnten bis vierzehnten Jahrhunderts* (Wiesbaden, 1966), 46 n. 39 (where the star catalogue is falsely attributed to Jean de Lignères); Kunitzsch, 'The Star Catalogue Commonly Appended to the Alfonsine Tables', *Journal for the History of Astronomy* 17 (1986), 89–98, at 96 n. 10.

3 Copies not mentioned by Zinner appear in MSS Berlin, Staatsbibliothek, lat. fol. 246, fols. 158r–175r; Brussels, Bibliothèque Royale, 926–940 (930), fols. 125ra–51vb; Freiburg, Universitätsbibliothek, 28, fols. 77r–136v; Freiburg, Universitätsbibliothek, 537, fols. 1r–26r; Lüneburg, Ratsbücherei, Miscell. D 2° 13, fol. 35v (excerpt taken from ch. 2.3); Paris, Bibliothèque nationale de France, lat. 7292, fols. 9r–26v (ch. 3.12–35; Zinner records only the star catalogue on fol. 13r–v); Vatican City, Biblioteca Apostolica Vaticana, Pal. lat. 1354, fols. 94v–96v (ch. 3.14). Zinner's manuscript no. 9602, listed as Tambach, Gräfliche Bibliothek, E 225

Thanks to a find made by the independent scholar Karl Mütz, Selder can now also be credited with calendar-cum-lunar almanac, which lists the precise time (down to the second) of all mean conjunctions of sun and moon during the period 1361–1436, calculated for the meridian of Salzburg.[4] When exactly these calculations were made is difficult to tell, but Selder's main work, the aforementioned *Canones tabularum Alphonsinarum*, are unambiguous in identifying 1365 as the year of writing.[5] It is hence clear that he had become an accomplished astronomer by the middle of the 1360s. A potentially revealing passage appears in a chapter dealing with methods of determining local longitude. As an illustrative example, Selder singles out the city of Erfurt in Thuringia, notifying his readers that Erfurt is 16° — the equivalent of 1 hour and 4 minutes — east of Toledo and hence occupies roughly the same meridian as Lübeck to the north as well as Bamberg, Nürnberg, and Augsburg further to the south.[6] Erfurt's *studium generale*, which was promoted to the status of a university only in 1389, was an important centre for the study of astronomy during the late Middle Ages and it is perhaps no accident that at least two preserved copies of the *Canones*, dated to 1443 and 1461, were made in this central German town.[7] The temptation, however, to locate Heinrich Selder himself at

[correct: E 335], is now MS Philadelphia, University of Pennsylvania Library, LJS 174, fols. 103v–15v (ch. 1.1–3.10).

4 MS Rottenburg am Neckar, Diözesanbibliothek, H 15, fols. 1r–8r, which is described and partly reproduced in Karl Mütz, 'Der Kalender des Magister Hainrich Solder: Ein Reformwerk 180 Jahre vor Papst Gregor XIII.', *Rottenburger Jahrbuch für Kirchengeschichte* 18 (1999), 167–185, who, however, grossly overstates the originality of this work. See also Karl Mütz, 'Heinrich Selder, um 1400, Kalenderrechner und Astronom aus Schwaben', in Sönke Lorenz and Stephan Molitor, eds., *Text und Kontext: Historische Hilfswissenschaften in ihrer Vielfalt* (Ostfildern, 2011), 367–379. One may note in passing that in one fifteenth-century manuscript a table for the calculation of movable feast days (*Tabula Dionysii*, accompanied by a *contratabula* and explanation) is claimed to have been composed or redacted by 'Master Heinrich Selder'. MS Augsburg, Universitätsbibliothek, II.1.4° 61, fols. 28r: 'Tabula Dionysii vel saltem sibi similis, quia magister Heinricus Selder eam fecit'.

5 See, for example, Selder, *Canones tabularum Alphonsinarum* (3.14, 35), MS Freiburg, Universitätsbibliothek, 28, fols. 110v, 136v. In what follows, all references to Selder's *Canones* and their chapter-partitions will be based on this manuscript, which is freely available online at http://dl.ub.uni-freiburg.de/diglit/hs28.

6 Selder, *Canones* (2.3), fol. 85v. The correct longitudes for the mentioned cities are: Toledo: 04;01° W — Lübeck: 10;41° E — Erfurt: 11;02° E — Bamberg: 10;54° E — Nürnberg: 11;05° E — Augsburg: 10;54° E. The German cities thus all stay within one degree longitude, although the distance to Toledo is closer to 15° than 16°.

7 See the colophons in MSS Berlin, Staatsbibliothek, lat. fol. 246, fol. 175r (*Erfordie 1443*); Freiburg, Universitätsbibliothek, 537, fol. 26rb (*anno domini 1461 in alma universitate Erfordensi*). On the astronomical activities at the Erfurt *studium*, see Sönke Lorenz, *Studium*

one of Erfurt's schools is somewhat mitigated by the fact that another manuscript, copied in 1428, refers to the author as *magister Pariensis*.[8] This information would seem to go together with the colophon in the earliest datable manuscript, in which the copyist tells us that he finished his work on 14 December 1377 in Paris.[9] As it happens, a *Henricus* or *Hinricus Selder* appears six times in the records of the English-German nation at the University of Paris, from which it emerges that he determined in 1377, became a licentiate in the same year, and incepted as Master of Arts in 1378.[10] In most of the entries, he is identified as a man of Swabian extraction (*de Swevia*), which matches some of the evidence we shall have occasion to consider further below (see p. 278). It is true that a graduation at Paris in 1377/78 may seem at odds with the fact that Selder wrote his commentary as early as 1365.[11] No one can exclude, however, that Selder already received an advanced education in his native Germany, but then moved to Paris at a later stage to obtain the higher degrees Erfurt's schools were not yet entitled to award.

Whatever the precise details of Heinrich Selder's career, his *Canones tabularum Alphonsinarum* fit squarely into a larger tradition of astronomical works written in fourteenth-century Paris, where the Latin version of the Alfonsine Tables, named after King Alfonso X of Castile and León, began to take root around 1320.[12] From Paris, these tables quickly spread to England, Germany, and other parts of Europe, creating a continent-wide standard for computational astronomy that lasted until the days of Copernicus. During the more than two centuries of their use, the Alfonsine Tables generated a rich 'second-

Generale Erfordense: Zum Erfurter Schulleben im 13. und 14. Jahrhundert (Stuttgart, 1989), es 149–153, 239–260; Lorenz, "Studium Generale Erfordense': Neue Forschungen zum Erfurter Schulleben', *Traditio* 46 (1991), 261–289, at 281–289; José Chabás and Bernard R. Goldstein, 'Nicholaus de Heybech and His Table for Finding True Syzygy', *Historia Mathematica* 19 (1992), 265–289.

8 MS Freiburg, Universitätsbibliothek, 28, fol. 136v.

9 MS Erfurt, Universitätsbibliothek, BA 2° 37, fol. 85v: 'Expliciunt canones Henrici Sälder scripti per me, Kristianum de Hag presbyterum et monachum monasterii S. Petri Saltzburge, anno domini 1377, 14ª die mensis Decembris, Parisius'.

10 Henri Denifle and Émile Chatelain, *Liber procuratorum nationis Anglicanae* (*Alemanniae*) *in Universitate Parisiensi*, vol. 1 = *Auctarium Chartularii Universitatis Parisiensis*, vol. 1 (Paris, 1894), cols. 513, 515–516, 547–548, 555.

11 Mütz, 'Heinrich Selder', 373, asserts that the *Canones* were written 'vermutlich zwischen 1377 und 1400', but this is at odds with the evidence.

12 On these tables and their background, see José Chabás and Bernard R. Goldstein, *The Alfonsine Tables of Toledo* (Dordrecht, 2003).

ary literature' geared toward explicating their principles and use, starting with a pioneering *Expositio* (1319–1321) by Jean de(s) Murs and culminating early on in the widely copied canons by John of Saxony (1327).[13] From the introduction to his *Canones*, it can be gathered that Heinrich Selder was well aware of this literature, but that he regarded the existing texts as insufficiently complete, motivating him to produce a new explication of the Alfonsine Tables, which dwarfed most of its predecessors in size.[14] As found in most manuscripts, Selder's work comes in three parts or *differentiae*, the first of which (in 12 chapters, excluding the introduction) is dedicated entirely to eras and calendars, while the second (in 8 chapters) teaches how to calculate the mean longitudes and syzygies of the sun, moon, and fixed stars, next to the position of apogees and fixed stars. The third (in 35 chapters) adds to this the techniques necessary for finding true longitudes and syzygies, eclipse parameters, stellar coordinates, planetary latitudes, as well as a host of other topics.[15] What may seem like a fairly unremarkable production, didactic in nature and dependent entirely on the source it was meant to elucidate, turns out to contain quite a few points of interest to historians of astronomy. Far from treating King Alfonso and his tables as an unimpeachable authority, Selder notes that

> virtually all mean motions displayed in the Alfonsine [Tables] are diminished. And certain tables for equations, like those for Sun, Jupiter, and Venus, are in excess, whereas the equations for the lunar arguments are deficient. Nevertheless, I say that the true conjunctions of the luminaries come quite close to the truth, because what is in excess in one (i.e., the sun) is diminished in the other (i.e., the moon) and so the shortfall of one

13 For editions, see Emmanuel Poulle, 'Jean de Murs et les Tables Alphonsines', *Archives d'histoire doctrinale et littéraire du Moyen Âge* 47 (1980), 241–271, and Poulle, *Les Tables Alphonsines avec les canons de Jean de Saxe: édition, traduction et commentaire* (Paris, 1984), 32–105. Many further texts of this type are mentioned in Chabás and Goldstein, *The Alfonsine Tables*, 266–290; Pierre Duhem, *Le système du monde: histoire des doctrines cosmologiques de Platon à Copernic*, 10 vols. (Paris, 1913–1959), 4:60–90; Emmanuel Poulle, 'Les astronomes parisiens au XIV^{e} siècle et l'astronomie alphonsine', in *Histoire littéraire de la France* 43 (Paris, 2005), 1–54.

14 Selder, *Canones* (1.1), fol. 77r: 'Licet multi libri sunt conscripti qui canones tabularum appellantur, tamen quia nullum eorum videram completum, ideo placuit michi novissimis istis temporibus, scilicet in fine seculi, quasdam recolligere regulas de eisdem, talem processum retenturus quod applicabo ipsas regulas specialiter ad tabulas Alfoncii illustris regis Castelle'.

15 See the selective summary of content in Mütz, 'Heinrich Selder', 372–376.

> compensates the excess of the other; and this has led many and rather famous philosophers to believe in the aforementioned tables.[16]

That Selder was no naïve follower of the tables he commented upon is also clear from his statements about the Alfonsine model of stellar and apsidal precession, which had two components: a steady, linear term and a variable, periodic one. The latter was known as the 'motion of access and recess' (*motus accessus et recessus*), a concept Latin astronomers were wont to associate with Thābit ibn Qurra.[17] Selder patiently explained how a user faithful to the Alfonsine Tables might 'verify' stellar coordinates using this combined model, but not without protesting that the oscillating 'access and recess'-component had to be categorically rejected.[18] Instead of the combined motion, he advocated a return to a simple linear model of precession, for which he suggested a rate only slightly slower than 1° in 66 years.[19] Selder followed this recommendation himself when drawing up his star catalogue, which updated the longitudes of 60 stars found in Ptolemy's *Almagest* to the completed year 1340 CE by consistently adding 18°. A note appended to this list advises readers to increase the longitudes by another 0;54° in order to obtain data adequate for 1400 CE.[20] Both numbers imply a precession of 54 seconds per year or 1° every 66 2/3 years, which comes very close to the rate of 1° per 66 years Arabic astronomers such as al-Battānī had determined in the ninth century.[21] In the accompanying

16 Selder, *Canones* (2.8), fol. 92v: 'Scio enim quia antique observaciones et moderne me hoc docuerunt quod quasi omnes medii motus qui ponuntur in Alfoncio sunt diminuti. Et quedam tabule equacionum, sicud solis, Iovis, Veneris, superfluunt; equaciones vero argumentorum lune sunt deficientes. Verumtamen hoc dico quod coniunctiones vere luminarium satis appropinquant veritati, quia quod superfluit in uno, scilicet in sole, est diminutum in alio, scilicet in luna, et ita diminutio unius restaurat habudanciam alterius, et hoc multos et satis famosos philosophos in predictarum tabularum perduxit credulitatem'.

17 On the background, see C. P. E. Nothaft, 'Critical Analysis of the Alfonsine Tables in the Fourteenth Century: The Parisian *Expositio tabularum Alfonsii* of 1347', *Journal for the History of Astronomy* 46 (2015), 76–98, at 81, with further references on 93 nn. 23–24.

18 Selder, *Canones* (3.15), fol. 111r–v.

19 Ibid. (3.35), fol. 136v.

20 Ibid. (3.16), fol. 113r: 'Item super stellas hic positas addas 54 minuta et habebis loca earum verificata ad annum Domini 1400^{m}'.

21 al-Battānī, *Opus astronomicum*, ed. Carlo Alfonso Nallino, 3 vols. (Milan 1899–1907), 1:124. At a rate of 0;0,54° per year, 18° will be reached after exactly 1200 years, which happens to be the difference between 1340 and 140 CE, the approximate year of writing of the *Almagest* (see n. 99 below). Likewise, the total precession will be exactly 0;54° during the 60 years from 1340 to 1400.

text, Selder announces his intention to further defend his choice of precession model in a separate book on the eighth sphere, to be written later the same year, which would contain information on all the 48 constellations and 1022 stars known from the *Almagest* as well as the 28 lunar mansions and, finally, a 'refutation' (*reprobacio*) of Thābit's 'access and recess'-motion.[22]

Whether Selder ever managed to produce this book, we do not know, but his critical attitude toward the established astronomy of his day is evident enough from various passages in his *Canones*. That he was not the only expert in his day to feel this way can be inferred from an *Expositio tabularum Alfonsii* written in 1347, whose author openly negated the predictive accuracy of King Alfonso's tables. According to this unknown astronomer, who had access to the library of the Collège de Sorbonne in Paris, examining the parameters of astronomical tables was an important business chiefly because 'all of us who sweat in gaining knowledge of the stars' needed to obtain reliable data about celestial motions and positions before casting judgments about their effects.[23] That (computational) astronomy and (judicial) astrology used to be parts of the same unit and that the whole *raison d'être* of the former was to provide a technical basis for the latter has long been treated as a truism about medieval star-science. Yet, while the astronomer of 1347 lends full support to this view, Heinrich Selder may have been unique among his contemporaries in being simultaneously a highly skilled practitioner of mathematical astronomy and a fierce opponent of astrological prognostication, not to mention an outspoken sceptic of astrology's theoretical-philosophical claims. The evidence for this remarkable set of attitudes comes not from his Alfonsine *Canones*, but from a highly sophisticated treatise on historical chronology, written in the years 1371–1378, in which we are told that the goal and purpose of astronomy is not 'to know how to cast predictions' (*scire iudicare*), but to obtain purely 'speculative knowledge' (*noticia speculativa*) as well as the sort of understanding

22 Selder, *Canones* (3.16), fol. 112r: 'Et si deus prolongaverit michi vitam hoc anno intendo componere librum de octava spera, in quo pertractabo disposiciones 48 ymaginum et loco<s> omnium stellarum fixarum intrancium consideracionem astronomi, que sunt 1022, et de mansionibus lune, que sunt 28; et ponam ibidem motum octave spere secundum modum quem hic teneo cum reprobacione Thebith et omnium aliorum ponencium motum accessus et recessus'.

