

Chapter 4

Francesco Capuano di Manfredonia



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Abstract One of the most important commentaries on Sacrobosco's *Tractatus de sphaera* was written by Francesco Capuano da Manfredonia and printed toward the end of the year 1499 in Venice. Capuano was professor of Astronomy at Padua and had already published a commentary on Peurbach's *Theoricae planetarum* in 1495. He subsequently entered into the ranks of the Lateran Canons Regular, taking the name Giovanni Battista. Later editions of his commentary on Sacrobosco's *Tractatus* (Venezia, 1518 and 1531) were published under the name Giovanni Battista Capuano and contain a revisited text of that work. The two different redactions of the commentary on the *Sphaera* allow us to illustrate the radical transformation the text underwent. The two redactions of the prologue that opens the commentary are compared.

1 Introduction

Francesco Capuano, the author of some important commentaries on Georg Peurbach's (1423–1461) *Theoricae novae planetarum* and Johannes de Sacrobosco's (died 1256) *Sphaera*, is not well known. The dearth of information about his life makes it objectively difficult to reconstruct his scientific career in any detail. It might have been possible to remedy the situation through an analytical and wide-ranging study of his works, but no attempt to conduct such a comprehensive study has ever been conducted—it remains a desideratum. The present enquiry will offer a short discussion of what an investigation of this sort might lead to.

In order to meet this goal, I will focus my enquiry on the text devoted to Sacrobosco's *Sphaera*. Moreover, I will not be taking specific passages from this medieval author's work into account, but will rather concentrate on the question of the philosophical and scientific status of astronomy, which Capuano discusses in the prologue to his commentary. While this topic is not explicitly addressed in the

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Sphaera, it acquired a central importance for the many commentators on the text. First of all, it must be noted that in his work Sacrobosco systematically avoided investigating natural philosophical topics in depth, possibly in order to maintain the strict distinction between different disciplines adopted in medieval universities. However, this approach would appear to have been abandoned early on, with the rediscovery of Aristotle's (348–322 BCE) works on natural philosophy, and in particular with the increasingly detailed study of *De coelo*.

In the *Expositio* of the *Sphaera* attributed to Michael Scot (ca. 1175–ca. 1234), for instance, systematic use is made of Aristotle's works. Indeed, they are often used so extensively that the *expositio* takes the form of a genuine *quaestio*. Consider, for instance, the discussion about the 'elements,' which is only touched upon in Sacrobosco's text, but which here takes the form of a reassessment of the positions expressed on the topic by the Greek philosopher in his *Metaphysics*, *Physics*, *De coelo*, *De generatione et corruptione*, and *Metereologica* (Thorndike 1949, 247–342). On the other hand, the topics discussed in the various texts, particularly the *Sphaera* and *De coelo*, were so closely related that it was almost impossible to treat them separately. Thus, the discussion increasingly took the form of a unitary enquiry, which nonetheless implied an extensive reflection on the relations between the various branches of knowledge.

In the light of all this, I will attempt to identify the specific ways in which Capuano addressed the problem of the place of astronomy within the more general sphere of knowledge. The fact that two different redactions of the commentary on the *Sphaera* are available will allow me to illustrate the radical transformation the text underwent between the first draft of the prologue, which takes up just over a page in the editions known to us, and the second draft, which instead extends across no less than ten pages. I will argue that this significant change is a direct consequence of the author's choice to join a religious order: in doing so, he took it upon himself to justify the need to study astronomy, and at the same time to establish the limits of this discipline. His readership changed and, as we shall see, this significantly contributed to the greater extension and complexity of the second redaction of the prologue.

2 Bibliographical Fragments

Up until the 1880s, very little was known about our author, and even this limited information was wholly based on his printed works. We can get an idea of the *status quaestionis* at the time from a short contribution by Pietro Riccardi entitled *Intorno ad alcune rare edizioni delle opere astronomiche di Francesco Capuano da Manfredonia*, which was published in volume 14 of "Memorie dell'Accademia di Scienze, Lettere ed Arti di Modena" in 1874 (presented at the Accademia in 1871 and separately published there in 1873). Riccardi had systematically perused the previous literature, yet had failed to come up with any significant new information compared to what could be inferred from the frontispieces and dedications of the

two printed texts. This was a purely bibliographical study, which regrettably relied for the most part on a single source, Gabriele Pennotto's *Generalis totius sacri ordinis Clericorum Canonicorum historia tripartita* (Rome, 1624), which provided an arbitrary date for Capuano's death. Riccardi wrote:

Bringing together the little information transmitted by these writers about his life and works, it seems possible to determine:

1. That Francesco Capuano was born in Manfredonia, probably in the first half of the fifteenth century, and died in Naples, according to Pennotto, around 1490, at the time of King Ferdinand of Aragon.
2. That in 1475, and possibly for a few years, he practised astronomy and philosophy (as the natural and mathematical sciences were referred to at the time) at the famous University of Padua.
3. That he illustrated and commented on the treatises *Sphaera* by Sacrobosco and *Theoricae Novae Planetarum* by Georg von Peurbach.
4. That later in his life he joined the order of the Lateran Canons Regular.
5. After becoming a man of the cloth he took the name Giovanni Battista in place of his given name Francesco.¹

The dates drawn from Pennotto—and which de facto anticipated Capuano's scientific career by over one generation—ought to have struck Riccardi as questionable, had he paid more attention to the dates of publication of the works and the dedications they contained. Antonio Favaro realised as much and, by accessing the archives of Padua University, was able to set our author within the correct time frame. In a work entitled *Le matematiche nello Studio di Padova dal principio del secolo XIV alla fine dl XVI* (presented at the Accademia di Scienze, Lettere ed Arti di Padova in 1880 and published there in the same year), the great Galileo scholar pointed to the existence of a document attesting to Capuano's graduation in 1494 (Favaro 1880, 44–47). In the light of this, the mathematician could no longer be regarded as an author who suddenly burst upon the scene of astronomical studies in the late fifteenth century; rather, he was a young professor who in 1495 published his commentary on Peurbach's *Theoricae novae planetarum* in Venice.