23 MS Berlin, Staatsbibliothek, lat. fol. 192, fol. 211r: 'Bonum quidem michi videtur omnibus nobis astrorum peritie insudantibus antequam aliquid de motuum effectibus iudicemus diligenti perscrutatione previdere an instrumenta, persertim tabule quibus utimur in extractione motuum stellarum, sint fidelia necnon defectibus in errorem ducentibus inpermixta'. See the discussion of this text in Nothaft, 'Critical Analysis'.

involved in working with tables and instruments.[24] Far from seeing astrological prognostication as a commendable pursuit, the author describes it as a malicious invention of the Devil himself, who for many centuries managed to fool unsuspecting men by passing it off as a regular part of the quadrivium. The holy mother Church, on the other hand, has long perceived the truth and dissolved the liaison between astrology and astronomy with the sword of perpetual divorce, forcing the father to take his illegitimate daughter back. Still, 'among all the harlots of divination, no other imitates the face of honesty of a chaste and venerable matron as much as this one'.[25]

The passionate critique levelled against astrology in this previously unknown treatise will be my main subject for the remainder of the present article. If I am right about my interpretation of the material, it must be ranked among the most original such attacks attempted in medieval Europe and deserves to be placed alongside the famous anti-astrological writings of Selder's contemporaries Nicole Oresme and Heinrich of Langenstein. In what follows, I shall try to support this case by focusing on a select number of topics broached in this work. Among them are Selder's technical objections to Abū Maʿshar's popular doctrine of the 'great conjunctions', which reveal a close connection between his doubts about the accuracy of Alfonsine astronomy and his general disdain for divination by the stars. Another issue will be his attitude toward the idea of celestial influence, which came close to a complete denial of the physical effects astrology was supposed to be assessing. Closely interconnected with this philosophical position are his objections to particular astrological theories and techniques, whose 'absurdity' he repeatedly sought to expose in the course of his discussion. In the end, Selder regarded astrological doctrines as so vacuous that only demonic intervention could explain the occasional success of the predictions made on their basis. Before I can proceed to discuss these points,

24 MS Munich, Bayerische Staatsbibliothek, Clm 18298, fol. 18va: 'Nec finis scientie de motibus celestibus est scire iudicare, sed est noticia speculativa, etiam eius que in tabulis traditur et instrumentis'.

25 Ibid., fol. 18rb–va: 'Unde dico quod scientia de motibus celestibus nequaquam est flos in astrologiam iudicialem, nec ista fructus illius aut philosophie naturalis aut geometrie, ut patet ex predictis. Sed est quedam adulterina hostis nequam dyaboli filia, quam sub specie legittime prolis scientie naturalis et de motibus celestibus, id est astrologie quadruvialis, ipse pater mendacii duxit in orbem et eam pluribus non infimis seculis mendaciter copulavit. Sed sancta mater ecclesia hanc copulationem, quia nequaquam legalis est, non sustinens indispensabili interdicto inhibet fienda, factam vero perpetui divortii gladio dirimit et rescindit, cogens ad patrem a quo genita, inducta, nutrita est filia filiam hanc reverti. Unde inter omnes meretrices divinatorias nulla sic honestatis pudicitie et reverende matrone mentitur faciem sicut illa'.

it will be necessary to introduce the new textual evidence and secure its date and authorship. In particular, I will have to support my contention that we are dealing with a heretofore unknown work by Heinrich Selder. To this I turn in the following two sections.

2 ...And a Forgotten Treatise

It is no accident that Heinrich Selder's anti-astrological views should have slipped under the radar of all scholars interested in the topic, for they are buried deep within an anonymous and utterly obscure work on historical chronology — *Tractatus de tempore dominice annunciationis, nativitatis et passionis*, dated to 1371 — which occupies the first 34 folios in the *codex latinus Monacensis* (Clm) 18298 of the Bavarian National Library (hereafter: MS *M*). Like all codices with shelfmarks in the 18000s, this one came to Munich from the secularized library of the Benedictine Abbey of Tegernsee, where its pages were written in the mid-fifteenth century.[26] At first glance, the Tegernsee *Tractatus* may appear to contain an endless, and endlessly sterile, disquisition on the age-old question of the chronology of Jesus Christ's life, above all the date of his crucifixion, which during the Middle Ages engendered a lively and involved discussion.[27] The author of the *Tractatus* set out to tackle these questions in a comprehensive manner, dedicating the first of its three main chapters to the year and date of Jesus's birth, the second to his conception, and the third to his crucifixion and death. In spite of its outward structure and stated purpose, less than 25% percent of the entire work, which comprises some 37,000 words, deal with the chronology of Jesus in any strict sense. Considerably more time is spent in Chapter 1 on figuring out the distance in years between Christ's nativity, fixed on 25 December 1 BCE, and a series of earlier epoch dates based on the accession of important rulers and major historical events. Working backwards from Christ and the Emperor Augustus, the author lists 17 such *propositiones* in reverse chronological order, ranging from Judah Maccabee to the creation of the world. These dates are not presented in a matter-of-fact way, but are arrived

26 The verso-side of a flyleaf preceding the first page of *M* begins with the following owner's note: 'Iste liber attinet venerabili cenobio sancti Quirini regis et monachis atque patroni in Tegernsee, in quo continentur hec infra: Tractatus de tempore dominice annunciationis, nativitatis et passionis et etate atque assumptione beate virginis Marie; compilatus est hic tractatus anno dominice incarnacionis 1371°'.

27 See C. P. E. Nothaft, *Dating the Passion: The Life of Jesus and the Emergence of Scientific Chronology (200–1600)* (Leiden, 2012).

at by means of sometimes drawn-out discussions. A characteristic feature of these discussions is the author's frequent use of Ptolemy's *Almagest*, whose chronological data he viewed as especially reliable thanks to their grounding in astronomical observation and calculation.[28]

A surprising change of pace and subject can be witnessed in proposition no. 16, which deals with the retrospective number of years between Christ and the biblical Flood. In solving this puzzle, the author had to confront a widely-cited tradition, inherited from Arabic sources, according to which the Flood had begun in 3102 BCE. This he rejected in favour of a date in 3073 BCE, but more than by the purely chronological question, he was agitated by the idea, famously espoused by the Abbasid astrologer Albumasar (Abū Maʿshar, 787–886) in the *Liber de magnis coniunctionibus*, that the deluge of 3102 BCE had been signified or caused by a conjunction of Jupiter and Saturn 279 years prior. His protest against this claim takes the form of a lengthy excursus — in effect a treatise within a treatise — on the inconsistencies and absurdities of astrological divination, which in Codex *M* comprises a total of 15 leaves or ca. 16 500 words.[29] The discussion is structured in a way reminiscent of a scholastic disputation and begins with some preliminary remarks on the technical-astronomical basis of Albumasar's doctrine of the 'great conjunctions', followed by seven conclusions directed specifically against his astrological interpretation of the Flood. These conclusions culminate in the charge that any kind of astrological prognostication must be illicit, since it is forbidden by Christian doctrine and canon law. Next, the author cites seven possible counterarguments likely to be chosen by those who want to defend astrology against this potentially devastating blow. These counterarguments are subsequently dealt with in a systematic fashion and taken down one by one, as many further arguments exposing the baselessness of astrological doctrine are being presented. At various points in this discussion, the author inserts excurses on points of astronomical interest, e.g., on dog-days or the principal stars of the night sky.[30] He returns to the topic of astrology in Chapter 2 of the *Tractatus*, where the search for the precise date of Christ's conception provides an opportunity to discuss and refute the techniques astrologers use to calculate the duration of a pregnancy and to

28 See especially the discussion of the year of Alexander the Great's death in *M*, fol. 2rb–va. I shall deal with the author's chronological method in more detail in C. P. E. Nothaft, 'Two Medieval Pioneers of Technical Chronology', forthcoming in *Early Modern Chronologies*, ed. Michał Choptiany.

29 *M*, fols. 10ra–24vb. A marginal note on fol. 10ra introduces this section as *Nota de divinacione astrologica*.

30 *M*, fol. 32rb–va.

rectify the ascendant at birth. Chapter 3 centres on the date of Christ's death (Friday, 3 April 33 CE), which is arrived at via a series of painstaking calculations. In addition, the author informs us about the date of Christ's ascension, in which context he presents a detailed astronomical-mathematical deduction of the number of German miles Jesus had to traverse when he ascended to heaven. He ends his treatise with a discussion of the life of the Virgin Mary, which mostly relies on the visions of the twelfth-century monastic writer Elisabeth of Schönau.

That this remarkable text has survived to the present day is most likely due to the chronological interests of Johannes Keck (1400–1450), prior in Tegernsee during the years 1443/1444–1446, whose hand features prominently in various parts of codex *M* as well as in numerous other manuscripts from the Abbey's library.[31] Among the autograph texts found in *M* are Keck's *Introductorium musicae* of 1442 (fols. 64r–69v), which has already been edited on two occasions,[32] as well as a brief *Calculatio annorum ab origine mundi usque ad Christi nativitatem* (fols. 35r–36v). This text functions as an appendix, perhaps even as a corrective to the *Tractatus*, seeing how it recapitulates some of the chronological material discussed in the previous work, but comes to different conclusions.[33] In addition, Keck's hand was responsible for the copious marginal annotations that adorn the *Tractatus* proper. Significantly, these annotations are devoted almost exclusively to the chronological and astronomical content of the text; the anti-astrological section, by contrast, seems to have left Keck cold. None of his additions offer us any clue as to the origin or authorship of the *Tractatus*, which appears to have been unknown to both Johannes Keck and the Tegernsee scribe responsible for the main text. This anonymous state of transmission has doubtlessly contributed to the text's obscurity, with the result that even its incipit ('Plerique oppinati sunt, ymmo et in scripturis reliquerunt posteris') has gone uncatalogued.

31 See Heribert Roßmann, 'Keck, Johannes', in *Die deutsche Literatur des Mittelalters: Verfasserlexikon*, eds. Wolfgang Stammler et al., 2nd ed., 14 vols. (Berlin, 1978–2008), 4:1090–1104, with corrigenda ibid., 11:835–836. See now also C. P. E. Nothaft, 'Johannes Keck, das Konzil von Basel und der vergessene Osterstreit des Jahres 1444', *Deutsches Archiv* 71 (2015), 105–147.

32 *Scriptores ecclesiastici de musica sacra potissimum*, ed. Martin Gerbert, vol. 3 (St Blasien, 1784), 319–329; Peter Slemon, *Introductorium Musicae of Johannes Keck: Introduction and Translation* (Ottawa, 2001), which comes with a facsimile of the manuscript.

33 Further calculations from Johannes Keck's hand can be found in MS Munich, Bayerische Staatsbibliothek, Clm 18931, fols. 2r–13r, where a different version of the chronological *Calculatio* segues into a catalogue of emperors and popes. Similar, but not identical, material appears in several other codices from Tegernsee and neighbouring monasteries. See the list of manuscripts in Roßmann, 'Keck, Johannes', col. 1095.

3 The Case for Selder's Authorship

The anonymity of the Tegernsee *Tractatus* notwithstanding, it is possible to extract a significant amount of information on the author's personality from the internal evidence it provides. That he was widely read is evident from the diversity of his oftentimes extensive quotations, which cover both the Church fathers (Ambrose, Jerome, Augustine, Gregory the Great) and the great Roman poets (Horace, Ovid, Virgil). He appears to have had a particular penchant for Virgil, whom he quotes no fewer than 15 times, for the *Eclogues*, the *Georgics*, as well as the *Aeneid*. He cites Bede and Nicholas of Lyra for their exposition of Daniel's Seventy Prophetic Weeks and Peter Comestor and Rupert of Deutz for their views on the chronology of Jesus. Other historical and chronographic material is obtained from classics such as Josephus, Solinus, Orosius, and Isidore of Seville, but also from Freculf of Lisieux's *Historiae* and Godfrey of Viterbo's *Pantheon*. A series of patristic quotations aimed to elucidate the question of Solomon's salvation was taken *en bloc* from a twelfth-century text known as *De praevaricatione et poenitentia Salomonis*.[34] As far as astronomical literature is concerned, the source he adduces most often is Ptolemy's *Almagest*, but there are also references to the major Arabic authorities such as Azarquiel, al-Farghānī, and al-Battānī. Astrological sources include Ptolemy's *Tetrabiblos* with commentary by Haly Abenrudian, the pseudo-Ptolemaic *Centiloquium*, Haly Abenragel's *De iudiciis astrorum*, and the writings of Abraham Ibn Ezra (*De mundo vel saeculo*; *Liber de nativitatibus*). Guido Bonatti is also mentioned once,[35] but otherwise references to more recent astrologers are avoided.

Although the author was well informed with regard to what the Church Fathers and the canon law had to say about astrology and divination, there are otherwise few signs that he was in holy orders. A slightly more plausible notion would be that he earned his keep as a physician, which would explain his strong interest in bio-medical issues such as critical days, gestation periods, and fetal development, the discussion of which takes up a considerable amount of space in both Chapters 1 and 2.[36] As one would expect, he finds

34 See *M*, fol. 7ra–b, and Lorenzo DiTommaso, 'Pseudepigrapha Notes III: 4. Old Testament Pseudepigrapha in the Yale University Manuscript Collection', *Journal for the Study of the Pseudepigrapha* 20 (2010), 3–80, at 39–49.

35 *M*, fol. 29rb–va: 'Ex hiis omnibus non minus refellitur et Guido Bonactus astrologus … fuit autem Guido Bonactus circa annos domini 1260, scilicet contemporaneus beati Thome de Aquino et Alberti Magni'. The reference is to Guido Bonatti, *Liber astronomiae* 9.1.4 (Venice, 1506), sig. BB3r.

36 *M*, fols. 22rb–24va (on critical days and the medicinal month), 27rb–28vb (gestation periods and fetal development).

several opportunities to reference the opinions of Hippocrates (*Aphorisms*, *Prognostics*) and Galen (commentary on the *Prognostics*, *On Critical Days*) and to insert quotes from Avicenna's *Canon of Medicine*. More remarkable is the way he at one point expands upon Albertus Magnus's statements about the fetal position in the womb by citing oral testimony he received 'from a certain midwife experienced in her art', who had opened the uterus of a deceased mother in order to save the child.[37] In another passage, he refers to his pool of personal observations concerning the time of conception and birth of various children, which help him refute the common idea according to which the place of the moon at conception will be the ascendant at birth and vice versa.[38] At the same time, he admits to his former acceptance of this doctrine, which was used to calculate the length of a pregnancy and fix the ascendant at birth after the event.[39] Together with another passage, in which he mentions the personal waste of time incurred in comparing horoscopes for conception and birth of different individuals,[40] this suggests that our author was a disillusioned former practitioner of natal astrology.