After these important findings, we must wait until 1974 to obtain more detailed information on the documents preserved in the Padua archives. That year, a work giving some room to Capuano was published by Paolo Sambin in "Quaderni per la storia dell'Università di Padova" under the title *Professori di astronomia e matematica a Padova nell'ultimo decennio del Quattrocento*. This contribution informs us that on the 6th of November 1494 Francesco Capuano and another Apulian scholar, Girolamo Palmieri da Ostuni, had submitted a request for a reduction of the fees due

¹(Riccardi 1873, 25–26): "Raccogliendo le scarse notizie lasciateci da questi scrittori intorno alla vita ed alle opere di lui, sembra potersi accertare: (1) che Francesco Capuano nacque in Manfredonia, probabilmente nella prima metà del secolo XV, e morì in Napoli, secondo il Pennotto, circa nel 1490, al tempo del Re Ferdinando d'Aragona. (2) che nel 1475, e forse per alcuni anni, professò l'astronomia e la filosofia (come solevansi allora chiamare le scienze fisicomatematiche) nel celebre studio di Padova. (3) che illustrò e commentò il trattato della *Sfera* del Sacrobosco e le *Teoriche dei pianeti* di Giorgio Peurbach o Purbach. (4) che nel seguito di sua vita abbracciò l'ordine dei Canonici regolari lateranensi. (5) che abbandonando il secolo assunse il nome di Giovanni Battista, in luogo del nome battesimale di Francesco."

for their examination and proclamation ceremony. On account of their poverty and of the war being waged in their homeland, the two *iuvenes* requested that at least one of them be exempted from paying the fees. The request was granted (Sambin 1974, 63; Martellozzo Forin 2001, 1228–29). On the 12th of November 1494 Capuano passed his *tentativum* in the arts and medicine, and was unanimously approved by his *promotores*, including Nicoletto Vernia and Pietro Trapolino, and, for medicine, Gabriele Zerbo (Sambin 1974, 63; Martellozzo Forin 2001, 1230). Trapolino and Zerbo bestowed the ‘doctoral insignias’ upon him during the ceremony held on the 15th of November 1494 (Sambin 1974, 63–65; Martellozzo Forin 2001, 1231–32).

This information allows us to directly connect our author to the leading exponents of Aristotelianism in Padua in those years, giving us a clearer picture of the cultural context in which Capuano’s early career unfolded.

Thanks to the publication of the *Acta graduum academicorum Gymnasii Patavini ab anno 1471 ad annum 1500* in 2001, we are now in a position to trace this young scholar’s career in even greater detail. On the 28th of July 1492 “Franciscus Capuanus de Manfredonia, art. scholare” was a witness to the bestowal of a doctoral title in Padua (Martellozzo Forin 2001, 1098). The same role was played by “Franciscus Manfredonius,” by now referred to as *magister*, on the 14th of December 1493 (Martellozzo Forin 2001, 1174). In November 1494 he completed his studies, and then acted as a witness on at least five occasions between the 18th of November 1494 and the 4th of September 1495 (Martellozzo Forin 2001, 1263–64, 1268, 1272).

Unfortunately, after this date the documents from Padua are no longer helpful, so we are forced to turn to our old sources again, starting from Celso Rosini’s *Lyceum Lateranense* (Cesena, 1649). The first volume of this work includes an extensive biography of Capuano, which to this day constitutes an unavoidable point of reference as regards his work within the schools of the Lateran Canons Regular in Padua and Naples. Unknown to Riccardi, but duly noted by Favaro, this biography does not provide any precise dates either for Capuano’s entry into the ranks of the Canons Regular or his death. However, this biography would allow us to outline a provisional chronology, which would help us make sense of the information provided in the frontispieces and dedicatory letters prefacing Capuano’s works, were it not that it too places the activity of the mathematician at 1475, giving rise to quite a few problems of evaluation.

As already noted, the commentary on Peurbach’s *Theoricae novae* was published in Venice in 1495—to be more precise, in August of that year (Chap. 6). Both in his dedication to Ferdinand II of Naples and in the title of the work, Capuano states that he is a public professor of astronomy at Padua University. The same claim is to be found in the opening of the first edition of his commentary on Sacrobosco’s *Sphaera* (Venice, 1499), which moreover includes a succinct dedication to Lorenzo Donato (Donà), “quaestor Patavinus,” who attended many graduation ceremonies in the years 1495–1496 (Martellozzo Forin 2001, 1270, 1279, 1288, 1329). The information included in the 1499 edition was reprinted in the edition of the commentary published in Venice in 1508, where it was featured as

part of a collection of astronomical texts that also included Pierre d'Ailly's (ca. 1350–1420) *Quaestiones subtilissimae* on Sacrobosco's work and a *Compendium sphaerae* written by Robert Grosseteste (ca. 1175–1253).

In 1518 two almost identical collections of astronomical works were published in Venice, one by the heirs of Ottaviano Scoto, the other by Lucantonio Giunta (1457–1538), which also included the commentaries on the *Theoricae novae* and the *Sphaera* written by Lateran Canon Regular Giovanni Battista Capuano. The commentary on Sacrobosco's work featured a new dedication, addressed to the canons who were Capuano's pupils, and who had begged him to get back to work on the text he had already published. Capuano had agreed to meet this request despite his busy schedule and had substantially revised his commentary, removing certain parts, making some additions, and correcting the text here and there.² This new redaction of the commentary, prefaced by the new dedication, was reprinted in Venice in 1531 as part of a large new collection of astronomical texts.

Based on the information provided so far, we might conclude that Capuano entered religious life between 1508 and 1518, yet the 1508 edition of his commentary might only be a reprint which was not up to date with regard to the author's new title and profession. This may be inferred from a passage inserted in the 1518 and 1531 editions, in which Capuano claims to have witnessed a lunar eclipse on the 15th of August 1505, "with all the associates and fathers."³ Rosini's testimony might be helpful here to determine the exact date in which Capuano ceased to be a layman, even though, as already noted, the author of the *Lyceum Lateranense* pushes the date for Capuano's teaching career forward to about 1475. This source, then, is best approached with a degree of caution. Rosini claims that Capuano requested to join the Lateran Canons when these were holding their general chapter in Ravenna, and that he was told not to leave Padua but to wait in the monastery of San Giovanni in Verdara. According to Pennotto, general chapters were held in Ravenna in the years 1502, 1511, 1514 and 1515. At this stage, 1502 would appear to be the most likely date for Capuano's entrance into the Lateran Canons, although it should be noted that later on in his account Rosini appears to set this event in the year 1476 or thereabouts. He speaks of it as occurring roughly forty years after the donation of the church of San Giovanni in Verdara to the Canons, which was made by Cardinal Antonio Correr in 1436.

²In the new dedication, Sacrobosco—Capuano 1531, 57v, we read: "Exegistis a me singulari quadam cum instantia, venerabiles et optimi auditores, ut opus de Siderali disciplina (quam Astronomiam vocant) nova denuo impressione ad multorum cum voluptatem, tum institutionem reficiendum curarem....Ego etsi plurimis obruar negociis, simque adeo quot diebus in legendis lectionibus occupatus, ut mihi tempus ad vite commodum vix suppeditet, me tamen non invitum et vestra studia, et aegregia charitas in vos mea cogit, ut lubens vestris desideriis acquiescam....Vestri igitur gratia Siderale opus revidendum exactissime prius putavi, subinde ex eo plura quom variassem, depressem, addidissem, castigatius illud atque emendatius iterato imprimendum tradidi, nomini dicato vestro."

³(Shank 2009, 295) has used this chronological reference to date the whole revision of the text to 1505; in my view, this is a purely speculative inference.

There is no need here to tackle these chronological problems any further. However, it should be noted that other difficulties of the same sort emerge in relation to other areas of Capuano's life. Let us keep to Rosini's information. He informs us that for roughly four years Capuano completely devoted himself to his religious training, after which time he reluctantly resumed his teaching work in the Paduan convent, where the more gifted clerics would be sent to study Aristotle's natural philosophy. Capuano apparently taught at San Giovanni in Verdara for twelve years—first philosophy and then mathematics. In fact, he could even be regarded as having introduced mathematical studies into the schools of the Lateran Canons. After teaching in Padua, he moved to Naples, where he served as the abbot of San Pietro in Aram. Here he significantly increased the number of people attending the church and passed away at a ripe old age.

3 The Venetian Collections of Astronomical Works Containing the Commentary on Sacrobosco's *Sphaera* Written by Francesco Capuano

As we have seen, Capuano's work was often published together with other texts about the *Sphaera* in collections that were steadily enlarged over the years. Since its publication, then, the work was destined to be read in parallel to works of a very different nature and provenance. I will now provide a succinct outline of the most interesting features of the collections including Capuano's commentary, in such a way as to highlight their peculiarities, while at the same time noting the differences and similarities distinguishing the various approaches to Sacrobosco's text. I make no claim here to provide an exhaustive and complete exposition of all the texts featured in these collections. Still, it might be useful to present a chart listing the titles of the various works featured in the Venetian collections (1499, 1508, 1518a, 1518b, 1531) alongside Sacrobosco's *Sphaera* and Georg Peurbach's *Theoricae novae planetarum*:

Commentaries on Sacrobosco's <i>Sphaera</i>	
Cecco d'Ascoli (Francesco Stabili), <i>Commentarius</i>	1499, 1518a, b
Francesco [Giovanni Battista] Capuano, <i>Commentarius o Expositio</i>	(1 ed.): 1499, 1508, (2 ed.): 1518a, b, 1531
Jacques Lefèvre d'Étaples, <i>Commentarius o Paraphrases et annotationes</i>	1499, 1508, 1518a, b, 1531
Pierre d'Ailly, <i>Quaestiones subtilissimae XIV</i>	1508, 1518a, b, 1531
Bartolomeo Vespucchi, <i>Annotationes</i>	1508
Michael scot, <i>Quaestiones o Expositio brevis et quaestiones</i>	1518a, b, 1531
Prosdocimo de' Beldomandi, <i>Commentaria</i>	1531

Other works devoted to the <i>Sphaera</i>	
Robert Grosseteste, <i>Compendium</i> or <i>Tractatulus</i>	1508, 1518a, b, 1531
Campanus of Novara, <i>Tractatus de Sphaera</i>	1518a, b, 1531
Campanus of Novara, <i>Tractatus de sphaera solida</i>	1518a, b, 1531
Campanus of Novara, <i>Tractatus de computo maiori</i>	1518a, b
Thebit ben Corat, <i>De imaginatione Sphere</i>	1518a
Works devoted to the <i>Theoricae planetarum</i>	
Francesco [Giovanni Battista] Capuano, <i>Expositio Theoricae novae</i> (Peurbach)	[1499], 1508, 1518a, b, 1531
Johannes Regiomontanus, <i>Disputatione contra cremonensia deliramenta</i>	1508, 1518a, b, 1531
Gerard [John sic!] of Cremona, <i>Theorica Planetarum</i>	1518a, b, 1531
Al-Bīṭrūjī (Alpetragius), <i>Theorica planetarum</i>	1531
Other works	
Theodosius of Bithynia, <i>De spheris</i>	1518a, b
Ptolemy, <i>De speculis</i>	1518a, b

The 1499 edition contained two works that were destined to accompany Capuano's text even in the later Venetian editions of 1508, 1518 and 1531: the commentary on Peurbach's *Theoricae novae* written by Capuano himself and the commentary on Sacrobosco's work composed by Jacques Lefèvre d'Étaples (ca. 1455–1536) (Chap. 2).

In this first collection, Capuano's work was juxtaposed, although it might be more appropriate to say 'counterposed,' to the commentary on the *Sphaera* written by Cecco d'Ascoli (Francesco Stabili) (1257–1327), the author of an exposition steeped in astrological thought. It is worth recalling that this author had been brought to trial by the Inquisition precisely on account of certain statements based on astrology, first in Bologna in 1324 and then in Florence in 1327, when he was sentenced to death.⁴ Compared to this text, Capuano's commentary must have been perceived as a far more rigorous exposition, from both a philosophical and astronomical standpoint. In Capuano's work, Aristotle's texts on natural philosophy, Ptolemy's (ca. 100–ca. 170) *Almagest* and Al-Farghānī's (ca. 800–870) *Compendium of the Science of the Stars* serve as the basis for explicating Sacrobosco's work. Only very rarely are other sources mentioned.⁵ For instance, we only need to read the commentary on the final section of Book 1 of the *Sphaera*, concerning the measurement of the circumference and diameter of the Earth, to appreciate the difference between the two authors' approaches. Sacrobosco's text only presents the result of Eratosthenes' measurement, as transmitted by Macrobius's (ca. 385–430) commentary on the *Somnium Scipionis*, and then succinctly explains how it is possible to use

⁴On Cecco d'Ascoli's astronomical work, see (Weill-Parot 2007) and (Gottschall 2007).