By far the most conspicuous trait, however, is his profound expertise and personal delight in astronomical questions, which is in evidence almost throughout the treatise. At numerous junctures, he presents accurately computed data for conjunction times or planetary longitudes, whether it be in order to solve chronological problems or to exemplify one of his anti-astrological arguments. While these generally rely on the Alfonsine Tables, adjusted to different meridians, he sometimes goes the extra mile of comparing their results with those yielded by other tables known to him. Next to the tables provided in Ptolemy's *Almagest*, these include relatively obscure ones like the tables for Mechelen (Malines) cast in the thirteenth century by Henri Bate and the tables for Novara by Campanus of Novara (d. 1296), which were each based on the

37 *M*, fol. 28rb: 'Et ego cognovi a quadam artis sue perita obstitrice hoc verbum sic se habere, que, ut mihi retulit, cuiusdam defuncte matris uterum apparuit ob infantis salutem, quem infantem adhuc gestaverat, et infantem sic fore positum in matrice visu conspexit. Sed hoc addidit quod digitellos suos habebat quasi in pugnulum complicatos et ipsos pollices impositos cavitatibus oculorum'.

38 *M*, fol. 28va: '… sicut in omnibus conceptionibus et nativitatis quas experiri poteram sum expertus. Ex hiis autem duas referam pro exemplo'.

39 *M*, fol. 27va: '… et sic invenerunt, ut eis visum est *et mihi aliquando videbatur*, totum tempus quo infans steterat in utero matris et tunc ulterius quesierunt quantum luna in tali inquisito tempore moveretur et illud subtraxerunt a loco lune hora nativitatis et quod post subtractionem remansit ostendebat eis locum lune tempore conceptionis et ita rectificaverunt gradum ascendentis'.

40 See n. 139 below.

old Tables of Toledo (late eleventh century). All three of these sets were also known to Heinrich Selder, as a brief reference to them in his *Canones* shows.[41] An area where the professional attitudes of these two authors very clearly converge is the critical assessment of the Alfonsine Tables, whose failures at accurate prediction receive open treatment not only in the *Canones*, but also in the discussion of Albumasar's 'great conjunctions' in the *Tractatus* (see p. 288 below). In line with these doubts, the author of the *Tractatus* does not adhere to the popular Alfonsine value for the (mean) tropical year, which was ca. 365 ¼ – 1/134 days. Instead, he asserts at one point that truthful observations have shown the vernal equinox to progress at a rate of 1 day every 112 years relative to the Julian calendar, which implies a year of 365 ¼ – 1/112 days.[42] It is worth comparing this to a passage found toward the end of Selder's *Canones*, in which he reveals his doubts about the Alfonsine value and places it next to Ptolemy's 365 ¼ – 1/300 days and al-Battānī's 365 ¼ – 1/100 days. The latter, he states, comes closest to the actual truth, which would appear to be in agreement with the claim made in the *Tractatus*.[43]

Much more significant than the hints just mentioned is the evidence provided by the *Tractatus*'s detailed excursus on fixed stars and stellar magnitudes, for which the author sometimes cites his own observations in addition to data he draws from the *Almagest*.[44] Most of his attention is devoted to the 15 stars of first-order magnitude known to Ptolemy, for each of which he provides precise coordinates. As far as ecliptic latitudes are concerned, his numbers are identical to those found in the *Almagest*, but the longitudes are almost consistently precessed by 18;54°. This makes for an intriguing comparison with the star catalogue contained in Heinrich Selder's *Canones*, which likewise contains all 15 first-order stars. As mentioned above (p. 266), Selder's catalogue was meant to be valid for the completed year 1340 CE, based on an addition of

41 *M*, fols. 10vb, 27ra, 31rb, 32rb; Selder, *Canones* (1.4), fol. 78r.

42 *M*, fol. 31rb: 'Sit autem secundum veriores observationes huiusmodi mutatio in 112 annis fere per unum diem, ita ut quartus annus bisextilem diem intercalet'. The resulting value comes fairly close to the solar year of 365d 5h 47m (or 365 ¼ – ca. 1/111d) which Alard of Diest derived from observation in ca. 1308. See Ernst Zinner, 'Magister Alard von Diest und die Pariser Beobachtungen von 1312–15', *Isis* 42 (1951), 38–40, at 40, and the marginal note in MS Berlin, Staatsbibliothek, lat. fol. 610, fol. 130r: 'Secundum magistrum Alardum annus continet 365.5.47.15.'

43 Selder, *Canones* (3.31), fol. 134r–v. It is worth noting that 365 ¼ – 1/112 days (or 365d 5h 47m 9s) is also the year-length erroneously attributed to al-Battānī by Jean de(s) Murs in ca. 1332 and 1345, whereas the actual Battānīan value was 365d 5h 46m 24s or ca. 365 ¼ – 1/106 days. See C. P. E. Nothaft, 'John of Murs and the Treatise *Autores kalendarii* (1317): A Problem of Authorship', *Sudhoffs Archiv* 99 (2015), 209–229, at 220–221.

44 *M*, fols. 21ra–22rb.

18° to Ptolemy's longitudes. But there was also a note informing readers that these longitudes will have increased by another 0;54° by (the end of) 1400. As it happens, the author of the *Tractatus* is himself explicit about having 'verified' (i.e., calculated) the coordinates of the fixed stars listed in his excursus for '1400 completed years of the Lord'.[45] This is certainly not a trivial agreement, especially considering how Selder rejected the Alfonsine variable precession model and substituted it for a linear precession of 1°/66;40y. The addition of exactly 18;54° to Ptolemy's longitudes indicates that Selder considered the star catalogue in the *Almagest* to have been assembled in 140 CE — an assumption that is expressly made in the *Tractatus*.[46] What is more, the *Tractatus* also applies the adjustment to 1400 CE to the longitude of Polaris (the *stella maris*), a third-order star, as well as to that of Atlas (27 Tauri), one of the fifth-order stars making up the Pleiades.[47] Since Selder's catalogue contains no stars smaller than the second order of magnitude, it is clear that the *Tractatus*-author cannot have simply copied his data from the latter.[48] His use of the exact same precession rate as Selder is thus very intriguing.

Another area where both texts converge are their respective comments on Jupiter-Saturn conjunctions and the mathematical patterns of their recurrence. Selder, in the *Canones*, even announces that he intends to write a whole separate treatise on the topic, which he says will be directed 'against Abraham *On the redemption of the sons of Israel* and [against] Albumasar'.[49]

45 *M*, 22ra–b: 'Et scias quod gradus earum hic positos verificavi ad annos domini 1400 completos et tam gradus quam minuta sunt perfecta et pertransita'.

46 See n. 99 below.

47 Note that the author places Polaris (the *stella maris*) in 19;6° Gemini (*M*, fol. 21vb) compared to Ptolemy's 0;10°. Similarly, he raises the longitude of Atlas (*pars sequens Plyadum*) from 3;40° to 22;36° Taurus (fol. 22ra). This increase of 18;56° as opposed to 18;54° also appears in three of the first-order magnitude stars under discussion (see the comments on α Centauri, Canopus, and θ Eridani on fol. 21rb–va), but he is otherwise consistent in adding 18;54° to Ptolemy's longitudes. For Ptolemy's coordinates, see the edition of the Latin text in Paul Kunitzsch, *Der Sternkatalog des Almagest: Die arabisch-mittelalterliche Tradition*, 3 vols. (Wiesbaden, 1986–1991), 2:33–169.

48 It is also worth pointing out that most of the copies of Selder's catalogue I have seen erroneously put down 17° Cancer for the longitude of Canopus, when 5;10° Cancer should have been the expected result based on Ptolemy's 17;10° Gemini (+18°). An exception is MS Paris, Bibliothèque nationale de France, lat. 7292, fol. 13r, which has 3;10° Cancer. The *Tractatus*, by contrast, locates Canopus in 6;6° Cancer (an error for 6;4°), which suggests that he worked directly from the *Almagest*.

49 Selder, *Canones* (2.7), fol. 91r: 'Sed si Deus prolongaverit michi vitam de coniunctionibus Saturni et Iovis distinctius dicam in libro quem componere intendo contra Abraham de redemptione filiorum Israhel et Albumazarem'.

This announcement is reminiscent of the *Tractatus*'s extended critique of Albumasar's doctrines concerning the 'great conjunctions', even though it is true that it makes no mention of the other work targeted here: Abraham bar Ḥiyya's *De redemptione Israel*, which interpreted the history of the Jews, past and future, along astrological lines.[50] When it comes to critiquing Albumasar, the *Tractatus*-author takes particular care to counter the idea that conjunctions of Jupiter and Saturn follow a neat pattern according to which each series of 12 conjunctions will take place within the same triplicity of zodiacal signs. In order to demonstrate the contrary, he lists times and true longitudes of 18 consecutive joinings of the outer planets, spread out between 1126 and 1464, which clearly show that the chain of conjunctions in a single triplicity was often interrupted during this period.[51] He even contends that Albumasar's doctrine could be falsified using mean, instead of true, conjunctions, although he refrains from providing further details. His notion may have been that mean conjunctions, if plotted against the ninth sphere, already change triplicity after 10 (in some very rare cases after 11) iterations and return to start after ca. 800 years, whereas Albumasar used the eighth sphere as his frame of reference and assumed a cycle of 960 years. As it happens, Selder makes exactly this point in his *Canones*, where he discusses the mean locations and dates of 10 great conjunctions between 6 BCE and 1782 CE.[52] He does not forget, however, to signal the fact that true conjunctions can enter new triplicities earlier than their mean counterparts, thus breaking the pattern. As examples, he uses the conjunction of the year 571, which 'signifies the most deplorable law of Mahomet about which one can read in al-Qabīṣī and in the other books on judicial [astrology]'[53] as well as the conjunction of the present year 1365.[54]

50 See Graziella Federici Vescovini, 'Una versione latina medievale dell'opera escatologica di Abram bar Hijja (Savosarda) "'Megillat ha-megalleh": il "Liber de redemptione Israhel"', in *Filosofia e cultura: per Eugenio Garin*, eds. Michele Ciliberto and Cesare Vasoli, 2 vols. (Rome, 1991), 1:3–37; Federici Vescovini, 'Escatologia e previsione astrologica: Abramo Savosarda', *Medioevo* 26 (2001), 111–35; Hannu Töyrylä, *Abraham Bar Hiyya on Time, History, Exile and Redemption: An Analysis of* Megillat ha-Megalleh (Leiden, 2014), 303–429.

51 *M*, fol. 12ra–b. See also p. 287 below.

52 Selder, *Canones* (3.14), fols. 109r–110v.

53 Ibid., fol. 110v: 'Anno enim domini 571 coniunctio vera Saturni et Iovis significans legem Machometi pessimi, de qua legitur in Alkabicio et in ceteris libris iudicialibus, mutaverat se de triplicitate aerea in aquatica, scilicet ad Scorpionem, licet media venerit postea ad eandem triplicitatem, scilicet Cancrum, anno 590, sicud patuit supra'.

54 Ibid.: 'Similiter sic accidit et hoc anno, scilicet 1365° incompleto. Saturnus etenim et Iupiter vera eorum coniunctione mutabunt se in fine Octobris de triplicitate aerea, scilicet

The relevant chapter in the *Canones* appears independently in a second fifteenth-century manuscript from southern Germany, now at the Vatican, where it is ascribed to 'Seld(n)er, the greatest among the Germans' (*Hec Seldner almannorum maximus*).[55] It is perhaps not insignificant that this same codex contains several pages of excerpts from the *Tractatus*, the lengthiest of which reproduces the aforementioned excursus on fixed stars. In addition, there are passages referring to Albumasar's conjunctionist interpretation of the Flood as well as chronological material.[56] What is very striking is the fact that a sequence of brief notes drawn from the *Tractatus* appears right underneath the colophon mentioning *Selder almannorum maximus*. One may be forgiven for wondering if the scribe was aware of any connection between the source of these excerpts and the author whose name he had just extolled.

Even if the mentioned parallels between *Tractatus* and *Canones* are considered too insubstantial to support ascribing the former to Heinrich Selder, one will have to admit that both works were written by contemporaries with a shared southern German background. The author of the *Tractatus* mentions 1371 as the year in which he began writing it, noting in one instance that he witnessed the lunar eclipse seen on 24 October that year.[57] Presumably as a reaction to these explicit remarks, the colophon in *M* (fol. 36r) gives 1371 as the year of writing, but closer inspection reveals this to be imprecise. Some parts of the extant texts must in fact have been completed only after 1378, given the author's remarks about the times of conception and birth of his grand-cousin (literally, 'the mother of the boy was the daughter of my uncle'), which took place 'in my home' (*in villa mea*)'.[58] Dates after 1378, in so far as they show up in the text, are all mentioned in the future tense, which strongly suggests that

in Aquario, in aquaticam, scilicet Scorpionem'. Cf. MS *M*, fol. 12ra ('29ª die Octobris, super 7 gradus Scorpionis et 14 minuta').

55 MS Vatican City, Biblioteca Apostolica Vaticana, Pal. lat. 1354, fols. 94v–96v. The ascription to Selder appears on fol. 96v. See the detailed description of this codex in Ludwig Schuba, *Die Quadriviums-Handschriften der Codices Palatini Latini in der Vatikanischen Bibliothek* (Wiesbaden, 1992), 27–33. Attention to it was first drawn by Lynn Thorndike, 'Some Little Known Astronomical and Mathematical Manuscripts', *Osiris* 8 (1948), 41–72, at 43–44; Thorndike, 'More Dates for Late Medieval Astronomy from Some Vatican Manuscripts', in *Homenaje a Millás-Vallicrosa*, 2 vols. (Barcelona, 1954), 2:467–470, at 469–470; Thorndike, 'Notes upon Some Medieval Latin Astronomical, Astrological, and Mathematical Manuscripts at the Vatican: Part II', *Isis* 49 (1958), 34–49, at 45–47.

56 MS Vatican City, Biblioteca Apostolica Vaticana, Pal. lat. 1354, fols. 33r, 96v, 241va–243va.

57 *M*, fols. 31ra, 32vb.