⁵The *Compendium of the Science of the Stars* is one of the main sources for Sacrobosco's *Sphaera*. written around 833, it was translated into Latin in the twelfth century, later becoming a reference text for the study of Ptolemaic astronomy.

an astrolabe to measure an arc of the terrestrial meridian coinciding with a degree of the celestial circumference. The author of the *Sphaera* therefore avoided using the different value given for the circumference of the Earth in Al-Farghānī's *Compendium*, thereby offering a highly simplified presentation of the whole question. Both commentators report the different measurement given in the work by the Arab author, but whereas Capuano dwells at length on the part concerning the astrolabe, directly drawing upon Ptolemy's *Planisphaerium*, Cecco d'Ascoli questions the relevance of this research. What truly matters for him is not "to know the quantity of the Earth," but "to learn the properties of the geographical regions" (*scire proprietates situum*)—which is to say the astrological properties that can be associated with each geographical area. In his view, the former kind of research is of little practical use, whereas the latter in some way allows one to attain true knowledge, which is to say "foreknowledge of future events" (*ad praescientia futurorum*).

The 1508 edition instead left out Cecco d'Ascoli's commentary, which was nonetheless newly included in the 1518 editions, while adding two works that continued to be present in later editions: the *Compendium sphaerae* written by Robert Grosseteste and especially Pierre d'Ailly's *Quaestiones subtilissimae* on Sacrobosco's work. These *Quaestiones* are highly relevant and make up a very interesting text, touching upon some of the most widely debated issues in basic medieval astronomy: e.g. the number of heavenly spheres, the variation of the inclination of the ecliptic, and whether eccentric orbits and epicycles are necessary in order to 'save the appearances of planetary motions' (Chap. 2).

In the 1518 editions, the *Expositio* of the *Sphaera* attributed to Michael Scot and Campanus of Novara's (ca. 1220–1296) *Tractatus de sphaera* made their appearance. To these works was added, in 1531, the important commentary on Sacrobosco's work written by Prosdócimo de' Beldomandi (ca. 1370–1428): a distinguished reader of mathematics at the University of Padua in the early fifteenth century and hence a predecessor of, and possible source for, Capuano. We will see how both these authors drew upon the tradition of Pietro d'Abano's (ca. 1250–ca. 1315), albeit independently from one another.⁶

⁶Pietro d'Abano, who has traditionally been regarded as the founder of so-called Paduan Aristotelianism, will here be considered only in relation to his astronomical and astrological work *Lucidator dubitabilium astronomiae*. Along with the *Tractatus de motu octave spere*, this work would appear to have enjoyed rather limited circulation, chiefly at a local level. What were far better known were his *Conciliator differentiarum quae inter philosophos et medicos versantur* and commentary on the pseudo-Aristotelian *Problemata*. On the figure of Pietro d'Abano and his importance for the Paduan philosophical tradition, see (Marangon 1977). It should be mentioned that Pietro d'Abano is also credited with some magical works.

4 The Commentary on Sacrobosco's *Sphaera*: A Comparative Analysis of the Two Redactions of the Prologue

An analysis of Capuano's work allows us not just to compare two chronologically distant redactions of the same commentary but also to contextualize the textual changes made with reference to two clearly distinct readerships: on the one hand, the students in arts faculties; on the other, clerics belonging to a religious order that followed the rule of St Augustine. The former often learned astronomy as part of an educational programme that would eventually lead them to study medicine; the latter, who had no need for specific training in astronomy, apparently enjoyed a greater freedom of research, but de facto operated within a hierarchy of the various branches of learning that set specific limits to the scope of astronomical knowledge. We need only consider here the recurrent polemic against judicial astrology. In Capuano's university days, this significant branch of astronomy had harshly been criticized in the *Disputationes adversus astrologiam divinatricem*, composed by Giovanni Pico della Mirandola (1463–1494) in the years 1493–1494.⁷

What has just been stated emerges quite clearly from the two redactions of the prologue that opens the commentary. The text published in 1499 perfectly fits within an educational course based on the in-depth study of Aristotelian natural philosophy. The fundamental aspects of the logical-demonstrative thought at the basis of this philosophy are tacitly assumed, as they are approached separately as part of the same course of study. There is no need to prove the scientificity of astronomy: this is taken for granted, as is its place within the field of learning in general. Within this context, introducing actual exegetical practice is a secondary task, which in most cases takes the form of an almost rhetorical exercise.

In the first version of the prologue, the young layman Francesco Capuano only recalls what makes astrology a 'worthy' object of study. The *dignitas* and *utilitas* of the discipline are succinctly illustrated through a series of references that were to become standard. The first is to the opening section of Aristotle's *De anima*, where the philosopher sets out to explain how the greater or lesser dignity of a discipline

⁷Based on the assumption that the heavenly bodies exercise a crucial action, or influence, on terrestrial natural phenomena, astrologers would study the specific positions of the planets and constellations at a given time, or stretch of time, so as to then offer their 'judgement' with regard to future events in the lives of individuals or even peoples. The position of the heavenly bodies at the time of a person's birth, or conception, constituted the basis for individual 'horoscopes,' whereas more general 'forecasts' were chiefly based on the positions of the furthest planets, which is to say those that took longer to run their course. Commonly used in medicine, this branch of astronomy was regarded as an important aid to diagnostic and therapeutic practices. Medieval Christian philosophers always sought to limit the scope of astrology, which, when taken at face value, could lead to a form of determinism that threatened to undermine the Christian faith. The defence of human free will and the affirmation of the existence of 'contingent' events that man cannot foresee were among the key topics in the polemic against astrology. For an overview of these issues in relation to the Renaissance, see (Hübner 2014; Federici Vescovini 2014).

with respect to other disciplines may be determined in two ways: either on the basis of the importance and excellence of the object under investigation, or by reference to the degree of certainty of the demonstrations employed. The text strongly affirms that a kind of knowledge pertaining to ‘nobler’ objects is preferable, and this is once again proven by invoking the *auctoritas* of certain passages from *De coelo*, *Metaphysica* and *De partibus animalium*. It is better to know a little about ‘nobler’ things than to know a lot about ‘baser’ ones (Sacrobosco and Capuano 1499, sign. [c Ir]).

Given this maxim, Capuano only needed to justify the greater nobility of celestial bodies compared to all others natural bodies, which was not a difficult task for an author operating within an Aristotelian framework. Hence Capuano chose to focus on a passage from Averroes’ commentary on Book I of *De coelo* (comm. 22) which provided the required proof of nobility by emphasizing the mediating role of celestial bodies: connected not so much to the sublunary world, as to ‘the eternal incorporeal being,’ the circular motion of the heavens was regarded as that which ensured the action of the eternal principle in time.⁸ In the light of this passage, Capuano established a highly defined hierarchy of disciplines: astronomy lay above the natural sciences and mathematics, and just below theology.⁹ However, a different picture emerged when these disciplines were considered in relation to the degree of rigour marking the arguments used in related treatises: for according to this criterion, the highest degree of certainty was assigned to mathematical demonstrations and therefore—as Averroes himself had noted in his commentary on Book II of the *Metaphysics* (comm. 16)—astronomy could even be ranked above theology, and below mathematics alone (Aristotle and Averroes 1552, 17v). All these considerations combined definitely confirmed the nobility of astronomical knowledge.

If we instead move on to examine the second version of the prologue, which was produced several years later by the Lateran Canon Giovanni Battista Capuano, we note that the arguments made in the first redaction only serve as a brief introduction to some more extensive arguments developed according to the standard model of the medieval *quaestio*. The author asks himself: is astronomy a science? Is there a science of celestial bodies? If so, how should we rank astronomy vis-à-vis the other sciences? Finally, is astronomy a mathematical science?

⁸ (Aristotle and Averroes 1550, 9v): “...et innuit per hoc ligamenta inter generabilia et incorruptibilia, et corpus ingenerabile et incorruptibile, et ligamentum istius corporis cum ente aeterno non corporeo; necessarium est, enim, ut sit corpus ingenerabile et incorruptibile, quod nunquam in suo substantia transmutatur, nisi tantum in loco, ita quod ipso transmutato semper in loco remanente, substantia non cessat agere alias mutationes paedictas in corporibus, quae sunt sub ipso; et etiam non cessat generare recipientia ista necessarium est, enim, ut inter principia aeterna et res generabiles sit ens talis modi; et si non esset ita, impossibile esset quod a principis aeternis proveniret aliqua actio temporalis.”

⁹ (Sacrobosco and Capuano 1499, sign. [c Ir]): “Quinimmo omnium generabilium et corruptibilium causa ex omnium sententia philosophorum, corpus coeleste inter omnia corpora praestantissimum est, qua de re astronomia excellit et mathematicas scientias et naturales disciplinas, minime autem divinam.”

Clearly, these are all issues that had played a far from marginal role in philosophical reflection for the past two centuries, and which Capuano developed with due adroitness by constantly referring to some of the most important authors in the medieval philosophical tradition: Robert Grosseteste, Albertus Magnus (ca. 1200–1280), and especially Thomas Aquinas (1225–1274). The need for a preliminary enquiry on the scientific status of astronomy would appear to be directly related to the new role acquired by Capuano within his order. As the first person to introduce the teaching of science among the Lateran Canons, he needed to define the nature of astronomical knowledge as rigorously as possible. Hence his constant use of Aristotle's *Posterior Analytics*, the reference text for anyone investigating the structure of the kind of demonstrative reasoning used in mathematical sciences. At the same time, however, Capuano was also aware that it would be impossible for the Church to accept any epistemological positions that might be seen to promote astrological determinism. The second draft of the prologue may be regarded as a wide-ranging discussion of such issues: an attempt by Capuano to strike a balance between these two requirements by drawing upon the medieval philosophical tradition.

Here I will only provide a schematic overview of what is stated at the beginning of the first *quaestio* (is astronomy a science?) in order to clarify the nature of the important additions made to the second redaction of the prologue. Capuano presents four arguments that would lead us to deny astronomy its status as a science.

1. Capuano notes that in Book I of *De anima* Aristotle affirms the need to know 'accidents' in order to build any scientific knowledge. Connected to sense organs, this kind of knowledge can only be very limited in the case of astronomy, which makes use of sight alone, directing it towards exceedingly distant bodies. If we then add the fact that the 'heavens' are only known through the imagination, we can only deny the possibility of the existence of a science of celestial bodies (Sacrobosco and Capuano 1531, 58r).
2. The same conclusion can be reached by emphasizing the fact that astronomy assumes pieces of information that cannot directly be traced back to any sensory experience: for example, the existence of a movement of precession for the sphere of the fixed stars. No human being can observe such a movement, given that its perception requires an observer being at work for approximately a 100 years (Sacrobosco and Capuano 1531, 58r–v).
3. Getting back to the role of the knowledge of 'accidents' for the establishment of a science, Capuano notes that any form of knowledge exclusively based on them cannot be regarded as scientific. This idea is drawn directly from Aristotle's exposition in Book I of the *Posterior Analytics*. But is astronomy not the knowledge of the positions, movements, magnitudes and shapes of celestial bodies? These are all 'accidents;' hence, according to this premiss too, we would have to deny the possibility of an astronomical science (Sacrobosco and Capuano 1531, 58v).

4. Finally, again on the basis of the *Posterior Analytics* and of sacred theology, it is necessary to reject the claim to scientificity made for judicial astrology, an essential part of the discipline of astronomy. Theology proves the ‘non-binding’ nature of the action exerted by the heavenly bodies on the lower world; but, according to Aristotle, scientific demonstration (i.e. demonstrative syllogisms) must rest on necessary premises; hence, it is impossible to uphold the scientificity of this branch of astronomy (Sacrobosco and Capuano 1531, 58v).

As one would expect, Aristotle’s work served as the main source for the supposed arguments against the scientificity of astronomy, but it also contained all the elements that might be used to refute such arguments, and to establish astronomy as a ‘most noble science.’ It was here that Capuano brought into play the exegetical work of the aforementioned philosophers, who had often sought to solve the ‘apparent contradictions’ riddling Aristotle’s texts by identifying some additional distinctions.

As previously noted, one of the major innovations in this second redaction of the prologue is the widespread use of the *Posterior analytics*, which offered not just a complete general theory of mathematical demonstration, but also some important insights with regard to the so-called ‘sciences subordinate to mathematics.’ These included harmonics, optics, and astronomy. All these sciences studied particular natural phenomena on the basis of principles and demonstrations drawn from arithmetic and geometry. The mathematical disciplines were used to explain the cause of phenomena, to account for why they occurred, whereas it was left to the general science of *physics* to explain what they were.