58 *M*, fol. 28vb: 'Fuit autem hec conceptio et nativitats in villa mea et mater pueri erat filia patrui mei, unde hec omnia melius inquirere potui et probare'.

he finished his treatise not too long after this event.[59] He does not identify the town of his relatives, but from an earlier passage discussing a twin birth in 1372 it appears that he was staying in Salzburg at the time, which happens to be the place for which Heinrich Selder cast his lunar calendar for 1361–1436 as well as the place of origin of the scribe responsible for the earliest known copy of the *Canones*.[60] Since he marks his stay in Salzburg in the past tense (*morabar*), it seems clear that he was no longer domiciled there at the time of writing the *Tractatus*. In a passage discussing the locations of Babylon and Jerusalem, he places the holy city 2 hours and 40 minutes east of 'our province' (*provincia nostra*), identifying the latter as East Swabia (*orientalis Suevia*).[61] On several occasions, moreover, he cites his own astronomical calculations for the meridian of *civitas Augusta*, this being the East Swabian town of Augsburg, which he locates in 'our diocese'.[62] As it happens, these calculations are based on the Alfonsine Tables and involve an implicit addition of 64 minutes to the Toledan standard meridian used in these tables, which conforms to the 16° difference Heinrich Selder records for Augsburg and other German cities in his *Canones* (see p. 263 above).

Even more so than this shared view concerning Augsburg's meridian, the appearance of Swabia as the *Tractatus*-author's region of residence is very striking and offers us a strong hint in establishing his identity. As already mentioned in the introduction (p. 264 above), Swabia was also the place of origin of the *Hinricus Selder* who graduated at the University of Paris in 1378. While there are no direct references to academic life in the *Tractatus*, the author at one point mentions that the custom of singing the nones in the afternoon is observed at Notre Dame in Paris, which may hint at a stay in this town.[63] A visit to Rome is possibly implied in his remark that the city's northern latitude is 42°, 'as I have experienced' (*ut expertus sum*).[64] Similar to Selder in the

59 This holds true for the Jupiter-Saturn conjunctions of 1385, 1405, 1425, 1444 and 1464, which are all announced in the future tense ('coniungentur'). See *M*, fol. 12ra–b.

60 *M*, fol. 28va: 'Erat autem sol tempore nativitatis in 25° gradu Capricorni, ergo tunc ascendens fuit 26^{tus} Geminorum, eo quod nativitas illa erat Salczburge, cuius situs est aliquanto citra medium septimi climatis, ubi tunc morabar'. See nn. 4 and 9 above.

61 *M*, fol. 27ra.

62 *M*, fol. 32rb: 'Sed secundum tabulas Alphonsi erat illa coniunctio per 28 minuta hore ante meridiem predicte ferie quinte respectu meridiani civitatis Auguste diocesis nostre, que distat a meridiano Parysiensi versus orientem circa quinta partem unius hore'. See also ibid., fols. 30rb–va, 31va, 32va.

63 *M*, fol. 33va: 'Itaque patet quod none debent cantari post meridiem et hoc modo observantur Parysius apud nostram dominicam'.

64 *M*, fol. 6rb.

Canones, he also remarks on the latitude of Lübeck, giving it very accurately as 54° North.[65] Unlike Selder, he does not specifically mention Erfurt or its coordinates, although he does bring up that η Ursae Majoris (the easternmost star in the Big Dipper) passes through the zenith of those living in Thuringia, owing to its declination of +51;15°.[66] In spite of some open questions, I find the cumulative evidence just presented convincing enough to sustain the idea that the *Tractatus* is a previously unknown work by the astronomer Heinrich Selder. I shall operate on this assumption in the following discussion, although some readers may quibble with my ascription. In this case, they are invited to substitute 'anonymous Swabian astronomer' for all the references to 'Selder' in what is to follow.

4 Contexts: The Parisian Opposition to Astrology in the Fourteenth Century

A core strategic element in Heinrich Selder's attack on astrology was the way he framed the discipline as a form of divination, which made it particularly easy to mobilize Christian theology against it. To a loyal member of the fourteenth-century Latin Church, a critique, indeed an outright condemnation of astrology-as-divination, required no more than the following syllogism, which appears, in a slightly more elaborate form, in the middle of Selder's *Tractatus*:

> (major premise) no Christian is allowed to believe in or practice the art of divination
> (minor premise) astrology is a divinatory art;
> (conclusion) therefore, belief in and practice of astrology is illicit.[67]

65 *M*, fol. 29rb.

66 *M*, fol. 21vb. For an object to pass overhead, its declination must coincide (roughly speaking) with the observer's latitude. The latitude of Erfurt is 50;59°, which comes close to the coordinate suggested here.

67 *M*, fol. 12va–b: 'Conclusio sexta: nulli Christiano licet alicui arti divinatorie fidem adhibere nec eam exercere. Probatur: nulli rei divina lege prohibita licitum est alicui Christiano fidem adhibere nec ipsam exercere. Sed sic est de omni arte tali aut modo divinationis, ergo etc. … Septima conclusio est (et est quasi corrolaria ex predicta): iudiciis astrologicis nulli Christiano licet fidem adhibere nec ea facere. Probatur: nulli arti divinatorie licitum est Christiano fidem adhibere nec eam exercere (per conclusionem precedentem). Sed astrologia iudicialis est ars divinatoria, ut expresse scribit Augustinus in libro *De natura demonum*, ut infra ponetur, et Tulius libro secundo *De divinatione*, ergo etc'.

As Selder's own discussion shows, the list of authorities that could be adduced to prove these two premises was long and variegated, ranging from various passages in the Old and New Testament to Cicero's *De divinatione*.[68] Of particular gravitas were the opinions of St Augustine of Hippo, which were often appealed to on the pages of *causa* 26 of the *Decretum Gratiani*, a section of the canon law dealing exclusively with different forms of divination.[69] Drawing on a list of terms assembled by Varro and transmitted via Augustine, Isidore of Seville, and Rabanus Maurus, Gratian's law book distinguished twenty different, sometimes overlapping, categories of illicit diviners. Among these were the *astrologi*, *genethliaci*, *magi*, *mathematici*, and *horoscopi*, who all made predictions from the stars.[70] Another chapter of the *Decretum* cited a commanding passage in Augustine's *De doctrina Christiana*, which warned that practitioners of these arts ran the risk of entangling themselves with demons 'as if by a pact of faithless and deceitful friendship' (*quasi pacta infidelis et dolosae amicitiae*).[71] Demons, as Augustine taught in *De divinatione demonum* and other works, had the ability to manipulate and predict future events, which put them in a position to secretly aid diviners, astrologers included, and thus lead them and their clients to perdition.[72]

68 On the wider historical background, see Dieter Harmening, *Superstitio: Überlieferungs- und theoriegeschichtliche Untersuchungen zur kirchlich-theologischen Aberglaubensliteratur des Mittelalters* (Berlin, 1979), 178–216; Tim Hegedus, *Early Christianity and Ancient Astrology* (New York, NY, 2007); Michael D. Bailey, *Fearful Spirits, Reasoned Follies: The Boundaries of Superstition in Late Medieval Europe* (Ithaca, NY, 2013), 35–70; Erik Niblaeus, 'Arguing Divination by the Book: The Latin Fathers and Scriptural Categories of Foretelling', in S. Rapisarda and E. Niblaeus, eds., *Dialogues among Books in Medieval Western Magic and Divination* (Florence, 2014), 33–47.

69 *Decretum Gratiani*, causa 26, ed. Emil Friedberg, *Corpus Iuris Canonici: pars prior* (Leipzig, 1879; repr. Graz, 1959), cols. 1019–1046, on which see Patrick Hersperger, *Kirche, Magie, und 'Aberglaube': Superstitio in der Kanonistik des 12. und 13. Jahrhunderts* (Cologne, 2010), 198–203. Selder (*M*, fols. 13ra, 13vb–14ra, 16rb–va, 17ra–b, 17vb, 19rb) quotes *quaestiones* 2 (c. 5–6, 8–9), 3 & 4 (c. 1–2), 5 (c. 3, 14), and 7 (c. 16).

70 *Decretum Gratiani*, causa 26, q. 3 & 4, c. 1, ed. Friedberg, col. 1025. See Hersperger, *Kirche*, 171–175, 240–241.

71 Augustine, *De doctrina Christiana* (2.23), ed. Joseph Martin, CCSL 32 (Turnhout, 1962), 58, ll. 23–26, quoted in *Decretum Gratiani*, causa 26, q. 2, c. 6, §5, ed. Friedberg, col. 1022.

72 Augustine, *De divinatione daemonum*, ed. Joseph Zycha, CSEL 41 (Prague, 1900), 597–618; *De Genesi ad litteram* (2.17), ed. Joseph Zycha, CSEL 28 (Prague, 1894), 61–2; *De civitate Dei* (5.7, 8.16), ed. Bernhard Dombart and Alfons Kalb, CCSL 47 (Turnhout, 1955), 135, 233. See Thorndike, *A History*, 1:504–522; Hegedus, *Early Christianity*, 125–137; Hersperger, *Kirche*, 167–171.

Had the intellectual culture of the Middle Ages been wholly Augustinian, astrology should have never gotten a foothold, but the reality on the ground looked very different indeed. By the mid-fourteenth century, predictions of the future based on celestial configurations had not only received the qualified theoretical support of scholastic luminaries such as Albertus Magnus and Thomas Aquinas, who distinguished superstitious divination from astrology as an art continuous with natural philosophy (see p. 291 below), but the advice of practicing astrologers was regularly sought by those in the highest echelons of society, including the royal courts of Europe.[73] Selder himself at one point calls to mind the droves of astrologers who tried to find subsistence by following around princely courts, 'at which they are treated with a good deal of hate and contempt'.[74] If we can assume that Selder visited or studied in Paris before completing the *Tractatus*, he would have likely been aware of the situation at the court of Charles V (regent since 1356, king from 1364 to 1380), which was a place exceptionally hospitable to both astrologers and their books.[75] Yet, while the French king was certainly a long way

73 On the social-political impact of astrology in the later Middle Ages, see for example Hilary M. Carey, *Courting Disaster: Astrology and the English Court and University in the Later Middle Ages* (Houndmills, 1992); Carey, 'Church Time and Astrological Time in the Waning Middle Ages', in *The Use and Abuse of Time in Christian History*, ed. R. N. Swanson (Woodbridge, 2002), 117–132; Jean-Patrice Boudet, 'Les astrologues et le pouvoir sous le règne de Louis IX', in *Observer, lire, écrire le ciel au Moyen Âge*, ed. Bernard Ribémont (Paris, 1991), 7–61; Boudet, *Entre science et nigromance: astrologie, divination et magie dans l'Occident médiéval (XII^e–XV^e siècle)* (Paris, 2006), 283–349; Boudet, 'Les horoscopes princiers dans l'occident médiéval (XII^e–XV^e siècle)', *Micrologus* 16 (2008), 373–392; Julien Véronèse, 'Contra la divination et la magie à la cour: trois traités adressés à des grands aux XIVe et XVe siècles', *Micrologus* 16 (2008), 405–431; Gerd Mentgen, *Astrologie und Öffentlichkeit im Mittelalter* (Stuttgart, 2005); Stefano Rapisarda, 'Il principe e l'astrolabio: la divinazione nell'educazione dei principi medievali', in *'L'éducation au gouvernement et à la vie': la tradition des 'règles de vie' de l'antiquité au Moyen-Âge*, ed. Paolo Odorico (Paris, 2009), 153–180.

74 *M*, fol. 20ra: 'Nam si astrologia iudicialis foret tante potencie, quis astrologorum sese suosque non faceret divites, cum tamen propter peccunias non dedignentur dominorum sequi curias, in quibus satis odibiles sunt habiti et despecti?'

75 Jeannine Quillet, *Charles V, le roi lettré: essai sur la pensée politique d'un règne* (Paris, 1984), 96–113; Edgar Laird, 'Astrology in the Court of Charles V of France, as Reflected in Oxford, St John's College, MS 164', *Manuscripta* 34 (1990), 167–176; Laird, 'Christine de Pizan and Controversy Concerning Star-Study in the Court of Charles V', *Culture and Cosmos* 1 (1997), 35–48; *Pèlerin de Prusse on the Astrolabe*, eds. Edgar Laird and Robert Fischer (Binghamton, NY, 1995), 1–8; Joan Cadden, 'Charles V, Nicole Oresme, and Christine de Pizan: Unities and Uses of Knowledge in Fourteenth-Century France', in *Texts and Contexts*

from holding astrologers in contempt, it may not have escaped Selder's attention that one of his closest advisors, the Parisian arts master and doctor of theology Nicole Oresme (ca. 1320–1382), vehemently opposed astrological divination on moral, political, and philosophical grounds.[76] The moral and political angle dominates in two of Oresme's early works, the brief Latin *Tractatus contra iudiciarios astronomos* and the more detailed French *Livre de divinacions*, which were expressly written to warn princes and magnates against soliciting astrological advice.[77] Other works from his pen advanced less traditional and more detailed philosophical criticisms based on Aristotelian ideas of causation and a mathematical argument about the incommensurability of celestial motions. The culmination point of Oresme's intellectual campaign against the astrologers was reached with the intricately structured *Quaestio contra divinatores horoscopios* (1370?), which may well contain the most thorough attempt at refutation the art had ever been subjected to up to that point.[78] To be sure, none of this sufficed to stem the tide of astrology,

in Ancient and Medieval Science, eds. Edith Sylla and Michael McVaugh (Leiden, 1997), 208–244; Jean-Patrice Boudet, 'Charles V, Gervais Chrétien et les manuscrits scientifiques du collège de Maître Gervais', *Médiévales* 52 (2007), 15–38; *Nicole Oresme: Contro la divinazione; Consigli antiastrologici al re di Francia* (*1356*), ed. Stefano Rapisarda (Rome, 2009), 43–51; Steve Vanden Broecke, 'Astrology and Politics', in *A Companion to Astrology in the Renaissance*, ed. Brendan Dooley (Leiden, 2014), 193–232, at 207–214.

76 Thorndike, *A History*, 3:398–423; Duhem, *Le système*, 8:462–483; Stefao Caroti, 'La critica contro l'astrologia di Nicole Oresme e la sua influenza nel Medioevo e nel Rinascimento', *Atti della Accademia Nazionale dei Lincei, Classe di Scienze morali, storiche e filologiche*, 8th ser., 23 (1979), 545–685; Edward Grant, 'Nicole Oresme on Certitude in Science and Pseudo-Science', in *Nicolas Oresme: tradition et innovation chez un intellectuel du XIVe siècle*, eds. P. Souffrin and A. Ph. Segonds (Paris, 1988), 31–43; Max Lejbowicz, 'Chronologie des écrits anti-astrologiques de Nicole Oresme: étude sur un cas de scepticisme dans la deuxième moitié du XIVe s.', in *Autour de Nicole Oresme*, ed. Jeannine Quillet (Paris, 1990), 119–176; Jeannine Quillet, *De Charles V à Christine de Pizan* (Paris, 2004), 91–99; Bailey, *Fearful Spirits*, 94–105.

77 The *Tractatus* was first edited in Hubert Pruckner, *Studien zu den astrologischen Schriften des Heinrich von Langenstein* (Leipzig, 1933), 227–245, and again in G. W. Coopland, *Nicole Oresme and the Astrologers: A Study of His* Livre de Divinacions (Cambridge, MA, 1952), 123–141. For the *Livre de divinacions*, see Rapisarda, *Nicole Oresme*, with introduction, Italian translation, and extensive notes, and the earlier edition (with English translation) in Coopland, *Nicole Oresme*, 50–121. See also Stefano Rapisarda, 'From the *Tractatus contra astronomos judiciarios* (1349) to the *Livre de divinacions* (1356): Nicole Oresme Lost in Translation', in *El saber i les llengües vernacles a l'època de Llull i Eximenis*, eds. Anna Alberini et al. (Barcelona, 2012), 231–255.