In order to get an idea of the importance of the Aristotelian text, we can briefly consider the opening of Capuano’s argument. Just after listing all the authors championing the scientificity of astronomy, he begins his discussion by setting out from Robert Grosseteste’s commentary on the *Posterior Analytics*. According to our author, in his work the British philosopher has identified three different ways of knowing, from which three different types of science derive. One can know “*propriissime, proprie et minus proprie*.” In the first case, one possesses ‘*propter quid*’ knowledge, the kind of knowledge on which science rests according to its strictest definition, since it derives its conclusions from immediate and necessary causes. In the second type of knowledge, one approaches something unknown through something known in two different ways: by setting out from either a cause or an effect; this type encompasses both ‘*propter quid*’ demonstrations and ‘*quia*’ ones. Finally, the last type of knowledge includes both that which can be known via demonstration and what can be known without it. With respect to the latter, this type of knowledge may also be seen to include the knowledge of principles.¹⁰

¹⁰(Sacrobosco and Capuano 1531, 58v): “Quantum ad primum est sciendum quod cum a scientia denominetur scire, quot modis contingit scire, tot modus dicitur scientia, scire autem proprio modo contingit tripliciter, ut habetur a Linconiensi primo posteriorum, scilicet propriissime, proprie et minus proprie. Scire nanque propriissime est causam rei habere et quoniam illius est causa et non contingit aliter se habere, ut primo posteriorum; et tale scire dicitur propter quid. Scire autem

Clearly, this approach might offer some interesting perspectives for a reinterpretation of some of the astronomical examples presented in the *Posterior Analytics*. Let us think of the issue of the scintillation of the fixed stars compared to the planets, discussed in I,13. Here the Greek philosopher had stressed the crucial need to distinguish between ‘*propter quid*’ demonstrations and ‘*quia*’ ones, particularly when operating within the same science: for it is possible to reach a correct conclusion on the basis not of the first cause but rather of what is known better. Thus the syllogism inferring the proximity of the planets from their lack of scintillation might be valid, but it is a ‘*quia*’ demonstration, which is not to be confused with the ‘*propter quid*’ conclusion, according to which it is the proximity of the planets that is the cause of their lack of scintillation.¹¹

However, Capuano was not interested in exploring such cases in detail. Rather, he chose to embark on a lengthy and articulate discussion on the various forms of knowledge, starting from the distinction between practical and theoretical disciplines. The former depends on us and on our will, and can further be divided into active and factual disciplines—the latter dealing with what pertains to nature. Setting out from these initial distinctions, which have Book VI of Aristotle’s *Metaphysics* as their point of reference, Capuano briefly outlines first the so-called *artes mechanicae*, and then grammar, logic and rhetoric, and finally ethics, economics and politics. The sciences springing from nature are instead divided according to their degree of abstraction through a process that starts with natural philosophy, continues with mathematics, and ends with metaphysics (Sacrobosco and Capuano 1531, 58v–59r). The need to draw an exact distinction between astronomy and the natural sciences that emerges here is met within the framework of the notion of ‘subordinate science’ expounded in Book I of the *Posterior Analytics*. This is immediately connected to what Aristotle states in Book II of his *Physics*, where astron-

proprie est habere noticiam ignoti per aliquid notum sive illud sit causa sive effectus, et hoc scire est tam per demonstrationem propter quid quam quia. Scire vero minus proprie est cuiuscunque veritatis noticiam habere, vel per demonstrationem seu sine ea; et tale scire extenditur etiam ad cognitionem principiorum, quae accipitur sine discursu, primo et secundo posteriorum.”

¹¹ (Aristotle and Tredennick 1960, *An. Post.*, I, 13, 78a22–39): “Knowledge of a fact and knowledge of the reason for it differ when both fall under the same science, under several condition: (1) if the conclusion is not drawn from immediate premisses (for then the proximate cause is not contained in them, and knowledge of the reason depends upon the proximate cause); (2) if premisses are immediate, but is drawn not from the cause but from the more familiar of two convertible terms; for it may well be that of two reciprocally predicable terms that which is not the cause sometimes the more familiar, so that the demonstration will proceed by it; e.g. the proof that the planets are near because they do not twinkle. Let C stand for ‘planets’ B for ‘not twinkling,’ and C for ‘being near.’ Then it is true to state B of C; because the planets do not twinkle. But is also true to state A of B; because that which does not twinkle is near (this may have been assumed either by induction or through sense-perception). The A must apply to C; and so it has been proved that the planets are near. Thus this syllogism proves not the reason but the fact; for it is not because the planets do not twinkle that they are near, but because they are near that they do not twinkle.”

omy is regarded as an ‘intermediate science’ between natural philosophy and mathematics.¹²

At first sight, this might seem like one of the many treatments of the subject that were circulating in the Middle Ages. However, here and there in the text a more unusual source emerges, first in between the lines, and then explicitly in a rather lengthy passage. The source in question is Pietro d’Abano’s *Lucidator dubitabilium astronomiae*, a work composed between 1303 and 1310 but only published in 1988 by Graziella Federici Vescovini. Up until now, the text has only been known in three manuscript copies from the Bibliothèque Nationale in Paris (lat. 2598), the Bibliothèque Universitaire de la Sorbone (lat. 581), and the Vatican Library (Pal. Lat. 1171) (Pietro d’Abano 1988, 44–47). A fourth copy had been preserved by manuscript lat. VI, 156 (2672) of the Biblioteca Marciana in Venice, but was at some stage removed from the codex. This last manuscript would have been the most important one for us, since it came from the library of San Giovanni in Verdara and hence must have been used by Capuano himself (Pietro d’Abano 1988, 47–48).¹³

The passages invoked in the prologue chiefly concern astrology and come from the *differentia prima* of the *Lucidator*, where Pietro d’Abano discusses precisely the question of the scientific status of astronomy–astrology. Is astrology, with everything it entails, a science? “An astrologia sit scientia cum eius appenditiis” is the question Pietro addresses—and it must be noted that throughout the introductory section of this *differentia* the terms ‘astrology’ and ‘astronomy’ are perfectly interchangeable. It is therefore with an explicitly critical intent that Pietro d’Abano mentions the position of those who infer the existence of two separate disciplines from the use of the two terms. Reason and etymology instead prove this distinction to be untenable. What we have is a single ‘science,’ whether it theoretically discusses planetary motions or operatively seeks to predict the ‘effects’ of these motions within the sublunary realm:

¹²(Sacrobosco and Capuano 1531, 59r): “Secundum notandum est quod astrologia [i.e. astronomia] est scientia tractans de corporibus coelestibus partibus eorum et passionibus, et quia corpora coelestia sunt naturalia, ex quo meventur per se, id est non secundum accidens (secundo physicorum, textus 3) sequitur quod circa eadem corpora versatur physicus et astrologus [astronomus], quare patet cum astrologia [astronomia] accipiat considerationem vel subiectum a naturali, quod ei subalternata (primo posteriorum), quod intelligit Aristoteles (secundo physicorum, textus 19) quando astronomiam dicit esse mediam inter naturalem et mathematicam.”

¹³One might posit here an indirect knowledge of Pietro d’Abano’s text, possibly via the work of Prodocimo de’ Beldomandi, the author of a commentary on the *Sphaera* that Capuano is likely to have been familiar with. However, the two quotes from Pietro d’Abano featured in Prodocimo’s work derive: 1) from the *Conciliator* (Sacrobosco and Capuano 1531, 7b; 2) from the *Tractatus de motu octave spere* (Sacrobosco and Capuano 1531, 11a). On the latter work, see G. Vescovini’s edition in (Pietro d’Abano 1988, 347–65). In the light of this, it is possible to infer that Capuano directly drew upon the *Lucidator*.

(*Lucidator*, 108,21–109,9) Propter primum sciendum **quod** quidam assignarunt differentiam inter astronomiam et astrologiam dicentes astronomiam fore illam que partem motus pertractat; astrologia autem que iudicia instruit.

Sed illud neque **ratio** construit, aut multorum usus persuadet: cum astronomia dicatur ab “astro” et “nomos,” lex. Astrologia vero a “**logos**,” **ratio**, **sermo**, vel logia, **locutio**, hoc autem indifferentia: similiter alterutrumque inuenio in alterutra eius partem utramque proferri.

Est autem ea scientia quantitatum et motuum celestium corporum in se ac eorum effectibus universaliter considerata. Ipsa enim metitur magnitudines celestes et ipsarum distantias, coniunctiones et figuras earumdem pertractans, motusque ipsarum coniecturans universales et singulares cuiuslibet astri, que scientia solet “de motibus”... appellari: que ipsius est ut theoricata, eo quod dicebatur quantitatum. Et reliqua applicatur etiam huius ad hec inferiora precise impressiones consequentes attendendo: que scientia iudicialis nominatur ex causis, velut practica.

(Capuano, *Prologus*, Venezia 1531, 60r) Nota etiam quod aliqui ponunt differentiam inter theoreticam et practicam non solo quae dicta est, sed etiam in nomine, nominantes theoreticam quae est de motibus coelorum velocitate quantitate sphaerarum distantia situ aliisque passionibus eorum; astronomia ab astro et nomos quod est lex. Practica vero quae est de iudiciis causatis in his inferioribus, astrologia ab astro et logos quod est ratio sermo vel locutio.

Pietro d’Abano, therefore, disagrees with those who draw a clear-cut distinction between astronomy and astrology, regarding the former as a discipline devoted to the study of planetary motions and the latter as one focusing on the formulation of horoscopes and forecasts. From an etymological and terminological standpoint, this distinction is unfounded.¹⁴ In Pietro’s view it would be more correct to affirm the existence of a single science devoted to the study both of the motions of heavenly bodies and of their universal effects. No doubt, there is a mathematical side to this astronomy-astrology, which focuses on all the quantitative aspects of such ‘motions.’ This might be described as ‘theory,’ yet it can in no way be separated from the ‘practice,’ insofar as it is precisely on the basis of the results attained by the former that the latter is capable of foreseeing the consequences of celestial influences in the sublunary world.

It is evident that the medieval author’s text has not just been substantially abridged, but also weakened in a way. Capuano downplays the author’s staunch affirmation of the scientificity of judicial astrology, and would appear to stress the differences between the two branches of astronomy-astrology rather than their similarities—to the point of depriving etymological considerations of all probative force (Chap. 3). Be that as it may, Capuano also holds that judicial astrology is a knowledge worth pursuing, or even one necessary to practise medicine. Indeed, with regard to this point he fully agrees with Pietro d’Abano and the *auctoritates* he quotes, all of whom affirm that it is necessary for physicians to know astrology, for else they would be incapable of establishing the most suitable days for taking

¹⁴This part of Pietro d’Abano’s argument falls within a debate that was first launched in the West by Isidore of Seville’s *Etymologiae* (III,27), which sought to establish the essential difference between ‘astronomia’ and ‘astrologia.’

certain medications (Haly Abbas), or might even harm their patients—for instance, by executing a phlebotomy on a certain part of the body just when the moon finds itself in the corresponding sign (*Centiloquium*).¹⁵

(*Lucidator*, 130,25–131,6) Laudat [Galenus] etiam non parum astronomiam in libro *De pronosticatione* secundum lunam sibi ascripto; ita cuiusmodi medicus est, qui astrologiam ignorat, nullus debet se in eius manus ponere....

Unde Haly Abbas, *Theorice* primo “eget quoque medicus astrologia, qua medicamentibus electis utitur et temporibus, quibus luna est, beatis et felicibus, temperata planetis et sub competentibus figuris.” Quare in *Centiloquio*: si quis purgatorium sumpserit luna existente cum Iove, operationis ipsius minuetur effectus, atque tangere ferro luna stante in illius membri signo horribile.

(Capuano, *Prologus*, Venezia 1531, 60v) Ideo consulit Galenus in libro *De pronosticis*: “Ut nullus se confidat in manus medici astrologiam ignorantis.” Unde Haliabas “astrologia eget medicus, qua medicationibus utatur temporis letis, quibus luna beatis et foelicibus temperata planetis, et sub competentibus figuris.” Et Ptolomeus in *Centiloquio* declarat quam parum prosint medicamina temporibus incongruis exhibita, si quis purgatorium sumserit luna existente cum Iove, ipsius minuetur effectus, et per contrarium quam periculosum operari in corpore humano luna statu et situ non considerato “Tangere, inquit ibidem, membrum ferro luna existente in illius membro signo horribile.”