78 The whole text was edited by Stefano Caroti, 'Nicole Oresme: *Quaestio Contra Divinatores Horoscopios*', *Archives d'histoire doctrinale et littéraire du Moyen Âge* 43 (1976),

whether at the court of Charles V or elsewhere, but it should be noted in passing that Oresme's views were known to Giovanni Pico della Mirandola, whose posthumously published *Disputationes adversus astrologiam divinatricem* (1496) became the epicentre for many sixteenth-century discussions and controversies surrounding the topic.[79]

Another Parisian Arts master who may help us put Selder's attack on astrology in context — and who was likewise namechecked in Pico's *Disputationes*[80] — was Heinrich of Langenstein (or Henry of Hesse, 1325–1397), who had been a teacher at the university since 1363.[81] Of his two most overtly anti-astrological texts, one — a *Questio* on the comet of 1368 — was written before Selder penned his *Tractatus*, whereas the other, a programmatically titled *Tractatus contra astrologos coniunctionistas de eventibus futurorum*, postdates

201–310. More critical remarks on astrology can be found among the responses to the first 44 questions of Oresme's *Tabula problematum*. The *Tabula* was edited in Bert Hansen, ed. *Nicole Oresme and the Marvels of Nature: A Study of His* De causis mirabilium*, with Critical Edition, Translation and Commentary* (Toronto, 1985), 366–393. For the responses, I have used MS Paris, Bibliothèque nationale de France, lat. 15126, fols. 95r–146v. See also Stefano Caroti, 'Nicole Oresme's Polemic against Astrology in His *Quodlibeta*', in *Astrology, Science and Society: Historical Essays*, ed. Patrick Curry (Woodbridge, 1987), 75–95. For his mathematical arguments, see n. 102 below.

79 Giovanni Pico della Mirandola, *Disputationes adversus astrologiam divinatricem*, ed. Eugenio Garin, 2 vols. (Florence, 1946–1952; repr. Turin, 2004), 1:58, 2:14, 420, 530; Caroti, 'La critica', 659–666. On Pico's *Disputationes* and their influence, see now the essays assembled in *Nello specchio del cielo: Giovanni Pico della Mirandola e le* Disputationes *contro l'astrologia divinatoria*, ed. Marco Bertozzi (Florence, 2008), as well as Thorndike, *A History*, 4:529–543; Don Cameron Allen, *The Star-Crossed Renaissance: The Quarrel about Astrology and Its Influence in England* (Durham, NC, 1941); Desmond J. Fitzgerald, 'Some Notes on Pico's Disputes with Astrology', in *Arts libéraux et philosophie au Moyen Âge* (Montreal, 1969), 1049–1055; Steve Vanden Broecke, *The Limits of Influence: Pico, Louvain, and the Crisis of Renaissance Astrology* (Leiden, 2003); H. Darrel Rutkin, 'Astrology, Natural Philosophy and the History of Science c. 1250–1700: Studies Toward an Interpretation of Giovanni Pico della Mirandola's *Disputationes adversus astrologiam divinatricem*' (PhD Diss., Indiana University, 2002); Robert Westman, *The Copernican Question: Prognostication, Skepticism, and Celestial Order* (Berkeley, CA, 2011).

80 Pico della Mirandola, *Disputationes*, 1:56, 2:530.

81 See Otto Hartwig, *Henricus de Langenstein, dictus de Hassia: Zwei Untersuchungen über das Leben und die Schriften Heinrichs von Langenstein* (Marburg, 1857); Thorndike, *A History*, 3:472–510, 743–759; Duhem, *Le système*, 8:483–489; Justin Lang, *Die Christologie bei Heinrich von Langenstein: Eine dogmengeschichtliche Untersuchung* (Freiburg, 1966), 31–8; Caroti, 'La critica', 613–629; Nicholas H. Steneck, *Science and Creation in the Middle Ages: Henry of Langenstein* (*d. 1397*) *on Genesis* (Notre Dame, IN, 1978); Bailey, *Fearful Spirits*, 105–111.

at least part of it.[82] In it, Langenstein reacts to predictions of imminent disaster some had made for the present year 1373, using them as an occasion to attack the very foundations of judicial astrology, in particular the branch sometimes known as 'conjunctionism'. To take issue with the latter was to oppose one of medieval star-science's most widely read authorities, Albumasar, whose *Liber de magnis coniunctionibus* purported to teach how the cyclical patterns of the planets and their conjunctions governed the course of history, producing floods, famines, plagues, wars, political upheavals, and even the rise of new religions.[83]

A good measure of the influence conjunctionistic astrology exerted in Langenstein's and Selder's time is the way the medical faculty of Paris, when the French King Philip VI demanded a report on the causes of the Black Death, took recourse primarily to a conjunction of the three superior planets in March 1345, which was thought to have stirred up and ignited pestilential vapours.[84] The conjunctionists attacked in Langenstein's treatise asserted that the harmful long-term effects of this one conjunction were still active in 1373, a notion the Parisian scholar found highly implausible.[85] One high-profile *conjunctionista* who claimed to have predicted the Black Death in advance was

82 Both texts are edited in Pruckner, *Studien*, 89–206. I shall henceforth cite the latter as 'Langenstein, *Contra astrol.*, ed. Pruckner'. Another relevant source is the commentary on Genesis 1:14–17 in Langenstein's *Lecturae super Genesim* (ca. 1386–1393), which is summarized in Steneck, *Science*, 100–104. For the passages relevant to astrology, I have consulted MS Munich, Bayerische Staatsbibliothek, 18145, fols. 36vb–38va, 41ra–48va.

83 On the influence of this doctrine on the Latin Middle Ages, see, for example, Friedrich von Bezold, 'Astrologische Geschichtsconstruction im Mittelalter', *Deutsche Zeitschrift für Geschichtswissenschaft* 8 (1892), 29–72; John North, 'Astrology and the Fortunes of Churches', *Centaurus* 24 (1980), 181–211, repr. as ch. 8 in idem, *Stars, Minds and Fate: Essays in Ancient and Medieval Cosmology* (London, 1989); Jean Patrice Boudet, 'Simon de Phares et les rapports entre astrologie et prophétie à la fin du Moyen Âge', *Mélanges de l'École française de Rome: Moyen Âge* 102 (1990), 617–648; Laura Ackerman Smoller, *History, Prophecy, and the Stars: The Christian Astrology of Pierre d'Ailly 1350–1420* (Princeton, NJ, 1994), 61–84; Hilary M. Carey, 'Astrology and Antichrist in the Later Middle Ages', in *Time and Eternity: The Medieval Discourse*, eds. Gerhard Jaritz and Gerson Moreno-Riaño (Turnhout, 2003), 515–535, and the essays assembled in *'Astrologi hallucinati': Stars and the End of the World in Luther's Time*, ed. Paola Zambelli (Berlin, 1986).

84 Rosemary Horrox, ed. and trans., *The Black Death* (Manchester, 1994), 158–163. See also William C. McDonald, 'Death in the Stars: Heinrich von Mügeln on the Black Plague', *Mediaevalia* 5 (1979), 89–112; Chris Schabel and Fritz S. Pedersen, 'Miraculous, Natural, or Jewish Conspiracy? Pierre Ceffons' Question on the Black Death, with Astrological Predictions by Gersonides and Jean de Murs/Firmin de Beauval', *Recherches de Théologie et Philosophie médiévales* 81 (2014), 137–179.

85 Langenstein, *Contra astrol.* (1.8–9), ed. Pruckner, 149–155; Thorndike, *A History*, 3:498–499.

John of Ashenden, whose gargantuan *Summa iudicialis de accidentibus mundi*, written in the years 1347–1348, became a frequently used compendium on the whole field of mundane and meteorological astrology.[86] The first chapters of this work were taken up by musings on world chronology, in particular the age of the world, which Ashenden felt could not be established without the aid of astrological sources such as Albumasar.[87] Heinrich Selder's *Tractatus* can in a sense be viewed as an antithesis to Ashenden's *Summa*, even though it is not clear that the latter was among Selder's targets. Ashenden wrote about chronology in the context of astrology, suggesting that the former could profit from the latter. Selder, by contrast, tackled astrology within a treatise on chronology and, in doing so, made the point that astrological doctrine — as opposed to astronomical data — had no place at all in the chronologer's tool-kit.

5 Conjunctionism and the Flood: Selder vs. Albumasar

The primary example for this difference in outlook between Ashenden and Selder is the date of the biblical Flood, which astrologers and astronomers often assumed to have started on 17 February in the year 3102 BCE. Unbeknown to medieval Christian authors, this convention had its origins in Hindu astrology, where it marked an assumed mean conjunction of all planets at 0° Aries and the start of a 432,000-year period known as the *kaliyuga*. It was only in the course of a complex process of transmission from East to West, mediated by Sassanid Persian sources, that this epoch ended up being conflated with a flood event.[88] Having entered Latin Europe in the twelfth century, the *kaliyuga*-flood date gained prominence as a reference epoch recorded in astronomical tables, including the Toledan and Alfonsine Tables.[89] It was supported by no less an authority than Albumasar, who, in a famous passage cited by Selder, alleged

86 Thorndike, *A History*, 3:325–346, 717–721; Keith Voltaire Snedegar, 'John Ashenden and the *Scientia Astrorum Mertonensis*' (PhD Diss., University of Oxford, 1988); Carey, *Courting Disaster*, 73–91, 189–191.

87 See Bk. I.1.1–3 of John Ashenden [Iohannes Eschuid], *Summa astrologiae iudicialis de accidentibus mundi* (Venice, 1489), fols. 2vb–12ra. For more information, see C. P. E. Nothaft, 'Walter Odington's *De etate mundi* and the Pursuit of a Scientific Chronology in Medieval England', *Journal of the History of Ideas* 77 (April 2016), 183–201.

88 The origins of the date are discussed in David Pingree, 'Astronomy and Astrology in India and Iran', *Isis* 54 (1963), 229–246, at 239–246; Pingree, *The Thousands of Abū Ma'shar* (London, 1968), 27–45; B. L. van der Waerden, 'The Conjunction of 3102 B.C.', *Centaurus* 24 (1980), 117–131.

89 See Fritz S. Pedersen, *The Toledan Tables*, 4 vols. (Copenhagen, 2002), 3:899–900; Poulle, ed., *Les Tables Alphonsines*, 108; Chabás and Goldstein, *The Alfonsine Tables*, 250.

that the occurrence of the Flood in 3102 BCE had been heralded 279 years earlier by a great conjunction of Saturn and Jupiter, while another such conjunction, 3671 years after the Flood (in 571 CE) signified the rise of Islam.[90] In John Ashenden's eyes, this flood date deserved to be treated as one of the most reliable pivots in world history,[91] but Selder strongly disagreed, leading him to write the lengthy anti-astrological excursus we find in his work.

With all this said, Selder's protest against Albumasar's 'great conjunctions' was directed not so much against the flood date associated with this theory — a date which differed by less than three decades from one he himself defended (May 3073 BCE) — but, rather, against the implicit claim that the events described in books 7 and 8 of Genesis had been the result of natural (in this case: astrological) causes. In Selder's opinion, such an interpretation entailed a host of philosophical absurdities. For one thing, natural processes were known to be inherently directed toward the preservation of living beings, from which it followed that no natural effect could be so destructive as to extinguish all life on earth (as the Flood would have done, had it not been for God's intervention). Furthermore, natural effects were understood to bring about their effects in a gradual way, whereas the Flood was depicted in the Bible as a sudden, rapid, and universal event. More than that, if the Flood had been triggered by a celestial cause, one should have seen the occurrence of similar events over the course of history, given the cyclical recurrence of conjunctions, yet the Flood remained a singular event.[92] Another argument, one which Pico della Mirandola was to restate in the 1490s, questioned the wisdom of linking the Flood to a cause that preceded it by 279 years without leaving any traces prior to the main event.[93] Selder could find no intelligible reason why this particular conjunction should have had such destructive powers, while later ones, which happened much closer to the signified event, should have remained without influence. Why, he asked, did astrologers not instead nominate the Jupiter-Saturn conjunction in Leo that happened only 41 years before Albumasar's flood date? His opponents could be expected to retort that Leo was a 'fiery' sign with a 'hot' and 'dry' disposition — hardly the stuff from which universal floods were made — but Selder dismissed such objections with a few strokes of the quill: zodiacal signs, he argued, exerted no influence beyond that pertaining

90 Abū Maʿshar, *De magnis coniunctionibus* 1.1.26, ed. Keiji Yamamoto and Charles Burnett, 2 vols. (Leiden, 2000), 2:15. Lines 204–209 are cited in *M*, fol. 10ra.

91 Ashenden, *Summa astrologiae* (1.1.2), fol. 8vb: 'Sed firmiter credo quod tempus quod ponit Alfonsius a diluvio usque ad Christum fuit verum et precisum, ut multi dicunt'.

92 These are some of the points made in 'conclusion 5' in *M*, fol. 12rb–va.

93 Pico della Mirandola, *Disputationes* (5.11), ed. Garin, 1:584–590.

to the stars placed in them. If Leo felt hotter than other signs, this was due entirely to the sun's traversing it during the summer months (July/August) and not to any occult quality residing in the arbitrarily defined tropical signs of the ninth sphere.[94]

Defenders of Albumasar were nevertheless likely to point out that the conjunction of 3102–279 = 3381 BCE was the first in a series of twelve conjunctions located in the 'watery' triplicity of Scorpio, Cancer, and Pisces. Thus, the water-bearing effects of these conjunctions could accumulate over a period of approximately 12 × 20 = 240 years, issuing in the Great Flood. As already mentioned (p. 276), Selder swiftly parried this move by listing the true dates and longitudes of 18 consecutive Jupiter-Saturn conjunctions between 1126 and 1464, which failed to conform to the neat pattern presupposed by Albumasar's theory. The conjunction of 1126, for instance, took place in Libra and thus appeared to head a chain of conjunctions in the 'airy' triplicity of Gemini, Libra, and Aquarius, but this series was already interrupted in 1146 and again 1206 by conjunctions in Taurus, an 'earthly' sign. From 1306 on, the airy signs started to alternate with those of the watery triplicity before coming to a temporary end in 1405.[95] This point about the incongruent triplicity patterns was not the only instance where Albumasar's theory could be shown to rely on insufficiently accurate abstractions from astronomical reality. A kindred complaint had already been voiced in the twelfth century by the Jewish astrologer Abraham Ibn Ezra, who began his *Liber de mundo vel seculo* (translated in the thirteenth century by Henri Bate of Malines) by rejecting Albumasar's predictions due to their being based on mean, rather than true, conjunctions.[96] As Selder confirmed near the beginning of his discussion, a mean conjunction was a mathematical fiction rather than an actual celestial event and thus could have no effect on the sub-lunar world — political, meteorological or otherwise.[97]

Even if the use of mean conjunctions was granted, there was still much room for doubt about the accuracy of Albumasar's astronomical parameters, from which it seemed to follow that the conjunction of the Flood and the conjunction of 571 CE heralding Islam had occurred in identical zodiacal signs, standing only 1;51,56,29,54° apart. Selder put this value to the test by independently

94 *M*, fol. 11vb.

95 *M*, fol. 12ra–b.

96 See *Abrahe Avenaris Iudei Astrologi Peritissimi in Re Iudiciali Opera ab Excellentissimo Philosopho Petro de Albano post Accuratam Castigationem in Latinum Traducta* (Venice, 1507), fol. 77vb, cited in *M*, fol. 10vb.

97 *M*, fol. 10vb. Selder later (ibid., 22vb) raises the same complaint about Galen's 'medicinal month', which is derived from the moon's mean rather than true period.

calculating the dates and longitudes of the Islam-conjunction with the help of the Alfonsine Tables. According to the latter, the true conjunction (8 September AD 571) happened in Scorpio, while the mean conjunction (17 January AD 571) could be assigned to Libra. Neither of these signs had been host to the mean conjunction supposedly responsible for the Flood, which instead took place on 14 January 3382 BCE in the 7th degree of Cancer. The disagreement remained even if one swapped the Alfonsine Tables for the tables included in Ptolemy's *Almagest*, which according to Selder shifted the location to somewhere close to 20° Cancer, or the eleventh-century Tables of Toledo, which instead placed the same conjunction in the vicinity of 10° Virgo.[98] Deviations in the old Toledan Tables could always be blamed on their deficient approach to the precession of the eighth sphere, which, as Selder was well aware, depended on the theory of 'access and recess' ascribed to Thābit ibn Qurra. In a similar vein, it was undeniable that Ptolemy's tables had fallen into severe error since he fixed their parameters around 140 CE, to the extent that their predictions were now off by 10° or more.[99] The Alfonsine Tables, which had only been produced in the previous century, were clearly more reliable when it came to calculations for the present, but Selder displayed no confidence that they were going to maintain their utility in the long run. On the contrary, he insisted that the tables of King Alfonso already often failed to accurately track Mars, deviating from its observable position by 2°, while their solar longitudes were found wanting by 0;25°. What sounded like a relatively minor discrepancy was in fact bad news for practicing astrologers, given that even a seemingly negligible error of 0;2,30° in the sun's ecliptical longitude was equivalent to about one hour in time — enough to continuously miscalculate the ascendant sign when analysing a parameter like the sun's entry into Aries.[100]

That astrological judgments were rendered useless by a lack of adequate tools was not an idea exclusive to Selder, but one that had been commonly employed since antiquity to dismiss the information found in horoscopes.[101] A potentially devastating update on this old line of reasoning was delivered in the fourteenth century by Nicole Oresme, who used the incommensurability of celestial motions to argue that celestial effects were unpredictable in

98 *M*, fol. 10va–b. According to Raymond Mercier's program *Deviations* (http://www.raymondm.co.uk), the *Almagest* tables place the mean conjunction of 3382 BCE on 25/26 March at ca. 17° Cancer. The Toledan Tables show a conjunction on 26 March at ca. 7° Virgo.

99 *M*, fol. 11ra: 'Nam tabule Ptholomei, quas ipse ex suis observationibus et antiquorum, scilicet circa annos Domini 140, composuit, inveniuntur hodie deficere circa 10 gradus'.

100 *M*, fol. 11ra–va.

101 Hegedus, *Early Christianity*, 29–41.

principle, rather than just in practice.[102] Heinrich of Langenstein accepted Oresme's argument,[103] but he also pointed to the 'notable error in our tables,' which in the case of conjunctions of the exterior planets (Mars, Saturn and Jupiter) could reach up to four degrees.[104] In an enormous Genesis commentary written during his later years in Vienna, he once more highlighted the differences between tabulated and observed longitudes, explaining that even tiny deviations in parameters were bound to accumulate to large discrepancies over time. It was hence 'futile and stupid' for astrologers to 'exhaust themselves in laboriously calculating the places of the planets down to the minute, second, third, and fourth, when once the whole calculation has been made, the calculated place often is wrong by one degree or more, as has been experienced for Mars'.[105]

According to Langenstein, astronomers in his own time were at a loss to determine whether such discrepancies in calculation were due to incorrect mean motions or equations, not least because few, if any, of them were sufficiently versed in the *Almagest* or the twelfth-century astronomical work of Geber (Jābir ibn Aflaḥ).[106] This comment would not have been a fair one to make about Heinrich Selder, who found fault with *both* the mean motions *and* the equations of the Alfonsine Tables (p. 265 above). Not only was he intimately

102 See Duhem, *Le système*, 8:443–454; Hansen, *Nicole Oresme*, 17–21; Grant, 'Nicole Oresme on Certitude', 35–38; Caroti, 'La critica', 584–587; Godefroid de Callataÿ, *Annus Platonicus: A Study of World Cycles in Greek, Latin and Arabic Sources* (Louvain-la-Neuve, 1996), 189–204, and the editions of the relevant texts in *Nicole Oresme:* De proportionibus proportionum *and* Ad pauca respicientes, ed. Edward Grant (Madison, WI, 1966); *Nicole Oresme and the Kinematics of Circular Motion: Tractatus de commensurabilitate vel incommensurabilitate motuum celi*, ed. Edward Grant (Madison, WI, 1971).

103 Langenstein, *Contra astrol.* (1.13), ed. Pruckner, 159.

104 Ibid. (2.5), 181: 'Et igitur non mirum, quod iam in aliquibus veris locis planetarum sit error in tribus vel in quatuor gradibus, quod apparet ad experienciam, si cum armillis coniunctio Martis et Saturni vel Jovis comprehenderetur; ymmo sine instrumento apparet, quod videtur pretendere errorem notabilem in nostris tabulis'.

105 Heinrich of Langenstein, *Lecturae super Genesim*, MS Munich, Bayerische Staatsbibliothek, Clm 18145, fol. 48rb: 'Frustra ergo et stulte fatigant se iam moderni astrologi laboriose calculando loca planetarum ad minutum, secundum, tertium et quartum, cum tota calculatione facta locus calculatus fallat sepe in uno gradu vel pluribus, ut expertum est in Marte'. Langenstein here also mentions the example of Ptolemy's tables, which were highly valuable (*preciosissime*) for his time, but had fallen into complete error by the time King Alfonso commissioned new ones.

106 Langenstein, *Contra astrol.* (2.5), 181: '[Q]ui error an sit ex parte mediorum motuum sive ex parte equationum, percipere nesciunt, quia pauci vel nulli iam reperiuntur experti in almagesto vel gebero'.

familiar with various sets of tables (p. 273 above), but his reading of Ptolemy's *Almagest* had given him a clear vision of how they had been constructed, as seen from his remarks on the foundational role the sun played in determining the longitude of the moon, which could be used to locate the fixed stars, which in turn served as reference points for the five planets. If there were flaws in one's solar parameters, as appeared to be the case with the Alfonsine Tables, a knock-on effect on all other results was hence more than likely.[107] It is this profound understanding of technical astronomical matters that sets Heinrich Selder apart most clearly from both Langenstein and his predecessor Nicole Oresme, who critiqued astrology primarily from the elevated vantage point of Aristotelian natural philosophy. Selder, by contrast, launched his attack as a practicing astronomer who felt especially qualified to assess the mathematical-astronomical dimension of the claims astrologers — such as Albumasar — were wont to make. A telling sign of this expertise is Heinrich of Langenstein's tacit recouse to numerical data contained in Selder's *Canones* when contesting the doctrine of great conjunctions in his *Tractatus contra astrologos*.[108]

6 Celestial Influence and the Incoherence of Astrology

Having attacked the legitimacy of astrology in his response to Albumasar's interpretation of the great Flood, Selder proceeded to cite seven possible objections or counterarguments against his position, which together offer a good idea of how fourteenth-century astrologers may have tried to safeguard their discipline against the condemnations found in patristic literature.[109] The first of these objections comes in two parts. It argues that belief in or practice of astrology could be reasonably opposed on only these two grounds: (a) the predictions made by this art are false or (b) they are illegitimate for involving the invocation of evil spirits. Yet, the success of these predictions is experienced on a daily basis, showing (a) to be incorrect. Likewise, astrological literature

107 *M*, fol. 11rb: '[C]um loca eorum sint inquisita post et super locum solis et lune et stellarum fixarum prius inquisitum, ut patet per processum Ptholomei per totum librum Almagesti. Nam prius inquisitus est locus solis, deinde ex loco solis locus lune, tertio ex loco lune locus stellarum fixarum, scilicet que sunt in firmamento, quarto ex hiis loca aliorum planetarum. Et si in aliquo precedentium fit error et in sequentibus'.

108 See Langenstein, *Contra astrol.* (1.4, 6), ed. Pruckner, *Studien*, 144, ll. 2–13 and 145–146, which passages are partly paraphrased and partly taken verbatim from Selder, *Canones* (3.14), fols. 109v–110v.

109 To this one may compare the 15 arguments for the validity of astrology presented at the start of Oresme, *Quaestio*, ed. Caroti, 216–219. Cf., Caroti, 'La critica', 589–594.

shows no traces of invocations, with the notable exception of texts on talismanic magic. Since it is very implausible that demons, who are notorious for their egotistical and spiteful nature, would assist astrologers by their own free will (i.e., without being compelled by incantations), (b) must be false as well.[110] The remaining six objections Selder decided to face can be distilled into the following bullet points:[111]

- Astrology is a part of natural philosophy, because it rests on the recognized natures and qualities of the signs, planets, stars, conjunctions etc. Yet, natural philosophy is a licit pursuit and not condemned by anyone.
- Astrology is the fruit of mathematical astronomy, which the Church does not intend to impede in any way. Yet, to destroy the fruit would leave the flower (i.e., astronomy) sterile, since no one would engage in such a difficult discipline if it were not for its potential use in casting judgments.
- Astrology is a part of the seven liberal arts, which the Church holds in high regard.
- There is nothing illicit in predicting an effect from a known cause. Yet, the heavens rule as a cause over processes in the sub-lunar sphere, as is recognized in natural philosophy and supported by the authority of Aristotle.
- Physicians, farmers, navigators, and travellers are all allowed to determine the right time for their activities from observing the heavens, which speaks for the legitimacy of astrological elections. If the latter are acceptable, so must be predictions pertaining to human nativities.
- Some passages in Scripture, notably John 11:9 ('Are there not twelve hours in the day?') and Genesis 1:14 (' … let them be for signs, and for seasons, and for days, and year') seem to speak in support of judgments based on the configurations of the heavens.

Selder did not spend an equal amount of time on each of these arguments. Indeed some, like the slightly desperate sounding appeals to the Bible, were dispensed with rather quickly, e.g., by proposing a non-astrological reading of John 11:9.[112] Next to the bipartite opening argument, his attention was grabbed

110 *M*, fol. 14ra–va.

111 *M*, fols. 14va–15rb.

112 *M*, fol. 24va–vb. Selder here uses Augustine, *In Iohannis Evangelium* (49.8), ed. Radbod Willems, CCSL 36 (Turnhout, 1954), 424. His argument is implicitly directed against Guido Bonatti, *Liber astronomiae* 1.13 (Venice, 1506), sig. A5v, who used John 11:19 to claim that Jesus knew that human intentions changed in accordance with the planetary influence prevalent at different hours.

in particular by those points which suggested that astrology was continuous with established natural philosophy and hence should not be lumped together with other divinatory practices. Supporters of this idea, which included intellectual heavyweights such as Albertus Magnus and Thomas Aquinas, were wont to appeal to Aristotle, whose writings contained several statements that appeared to lend a foundation to theories of celestial influence.[113] A seemingly clear-cut case was the text known as *De secretis secretorum*, in which Aristotle advises Alexander the Great not to take any action without first consulting an astrologer. Like Nicole Oresme before him, Selder recognized the pseudepigrahic nature of this work, whose content he found to be completely out of step with the philosopher's known attitudes and beliefs.[114] He even slightly expanded on this critical sifting of the Aristotelian corpus by pointing out that another work — known to modern scholars as the pseudo-Aristotelian (or pseudo-Ptolemaic) *Iudicia* — could in no way be attributed to the Stagirite.[115] When it came to the authentic passages in the Aristotelian corpus, Selder's general strategy was to allege, plausibly enough, that the philosopher's statements pertained to no more than some mundane and general effects, such as the obvious role the sun's course along the ecliptic played in the change of seasons and the cycle of vegetation.[116] Even there, it was possible to criticize

113 On the general background, see Thomas Litt, *Les corps célestes dans l'univers de Saint Thomas d'Aquin* (Louvain, 1963), 110–241; John D. North, 'Celestial Influence — The Major Premiss of Astrology', in *'Astrologi hallucinati'*, ed. Zambelli, 45–100; North, 'Medieval Concepts of Celestial Influence: A Survey', and Richard Lemay, 'The True Place of Astrology in Medieval Science and Philosophy: Towards a Definition', both in *Astrology, Science and Society*, ed. Curry, 5–17, 57–73; H. Darrel Rutkin, 'Astrologia e divinazione in Tommaso d'Aquino', in *Il linguaggio dei cieli: astri e simboli nel Rinascimento*, eds. Germana Ernst and Guido Giglioni (Frecce, 2012), 23–37; Rutkin, 'Astrology and Magic', in *A Companion to Albert the Great: Theology, Philosophy, and the Sciences*, ed. Irven M. Resnick (Leiden, 2013), 451–505.

114 ps.-Aristotle, *Secretum secretorum* (1.22), ed. Robert Steele, Opera hactenus inedita Rogeri Baconi 5 (Oxford, 1920), 60, ll. 21–23: 'O rex clementissime, si fieri potest, non surgas nec sedeas nec comedas nec bibas et nichil penitus facias sine consilio viri periti in arte astrorum'. Cf. Nicole Oresme, *Contra judiciarios astronomos* (c. 7), ed. Coopland, 140; Oresme, *Livre de divinations* (c. 14), ed. Rapisarda, 164.

115 *M*, fol. 19vb. Selder identifies the text by its incipit 'Signorum alia sunt mausculini generis alia femini'. See Charles Burnett, 'Aristotle as an Authority on Judicial Astrology', in *Florilegium mediaevale*, eds. José Meirinhos and Olga Weijers (Louvain-la-Neuve, 2009), 39–62; David Juste, 'Les textes astrologiques latins attribués à Aristote', *Micrologus*, 21 (2013), 145–164, at 150–153.

116 *M*, fols. 14vb, 18vb–19ra, 19va–b. Among the Aristotelian passages discussed by Selder are *Meteorologica* 1.2 (339a22–23); *Physica* 2.2 (194b13), and *De generatione et corruptione* 2.10 (336a32–33).