The choice of an author so openly endorsing astrological knowledge might have caused quite a few problems to a man of the Church. This would have been especially true if *differentia 1* of the *Lucidator* had been taken into account, as here a close connection is drawn between astrology and a whole range of magical practices that had already been condemned. While in the first quote Capuano had altered the nature of the text from his source, and while in the second quote he had somehow conformed to a common sensibility, the need remained for him to clearly establish the limits of this kind of knowledge. Some questions were unavoidable. What level of scientificity does judicial astrology possess? How compelling are its conclusions? Capuano answered these questions at the end of his *quaestio*, where he picked up the fourth argument developed against astrology. The ‘non-binding’ nature of the action of celestial bodies upon the lower world established by theology seemed to deny the possibility of astrology as defined by Aristotle in the *Posterior Analytics*. How could this impasse be solved?

One interesting insight could be found in Aquinas, who in article 5 of *Quaestio* 95 (part two, section two) of his *Summa Theologiae* had addressed the question of the legitimacy of astral divination. Here the question had been addressed chiefly by investigating the nature of the cause-effect relation and emphasizing the existence of ‘effects’ that escape heavenly causation: first of all, what occurs by accident, and

¹⁵Pietro d’Abano also discusses these issues in *differentia 1* (*Utrum medico sit necessarium alias scire speculationis scientias necne*) of the *Conciliator*, where he enquires whether a physician needs to be familiar with other forms of scientific knowledge.

then, even more notably, acts that derive from the exercising of free will.¹⁶ However, this was not the path that Capuano chose to follow in order to answer the above-mentioned questions. Rather than focusing on the nature of the ‘effects,’ he turned his attention to the nature of the ‘causes,’ investigating in what way astrological predictions can be said to entail ‘necessity.’ In order to do so, he resorted to the concepts of ‘partial cause’ and ‘conditional necessity,’ ideas widely deployed in the theological field, at times precisely against the claim that astrology can predict the future.¹⁷ Arguably the most relevant point of reference here was once again Aquinas, who in article 6 of Quaestio 115 in the first part of the *Summa* had investigated precisely how the ‘necessity’ of the causation brought about by heavenly bodies was to be understood. Aquinas had noted that heavenly bodies cannot act on lower things, if not through the causes proper to the latter, and that, analogously, the disposition of matter, the distance from the place of the action and other possible conditions can prevent the achievement of an ‘effect.’¹⁸

I will not carry this enquiry any further, because I believe that what has been argued so far is enough to show the considerable importance of the issues discussed in this new redaction of the prologue. I will only focus on the example of the transformation of the text provided by the two passages drawn from Pietro d’Abano’s *Lucidator*. It is worth recalling that Capuano did not develop an interest in this work by Pietro d’Abano within the context of any cultural and religious battle against astrology. After becoming a man of the cloth, Capuano found himself adopting a more nuanced stance with regard to this form of knowledge. The availability of the *Lucidator*, a text composed by one of the most distinguished representatives of the University of Padua, simply offered him a great opportunity to further enrich the

¹⁶(Aquinas 1947): “Now two kinds of effects escape the causality of heavenly bodies. In the first place all effects that occur accidentally, whether in human affairs or in the natural order.... In the second place, acts of the free-will, which is the faculty of will and reason, escape the causality of heavenly bodies.” <https://dhsprpriory.org/thomas/summa/SS/SS095.html#SSQ95A5THEP1>. Accessed June 2019.

¹⁷(Sacrobosco and Capuano 1531, 61r): “Ad quartum de effectibus provenientibus a motibus coelorum talem habemus scientiam, qualiter ab eis dependent; dependent autem ab eis non tanquam a causa totali sed partiali et..., dependet etiam a causis suis particularibus, praecipue materia, qua diversimode disposita possunt effectus illi impediri, ideo non sunt necessarii, ideo pronosticantur non necessarii. Unde qualis necessitas est in eis, taliter etiam scintur, est nanque necessitas conditionata, quare et scientia conditionata, et conditionaliter etiam praedici debent.” Duplices autem effectus subtrahuntur causalitati caelestium corporum. Primo quidem, omnes effectus per accidens contingentes, sive in rebus humanis sive in rebus naturalibus....Secundo autem, subtrahuntur causalitati caelestium corporum actus liberi arbitrii, quod est facultas voluntatis et rationis.”

¹⁸(Aquinas 1947): “The heavenly bodies are causes of effects that take place here below, through the means of particular inferior causes, which can fail in their effects in the minority of cases. The power of a heavenly body is not infinite. Wherefore it requires a determinate disposition in matter, both as to local distance and as to other conditions, in order to produce its effect. Therefore as local distance hinders the effect of a heavenly body (for the sun has not the same effect in heat in Dacia as in Ethiopia); so the grossness of matter, its low or high temperature or other such disposition, can hinder the effect of a heavenly body.” <https://dhsprpriory.org/thomas/summa/FP/FP115.html#FPQ115A3THEP1>. Accessed June 2019.

traditional discussion on the scientific status of astrology. Pietro d'Abano's work, however, also constituted a potential danger for its readers. For it not only affirmed the 'scientificity' of astrology in no ambiguous terms, but also offered a statement of 'faith' in the magical sciences. It seems most likely, therefore, that access to this book was carefully restricted.

To bring this brief analysis of the two prologues to a close, it may be argued that they provided a general outline of the kind of knowledge expounded in Sacrobosco's *Sphaera*. Their different approach, length and structure show that they were tailored to the needs and knowledge of the final readers of Capuano's commentary. Liberal arts students in early sixteenth century Padua simply needed to be able to correctly define the place of Sacrobosco's work within the conceptual framework of Aristotelian natural philosophy. The clerics from the Convent of San Giovanni in Verdara instead set out from different assumptions: what they needed was a preliminary definition of the scientific status of astronomy–astrology, an issue which was directly connected to that of the place of this discipline within the more general sphere of learning. This was a hierarchically ordered sphere, in which theology strictly limited the field of application of astrological prognostication, without excluding it completely from the field of knowledge. Once duly stripped of any claim to be 'binding,' astrological forecasts remained valuable; at times, as in the case of medicine, for instance, they could even be regarded as indispensable tools for correctly exercising activities of the utmost importance.

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