Aristotle on specific points, as when he associated the sun's diurnal motion with stability and its oblique annual motion with generation and corruption (in *De generatione et corruptione* 2.10). Against this claim, Selder empasized that the two motions had no effect apart from transmitting the heat of the sun. He wrote that if God took away the oblique motion and decided to have all the lower spheres revolve around the poles of the diurnal motion, 'generations and corruptions in these lower [spheres] would come about just as well as before', albeit in slightly different ways.[117]

As one would expect, questions about the physical foundations of astrology also occupied a prominent place in the works Nicole Oresme and Heinrich of Langenstein, both of them leading minds in the philosophical debate of the second half of the fourteenth century.[118] While Langenstein conceived of celestial influence as something based on the four primary qualities (hot, cold, wet, dry),[119] Oresme's general strategy was to limit the power exerted by the heavens to light and motion and the heat thereby generated.[120] The resulting causal influences were remote rather than efficient, and universal rather than particular or localized, which left enough leeway for the idea that the heavens produced *some* change on earth, but was too little to sustain a system of astrological prognostication. If Oresme was right, it was no longer possible to assert that planets could produce effects just by virtue of their position or angle of separation (their aspects), nor could their being in the ascendant make a difference to their influence.[121] At the same time, however, he appears to have accepted that one might infer at least some large-scale outcomes — natural, but also political-historical — from the disposition of the heavens. It is true that most of his concessions to this effect are found in the *Livre de divinacions*, where they appear to serve mainly a rhetorical purpose,[122] but there is also

117 *M*, fol. 19vb: 'Unde et procul dubio, si Deus obliquum motum tolleret, ita videlicet quod singulorum orbium polos super diurni motus axem poneret, reliquis in sua natura servatis, eque bene fierent generationes et corruptiones in isitis inferioribus tunc sicut nunc. Unde videmus quod uno diurno motu, in quo quasi nulla sit obliquatio, generantur vermes in carnibus et in piscibus et huiusmodi rebus facilis corruptbilis et non debite custoditis. Sed verum est quod non eo modo fierent ut nunc fiunt'. Cf., Oresme, *Quaestio*, ed. Caroti, 225.

118 Thorndike, *A History*, 3:414–415, 440–441, 476–480, 485–488; Caroti, 'La critica', 594–629; Nicolas Weill-Parot, *Les 'images astrologiques' au Moyen Âge et à la Renaissance: spéculations intellectuelles et pratiques magiques* (*XII^e–XV^e*) (Paris, 2002), 422–435.

119 Langenstein, *Contra astrol.* (3.3–4), ed. Pruckner, 197, 202.

120 See especially Oresme, *Quaestio*, ed. Caroti, 268–286.

121 Ibid., 229–231, 241–242, 247–248, 255–260, 274–275, 278, and passim.

122 Oresme, *Livre de divinacions* (c. 1–2), ed. Rapisarda, 84–90. See also Oresme, *Contra judiciarios astronomos* (c. 4), ed. Coopland, 131; Thorndike, *A History*, 3:416–418; Caroti, 'La critica', 556–563.

a relevant passage in his later, and more resolutely argued, *Quaestio contra divinatores horoscopios*.[123] Similarly, in one of the responses to the questions appended to his *De causis mirabilium*, Oresme concedes that comets and planetary conjunctions can influence the elements below, although these changes are impossible to predict with any accuracy.[124] Even greater is the theoretical wiggle-room left in Heinrich of Langenstein's *Tractatus contra astrologos coniunctionistas*, the second part of which seeks to undermine the specific judgments cast by astrologers while accepting — for the sake of argument — some of their general doctrines concerning celestial influence. This culminates in Langenstein grudging admission that, given precise knowledge of the dispositions and relations between superior and inferior spheres, some form of prognostication of the future would be possible.[125] In his later Genesis commentary, Langenstein again acknowledges that astrology might be developed into an *ars conjecturativa* of some limited predictive capability, provided it was purged of all its superstitious elements.[126]

Much greater reluctance to countenance the causal claims made by astrologers is on display in Heinrich Selder's *Tractatus*, which includes a lengthy passage aimed to separate major mortalities of the kind wrought by political unrest or by plague and pestilence from the phenomena caused by planets or stars. Citing authors such as Isidore of Seville, Augustine, and Avicenna, Selder underlined his preference for the traditional idea according to which contagious disease was spread by corruptions in the air, which were often the work of supernatural forces, whether divine or demonic.[127] To an extent, this contrasts with his contemporary Heinrich of Langenstein, who, although critical

123 See the opening to argument no. 15 in Oresme, *Quaestio*, ed. Caroti, 225–226.

124 See the response to question no. 4 in MS Paris, Bibliothèque nationale de France, lat. 15126, fol. 99v.

125 Langenstein, *Contra astrol.* (2.8), ed. Pruckner, 191: 'Nolo tamen negare, quin sint in superioribus multe habitudines causales et inclinative inferiorum ad diversas dispositiones et effectus, ex quibus habitudinibus, si constarent simul, et ex dispositiones inferiorum possent aliqui effectus futuri propinqui pronosticari et rationabiliter coniecturari'. See also ibid. (1.9, 2.4), 154, 179, where Langenstein accepts that the moon's rays cause rheumatism. See more generally Thorndike, *A History*, 3:496–502; Bailey, *Fearful Spirits*, 109.

126 Heinrich of Langenstein, *Lecturae super Genesim*, MS Munich, Bayerische Staatsbibliothek, Clm 18145, fol. 37va. An example he mentions is the capacity of syzygies of sun and moon to disturb the air and influence the weather.

127 *M*, fol. 19ra–va. Selder here quotes Isidore of Seville (*De natura rerum* 39; *Etymologiae* 4.6.17) as well as Augustine, *De divinatione daemonum* 6.9 (CSEL 41, 607, ll. 8–10); Augustine apud *Decretum Gratiani*, causa 26, q. 5, c. 14, §11, ed. Friedberg, col. 1035; Avicenna, *Canon medicinae* 1.3.5 (Venice, 1507; repr. Hildesheim, 1964), fol. 65va.

of attempts to explain epidemics as the result of planetary conjunctions, still spent a considerable amount of time theorizing on how the celestial spheres might play a role in the production of pestilential vapours below. As he saw it, such influence from above, based on the four primary qualities, was only general and could be counteracted in various ways, but it was nevertheless a valid factor in explaining the origin of pestilential disease.[128]

The range of influences Heinrich Selder was prepared to accept appears to have been exceptionally narrow. He openly dismissed most statements made by astrologers about the 'natures' of stars, conjunctions, eclipses, etc., as fictitious, asserting instead that the causal effects exerted by the superior realm were confined to 'the change of the air toward heat, cold, humidity, or dryness, or the arousal of winds,' which were indeed connected to the sun and the moon.[129] He admitted that someone with a comprehensive understanding of these influences could undoubtedly make a great many accurate predictions about the weather and, hence, about the growth or decay of vegetation and the health of humans and livestock, provided he also took into account the nature of the environment in which any of these lived. 'But who among us would be fit to do this? No one, I guess.'[130] Selder also vigorously opposed the notion that the zodiacal signs themselves, as opposed to the stars they contained, could act in a causal way. This notion was particularly dubious for the tropical signs of the ninth sphere, which provided the reference frame for horoscopes in the Ptolemaic tradition, but which due to precession no longer aligned with

128 Langenstein, *Contra astrol.* (3.3–4), ed. Pruckner, 197–199, 203–204. See Thorndike, *A History*, 3:500–501.

129 *M*, fol. 17vb: 'Ad probacionem dico quod iudicia astrologica sunt fundata super naturas signorum stellarum, coniunctionum, oppositionum, eclipsium et aliarum applicationum et huiusmodi rerum fictas, exceptis valde paucis, scilicet eis que sunt de mutatione aeris ad caliditatem, frigiditatem, humiditatem vel siccitatem vel ventorum excitatione et de talibus huiusmodi impressionibus. Certum est enim quod per virtutes stellarum, et precipue solis et lune, hec inferiora alterantur secundum dictas impressiones'.

130 *M*, fols. 17vb–18ra: 'Si quis ergo dictarum virtutum stellarum industrius cognitor existeret … posset sine dubio multas aeris passiones previdere etiam sine peccati macula ex hiis profectum vel defectum terrenascentium coniectare et sanitates vel egretundines hominum vel iumentorum prenuntiare, considerata tamen natura et qualitate regionum, sine qua tamen consideratione totum reliquum foret frustra. Sunt enim aliqua loca naturaliter pluviosa, aliqua vero humiditatis egena et ymbrium inconsueta, quedam autem grandinosa, aliqua vero ventosa, aliqua in caliditate excedencia, quedam vero in frigiditate. Unde videmus quod etiam in provinciis contiguis propter dictarum qualitatum differentiam homines, iumenta et plante differunt manifeste. In hiis autem ipsi demones, tum propter subilitatem nature eorum, tum propter diuturna experigentia, plurima sunt experti. Sed quis ex nobis ad hec sufficiet? Puto nullus'.

the stellar constellations they had been named after. Even these constellations and other asterisms had been arbitrarily defined and labelled in antiquity, often by poets who drew their inspiration from mythology.[131] He had even greater scorn for the idea that each zodiacal sign was ruled by a planet, which could be spun further to include the 'Lord of the Year' (*dominus anni*). This was the planet whose sign was ascending at the moment the sun entered the first degree of the year (usually 0° Aries), allowing this planet to influence the general character of the coming twelve months, from the weather and vegetation to human affairs such as politics. Selder's protestation against this doctrine is worth quoting both for its vehemence and its biting sarcasm:

> All of this is vanity of vanities and above all vanity [*vanitas vanitatum et super omnia vanitas*]. Do you not see that the things which grow from the earth at first need mild heat to wake them up and pleasant humidity to nourish them and blowing wind to cool them down and to move the air to keep it from rotting? Later, as they thrive and mature, they need more heat and a lesser frequency of rain. Assume, then, that the planet that has been identified by the astrologers as Lord of the Year is favourably inclined — will it administer all of this so reasonably that it gives each at the suitable time? Nobody, I reckon, is so empty of cerebral matter that he would ascribe this to the planet's foresight. I also would like to know how a lordship of this kind is transferred onto such a heavenly body, given that its way of acting is, as with everything else, purely natural. Also: how come Aries or Cancer or Libra or Capricorn have such authority that just by virtue of the sun being in conjunction with the beginning of one of them the force of some other celestial body is strengthened or starts to prevail — a celestial body which according to them [sc. the astrologers] also has some dignity in the ascendant that is then in place, a dignity that in reality is null and void? The same principle no doubt underlies the greatest conjunction with the longest period of recurrence, namely when Jupiter and Saturn change triplicity and are at the start of Aries. About the completion of this conjunction's course — which has a venerable age, in as much as according to them it happens once every 960 years — they relate and believe that from it wonderful and great effects arise.

131 *M*, fol. 18ra–b. Cf. the remarks on zodiacal signs and constellations in Oresme, *Contra judiciarios astronomos* (c. 4), ed. Coopland, 129; Oresme, *Livre de divinacions* (c. 11), ed. Rapisarda, 132–134; Oresme, *Quaestio*, ed. Caroti, 231, 241–242, 251–254; Langenstein, *Contra astrol.* (2.5), ed. Pruckner, 180; Langenstein, *Lecturae super Genesim*, MS Munich, Bayerische Staatsbibliothek, Clm 18145, fols. 45ra–va, 47vb–48ra.

> But it is not inappropriate to reply to them with this [line] by Horace in his *Poetry:* 'Mountains will labour: what's born? A ridiculous mouse!'[132]

Selder maintained his strategy of asking sharp rhetorical questions as he moved on to discuss the practice of astrological elections. If an astrologer selects the appropriate hour for someone intending to go on a sea voyage and his advice is heeded: will this mean that winds from now on always blow in the sailor's favour and pirates decide to avoid his ship? Likewise, if he elects the right time for a journey, will this mean that the traveller will never experience rainfall or fatigue or lose his way? Will robbers spare him and hosts receive him more cordially? Will merchants be less greedy? Indeed, how could any of this be written in the stars?[133] Heinrich Selder's naturalistic sensibilities were especially offended by the idea that the configuration of the heavens was able to determine the fate of a newly born child. A classic argument against this position, made famous by St Augustine, was the existence of twins whose sex, character traits, life choices, and general destinies differed completely even though both were born under the same ascending degree.[134] Selder updated this ancient objection by reproducing a passage in Albertus Magnus's *De animalibus*, talking about 'a man who was in fact two men joined at the back.

132 *M*, fols. 15vb–16ra: 'Hec omnia sunt vanitas vanitatum et super omnia vanitas. Nonne vides quod terre nascentia primo indigent temperato calore excitante et suavi humido nutrente et vento vevente refrigerante et aerem ne putrescat commovente? Inde ipsis convalescentibus et maturere debentibus indigent maiori calore et ymbrium frequencia rariore. Posito ergo quod planeta ab astrologis pro domino anni assignatus sit propicius, utrum hec omnia ita rationabiliter administret ut quodlibet det in tempore oportuno? Puto quod nemo sit tam cerebro vacuus ut hoc planete prudencie ascribat. Peto eciam unde huiusmodi dominium transferatur in talem stellam cuius et actio sicut et omnium est naturalis pure. Unde eciam vel Arieti vel Cancro vel Libre vel Capricorno tanta auctoritas, quod ex coniunctione solis cum principio alicuius eorum roboretur et prevalere incipiat vis alterius stelle eciam in ascendente tunc existentis aliquam secundum eos dignitatem habentis, que tamen dignitas vanitas est et nichil? Eadem racio est procul dubio in grandissima coniunctione et maxima percurrienti, scilicet Saturni et Iovis, in principio Arietis cum mutatione triplicitatis; ex cuius quidem coniunctionis percurritione venerande etatis, ut pute que secundum eos sit in 960 annis semel, tradunt et credunt nasci miros et grandes effectus. Sed illis non incongrue dicitur illud Oracci in *Poetria*: '*Parturiunt montes et nascetur ridiculus mus*' [Horace, *Ars Poetica* 139]'

133 *M*, fol. 16ra.

134 See *M*, fol. 15rb–va, and ibid., fol. 17va, where he references Augustine, *De civitate Dei* (5.6), ed. Dombart and Kalb, 133–134. On Augustine's use of the 'twin-argument' and knowledge of astrology, see Hegedus, *Early Christianity*, 52–61. Cf. Oresme, *Contra judiciarios astronomos* (c. 4), ed. Coopland, 130–131; Oresme, *Quaestio*, ed. Caroti, 222, 228, 240.

One was rash and wrathful while the other was gentle. They lived more than twenty years and after one had died the other lived on until he himself died from the putrefaction and stench of his dead brother'.[135] Although Selder did not specifically say so, Albertus's testimony was interesting not least because defenders of astrology liked to point out that even twins left the womb at slightly different times, subject to different celestial influences. In the special case of conjoined twins, this rebuttal lost some of its persuasive force.

Even without such anecdotes, however, the absurdity of natal astrology was plain to see. As Selder depicted it, its adherents had to assume the existence of some special force of the heavens, which was somehow able to incline a child at the precise moment it left the uterus, but had no impact on its development during the months it spent inside the mother's womb. How could the uterus provide a thicker shield against celestial forces than the walls of the house in which the birth took place?[136] On a more technical level, Selder showed himself baffled by the whole notion of celestial houses, of which the first was supposed to predestine a newborn's personality, the second its material wealth, the third its brothers, and so on. Since houses were counted from the ascendant degree, their position depended on the local horizon and were bound to differ for different geographic longitudes. Under these circumstances, the very same part of the sky could mean good fortune to one person and bad fortune to another, an understanding of nature which Selder could only qualify as 'ridiculous'.[137] In another passage, he expanded his criticism by appealing to the doctrines of physiognomy, more specifically the idea that a person's character traits were mirrored by his or her physical appearance. As he reminded his readers, most physical characteristics of a person were already formed in the mother's womb, making it paradoxical for the astrologer to try and predict

> worldly dispositions and inclinations of the soul from the configuration of the heaven at the time of birth, given that it is certain that neither sex

135 Albertus Magnus, *On Animals: A Medieval* Summa Zoologica (18.2.3), trans. Kenneth F. Kitchell Jr. and Irven Michael Resnick, 2 vols. (Baltimore, MD, 1999), 2:1313. For the Latin text, which is cited in *M* on fol. 15va, see Albertus Magnus, *De animalibus* (18.2.3), ed. Hermann Stadler, vol. 2 (Münster, 1920), 1225.

136 *M*, fol. 15va.

137 *M*, fol. 15vb: 'Et ita manifestum est quod una et eadem pars celi fortunat et infortunat secundum dicta astrologorum diversas res propter diversitates solum orizontium, quod ridiculum est'.

> nor shape — be it of the head or the eyes or the fingers or the chest or any of the other things the astrologer tries to infer from the birth — are first introduced at the hour of birth.[138]

Attempts to resolve this contradiction quickly led into new absurdities, because one had to assume that the celestial configuration at birth somehow took into account the traits already formed in the uterus. An effort to safeguard the plausibility of this view could be found in Ptolemy's *Tetrabiblos* (3.1), whose introduction to natal astrology seemed to imply that the configurations at conception and birth were identical or similar in some important respect and that the reappearance of these features acted as a trigger that caused the child to be born at the appropriate time. Selder was familiar with this view but objected to it on empirical grounds: in reality, the horoscopes for conception and birth of a given person were often very different, 'as I myself have often wasted my time finding out'. Indeed, this point was once again especially evident from the existence of twins, who were conceived simultaneously, but could still be born in different hours and even differ in their biological sex.[139]

Next to nativities, the other main target of Selder's criticism were the various medical uses of astrology, as supposedly sanctioned by the authority of Hippocrates and Galen. For example, he felt obliged to discuss the famous Hippocratic admonition to avoid letting blood during the so-called dog days ('*Sub cane et ante canem moleste purgationes*').[140] Selder acknowledged the utility of this advice, but without conceding the common notion that the rising of the dog-star (or Sirius) itself had any ill effect on the body. What Hippocrates had instead tried to convey was that this astronomical event often coincided with

138 *M*, fol. 17rb–va: 'Quomodo ergo astrologus per figuram celi tempore nativitatis has temporales disposiciones et animi inclinationes et aptitudines presumit dicere, cum certum sit quod neque sexus, neque figura—vel capitis vel oculorum vel digitorum aut pectoris aut reliquorum que astrologus conatur exponere ex nativitate—primo hora nativitats inducantur?' On medieval physiognomy, see most recently Irven M. Resnick, *Marks of Distinction: Christian Perceptions of Jews in the High Middle Ages* (Washington, DC, 2012), 13–34.

139 *M*, fol. 17va: 'Et procul dubio, si tamen inquiras figuram nati ex hora casus spermatis et figuram eiusdem ex hora nativitatis, invenies duas diversas figuras, sicut ego cum temporis mei perditione pluries sum expertus. Et illud est evidens in gemellum ex uno concubitu conceptis et in diversis horis natis, quod pluries accidit et precipue in masculo et femella gemellis, quorum sexus, mores, fortune, et fere omnia humana vitam inspicientia inveniuntur diversa'.

140 Hippocrates, *Aphorismi* 4.5, in Petrus Pomarius Valentinus Hispanus, ed. *Articella nuperrime impressa* (Lyon, 1525), fol. 24v.

the hottest, most sultry days of summer, which were more likely than usual to indispose the body.[141] Another area of medical astrology that encountered his scepticism was melothesia, the widespread belief in a connection between body parts and zodiacal signs. Selder wrote defiantly that he once

> had the vein of an arm opened when the moon was in Gemini, not out of ignorance, but on purpose and out of my own volition. And even though I did this against their maxims by which they order one to be careful not to have body parts touched with iron when the moon is in a sign corresponding to this body part, the impact was not doubled, nor did the blood stall in making its exit, nor did I feel anything bad.[142]

Empirical criticisms of the astrological rules for bloodletting, with specific reference to the case of the moon being in Gemini, had already been in circulation before Selder's time. An early example is the treatise *De conservacione vite humane* (1307) by Bernard de Gordon, a physician and professor of medicine at the University of Montpellier. In a noteworthy passage, Bernard admits that he once prepared to administer a bloodletting to himself at the wrong hour, perceiving too late that the moon was in Gemini. He nevertheless continued the procedure and was relieved to find he never felt better.[143] Selder's case differs in the significant sense that his 'error' was in fact pre-meditated. Willing and ready to refute a whole branch of astrology, the Swabian astronomer had carried out an experiment on his own body, incising his arm at a time of the month when it was widely regarded as dangerous to do so.

Penetrating as his attacks on various aspects of astrological theory certainly were, they also raised the question why, if these doctrines were as absurd as he claimed, some astrologers were able to make successful predictions about the future. Rather than denying this success *tout court*, he readily acknowledged that some astrologers had been able to perform amazing feats such as guessing

141 *M*, fols. 20ra–22rb.

142 *M*, fol. 20ra: 'Nam et ego luna existente in Geminis feci mihi, non ex ignorancia, sed ex studio et voluntate, venam brachii aperiri. Unde licet fecerim contra aphorismum eorum, quo iubent cavere ne membris ferro tangatur luna existente in signo respiciente ipsum membrum, non tamen ictus geminabatur, nec sanguis tardavit exitum, nec aliquid mali sensi'.

143 Luke E. Demaitre, *Doctor Bernard de Gordon: Professor and Practitioner* (Toronto, 1980), 164; Thorndike, *A History*, 2:856–7; Danielle Jacquart 'Bernard Gordon et l'astrologie', *Centaurus* 45 (2003), 151–159, at 152–153. See also Oresme, *Quaestio*, ed. Caroti, 231.

the content of sealed letters or the colour of unseen urine.[144] The only explanation left for such manifestations was the assistance of impure and malignant spirits, which could rush to the astrologer's aid even without his knowledge. Against those who argued that it was against the evil character of demons to do anything like this without being compelled by an invocation, Selder emphasized that their motivation was 'not humility, harmony, generosity or charity, but a certain envy that is highly voracious and always irascible' as well as 'implacable resentment, enmity, and unceasing hate,' which made these demons seek any available avenue to trick a man and lead him to perdition.[145] Even where the victim enjoyed God's protection and hence could not be induced to any crime, the invidious demons spared no moment

> thrusting as many obstacles as they can in the way of good works, to the extent that they, if they have no other means, see to it that someone who sings the Psalms to God brings forward a wrong letter or syllable, so they can distract the psalmodizing or praying man at least by this corrupting influence.[146]

In another passage of his *Tractatus*, Selder went even further and portrayed the whole framework of astrological divination as a creation of the Devil, who had smuggled his nefarious invention into the canon of the liberal arts in

144 *M*, fol. 16ra. The mention of unseen urine is reminiscent of the treatise *De urina non visa* attributed to William of England, which teaches how to make medical diagnoses and predictions from the stars, without inspecting the urine of a patient. For an edition, translation, and commentary on this work, see Laurence Moulinier-Brogi, *Guillaume l'Anglais, le frondeur de l'uroscopie médiévale* (*XIII^e siècle*) (Geneva, 2011).

145 *M*, fol. 16va: 'Unde nec illam subministrationem faciunt ex humilitate, pacia, liberalitate aut ex caritate, sed ex edacissima quadam et semper irascibili invidia, ira implacabili, inimicitia odioque inquiescibili in perniciem tocius generis humani hec et quecumque illicita, eciam minima, excitant, suadent, hortantur et quandoque gravissime et quasi intollerabiliter incitant, ministrant et iuvant, in quantum Deus permittit, die noctuque infatigabiliter, plus, teste Deo, quam credibile videatur mortalibus, nisi cui Deus concessit experiri'.

146 Ibid.: 'Et si ad gravia et enormia scelera homo non permittitur, Deo protegente, protrahi adtempant tamen ad minima, et si in hiis deficiunt, ingerunt tamen quantum possunt impedimenta in bonis operibus, ita quod ad hoc laborant, dum aliud non possent, ut Deo psallens litteram corrupte proferat vel sillabam, ut saltem ex hac corruptela ab intentione psallentem distrahant aut orantem'.

order to seduce anyone who practiced it, inclining them toward fatalism and moral laxity. If an event became true according to the determination made by some astrologer, this was not due to any influence the heavens exerted on this event, but because the Devil had listened to the astrologer casting his judgment and then manipulated the course of events to produce the expected outcome.[147]

Selder's insistence that astrology was a satanic conspiracy against mankind makes for one of the more noticeable dividing lines between his attitude and that of Nicole Oresme, whose written works on natural philosophy are marked by his attempts to downplay the role of demons (or, for that matter, the heavens) in the explanation of any 'unusual' natural phenomena.[148] In line with this tendency, Oresme paid lip-service to the ability of demons to come to the astrologer's aid, but he preferred to explain successful forecasts as a result of the fraudulent practices employed by astrologers — or indeed of mere chance.[149] Compared to the French philosopher, Heinrich Selder took a more orthodox, Augustinian view of the place of demons in divination, which later was to characterize the writings of one of the great fifteenth-century critics of 'superstition', the Parisian chancellor Jean Gerson.[150] For the legitimacy of astrology as a science or art fit to be practiced by Christians, this connection between divination and demons was utterly destructive and underpins the strong disdain Heinrich Selder appears to have felt for the discipline and its adherents. Taken everything into consideration, divination by the stars was not only baseless and wrongheaded, but dangerous to the souls of those who engaged in it.

147 *M*, fols. 17rb–vb, 18rb–va. The possibility that constellations, signs, and other elements of astrology may be a Satanic invention is also discussed at length in Heinrich of Langenstein, *Lecturae super Genesim*, MS Munich, Bayerische Staatsbibliothek, Clm 18145, fols. 43vb–44rb, 45vb–46ra.

148 See Thorndike, *A History*, 3:428–429, 438–439, 441, 466, Eugenia Paschetto, *Demoni e prodigi: note su alcuni scritti di Witelo e di Oresme* (Turin, 1978), 43–80; Bailey, *Fearful Spirits*, 96, 102–104, 110–111, and the *Recapitulatio* of *De causa mirabilium*, ed. in Hansen, *Nicole Oresme*, 360–363.

149 Oresme, *Quaestio*, ed. Caroti, 251, 265–268, 307; Oresme, *Livre de divinacions* (c. 12), ed. Rapisarda, 140–154; Thorndike, *A History*, 3:415–416.

150 See Bailey, *Fearful Spirits*, 127–47; Benedek Láng, 'Experience in the Anti-Astrological Arguments of Jean Gerson', in *Expertus sum: l'expérience par les sens dans la philosophie naturelle médiévale*, eds. Thomas Bénatouïl and Isabelle Draelants (Florence, 2011), 309–321.

7 Concluding Remarks

As the late John North put it in one of his last articles, 'the best critics of astrology were mostly lapsed believers, able to make use of their "inside knowledge"'.[151] That Heinrich Selder fits this description fairly well can be inferred from a brief remark in his *Tractatus de tempore dominice annunciationis, nativitatis et passionis*, in which he recalls his loss of time in comparing horoscopes.[152] In this respect, Selder would not have differed radically from his much more famous predecessor Nicole Oresme, who freely admitted to his youthful — and unsuccessful — attempts at becoming an astrologer.[153] Contrary to what one may expect, however, Selder's work shows no clear signs of dependency on Oresme's anti-astrological writings. Instead, the *Tractatus* leaves us with the impression of a writer who had developed his own set of views and who had chosen to write on this contentious topic strictly out of personal interest. Among the hallmarks of his attack on astrology are the close attention to technical astronomical details, his use of empirical data, but also his fixation on the role of demons in explaining the success of astrological predictions. At the same time, it is interesting to find that Selder did not put any emphasis on the free-will argument against astrology, which had been a mainstay for patristic writers,[154] nor did he dwell much on the devious practices, backstage machinations, and questionable moral traits of astrologers, which were among the more prominent targets in Oresme's works.[155]

With all this said, a final verdict on the sources and originality of Selder's arguments would require a more wide-ranging comparison of criticisms of astrology written during the 1300s, which remains an underdeveloped field of research.[156] Such a study must remain outside the scope of this article, as

151 John North, 'Astronomy and Astrology', in *The Cambridge History of Science*, eds. David C. Lindberg and Michael H. Shank, vol. 2, *Medieval Science* (Cambridge, 2013), 456–484, at 478.

152 See n. 139 above.

153 Oresme, *Quaestio*, ed. Caroti, 310; Caroti, 'Nicole Oresme's Polemic', 89; Thorndike, *A History*, 3:418–419.

154 Hegedus, *Early Christianity*, 113–124; Oresme, *Quaestio*, ed. Caroti, 261; Caroti, 'La critica', 591–592.

155 Oresme, *Quaestio*, ed. Caroti, 251, 265–268.

156 Specifically for the fourteenth century, see Lynn Thorndike, 'A Hitherto Unnoticed Criticism of Astrology: *Liber de reprobatione iudiciorum astrologiae*', *Isis* 31 (1939), 68–78; Julien Véronèse, 'Le *Contra astrologos imperitos atque nigromantes* (1395–1396) de Nicolas Eymerich (O.): contexte de rédaction, classification des arts magiques et divinatoires,

must an exhaustive discussion of the contents of Heinrich Selder's *Tractatus*, which covers a much greater range of topics and ideas than I have been able to address. Examples that would repay further study include the author's close attention to medical subjects, in particular the theory of critical days and Galen's 'medicinal month', but also the human gestation period and some remarks about fetal development, in which context he adduces the eyewitness testimony of midwives and ordinary women.[157] All of this points to a multifaceted, if forgotten, thinker, who deserves a place in the intellectual history of fourteenth-century Europe.

édition critique partielle', in *Chasses aux sorcières et démonologie: entre discours et pratiques* (*XIVe–XVIIe siècle*), eds. Martine Ostorero, Georg Modestin, and Kathrin Utz Tremp (Florence, 2010), 271–329.

157 See n. 37 above. I hope to return to these aspects in a separate publication.